AGE AT NATURAL MENOPAUSE AND MENDOPAUSAL SYMPTOMS AMONG
SAUDI ARABIAN WOMEN IN AL-KHOBAR

DISSERTATION

Presented in Partial Fulfillment of the Requirements
for the Degree Doctor of Philosophy in the Graduate
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By

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Menopause is a physiological event, experienced as a long process of climacteric change (transitional phase that is immediately prior to and after menopause, when clinical, biological, and endocrinological symptoms of menstrual cessation commence), occurring universally in all women who reach midlife. The timing of menopause as well as women’s experience of menopausal symptoms varies between populations and within populations. Age of menopause and climacteric symptoms have been extensively studied in the developed world as well as in developing countries; but there have been few systematic studies of menopause in Arab countries.

The current study was conducted in 2003 among Saudi Arabian women in the city of Al-Khobar in the East of Saudi Arabia. Biocultural and lifespan perspectives were used to assess age at natural menopause and the prevalence of menopausal symptoms. This study examines the ways in which biological, sociodemographic, and cultural factors determine age at natural menopause. The objectives of the study are (1) to assess the mean and median age at natural menopause; (2) to detect factors that might contribute significantly to a more rapid decline in ovarian function experienced among Saudi Arabian women; (3) to determine the factors that significantly affect the prevalence of menopausal symptoms that Saudi Arabian women’s experience; and (4) to assess the relationship between women’s perceptions and attitudes toward the menopausal event
and the menopausal symptoms that women experience. This study also examines the differences in women’s attitudes toward menopause, depending on whether these women were experiencing, or had already experienced natural menopause.

In this cross-sectional study, a face-to-face questionnaire was administrated to 200 Bedouin and Hadar Saudi Arabian women, most of whom are housewives and members in women’s organizations and school staffs. The median age of the sample ranged from 40 to 55 years. The mean age at natural menopause among these Saudi Arabian women was 48.06 years and the median age was 49 years.

The findings of this study indicated that while age at natural menopause varied within and among the menopausal factors (anthropometric measures, sociodemographic status, reproductive history, and lifestyle); the only factors that were significantly associated with age at natural menopause were women’s weight, marital status, and employment status. The findings also indicated that the respondents’ marital status and number of children were significantly associated with the prevalence of menopausal symptoms among the Saudi women. Women’s attitudes toward menopause varied based on their menstrual status and ethnicity. Premenopausal women tended to have more negative attitudes toward menopause than perimenopausal and postmenopausal women. Hadar women in general tended to be more optimistic and possessed more positive attitudes toward menopause than did Bedouin women. Moreover, there was a significant association between the respondents’ total menopausal symptoms reported and their attitudes toward the menopausal event and the women’s educational level. This study revealed that age at natural menopause and menopausal symptoms are determined by the interactions among ecological, cultural, and biological factors.
Dedicated to my husband and my daughter,
Khaled and Hussah Al-Ammar,
to my parents,
Meshari Al-Sejari and Shaikah Al-Nassar,
to my brothers,
Meshal and Abduallah Al-Sejari,
and to my sisters,
Marcell Anthony and Nasmah Bastaki
for all their love and support.
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CHAPTER 1

INTRODUCTION

Menopause is an evolutionary puzzle since an early end to reproduction seems contrary to maximizing Darwinian fitness. Human females spend about one third of their lives postreproductive, a trait that appears to be shared only by the short-finned pilot whale (Austad 1994). Menopause is a physiological process, which takes place universally in all women who reach midlife. It is an important event that occurs within a long process of menopausal change, “the period immediately prior to menopause (when the endocrinological, biological, and clinical features of approaching menopause commence) and at least the first year after the menopause” (WHO 1980: 10), in which women move from the reproductive to the postreproductive phase of life as a part of the aging process (Eskin 1980; Holte and Mikkelsen 1982; Kaufert 1990; Leidy 1994; Lock 1986; MacPherson 1990).

The scientific meaning of menopause is “the last menstruation” and usually the median age at menopause is 45 to 55 years. According to the World Health Organization (WHO) meeting in Geneva in 1980, the scientific group defined natural menopause as no menses for 12 consecutive months with no obvious intervening cause, such as pregnancy, lactation, exogenous hormone use, dietary deficiencies, or surgical removal of the uterus or ovaries (WHO 1982). Menopause is described as an outcome event of loss of ovarian
follicular activity that is characterized biologically by decline in fertility, endocrinologically by alteration of both gonadotrophin and steroid hormone levels, and clinically by variation in menstrual cycle length and experience of a variety of symptoms.

1.1 Statement of the Problem

Recently, the study of menopause has received much attention because of the increased life expectancy of women and the subsequent postmenopausal manifestations associated with either estrogen deficiency, such as cardiovascular disease and osteoporosis, or estrogen dominance, such as breast cancer and endometrial cancer (Hidayet et al. 1999). According to Hidayet et al. (1999), 60% of women in developing countries were identified as postmenopausal in 1990 compared to 40% postmenopausal women who lived in industrialized countries. Both Hidayet et al. (1999) and Ozdemir and Col (2004) predicted that by 2030, the frequency of the world’s population of postmenopausal women is expected to increase to 1.2 billion. This therefore draws attention to the need to conduct more studies on the menopausal experiences of women living in developing countries, because women spend about one-third of their lives in the postmenopausal period when their life expectancy at birth is about 71 years and higher in developing and developed countries (www.census.gov).

The age at menopause has been studied in the industrialized countries, but there have been few systematic studies of menopause in Arab countries (Al-Qattan and Alexander 1996; Bener et al. 1998; Obermeyer 1999; Rizk et al. 1998). In this study, chapter four will discuss many finding of studies that have investigated the relationship between the age of natural menopause and the age of menarche, menstrual cycle length, parity, oral contraceptive use, cigarette smoking, genetic factors, race, and obesity
(Daniell 1978; Goodman 1980; Harlow et al. 2000; Hill 1982; Leidy 1996; McKinlay et al. 1985; Midgette and Baron 1990; Sievert et al. 2001). Psychological and sociodemographic factors also have been investigated, such as depression, education, marital status, and urban/rural living environment that may also contribute to early menopause (Beyene 1986; Luoto et al. 1994; Malacara 2002). Most studies have found the median age of menopause to be between 49 and 51 years in Western industrialized countries and between 46 and 48 years in developing countries (Gosden 1987; Holte 1992; Hunter 1992; Moore 1981; Sievert et al. 2001; Thomas et al. 2001; Varea et al. 2000; Whelan et al. 1990).

Menopause is experienced as a process by individual women. For example, the physiological transition from reproductive to postreproductive life is associated with a decline in estrogen levels. Over time, this decline may be experienced as a change in skin elasticity, altered cognitive abilities, lengthened or shortened menstrual pattern, or discomforts such as vaginal dryness, night sweats, and hot flashes. Cross-cultural comparisons have revealed diversity in symptom experiences and the meanings of menopause. For instance, in Turkey, muscle-joint-bone pain was the symptom most often associated with menopause (Seckin Neslihan et al. 1998), whereas in Japan, shoulder stiffness, ringing in the ears, and a heavy feeling in the head were commonly associated with the menopausal transition (Kaufert and Lock 1998; Lock and Kaufert 2001). And in the United Arab Emirates, hot flashes were considered as the most common menopausal symptomatology that occurred in 45% of the women studied, followed by urinary incontinence (30%) (Rizk et al. 1998).
According to Agoestina and Van Keep (1984), Boulet (1994), Davis (1986), Lock (1986), Martin et al. (1993), Obermeyer (2001) and Wasti (1993), women living in North America and Europe fare significantly worse with the menopausal transition and define menopause as signifying the end of menstruation; they usually consider it a difficult time. Particular symptoms such as hot flashes and night sweats are frequently reported among Western women and are not mentioned among Eastern women. Recent studies, which include Asian and African populations, show that Eastern women usually develop positive attitudes toward the incidence of menopause and they define it as another stage of their life (Dennerstein et al. 1996; Moore 1981; Sharma and Saxena 1981; Thompson et al. 1973). The most commonly reported symptoms among Japanese women are somatic ones such as shoulder and back pain, and neither the Chinese nor the Japanese language has an expression equivalent to “hot flash” (Lock 1994; Nagata 1998). And the most currently reported symptoms for perimenopausal Indian women are psychosomatic symptoms such as tiredness and headaches (Sharma and Saxena 1981). Hill (1993: 82) defines senescence as “a progressive increase in age-specific mortality even when conditions for survival are ideal.” Menopause is fundamentally distinct from reproductive senescence. Technically, menopause refers to the permanent cessation of menstruation and menstrual cycles that occurs in women who are usually around the age of 50, while reproductive senescence refers to the decline in the reproductive system that is one aspect of the general degenerative aging processes in vertebrates. Reproductive senescence includes gonadal changes, loss of secondary sexual characteristics, cessation of ovarian cycles, and a decrease in fertility (Crews and Garruto 1994; Kirkwood 1998; Pavelka and Fedigan 1991; Shanley and Kirkwood 2001; Williams 1957).
1.2 Significance of the Study

Findings from this study may reveal symptoms which are not recognized as part of the menopausal complex in Western biomedical literatures. Such information can transform how menopausal symptoms are recognized and treated in Middle Eastern countries. Furthermore, there are few anthropological studies on menopause in Saudi Arabian women that demonstrate the importance and necessity of recognizing Saudi Arabian women as complex biological and social beings who exist within a cultural context.

1.3 Theoretical Framework

1.3.1 Lifespan Perspective

According to the lifespan perspective, the event of menopause cannot be separated from ongoing life. Menopause follows years of exposure to infectious disease, childbearing, changes in marital status, smoking habits, and fluctuation in nutritional status (Leidy 1994). Kaufert (1996) stated that women’s health at menopause is determined by their cultural attitudes towards health, disease, and medical treatments, their reproductive histories, the environmental conditions under which they were born and lived, their exposure to disease, the quality and availability of diet, the expenditure of physical energies that depend on their labor, and their access to health care. Leidy (1994) argues that family history influences the range of variation in age at menopause and in reported symptoms. A mother’s lifestyle and activity during pregnancy affects the ovarian store her daughter possesses at birth, because the number of oocytes that a daughter possesses at birth and/or rate of atresia are genetically determined.
Gosden (1985) stated that the onset of menopause is determined by two factors: the number of eggs formed in the female ovary during the fetal period of development and the rate of loss of those same eggs across the lifespan through the process of ovulation and degenerative atresia. Thus the lifespan perspective views menopause as an outcome of many intrinsic (biological/genetic) and extrinsic (environment, diet, population density, culture, and society) factors (Ballinger 1985; Bart 1978; Bell 1990; Beyenne1989; Dennerstein 1978; Finch 1995; Gray 1976; Jaszmann 1976; MacPherson 1983; McKinlay 1974; Notelovitz 1988; Sarrel and Whitehead 1985; Utian 1980; Voda 1982; Wood et al. 1994).

1.3.2 Biocultural Perspective

According to the biocultural perspective, although menopause is defined as a biological event, the experience of this biological event is shaped by physiological and cultural factors (Abe and Moritsuka 1986; Beyene1986; Dowty et al. 1970; Flint and Samil 1990; Frey 1981; George 1988; Griffin 1977; Kaufert et al. 1981; Look et al. 1988; Malacara et al. 2002; Maox et al. 1970; Parlee 1976; Skultans 1970; Weideger 1976). Eastern women conceptualize menopause as a natural process and view this life stage more positively than their Western counterparts. The differences in attitude between Eastern and Western women can be attributed more to cultural factors than to biological factors. Based on the above research, menopausal women from Asia experience less menopausal symptoms because their social status is raised in older age—i.e., older women in the family are respected as wise matriarchs. They therefore develop positive attitudes toward the incidence of menopause. This is unlike the experience of European and North American women who report more menopausal symptoms and visit health
practitioners more frequently. In their experience, the social status of older women in the West declines with age. Therefore, they lose their self-confidence and feel emotionally vulnerable.

According to Lock (1986), menopause is of biological and sociocultural significance; culture provides the arena where values, attitudes, and beliefs about mid-life are transmitted and where the woman attaches meaning to her experiences (Lock 1991: 272) points out that: “Any effort to divorce biology of the menopause from the meanings, both ideological and individual, that are attributed to the associated social transition are, in clinical circumstances at least, inherently fraught with danger.”

1.4 Objectives of the Study and Research Questions

The main objectives of this study are (1) to assess the mean and median age at natural menopause; (2) to detect factors such as reproductive history, daily lifestyle, dietary habit, socioeconomic status, and health, all of which might contribute to a more rapid decline in ovarian function (i.e., earlier age at menopause), and to ascertain whether these factors are the same or different cross culture; (3) to determine the factors that significantly affect the prevalence of menopausal symptoms that Saudi Arabian women experience; and (4) to assess the relationship between women’s perceptions and attitudes toward the menopausal event and the menopausal symptoms women experience.

Based on these objectives, the study employed the following research questions.

1. Are the mean and median ages at natural menopause among Saudi Arabian women who live in Al-Khobar comparable to the findings of previous cross-cultural studies?
2. Is there a relationship between respondents’ reproductive history, daily lifestyle, dietary habit, socioeconomic status, and health and their ages at natural menopause?

3. Are the symptoms at natural menopause among Saudi Arabian women who live in Al-Khobar comparable to the findings of previous cross-cultural studies?

4. Is there a relationship between respondents’ reproductive history, daily lifestyle, dietary habit, socioeconomic status, and health and the symptoms they experience during the menopausal event?

5. How do women’s perceptions and attitudes toward the menopausal event affect the menopausal symptoms women experience?

6. Are menopausal symptoms that were reported by Saudi Arabian women in my study different or similar to the prevalence of menopausal symptoms among Western women?

1.5 Methods

The research was conducted between June and September 2003 in Al-Khobar, Kingdom of Saudi Arabia. The unit of analysis was 200 Saudi Arabian premenopausal, perimenopausal, and postmenopausal women who live in Al-Khobar and belong to different ethnic backgrounds, different lifestyles, and various socioeconomic statuses. The research is a cross-sectional analysis based on a confidential survey, part of which took place in the Al-Damam Mall as well as in the Al-Naafa Beauty salon. The survey was distributed randomly across women whose median age is between 40 and 55 years.
Also, the snowball sampling technique was used in the women’s homes and in the Lamezon coffee shop.

The empirical data was collected based on a face-to-face administrated questionnaire that took approximately thirty minutes with each participant. The questionnaire was focused on the participant’s health, reproduction history, menopausal symptoms frequencies, daily lifestyle, and the women’s attitudes toward the menopausal event.

1.6 Basic Assumptions of the Study

I assumed that the findings in this study would reveal differences between Saudi women’s reported age at menopause and the prevalence of their menopausal symptoms based on both biocultural and lifespan perspectives. Since the two perspectives portray the menopausal event as an outcome of the interaction among biocultural factors, women’s anthropometric measurements (height, weight, and body mass index), sociodemographic status (ethnicity, marital status, education, occupation, and family’s annual income), reproductive history (age at menarche, past cycle length, parity, number of miscarriages, age at last birth, use of contraceptive, contraceptive types, and duration of contraceptive use), and lifestyle (smoking habit, exercise pattern, and exercise types) are all determinants that can contribute to the variations in menopausal symptoms and reported age at natural menopause.

I chose the previous factors to determine Saudi women’s age at menopause based on my assumption that there would be an integration of Faddy’s (1992) oocyte depletion hypothesis and Saudi culture. Faddy hypothesized that the cause of individual difference in age at natural menopause is due to individual variation in the number of ovarian
folicles formed during the fetus’ developmental period and difference in the rate of oocyte depletion or deterioration across a female’s lifespan due to ovulation or the process of atresia. According to this hypothesis, less ovulation either by higher parity, lactation, or oral contraceptive use could save ova and thus could explain a delay in a woman’s menopausal age, whereas smoking or chemotherapy would damage the number of viable oocytes and/or increase the degradation of estrogens, thereby lowering the age at menopause.

I expected that culture would also play a major role in determining age at natural menopause and the prevalence of menopausal symptoms. Saudi Arabia is a conservative society and Islam for Saudi citizens is not an abstract idea but an idea one that is put into practice. Consequently, there are many restrictions on women’s behavior in Saudi society that might affect their health and hormonal fluctuations which might determine their age at natural menopause and the prevalence of their menopausal symptoms.

I assumed that Saudi women’s mean age at menopause and the occurrence of their menopausal symptoms vary among women based on the women’s marital status, anthropometric measurements, and attitudes toward menopause.

I predicted that there would be a relationship between the Saudi Arabian women’s marital status and the occurrence of their menopausal symptoms and reported age at menopause, because sexual relationship between men and women before marriage is prohibited in Islam. This means that only married women use birth control methods, experience miscarriages, and become pregnant. According to Faddy’s (1992) oocyte depletion hypothesis, the years of amenorrhea during pregnancy and breastfeeding are associated with later age at menopause, because of less follicular exhaustion during the
months of amenorrhea. Moreover, I assumed that oral contraceptive use would have a
direct effect on gonadotrophin concentration, which in turn affects the follicular depletion
rate, which accelerates or delays the age at natural menopause.

Saudi women’s anthropometric measurements (weight, height, and body mass
index) can be assumed to determine Saudi women’s age at natural menopause and the
occurrence of their menopausal symptoms based on Golub’s (1992) findings that showed
a positive correlation between both types of estrogen (estrone and estradiol) and
postmenopausal women’s weight. Adrenal androgens in adipose tissue are converted to
estrone (a weak estrogen); estrone is further converted into estradiol by the liver; and
since estrogen deficiency is assumed to trigger vasomotor symptoms, heavier women are
expected to report lower prevalence of vasomotor symptoms (Golub 1992).

I assumed that many Saudi women have positive attitudes toward the menopausal
event and consider it a natural transition and therefore that they would report fewer
symptoms than would Western women. Also I expected that there would be differences
between Hadar and Bedouin women in reporting the incidence of menopausal symptoms
based on their weight, physical activity, education, and employment status, because
Hadar women generally are more acculturated to the Western values of youth and
femininity, are more knowledgeable about the menopausal event and the health problems
that are commonly associated with this event, and generally have negative attitudes
toward menopause. In contrast, I predicted that Bedouin women would have positive
attitudes toward menopause, because wisdom and respect are highly valued than youth
and femininity. Since most Bedouin women are housewives, who devote their lives to
taking care of their family and are highly integrated in kin networks, I assumed that they would report having fewer menopausal symptoms, being too busy to notice them.

1.7 Limitations of the Study

According to Central Limit Theorem, the assumption that “samples are independently drawn from normal populations, but … with sufficient sample size ($N_1 > 50 > N_2 > 50$), the sampling distribution of the differences between means will be approximately normal, even if the original populations are not normal” (Frankfort-Nachmias and Leon-Guerrero 2002: 479), my study sample size (44 Saudi women reached menopause) might not be sufficient to establish a statistically significant association between the study variables, even though the associations between menopausal factors in this study and the average age at menopause and menopausal symptoms were different among Saudi women. Thus, according to the Central Limit Theorem, due to my sample size, my study findings might not be reliable to test the differences between the means of the two samples (my study sample and the population of Saudi women). Furthermore, age at natural menopause that the Saudi women reported may be subject to recall bias, due to the fact that some of the women did not have a birth certificate and only guessed their age.
CHAPTER 2

CONTEXT

This chapter provides background on Saudi Arabian culture, including the people, language, religion, social class, family, women, attitudes toward medical treatment, and education, as well as on the city of Al-Khobar, where I conducted my research. The chapter is intended to contextualize the Saudi Arabian women’s experience of menopause. Knowing their cultural, social, economic, religious and educational background will help to understand the effect of the factors on women’s attitudes toward, and experience of the incidence of menopause.

2.1 Geography

Saudi Arabia is the only country in the world named after its founder and ruler. The name in Arabic is “Almamlakah Alarabia Al-Saudia,” which literally means “the Arabian Kingdom of the House of Saud.” The Kingdom is bounded on the north by Jordan, Iraq, and Kuwait; on the east by the Arabian Gulf, Qatar, United Arab Emirates; and in the east by Sultanate of Oman. To the west, it is bounded by the Red Sea, and to the south by Yemen. The total area of the Kingdom is 900,000 square miles, which is slightly less than one-third the size of the United States. Saudi Arabia is divided into four main geographical divisions, which do not in every case correspond to political divisions:
Nejd “(highland”), high country in the heart of Saudi Arabia; al-Hijaz (“highland”), an elongated shelf region along the upper Red Sea coast; Asir (“difficult area”), in the southern Red Sea-Yemen border area; Al-Hasa (“sand ground with water”), or Eastern Province, the sandy and stony eastern part of the country (Vassiliev 2000).

2.2 Political History

The existence of Saudi Arabia as a political entity dates back to 1774. In that year, the head of the House of Saud, the present Royal family, formed an alliance with Mohammad Ibn Abdul Wahab, founder of an Islamic reform movement called “Wahhabism.” The message of Wahhabism calls for a return to classic Islam, for strict obedience to Shari’ah (Islamic law), and for the establishment of the Ummah (a community that seriously follows the law of Islam). Saudi Arabia is one of the few states to use the Qur’an as its constitution. The Kingdom’s political system is Islam. Saudi leadership has the special status in the Muslim world as the guardian of the two holy cities of Makkah and Medina (Gale 2003; Pompea 2002). The estimated population based on CIA estimate in July 1997 was 20.1 million including 5.2 million foreign nationals residing in Saudi Arabia. The estimated population growth rate is 3.42 percent.

2.3 Climate

Saudi Arabia has a harsh, hot climate that one associates with a desert area. There are variations among the regions. In the interior, the lack of humidity causes daytime temperatures to rise to as high as 54 degrees C (130 degrees F) or more. The same lack of humidity also causes temperatures to drop after the sun goes down to 20 degrees C (70 degrees F) in less than three hours. Subfreezing temperatures are common in the winter (Long 1997).
2.4 People

Arabs throughout the Middle East consider Arabia as their ancestral home and the origin of the Arab “race.” The majority of Saudi Arabians have descended from indigenous Arab tribes in the Arabian Peninsula. Other ethnic populations originated from Muslims of other countries (Iran, Pakistan, India, Indonesia, and China) and regions who decided to settle in Saudi Arabia after they made their pilgrimage to Mecca. The Arabs of Saudi Arabia are distinguished from one another not by racial differences, but by tribal affiliation and social status. Such distinctions divide the community in terms of way of life, heredity, occupational prestige, and social ranking.

Saudi Arabians use the term *Al-badu* (Bedouins) to indicate the nomadic Arab tribes whose pastoral existence is based on the raising of camels, sheep, and goats. The Bedouins follow regular migration routes according to the seasons of the year. Among these tribes, some—mainly camel-breeders—count themselves of noble descent and even when impoverished, enjoy high prestige as members of the desert aristocracy. Sensitive of family and tribal status, the Bedouins do not ordinarily permit their daughters to marry into ignoble groups.

Contrasted with the Bedouins is the part of the population which follows sedentary occupations: agriculture, trade, and other nonpastoral pursuits. The members of the settled communities are referred to as *al-hadar* (settled people). Although the Hadar feel that Bedouin ancestry has social prestige, they look down upon the Bedouins as naïve and ignorant people (Kurpershoek 2001).
2.5 Language

The Arabian Peninsula, especially the territory of Saudi Arabia, is the center from which Arabs spread after the initial Arab conquests in the seventh century A.D. Arabic is a Semitic language related to Aramaic, Hebrew, Phoenician, and several languages of Ethiopia. Today, many dialects of Arabic language are spoken depending on the region. The language exists in two forms: the classical and the colloquial. Colloquial Arabic dialects differ from classical Arabic notably in vocabulary and in the elimination of the grammatical features. Classical Arabic is based on the language of the Qur’an, on pre-Islamic poetry, and on grammatical studies made by Arab scholars in the first centuries of the Islamic era. Although there are variations in pronunciation, these do not prevent communication between people from different regions within the Kingdom of Saudi Arabia (Gale 2003).

Even though Arabic is the official language of the Kingdom, every region has its own special dialect. The major dialects are Hejazi, Najdi, and Sharqi. Hejazi, is spoken in the Western Province of the Kingdom (Jeddah, Taif, and the Holy Cities of Makkah, and Medina). This dialect includes borrowed words from other dialects, such as Egyptian, Palestinian, and Jordanian. The Najdi dialect is spoken in and around Riyadh, in the north central part of Saudi Arabia. The Najdi dialect is close to classical Arabic and is the dialect of the Royal family. Therefore, it has prestige. Sharqi is spoken in the oil-rich eastern region. This dialect borrows words from Kuwaiti, and Bahraini dialects (Ingham 1994; Prochazka 1988).
2.6 Religion

Arabia is the birthplace of Islam, and the people within the Kingdom of Saudi Arabia have remained almost exclusively Moslem in religion. Saudi culture is overwhelmingly Islamic and traditional and the majority of the population is Sunni. To a Muslim, Islam is an integral part of daily life, helping to make an ordered society that clearly defines man’s spiritual, political, and economic status. Islam is more than a set of spiritual beliefs and rituals. It is integrated in all of a Muslim’s life, including social class, philosophy of life, as well as in government (Wafah 1998). For Saudis, Islam is not an abstract idea but an idea put into practice. The Qur’an is regarded as the ideal to be applied. Islam is not only a set of religious beliefs but also provides regulations and guidance for everyone’s behavior in private, social, and business life (Abdrabboh 1985).

2.7 Social Structure

The kinship principle is apparent especially among the nomads, who are grouped as kinsmen belonging to larger tribes based on their descent from a real or fictitious common ancestor. Each tribe governs itself through a council of family heads or elders and is united under the Sheikh of the larger tribe to which it belongs. There are hierarchies among tribes based on their closeness to the royal family. The principle tribes in Saudi Arabia include the Anayzah, Beni Khaled, Harb, Al Murrah, Qahtan, and Tameem (Kurpershoek 2001).

Social class based on wealth has not been strictly defined as in some Western countries. Traditionally, lineage and occupation were the important criteria of status among Arabs. Within the Bedouin tribes, there were differences of status based on lineage and occupation rather than class division based on material wealth in the Western
sense. However, after the discovery of oil and the newfound wealth, Arabs were influenced by new values from the modern world. These values changed the criteria of social status to include wealth and material position as in the Western world.

The Sheikh of a wandering group led a life similar to that of his followers in terms of material conveniences. Social stratification can be seen especially in the towns, where there are families of sheikhs, wealthy merchants, important religious heads, high government officials, and professionals. The typical, large, nomadic tribal unit is called *gabilah* (sons of one ancestor), referring to a single tribe with a Sheikh or to a federation of tribes. A subtribe is referred to as *ashira* (collection of tens—i.e., ten tribes). The *ashirah* may in turn be divided into several subdivisions, or a *firqah* (trunk of the body); the *firqah*, into two or more divisions, each called a *fakhdh* (thigh); and the *fakhdh*, into the *hamulah* (womb), consisting of several related extended families.

### 2.8 Family

In Saudi Arabia descent is traced through the paternal line, which can be seen in the importance of kin groups or lineages through the male line. Arabia is significantly a man’s world. The male is looked upon as the responsible member, who gives direction and enforces order in the family. A new born son’s arrival in Saudi family has much value. When a woman fails to produce a son, it is sufficient reason for her husband to divorce her or take a second wife. This is because the honor of the family is passed to the oldest son, and the responsibility for maintaining the family lies upon him. In the absence of his father, the eldest son is expected to protect and direct the activities of the family. Women may be consulted, especially regarding the needs of the home and the children, but it is the man who must make the final decisions. Among their intimate relatives and
friends, a husband and wife are usually known in relation to their eldest son (Lipsky 1959). For example, if the oldest son is named Ali, his mother will be called “Umm Ali,” meaning “Ali’s mother.”

Polygamy is considered a desirable form of family life in Saudi Arabia. Arranged marriages are preferably set between the brothers’ children. Usually the newly married couple live in the husband’s father’s home or live close by. The extended family is typical in Saudi Arabia. Usually, three generations are represented in a household: a man and his wife or wives, their unmarried sons and daughters, and any married sons with their wives and children. Children are regarded as bringing a blessing; a common greeting is, “May you have many children.” It is common for Arab mothers to have a child every other year, and although infant mortality is high, families characteristically have many children.

2.9 Saudi Arabian Women

The Prophet Muhammad’s saying that heaven is under the feet of mothers raised women’s status among Arab tribes and ended their practice of female infanticide (Almunajjed 1997; AlTorki 1977; Keddie et al. 1980). Islam’s treatment of men and women differs greatly from Western ideology. According to Islam, men are the maintainers of women. Although Islam does not give the same rights to men and women, this does not mean that it favors men over women. Each gender has its own special roles to play, and both are treated with the same rewards and punishments from God.

The philosophy of Islam establishes norms and codes on family matters for its followers. Saudi women follow Islamic law to guide them in everyday life. According to Islam, a woman’s body is not for public display, and their clothes must cover the entire
body except the face and hands. For example, in the Holy Qur’an it is written: “Say to the believing women, do not give daring looks, cover the body, do not show your beauty, unless, like the eyes, it is already revealed.”

Segregation by sex is rigidly maintained in Saudi Arabia social life. There is a strong sense in Arabian society of what is public and what is private. Women belong to the private world. Their homes and the activities that take place in it are considered private. Visiting between women may be frequent in a community, and because it is a strict and private society, husbands will usually never know their wives’ female friends. Either a tent or a house usually has two separate entrances, one for the male guests and one for the females. When a woman appears in public places, in addition to being veiled she will be accompanied by some other member of her household, preferably a son or a household servant (Lipsky 1959; Long 1997).

Neither Saudi nor non-Saudi women are allowed to drive an automobile in the Kingdom. Women are traditionally dressed with their bodies draped from head to toe in shapeless black shrouds. Black veils always completely hide their faces. Above the age of nine, the only men whom a woman is permitted to meet unveiled are her husband or close relations whom she cannot marry, such as her brother, uncle, or nephew. While it is a rule in cities and towns that women wear a veil outside her home, it also can be practiced in the home where an extended family resides. A wife of one brother may veil when she is in the presence of another brother, and women usually keep a respectful distance between themselves and groups of strange men (Lipsky 1959).

In Saudi Arabia, a female’s life is not like a male’s. Women’s main purpose in life is considered to be a housewife and mother. A woman is totally dependent
economically on her husband. Job opportunities for women are very scarce and restricted to a few areas where they deal only with other women such as teachers, physicians, and bankers (Long 1997). Traditional Bedouin women, on the other hand, care for the children, cook, weave, and pitch and load their tents and gather fuel.

2.10 Attitudes toward Medical Treatment

Before the introduction of modern medicine into Arabia, people depended upon practitioners who used a mixture of practical folk remedies, magic, and quasi-religious interventions. Almost every bazaar and market place today contains folk medicines made from herbs and minerals, and have actual therapeutic value. Like other Middle Easterners, Saudi Arabians have traditionally regarded illness as a manifestation of God’s will or as the work of evil spirits. Although the divine will was regarded as unchangeable, Saudi women use the remedies or charms of folk practitioners to counteract evil spirits. Although there are few sorcerers in Saudi Arabia, disease in many parts of the country is thought to be caused by witchcraft. Particularly in the more isolated areas, tribesmen wear charms to protect themselves from the evil eye. They believe that the spirits of the dead are prevalent and that jinn can bring good or bad luck (Lipsky 1959).

2.11 Education

Formal education in Saudi Arabia sixty years ago was entirely in the Islamic belief and practice, and only very few Saudi youth had the opportunity to learn. The traditional education system was the Kuttab (Qur’anic elementary school) located in or near the mosque and often supervised by the Imam. The curriculum of the Kuttab was based on memorization of the Qur’an, with a secondary emphasis on reading and writing. Public education was existent in the 1930s; a small government school was established
following the model of the Egyptian school system. With the influence of the Arabian American Oil Company, there was a gradual realization of the need for expanded educational facilities, and the government began to offer courses in secular subjects as well as the traditional Islamic training (Lipsky 1959).

2.12 The City of Al-Khobar

Al-Khobar is one of the three main cities in the Eastern Province of the Kingdom of Saudi Arabia, the others being Dammam and Dhahran. In the past, Al-Khobar was a small port on the Arabian Gulf, inhabited mainly by fishermen. The first recorded settlement was in 1923 with the discovery of oil; it was transformed into an industrial port. Because of its location next to ARAMCO (Saudi Arabian Oil Company), it grew rapidly and became the commercial hub of the Eastern Province. Al-Khobar society can be portrayed as a small society that was initiated by small members of groups related to each other by a blood, marriage, or friendship. Al-Khobar society has diverse groups based on religion (fundamental Muslims and moderate Muslims) and descent (African, Arab, Persian, Bedouin, or Hadar, etc.).
CHAPTER 3

THE BIOLOGY OF MENOPAUSE

To detect factors that determine age at menopause and to understand the variation of menopausal symptoms that are reported across cultures can not be logically achieved without understanding the physiological mechanism of menopause. Chapter 3 is structured as follows: first, it will explain briefly the main mechanism that describes the biological event of menopause; second, it will provide functional and morphological stages of human female ovarian follicles. Next, it will view the endocrinological feedback that occurs in pre- and postmenopausal women and will present the morphological characterization of atresia and its endocrinological triggers. And finally, this chapter provides two different explanations of the mechanism that initiates the onset of the menopausal event.

The biology of the human female reproductive system begins when the human female is born with a fixed number of potential ova with no new germ cells produced after birth. The fixed numbers of primary oocytes (approximately 1 million) are maintained in a state of meiotic arrest until ovulation and fertilization. The vast majority of these primary oocytes degenerate between birth and menopause, with only about 400 being ovulated during the reproductive years (DeWitt 1989; Faddy 2000; Gosden 1985;
Wood et al. 1994). According to this biological explanation, the proximate cause of human female’s menopause is the exhaustion of ovarian oocytes, accompanied by degenerative changes in reproduction-associated elements of the neuroendocrine system. The age at menopause is determined by the number of oocytes in the ovaries at birth and the rate of follicular atresia across the lifespan that is affected by that chemical, immunological, and hormonal environment of the ovaries. Menstruation ceases when the quantity of the remaining follicles falls below a threshold number as a result of the gradual loss of the ovaries’ ability to release a follicle (Byskov 1979; Sonja et al. 1972; Thomford et al. 1987).

3.1 Ovarian Follicles

Unlike organs such as the hematopoietic system or the testes, which have self-renewing potential for the lifetime of the individual, the mammalian ovary is endowed with a supply of primordial follicles at birth which constitute the sole source of oocytes for the lifetime of an individual. The ovaries are characterized by the constant attrition of germ cells. The ovaries contain almost a million egg cells in the seventh month of fetal life, and from then on the number of ova decreases. At birth, the ovaries of the newborn girl contain a 500,000 egg cells; at puberty, ten or twelve years later, the number drops to 75,000. By the time a woman is fifty, there are no egg cells left. Research reveals that there are three types of nongrowing follicles: (1) primordial follicles, in which the oocyte is surrounded by flattened granulosa cells; (2) intermediary follicles, in which the oocyte is surrounded by a mixture of flattened and cuboidal cells; and (3) primary follicles, in which the oocyte is surrounded by a single layer of cuboidal cells (Alain 1993; Fortune et al. 2000).
Ovarian function has two important dimensions: (1) the production and maturation of gametes, and (2) the production of steroid hormones. As discussed above, the human ovary contains three major compartments: the granulosa cells, the thecal cells, and the ovarian interstitum or stroma. The oocytes are enclosed by follicular units, which are composed of a granulose cell layer, and the surrounding specialized ovarian stroma, the theca. The thecal compartment possesses all of the steroidogenic enzymes necessary for the synthesis of the three major classes of gonadal steroids: progestogens, androgens, and estrogens. The granulose cells, while possessing most of the same steroidogenic enzymes as the theca, are lacking significant amounts of the 17, 20-desmolase enzymes required to convert C-12 progestogens to C-19 androgens. Because estrogens must be aromatized from androgens, this limits the ability of granulose cells to synthesize estrogens.

Age-related ovarian structural changes coincide with endocrine changes: theca interna and granulosa cells diminish, while stromal or interstitial cell increase in number and activity. Changes in function in any one of these could conceivably play a major role in the initiation of menopause. These changes begin subtly with a shift in steroidogenesis occurring with the declining numbers of follicular cells. Since there is no significant follicular development occurring toward the end of the climacteric period, the sole source of ovarian steroids becomes the ovarian stromal cells. The most prominent hormonal changes at menopause are drastic reductions of estradiol (E2) and there are small amounts of estrone (E1) and progesterone secretion by the ovary, reflecting cessation of folliculogensis and ovulation. In contrast, androgens become the predominant endocrine
in the climacteric ovary (Gosden and Faddy 1994; Judd and Fournet 1994; Metcalf and Livesey 1985; O’Connor et al. 1998; O’Connor et al. 2001).

Asheim (1961) sought to answer whether the ovary ages because of an intrinsic change, or in response to signals from the brain and the pituitary. The experiment shows that the ovary is still capable of normal cycles after menopause, if the old ovary is transplanted to a young body. This may be direct evidence that there are primary changes of aging in the brain which could alter hormone production by the pituitary, and in turn could alter the activity of many other glands (Finch 1977).

3.2 The Endocrinology of Menopause

Endocrinologically, menopause represents the broader concept of progressive ovarian functional failure, often preceded by symptoms of menstrual irregularity and continuing for some years past the cessation of the menses. The cycles of reproduction are about one month long. Each cycle is formed by the gradual build-up of sex hormones, which peak in the interval when an egg leaves the ovaries. After ovulation, sex hormone production begins to decrease and reaches its lowest point just as menstruation begins. The amount of sex hormone present in each phase of the cycle varies from one individual to the next and from one cycle to another, but the overall pattern of build-up peak and diminution is constant (DeWitt 1989; Faddy, 2000; Gosden 1985; Leidy 1991; Treloar 1981; Wood et al. 1994).

As it has been discussed above in the ovarian follicles section, the cyclic changes in the ovary are regulated and controlled by endocrine events of the hypothalamus, pituitary, and the ovaries. The changes that occur in the ovaries influence the hypothalamus and pituitary hormone production in a feedback loop, which in turn
influences the hormone production and functions of the ovaries themselves (Van Keep et al. 1978).

In humans, a certain critical mass of oocytes is necessary for the ovaries to respond to the action of the follicular stimulating hormone (FSH) and luteinizing hormone (LH), secreted by the pituitary gland (Anderson 1993). In the luteal phase of the menstrual cycle, the production of estrogen and progesterone function in a negative feedback loop to the pituitary, which causes a decrease in FSH and LH secretions. With the absence of oocytes and the failure of the ovaries to respond to FSH, no follicle matures and ruptures, no corpus luteum is formed. Estradiol levels decrease from a premenopausal mean of 120 pg/ml to a postmenopausal mean of 13 pg/ml. This reduction results in a loss of negative feedback to the hypothalamus and in turn, to the pituitary; the loss of this negative feedback is assumed to be the cause of the elevated levels of LH and FSH typical of the menopausal and postmenopausal years (Burger 1996; Lenton et al. 1988; Metcalf et al. 1982; Rannevik et al. 1986; Santoro 1996; Shideler et al. 1989; Smith 1981; Studd 1977; Thijssen and Longcope 1976).

During the menopausal years, the ovaries are not the only source of estrogen; the central area of the ovary is filled with cells that produce androgens, androstenedione, and testosterone. Fat cells in the body take up the androstenedione and convert it to estrone. Estrone is further converted by the liver into estradiol. In addition, the adrenal glands produce a variety of hormones, cortisol, androgens, and small amounts of estrogen and progesterone. In postmenopausal women, both androstenedion and testosterone levels remain relatively constant and the circulating level of estrone after menopause is higher than that of estradiol. The ovary remains a source of testosterone and the source of
estrone is the peripheral conversion of androstenedion. The adrenal gland is consequently the primary source of circulating androstenedion in postmenopausal women (Genazzani et al. 2002; Jones 1980; Judd 1976; Longcope et al. 1980; Longcope et al. 1986; Longcope 1990; Mahesh 1976).

### 3.3 Atresia

Atresia represents a key phenomenon in reproductive biology that explains the onset of menopause. Literally translated, *a tresia* (a Greek term) denotes the closure or obliteration (*a* = not) of a normal body orifice or passage (*tresos* = perforated). Van der Stricht is credited as first identifying atresia in 1901. As Peters and McNatty (1980: 98) explained, “the term atresia has been used to describe various process: (1) the disappearance of germ cells before they become enclosed in a follicle; (2) the degeneration of small follicles; (3) the degeneration of follicles which have begun to develop and whose growth and differentiation becomes disrupted.”

The incidence of follicular atresia occurs constantly uninterrupted throughout the lifespan, including pregnancy and during all stages of follicular growth (Guraya 1985; Himelstein-Braw et al. 1976; Hurwitz 1991). Unlike the lifespan perspective, which portrays menopause as an outcome of an interaction among biological, psychological, and sociocultural factors, Hurwitz (1991) and Sherman et al. (1975) stated that age at menopause is determined only by the process of atresia and it is independent from a woman’s reproductive history such as oral contraceptive use, or number of pregnancies that suppressed ovulation or from prolonged periods of hypothalamic amenorrhea (Hurwitz 1993). Around 80% of the germ cell endowment is lost at birth and 95% is lost by the onset of puberty. Out of seven million germ cells that originate in the fifth month
post-conception, only 400 to 5000 are ovulatory cycles (< 1% of the total ovulates in the course of a reproductive lifespan).

A variety of hormonal triggers has been hypothesized to cause atresia: excess or insufficient gonadotropin stimulation; excess or insufficient androgen or estrogen production; and extraovarian or intraovarian nongonadotropic factors, such as inhibin, GnRH-like substance, FSH-binding inhibitor, and follicular regulatory protein (Behrman et al. 1993; Farookhi 1981; Richardson et al. 1987; Ryan 1981; Peters and McNatty 1980). Recently, it has been demonstrated that apoptotic cell death is the biochemical mechanism underlying follicular atresia (Gougeon 1996; Hsueh et al. 1994; Kaipia and Hsueh 1997; Tilly and Tilly 1995). The stepwise or “programmed” process of cell death by apoptosis involves cell shrinkage, chromatin condensation, and the formation of small spherical bits of membrane, referred to as “apoptotic bodies,” which contain nuclear fragments and are usually phagocytized by neighboring cells.

According to Gosden (1987), the most striking features of apoptosis are the activation of calcium-/magnesium-dependent endonuclease activity, which specifically cleaves cellular DNA between regularly spaced nucleosomal units. This characteristic feature, which is the hallmark of cells undergoing apoptosis, is markedly different than the haphazard breakdown of DNA which occurs during necrosis that produces a generalized smear of DNA following analysis by ethidium bromide staining (Gosden 1987). In contrast to apoptosis, cell death in necrosis is a result of cell injury or other traumatization characterized by a haphazard loss of cell structure, swelling, and ultimately cell rupture that can damage adjacent cells, leading to immune cell infiltration.
3.4 Transition to Menopause

The determinants of the age of natural menopause remain unknown, although it is generally accepted that both the number of oocytes formed during fetal development and the rate of ovarian follicular atresia during life are important (Cramer et al. 1996; Mckinlay 1996; Sonja 1992). There are two explanations for the mechanism that triggers the menopausal transition. One perspective is that the impending exhaustion of the follicle endowment triggers the menopausal transition; the hypothalamic/pituitary changes that accompany menopause are a consequence of diminished ovarian function. The following investigators (Crisp 1992; Erickson et al. 1995; Erickson 2000; Gougeon 1996) believe that the primary mechanism by which the primordial follicle endowment is depleted is through the onset of follicular growth. The major factor in determining the rate at which follicles begin to grow is the number of follicles in the primordial endowment. This contention is supported by observations derived from rats given the highest dose of busulfan as all of the remaining follicles began to grow very early in life, exhausting the follicular reserve during the prepubertal period (Richardson and Nelson 1990).

A second explanation for the mechanism that triggers the menopausal transition is that age changes in the central nervous system (CNS) trigger the menopausal transition: the exhaustion of the folliclar endowment is a consequence of altered CNS signals. In support of this contention is the fact that, in rats there are changes in the CNS component of the reproductive axis long before the ovary has substantially reduced follicles. It could be postulated that destabilization of the ovarian-CNS feedback relationship, triggered by aging of the CNS, leads to conditions that cause degeneration of primordial follicles in
situ (without growth) and depletion of the primordial endowment. Several studies suggest that menopause results from aging of the hypothalamus. In old animals, the hypothalamus is incapable of tightly regulating the secretion of gonadotropins from the anterior pituitary. Thus, there is transient increase in the levels of both LH and FSH. These transient increases in LH and/or FSH are thought to be toxic to the ovary and exacerbate normal depletion of the primordial follicle pool.
CHAPTER 4

LITERATURE REVIEW OF THEORETICAL PERSPECTIVES ON MENOPAUSE

Menopause has been increasingly examined from clinical, social, and scientific perspectives. The approach that physical anthropologists use to menopause incorporates primatological, historical, cross-cultural, and evolutionary views. Pavelka and Fedigan (1991) consider human female menopause a significant phenomenon in life history that every woman experiences around midlife. Austad (1994) suggests that human life history is characterized by several unusual features, including large babies, late puberty, and menopause. Menopause is an evolutionary puzzle. An early end to reproduction seems contrary to maximizing Darwinian fitness. Human females spend about one third of their lives postreproductive, a trait that appears to be shared only by the short-finned pilot whale (Austad 1994).

Many anthropologists have suggested that menopause is a hominine adaptation, that is, the result of selection for a postreproductive lifespan that permits increased maternal investment in existing offspring (Austad 1994; Fretts 2001; Hill 1993; Hill and Hurtado 1996; Jones et al. 1999; Peccei 2001). Others are persuaded that premature reproductive senescence is an epiphenomenon, either the result of a physiological
tradeoff favoring efficient reproduction early in the fertile part of life or simply the
byproduct of increases in lifespan or life expectancy (Ellison 1996; Graham et al. 1979;
Wood et al. 1994). Guthrie (1969: 319) considers reproductive senescence as a selective
advantage “as a result of the greater genetic effect on future generation of those who
spend greater energies on pre-menopause offspring and care rather than maintaining their
reproductive abilities.”

The basic problem with menopause is that cessation of reproduction and
postreproductive periods contradict the assumption that, from an evolutionary point of
view, sterility is the selective equivalent of death (Mace 2000). This chapter will first
discuss the basic elements of life history theory followed by two different approaches: (1)
the adaptive approach (the grandmother hypothesis, the altriciality-lifespan hypothesis
(ALH), the hunting hypothesis, the patriarch hypothesis, and menopause discourages
infanticide hypothesis), and (2) the non-adaptive approach (the lifespan-artifact
hypothesis).

4.1 Life History Theory

The basic tenet of life history theory, which logically flows from the laws of
thermodynamics, is the principle of allocation, which states that energy used for one
purpose cannot be used for another. In other words, all current investment in reproduction
will entail a future cost in fertility or survival of the species. Decisions about how to
invest energy are made at the molecular, physiological, and behavioral levels. In general,
life history theory expects natural selection to result in optimal allocation patterns, given
relevant constraints. The two most fundamental tradeoffs, which are the center of all life
history theory, are those between current and future reproduction and between the
number and fitness of offspring. Life history theory expects a relatively short lifespan for species living in dangerous situation. In this condition, rapid growth to reproductive maturity and high reproductive rate are necessary for the survival of the species. In contrast, when mortality rate is low, species tend to grow slowly to maturity and to have a longer lifespan (Hill 1993; Holliday 1996).

According to the life history theory, menopause, as a life history adaptive characteristic of human females, is fundamentally distinct from reproductive senescence (Charnov 1993; Hill and Hurtado 1996; Kozlowski 1992; Lack 1947; Roff 1992; Stearns 1992; Williams 1957). Menopause, or reproductive senescence as the non-adaptive perspective view, is an outcome of the biological degenerative accumulation process in organisms who experience relatively sudden lengthening of lifespan that outlives their reproductive lives of their evolutionary history (Gosden 1987; Donaldson 1994; Marlowe 2000; Peccei 1995; Washburn 1981; Weiss 1981; Wood 1994). In this perspective, menopause is viewed as a premature ovarian failure caused by insufficient energy that is devoted to maintain and repair somatic cells.

From the cultural, ecological, and evolutionary perspectives, life history theory explains the onset of menopause as a hominine adaptation that enhances the reproductive success of existing progeny as a tradeoff of reproductive cessation and long postreproductive lifespan. The key parameters of life history theory to explain the origin of menopause are the risk of maternal mortality and maternal investment (Lancaster and King 1985; Lancaster and Lancaster 1983; Mace 2000; Peccei 2001; Williams 1957).

Antagonistic pleiotropy theory advocates used life history theory to explain the long female postreproductive lifespan as a byproduct of increasing life expectancy by
presuming that the gains in fitness early in life outweigh the later pleiotropic costs of reproductive senescence. Reproductive value is strongly related to natural selection forces which decline with increasing age (Fisher 1958; Medawar 1957). Thus, menopause according to the antagonistic pleiotropy theory is described as “non-adapted manifestation of generalized physiological deterioration” (Austad 1994: 255).

According to this theory, menopause is considered to be an effect of pleiotropic gene accumulation in middle age that has a beneficial effect early in life, such as increased reproductive successes and detrimental effects later in life, such as causing an acceleration of aging. As an artifact of increasing human life expectancy, menopause or the postreproductive life stage evolve because longer female lifespan exceeds her egg supply and passes the threshold line to sustain ovulatory cycles (Gosden 1987; Donaldson 1994; Marlowe 2000; Peccei 1995; Washburn 1981; Weiss 1981; Wood 1994).

According to antagonistic pleiotropy theory, it would not be surprising if human females were one of only a few species who literally run out of oocytes during adulthood, because humans have an exceptionally long lifespan relative to their body size (Charnov 1993). On the other hand, data also suggest that female toothed whales of several species undergo reproductive senescence at about the age of 40 years. Even though they have a normal lifespan of more than 80 years, their morality hazard is still low when fertility terminates (Hill and Hurtado 1996).

In contrast to antagonistic pleiotropy theory that describes menopause as a byproduct of increasing age, menopause is viewed as a selective advantage in female life from life history theory based on the energy allocation perspective (Donaldson 1994;
Evans 1981; Gaulin 1980; Hawkes et al. 1997; Kirkwood 1985; Shanley and Kirkwood 2001; Sherman 1998). From the evolutionary perspective, menopause evolved when the maternal and neonatal mortality risks increased with age, and when postreproductive women as grandmothers helped younger kin and increased their daughters’ fertility. According to this theory, since energy decreases with age, postreproductive women in hunter-gatherer societies become more efficient to assure the survival of the children they already have and the survival of their children’s children, rather than devoting their remaining energy to pregnancy, child birth, and breastfeeding (Perls and Fretts 2001).

According to Hawkes et al. (1989), menopause or postreproductive lifespan is an outcome of selection for increased maternal investment when considering the consequences of rapid encephalization on female reproductive strategy: (1) High metabolic costs of gestation and lactation; (2) risk of rapid encephalization on the birth process; and (3) prolonged offspring dependence. Changes in climate and diet as a result of new ecological pressure, and altriciality of hoiminine infants due to cranial expansion and pelvic constraints were considered to explain the evolution of menopause. Williams (1957) called menopause an “adaptive response” to increased mortality risk associated with childbirth.

4.2 The Adaptive Approach

4.2.1 The Grandmother Hypothesis

As an adaptive approach, the grandmother hypothesis is grounded in the model of Charnov’s (1993) mammalian female life history. The model assumes that, given adult mortalities, natural selection operates according to the tradeoff between the benefits of
living longer versus reproducing sooner. Extrinsic adult mortality in a hazardous environment in this model is directly related to the reproductive effort of the organism.

According to life history theory, reproduction generally increases with the age of maturity that is proportional to maternal body size. The time available to optimal energy allocation between fertility and maturity depends on the instantaneous adult mortality rate (Charnov 1993; William 1984). As Hill (1993: 83) stated, “the optimal age at sexual maturity is when the proportional change in reproductive value (which increase with age) exactly equals the proportional change in juvenile survivorship (which decreases with age).” In other words, age at sexual maturity which is proportional to adult body size from life history theory perspective should reveal the optimal solution to a tradeoff between increasing reproductive value and decreasing survival. Based on this model, grandmother hypothesis advocates assume that when adult mortality rates fall, selection favors delayed maturity to benefit from larger size. Thus, grandmothering in their point of view is a favored evolutionary event because it extends the human lifespan and accordingly delays age of maturity, supporting their hypothesis that humans reach maturity at a relatively late age compared with other large-bodied primates. This delay in the maturity of humans indicates that gains from living longer before reproducing pay off throughout adulthood, including both the childbearing and grandmothering years.

According to the grandmother hypothesis, vigorous senior women who are provisioning their grown daughters as well as feeding and caring for grandchildren can recompense the cost between reproductive effort at younger age and somatic performance at later age as assumed to be the consequence of the regular mother-child food sharing. In other words, increased somatic effort that slows aging would come at the cost of lower
reproductive effort at younger ages. But the contribution of senior females would increase the reproductive success of child bearers more than enough to offset the reduced expenditure of the child bearers themselves (Hawkes and Bliege Bird 2002; O’Connell et al. 2002; Williams 1966).

The grandmother hypothesis highlights ancestral socioecological circumstances that allow more vigorous perimenopausal females to raise the fertility of their daughters, consequently strengthening selection against senescence and increasing potential longevity in our genus. The hypothesis has been developed on the observations among modern hunter-gatherers (Hadza), a small population of traditional foragers living in the arid savanna woodlands of the Eastern Rift in northern Tanzania. Blurton-Jones et al. (1996) and Hawkes et al. (1997) state that mother-child food sharing occurs among many primates, but only human mothers provide a substantial fraction of their weaned children’s diets. This allows mothers to use resources that they themselves can gather at high rates but their children cannot. Among some hunter-gatherer population, for example the Hadza, deeply buried tubers are year-round staples. Young children cannot extract them efficiently, but their mothers do so well enough to earn a surplus that can support more than one child. Postmenopausal women earn the same high rate of increasing their fitness. With no young children of their own, they help feed their daughters’ and nieces’ offspring. This help is especially important for the nutritional welfare of weaned children when their mothers forage less at the arrival of a newborn. According to O’Connell et al. (1999), this division of labor suggests a solution to the riddle of menopause in humans.
4.2.2 The Altriciality-Lifespan Hypothesis (ALH)

Like the grandmother hypothesis, ALH also explains the origin and evolution of menopause from the perspective of natural selection and life history theory. Based on socioecological and reproductive strategies of early Hominids, the hypothesis emphasizes the establishment of reproductive senescence as a life-history trait rather than focusing on the maintenance of reproductive senescence (Peccei 1995: 427). Unlike the grandmother hypothesis, the altriciality-lifespan hypothesis strongly stresses the mother’s investment in the survival and fertility of her own children, rather than the grandmother’s in her grandchildren as the grandmother hypothesis presumes. Moreover, prolonged juvenile dependency according to the grandmother hypothesis is considered to be a selective pressure on the initiation of menopause, whereas according to the altriciality-lifespan hypothesis encephalization and infant altriciality are major factors that contribute to the evolution of menopause.

Diamond (1992), Peccei (2001), Trevathan (1987) and Turke (1996) proposed that during the Plio-Pleistocene era (roughly 1.8 million years ago) continuing encephalization caused hominid infants to be born in an increasingly helpless state, creating the need for females to provide more prolonged and more intensive maternal care. Based on maternal metabolic depletion as a consequence of successive bouts of gestation, lactation, and maternal investment in nutritionally dependent offspring, the altriciality hypothesis advocates propose that natural selection made females who became prematurely infertile more profitable. According to this assumption, menopause or reproductive cessation is an adaptive event in terms of lifetime reproductive success for
hominid females to continue investing in the survival and fertility of their extant offspring, rather than attempting further pregnancies.

Peccei (2001) supported the altriciality hypothesis by giving examples of the variation in fertility patterns between human females as a provisioning species and olive baboons, Barbary macaques, and East African elephants as nonprovisioned or semi-provisioned species. Peccei (2001) showed that human females are unique in terms of their early fertility peak and postreproductive lifespan. Their fertility rate decreases gradually with age, while among macaques and elephants, fertility remains constant over a relatively long period, then terminating abruptly only a few years before maximum age at death. Advocates of the altriciality hypothesis also assert that the origin and evolution of menopause would have been influenced by the maximum potential lifespan (MPL), as well as by the mother’s life expectancy. As the adult life expectancy and MPL increased, the age of the onset of menopause increased which gives women the chance to have a sufficiently long reproductive and postreproductive lifespan and ensures that they can raise their existing dependent offspring.

According to Peccei (2001), it is possible that the fixation in age of MPL occurred long before the onset of menopause, because of two opposing tendencies: the downward pressure exerted by encephalization and secondary altriciality, and the upward selection due to increasing adult life expectancy.

Supporting this hypothesis, in species with male philopatry, mothers with still-dependent offspring will benefit more than mothers with a reproductive-aged daughter when the females remain in their natal groups after maturity. Moreover, Packer et al. (1999) explained that female lions do not engage in any grandmothering, once they
become postreproductive, even when their daughter is nursing cubs. Packer et al. suggest the reason for postreproductive investment absence in lions is that maternal mortality affects only the youngest offspring. Juvenile survivorship is not affected by the mother’s death or future reproduction.

4.2.3 The Hunting Hypothesis

Hill (1993) compared the life histories of humans and chimpanzees, and states that the cause of this divergence is due to human social foraging, use of weapons, and male provisioning that lower the human mortality rate from predation. Hill explains the hunting hypothesis starting with humans and chimpanzees that grow at about the same rate through childhood, but since the chimpanzees’ mortality rate is higher than humans, they begin to reproduce at an earlier age with a smaller size. This pattern of early reproduction, according to Hill (1993), should change the entire development trajectory between humans and chimpanzees to ensure that juvenile development is complete before the optimal age of maturity. Hill also explains that human females have a higher fertility rate than chimpanzees, because with male provisioning, human females are more efficient at harvesting energy than chimpanzee females. This additional energy allows the human female to meet the reproductive energy demands above their metabolic needs. According to Hill (1993), higher fertility and longer reproductive span in humans should lead to a higher mortality rate in human juveniles than in chimpanzees. But recent hunter-gatherer studies show that the juvenile mortality rate is lower than that of the chimpanzees, due to male economic contribution that allows the human offspring to grow slowly and reach full adult size (Smith and Fretwell 1974).
Pearls and Fretts (2001) explained why menopause does not occur in other mammals except for the pilot whale. They state that the development of reproductive cessation in the human female is a selective advantage, because maternal mortality that is associated with childbirth increases as a result of birth canal changes that coincide with the evolution of erect posture. In non-human mammals, giving birth does not have a high mortality risk even at the advanced age as in human females; thus, selection will not operate to terminate reproduction early among mammals. Austad (1994) explained that it is more advantageous to species to terminate reproduction early when they have higher mortality risk with childbirth and their dependent offspring require extensive periods of childcare. Austad stated that the short-finned pilot whale, in which suckling by offspring may last as long as 15 years (Marsh and Kasuya 1986) is an example that supports the adaptive view of reproductive termination. Based on Kasuya and Marsh’s (1984) study that examined ovaries from the carcasses of finned pilot whales, 24% of mature females were postreproductive by age of forty, their reproduction had ceased, and their life expectancy at complete reproductive cessation was still approximately 14 years. These additional postreproductive years were important to nursing their offspring that take about 15 years to wean.

4.2.4 The Patriarch Hypothesis

The patriarch hypothesis proposes that menopause is the by-product of selection for greater longevity in males based on three conditions—ovarian follicles depletion must be a constraint; genes that promote longevity must be on the X chromosome; and some old men must reproduce. According to this hypothesis, female longevity was “dragged along” with male longevity even though females gained no direct reproductive benefit,
because genes that were selected to extend the male lifespan were located on the X chromosome. This supports the hypothesis that age-specific fertility is more tightly correlated with senescence in Ache men’s than women’s (Hill and Hurtado 1996). The advocates of the hypothesis presume that beyond age 45, hominid females experienced menopause simply because their reproductive lifespan was constrained by the depletion of viable oocytes (Austad 1994; Gosden 1985; Wood et al. 1994). Once females outlived their reproductive careers, they could enhance their inclusive fitness by caring for their own children and grandchildren as the grandmother hypothesis explains (Alexander 1990; Gaulin 1980; Hamilton 1966; Hawkes et al. 1998; Lancaster and King 1992; Marlowe 2000; Peccei 1995).

Marlowe (2000) assumed that a “longevity allele” appeared to increase lifespan by delaying the age of maturity which leads to (1) larger adult body size, (2) longer period of dependence; and (3) delayed reproduction. However, once the male status became more long lasting, any longevity allele in a male who attained high status at age 40+ was selected for, because he was able to maintain his status and keep reproducing for several more years. And because male status could be maintained, longer-living males gained more in reproductive success later in life than they lost early in life.

4.2.5 Menopause Discourages the Infanticide Hypothesis

According to the infanticide hypothesis, menopause might have benefited women by reducing infanticide and by helping to maintain agnatic investment in children. This hypothesis makes two assumptions: (1) hominid mating relationships became relatively stable and involved, increasing levels of parental care; and (2) the males in these relationships were generally older than the females and thus were likely to die. Under
these conditions, a female who remains fertile after the death of her primary mating partner invites the presence of a new male, which in turn threatens the existence of extant offspring (especially the youngest) and also threatens to disrupt any nepotistic relationships that have existed with the primary mate’s family. Therefore, her continued fertility can cost her. I.e., she may lose the children she already has and she may compromise her relationship with her first husband’s family. These costs may be sufficient to account for the evolution and maintenance of menopause. I.e., it is beneficial for her to cease being able to reproduce.

Based on their field research among Ache couples of reproductive age in Eastern Paraguay between 1980 and 1990, Hill and Hurtado (1996) observed that men are about five years older than women on average, and Ache male life expectancy at age 45 is 17 years, whereas the life expectancy of the Ache female at age 45 is 21 years. As a consequence of age variation between Ache couples, 40% of mortality between ages zero and three and another 17% between ages three and fifteen are due to homicide or neglect; most of these infanticides, and all child homicides are perpetrated by men after the child’s father dies (Turke 1996).

4.3 The Non-Adaptive Approach

4.3.1 The Lifespan-Artifact Hypothesis

The lifespan-artifact hypothesis focuses attention on the processes and events that occur in the lives of individual organisms, and questions their evolutionary significance (Fretts 2001). According to this hypothesis, the age of menopause has been linked to longevity (Kane and Beeson 1989). In the situation of high mortality, rapid growth to reproductive maturity and a high reproductive rate are necessary for the survival of the
species (Holliday 1996). In these situations, the expected lifespan would be relatively short. Conversely, in the situation of a relatively low annual mortality, a species can evolve slower rates of growth to maturity and a longer lifespan. Holliday (1996) correlated the relationship between the onset of reproduction and the estimated longevity in primates and found a clear relationship between the age of reproductive maturity and the maximum lifespan. The expanding human population is largely due to decrease in annual mortality, as the population has expanded; older mothers have contributed more offspring to the next generation. Thus, factors that favor later reproduction are favored, and the lifespan has increased.

Ellison (1996) suggested that selection might favor any mechanism that improves the quality and quantity of early reproduction in females even if this mechanism leads to detrimental effects later in the reproductive span. For example, the human female trait of producing all viable oocytes before birth and storing them in arrested metaphase throughout the lifespan may be a mechanism to reduce the mutational accumulation that takes place with cell division. This same mechanism, however, leads to the ultimate depletion of viable oocytes. Supporting Ellison (1996), Wood et al. (1994) proposed that human women run out of eggs in their forties because the ability to maintain viable eggs to older ages is traded for more efficient ovulatory cycling at younger ages. Wood et al. (1994) proposed that menopause is merely the endpoint of a decades-long process of follicular depletion. And the mechanism that drives follicular depletion plays an essential role in the neuroendocrine system that maintains regular cycles and results in the release of a single egg at mid-cycle. Therefore, the rate of follicular depletion at early
reproductive ages is under tight selective control, since changes in that rate may disrupt normal ovarian function and ovulation.

As can be seen in the previous approaches, menopause can be considered to be either a recent historical artifact or an adaptive feature. The adaptation approach of menopause proposes that females who cease to reproduce before the end of their lifespan will increase their fitness benefits by devoting their remaining lifespan toward enhancing the survival and reproductive success of their existing progeny (Gaulin 1980; Hames 1988; Williams 1957). In contrast to the adaptationist approach, the non-adaptive approach asserts that menopause is a byproduct of relatively recent increases in the human lifespan (Washburn 1981; Weiss 1981).

Further investigation is needed to understand the biological perspective of menopause. For example, (1) why did the size of the initial oocyte stock not increase with increased human longevity?; (2) why was there no selection of an ovulatory system that is both optimally regulated early and capable of functioning much beyond age 45?; (3) why did selection not make oocytes more stable during the prepubescent period when there was no need to regulate ovulation? (Turke 1996); (4) why did only the human female’s lifespan exceed her reproductive capacity and approach menopause, while long-lived species females such as elephants, tortoises, and most whales, which live to be 60, 80, and 90 years old, do not have menopause? (Peccei 2001); and (5) what are the ultimate causes of the divergence between the human female’s life history and her closest phylogenetic relative, the chimpanzee, and how did these divergences take place in such a relatively short evolutionary period? (Hill 1993). Moreover, future studies are required to answer the question of under what ecological setting does the rate of
degenerative processes in human body functions become slower than the female reproductive function. In other words, why is the programmed mechanism of senescence of reproductive function not equivalent to senescence that occurs in the rest of the body?
Chapter 5 first discusses sociocultural, and biological factors that might determine the age of natural menopause, and then explains why symptoms of menopause vary across cultures.

5.1 Menopausal Factors

Harlow et al. (2000) present the importance of understanding why certain factors contribute to a more rapid decline in ovarian function, such as cigarette smoking, race, education, parity, menstrual cycle length, the use of oral contraceptive, and physical activity. Understanding these factors may help to improve women’s health and wellbeing during the menopausal transition.

Most research that assesses the associations among early or late age at natural menopause and different factors was based mainly on Faddy’s (1992) oocyte depletion hypothesis. Faddy hypothesized the cause of individual difference in age at natural menopause is due to individual variation in the number of ovarian follicles that formed during the fetus developmental period and difference in the rate of oocyte depletion or
deterioration across female life span due to ovulation or the process of atresia. According to this hypothesis, less ovulation either by parity, lactation, or oral contraceptive use could save ova and thus could explain a delay in menopausal age, whereas smoking or chemotherapy would damage the number of viable oocytes and/or increase the degradation of estrogens, thereby decreasing the age at menopause.

5.1.1 Anthropometric Factors

No associations between menopause and anthropometry have been reported in many bio-behavioral studies that link the onset of menopause with women’s body size. These studies were conducted based mainly on two assumptions: (1) an aromatization process will take place in the adipose tissue, leading to secreting a higher portion of estrogen from transforming androgens to estrogens (Bulun et al. 1999); (2) malnourished women tend to begin with only a few ovarian oogonia than women with adequate nutrition (Gosden 1985). Several observers have noted that women who reported weight loss have an earlier age at natural menopause (Brand and Lehert, 1978 in the Netherlands; Karim, 1985 in Bangladesh; MacMahon and Worcester, 1966 in the United States; and Neri 1982 in Israel). However, the following studies of age at menopause report no consistent association with women’s body weight (Bromberger et al. 1997; Jaszmann et al. 1969; Luoto et al. 1994; McKinlay et al. 1972; Sherman et al. 1981; Walsh 1978; Willett et al. 1983).

5.1.2 Sociodemographic Factors

Most studies have indicated that sociodemographic factors such as marital status, ethnicity, education, occupation, family annual income, and urban/rural living environments may also contribute to early or late menopause by affecting the body’s
endocrinologic regulation. They attribute their findings to women’s sociodemographic status which determines their psychological wellbeing and nutrition (Baird et al. 1988; Bromberger et al. 1997; Harlow et al. 2000; Nagata et al. 2000; Sternfeld et al. 1999; Torgerson et al. 1997).

Brambilla and McKinlay (1989), Jaszmann et al. (1969), Kisch (1928), Luoto et al. (1994), McKinlay et al. (1972), Walsh (1978) and Willett et al. (1983) proposed that since women’s educational and employment status can strongly affect their lifestyle (smoking habit, use of oral contraceptive, physical activity), these sociodemographic factors might determine women’s age at menopause by slowing down or accelerating the aging process when they alleviate or aggravate women’s psychological and physiological stress (Harlow et al. 2000; Sternfeld et al. 1999).

Cramer et al. (1996) and Torgerson et al. (1997) argued that there is a strong relationship between mothers and their daughters’ menopausal age. Women who had premature and early menopause were more likely to report that their mothers or sisters had experienced menopause before the age of 46. Some scientific findings link left-handedness to autoimmune and reproductive disorders, and the possibility of those autoimmune reactions against hormones. Based on her study among Mexican-American women, Leidy (1990) suggested left-handed women experienced menopause an average of five years earlier than right-handed women due to receptor sites and/or oocytes that may play a role on the premature onset of menopause.

### 5.1.3 Reproductive History Factors

Many studies (Cramer et al. 1995; Stanford et al. 1987; Van Keep et al. 1979; Whelan et al. 1990; Wise et al. 1996) have investigated the relationship between the age
at natural menopause and the age at menarche, menstrual cycle length, parity, number of miscarriages and oral contraceptive use, and duration of contraceptive use. It has been proposed that pregnancy, lactation, and oral contraceptive use contributed to later age at menopause because of their effect of saving ovarian oocytes. To the contrary, early menarche, lower parity, shorter cycles, and less oral contraceptive use might contribute to earlier age at menopause, because of more frequent ovulation during the individual’s life span (Aytollahi et al. 2003; Kato et al. 1998; Meschia et al. 2000; Stanford et al. 1987; Whelan et al. 1990). The previous research was based on the hypothesis that long lasting use of oral contraceptives may delay menopausal age. Since FSH concentrations accelerate follicle depletion of the follicle pool and oral contraceptive suppress FSH concentrations, the age at menopause is delayed when the follicle pool is at rest (Cramer et al. 1996; Faddy et al. 1992; Gougeon 1996).

5.1.4 Lifestyle Factors

Most studies found a significant association between early age at natural menopause and smoking based on experimental studies of the effect of smoking on mouse ovaries. They concluded that a human ovary has the enzyme for metabolizing a component of tobacco (Polycyclic aromatic hydrocarbon benzo (a) pyrene ) into a substance that may be toxic to ovarian germ cells which might lead to primordial oocyte depletion and to estrogen deficiency. Thus age at natural menopause might partially be affected by smoking, since smoking lowers the estrogen levels to sub-optimal levels because of follicular deterioration, which leads to menstrual cessation (Harlow et al. 2000; Mattison and Thorgerisson 1978).
Exercise habits and types also have been examined in many studies to determine their affect on the onset of the menopausal event based on the assumption that there is an inverse relationship between depression and physical activity. Harlow *et al.* (2000) found that depression affects the age at menopause through affecting the pituitary-ovarian axis at the level of the hypothalamus (Rivier *et al.* 1986) and causing a more precipitous or qualitatively different decline in endogenous estrogen levels (Harlow *et al.* 2000).

### 5.2 Menopausal Symptoms

Generally, anthropologists and sociologists view menopause as a natural transitional phase, and as a part of the aging process, in which women move from their reproductive stage into their non-reproductive stage (Eskin 1980). The following empirical research suggests that women’s experience of the menopausal event differs cross-culturally, and biology alone cannot explain these differences (Beyene 1986; Flint 1976; Flint 1982; Greene *et al.* 1980; Kaiser 1990; Kaufert and Syrotuik 1981; Kaufert 1990; Lock 1986; Macpherson 1990; Obermeyer 2001; Sharma and Saxena 1981; Sternfeld *et al.* 2000; Wright 1983). Moreover, as Hidayet *et al.* (1999) stated, it is difficult to attribute symptoms that occur in women’s mid-life years only to ovarian function retardation or to the aging process or to socio-environmental stresses, because menopausal symptoms are an outcome of the integration of endocrinological and psychosocial factors that include sociodemographic factors, individual attitude to the menopausal event, chronological age, and social network.
The prevalence of menopausal symptoms is explainable to the following hypotheses:

(1) Empty nest hypothesis. According to this hypothesis, at the same time that women lose their fertility due to menstrual cessation, children start to leave the home, which contributes to higher prevalence of menopausal symptoms (Spence et al. 1971).

(2) Negative attitudes toward menopause hypothesis. According to this hypothesis, women with optimistic attitudes toward the menopausal event and who describe menopause as a natural biological event tend to report lower menopausal complaints than women with negative attitudes such as loss of fertility, femininity, and health (Weideger 1976).

(3) Minimal integration into social network hypothesis. This hypothesis assumes that when women integrate into kin and social network, it affects their health positively. These women tend to report lower incidence of menopausal symptoms (Antonovsky 1972).

(4) Lack of valued roles after menopause hypothesis. Bart (1969) proposed that women whose status was enhanced once they approached menopause, such as freedom from menstruation taboo, access to ceremonies that are restricted only to men, and considerable domestic and political power, look forward to this event and tend to report fewer symptoms compared to women whose status declined when their menstruation had ceased.

(5) Endocrinologic feedback hypothesis. Endocrinologic feedback disturbance between ovarian steroids and pituitary gonadotropin hormones are due to the reductions
in the ovarian follicles that are available for stimulation during the menopausal transition (Studd 1977).

(6) Coexistence between symptoms hypothesis. Symptoms such as hot flashes (a sudden sensation of intense heat followed by a flashing of the skin, vasodilation followed by vasoconstriction) were usually associated with night sweats, which were in turn associated with insomnia and headaches (Freedman 2001). Because of sleep disturbance due to the incidence of hot flashes at night, women tend to be more fatigued and irritable (McKinlay and Jefferys 1974).

(7) Variation in individual’s awareness and sensitivity toward menopause hypothesis. Variations in individual’s awareness of and sensitivity toward menopausal symptoms may be due to women’s thermoregulatory system, lifestyle, and atmospheric temperature (Agoestina and Van Keep 1984; Coope 1995; Coope et al. 1978; Kronenberg and Barnard 1990).
6.1 The Research Sample

In the present study, 200 Saudi Arabian premenopausal, perimenopausal, and postmenopausal women who live in Al-Khobar, Kingdom of Saudi Arabia and belong to different ethnic backgrounds, different lifestyles, and various socioeconomic statuses were recruited. Subjects who had undergone pelvic surgery, had premature menopause (the cessation of menstruation for at least 6 months before age 40), and who were using hormonal treatment were not excluded. Data from these groups helped to compare these women’s symptoms and health status with those of women who are undergoing a normal transition to menopause.

6.2 The Research Design

This research is a cross-sectional analysis based on a confidential survey. The survey was distributed randomly in the Al-Damam Mall as well as in the Al-Naafa
Beauty salon among women whose median age is between 40 and 55 years. The snowball sampling technique was also used in the women’s homes and in the Lamezon coffee shop. Once a woman indicated her interest in participating in this study and was met the inclusion criteria, I explained to her in greater detail the purpose of my research, the different kinds of data to be collected, and the methods to be used. Before participating in the study, all respondents have to read a consent form or have this form read to them by me. The empirical data was collected based on a face-to-face administrated questionnaire that took approximately thirty minutes with each participant. The questionnaire was focused on the participant’s health, reproduction history, menopausal symptoms frequencies, daily lifestyle, and the women’s attitudes toward the menopausal event.

Anthropometric measures including height, weight, and body mass index (BMI) were taken on each participant. Age at menopause was estimated from responses to the question, “have you had a menstrual period in the last 12 months?” Women were asked which symptoms they had experienced “recently” that were unusual or uncomfortable.

6.3 Data Collection

The research was conducted between June and September 2003 in Al-Khobar, Kingdom of Saudi Arabia. Since the field study was in the summer, the research took place in public places rather than in schools or in women’s organizations, which were closed for the summer. The first research setting for collecting data was the Al-Naafa Beauty salon. It is one of the most famous beauty salons in Al-Khobar where everyone likes to go regardless of their age, ethnicity, or religious background. I spent nine hours everyday in the salon for three weeks. The second setting was the Lamezon coffee shop that only women can visit. It is like any ordinary house that has two floors; the first floor
is coffee shop and the second floor is the beauty salon. After receiving the owner’s permission, I reserved a private room and invited my mother’s friends who all meet the respondent criteria. I also invited their daughters. I picked these locations, because only women can go there and there was more freedom to conduct the interview and take the anthropometric measurements in a private room. These locations enabled me to gather in one place and interview many women whose ages ranged from 40 to 55 years and who come from different socioeconomic backgrounds.

I conducted two interviews with two groups of women; each group consisted of ten women who belong to the same age group. Each group required five hours of interview time, during which I took each woman’s anthropometric measurement, they each filled out the questionnaire, and I conducted a face-to-face interview with each of the ten women. I asked open-ended questions to the group of women who are either older than 50 years or younger than 45. The interview questions were about the women’s attitude toward the menopausal event, and their knowledge and expectation of the event.

Before requesting the respondents’ permission to conduct the interview, I introduced myself to the group of women as a medical anthropologist graduate student working on her Ph.D. from The Ohio State University in the United States. I informed the women that my research topic is about age at menopause and menopausal symptoms among Saudi women who live in Al-Khobar. I told them about the significance of the research on Saudi’s women’s wellbeing and the consequences of estrogen deficiency on their health and also told them about the significance of their participation in this research, since the information that they provide can help other Saudi Arabian women. I gave each woman a consent form to read, although I did not require them to sign it, since
in Saudi culture the type of information I was asking of them is considered to be private. They therefore gave me their oral consent.

After their consent to participate in the research, I took each woman to the private room one by one, where I took her height, weight, and body mass index measurement and conducted the interview with her. In the private room, the women could feel comfortable to take off their veil and ask me any questions. Following the interview, I answered the respondents’ questions about topics related to the menopausal event, such as the symptoms of menopause and what the remedies are to alleviate the symptoms if any are currently experienced.

The third research setting was my mother’s house and various women’s homes. With most of these women, I have a blood or friendship relationship. First of all, my mother called the women to ask for their permission to conduct the interview. She explained to them my research goals and the process and duration of the interview. After the women agreed, we invited a group of them (usually 10 to 12 women) to meet at my mother’s house or at one of the women’s homes. Two such interviews were conducted at my mother’s house, and two, at friends’ homes.

The respondents’ ages ranged from 40 to 55 years and who come from different socioeconomic backgrounds. I explained the goal of my research and the significance of their participation. I gave them the consent form before starting the interview. After getting their permission I took each woman’s anthropometric measurement in a private room before handing out the questionnaire and clarifying any questions during or after the interview. Usually the interviews took five hours, depending on the number of the participants in the group and whether they had any questions or comments regarding my
research. These interviews took longer than the interviews that I did in the mall and in the Al-Naafa beauty salon, because usually between each interview women would talk to each other and with me about their experiences during the menopausal event or about what their friends and families experienced. Also, serving tea and coffee and food during the interviews extended the time spent in the interview. In contrast, the interviews with the women in the Al-Naafa beauty salon and in the mall took less time because I interviewed them one by one, and not gathered as a group. Furthermore, the location did not encourage lingering and talking longer.

The fourth research setting was a women’s mall in Al-Damam which is only a ten-minute drive from Al-Khobar. I chose this place because, again as at the previous settings, only women can go there. However, this mall is usually frequented by Bedouin women. The mall is entirely for women starting from the gate guard ending with the restaurant food server. The visitors to this mall come from different socioeconomic backgrounds. I went to the mall every evening for two weeks and stayed there for five or six hours, watching the women and trying to guess their ages. I approached the women who I thought were between 40 to 55 years old and introduced myself. I told them about my research topic and goals and the significance of their participation. I then asked them if they would mind participating in my research. Most of them (nine out of ten) agreed to participate in my research.

I had the opportunity many times to interview the mothers, daughters, and their sisters. Most of the women felt comfortable during the interview, because they had plenty of time to answer my questions; they had gone to the mall to spend several hours with their children, friends, and relatives. Each interview took approximately 20 to 30 minutes.
I interviewed from eight to ten women daily for two weeks. After the consent process, I took their anthropometric measurements. And finally after every interview, I answered each respondent’s questions about my research.

Unlike the women whom I interviewed at the salon and in private homes, most of the women at the mall, all of whom were Bedouin, were very welcoming, and helpful. They also indicated that they would be very interested to learn about my findings. They were not self-conscious about their age or about going through menopause. About one third of the women at the salon and almost half of those who were invited to participate in my research and who even came to the private homes where I had arranged a meeting refused in the end to participate in my research. Most of them were modern Hadar, educated, and belonged to the middle class. They all were westernized in their thinking and behavior. Surprisingly, they appeared embarrassed and uncomfortable to admit that they were going through menopause. When they refused to participate in my research, they offered what seemed to be excuses, rather than real reasons, for why they could not participate. For example, one woman said, “What I have to say wouldn’t benefit your research.” Another woman said, “My husband will not allow me to participate.”

6.4. Age at Natural Menopause

During the interview, I asked each woman if she had a menstrual period recently. If she answered no, I asked her age and the year of her last menstrual period to determine her age at natural menopause. According to the WHO scientific group definition, respondents’ menopausal status was classified based on menstrual characteristics as follows: “postmenopause” was defined as no menstrual period in the past 12 months in the absence of previous bilateral oophorectomy; “perimenopause” was defined as
irregular menstrual periods in the past 12 months but not only in the last 3 months; “premenopause” was defined as regular menstrual periods in the past 3 months. This classification of menopausal status is in accordance with the following research: Avis et al. (1993), Boulet et al. (1994), Gold et al. (2000), Hunter et al. (1986), Hunter (1992), Jaszmann (1973), Kuh et al. (1997), Obermeyer et al. (1999), Porter et al. (1996), Sharma and Saxena (1981) and Taffe et al. (1997). Age at menopause and mother’s age at menopause were treated as continuous variables, and menopausal status was treated as a categorical variable.

During the interviews, women were asked to report their mothers’ ages at menopause and to identify their mothers’ menopausal symptoms, if known. Pearson correlation was applied between daughters’ and mothers’ ages at natural menopause.

6.5 Menopausal Factors

In this study menopausal factors that might affect age at natural menopause and menopausal symptoms were analyzed by using the Statistical Package for Social Science (SPSS 10.0, Chicago, IL, USA). One-way ANOVA was conducted to test variation between age at natural menopause and the following factors: anthropometric measures (body mass index); sociodemographic (ethnicity, education, and occupation); reproductive history (age at menarche, past cycle length, number of miscarriages, age at last birth, contraceptive types, and duration of use of contraceptive); and lifestyle (smoking habit, exercise patterns, and exercise types). Because of the small sample size, Independent-Sample t-Test was conducted to test the variations between age at natural menopause and Saudi women’s marital status, family’s annual income, parity, and contraceptive types.
Chi-square analyses were also conducted to test variations between menopausal symptoms and the following factors: anthropometric measurements (body mass index); sociodemographic status (ethnicity, marital status, family’s annual income, education and occupation); reproductive history (parity, number of miscarriages, age at menarche, past cycle length, age at last birth, contraceptive types, and duration of use of contraceptive); and lifestyle (smoking habit, exercise patterns, and exercise types).

This study is consistent with the following cross-cultural research in determining factors that might contribute to early or late age at natural menopause. Ayatollahi et al. (2003), Brambilla and McKinlay (1989), Brand and Lehert (1978), Carda et al. (1998), Cramer et al. (1995), Flint (1976), Ginsburg (1991), Harlow et al. (2000), Kato et al. (1998), Leidy (1991), McKinlay et al. (1984), Meschia et al. (2000), Nagata et al. (2000), Noord et al. (1997), Parazzini et al. (1992), Stanford et al. (1987) and Torgerson et al. (1994).

Means and standard deviations were calculated. Analyses of covariance (ANCOVA) were used to examine the correlation among menopausal factors (sociodemographic, reproductive history, anthropometric measurements, and lifestyle), and age at natural menopause and menopausal symptoms. Parity, number of miscarriages, family annual income, and total reported menopausal symptoms were treated as continuous variables. Sociodemographic factors, reproductive history factors, anthropometrics measures (body mass index), and lifestyle factors were treated as categorical variables. Multivariate regression analyses also were selected to control for the intercorrelations among the variables (reproductive history, lifestyle, body size, and sociodemographic status) as independent variables, and age at natural menopause as the
dependent variable. A stepwise regression analysis was used to examine the correlations between ages at natural menopause and respondents’ reproductive histories. A linear regression was also conducted to examine whether there was a secular trend in age at natural menopause and the respondents’ body mass index. A Pearson’s correlation was applied to examine the association between age at natural menopause and contraceptive history and the duration of contraceptive use. Differences were considered significant at p < 0.05.

6.5.1 Anthropometric Measurement

Following the standard anthropometric techniques in Lohman et al. (1988), each participant’s height and weight were measured. Women were asked to take off their shoes and to stand erect, heels together, with their head held in the Frankfort horizontal plane in order to measure their heights to the nearest millimeter. After removing their veils, a portable Tanita TBF-521 Body Fat Monitor/Scale was used to measure women’s weight to the nearest kilogram and measure their body mass index (BMI) calculated as weight/height (kg/m²). The following analyses were applied to check for significant differences in age at natural menopause and menopausal symptoms based on women’s height, weight, and body mass index: ANOVA one-way analysis of variance, ANCOVA analysis of covariance, Pearson correlation, and regression analysis.

6.5.2 Sociodemographic Factors

The participants were divided into two ethnic groups, Hadar (N = 126) and Bedouin (N=74), based on the women’s answers during the interview to my question, “to which category do you belong?” Mean age at natural menopause was compared between two groups to examine the relationship between ethnicity and age at natural menopause.
During the interview, the women were asked to identify their present marital status from four categories in the questionnaire under marital status: Single, Married, Divorced, and Widowed.

Independent-Sample t-Test and one-way ANOVA analysis of variance were applied to determine whether there is an association between respondents’ marital status and age at menopause. The questionnaire also asked women their age at marriage based upon the following categories: Younger than 15 years old, Between 16-20 years old, Between 21-25 years, and Older than 25 years old.

The women were asked to state their educational level during the interview and to select among the following categories: None, Primary, Middle school, Secondary, and University and higher. In addition, women were asked for their current employment and to choose among the following categories: Never worked, Used to work, and Currently working. Moreover, women were asked to indicate their present family annual income levels. Age at natural menopause was analyzed for variation based on level of education, employment history, and present family income. Regression analysis was applied to determine significant differences between menopausal symptoms and sociodemographic factors. ANOVA one-way analysis of variance was applied to assess the variation in age at menopause in each of the sociodemographic factors’ categories.

6.5.3 Reproductive History Factors

Age at menarche was assessed during the interview by asking the women when their first menstrual period started. The women were asked to choose one of the following categories: Under 13 years old; 13 years old, and Older than 13 years old. The classification of women’s age at menarche was done using the methods proposed by
Garrido-Latorre et al. (1996). Furthermore, the classification of women’s age at menarche based on the feasible research that I conducted in Saudi Arabia in 2002 showed that 13 years old was the most often reported age at menarche among Saudi women. Moreover, Leidy’s (1991) research among the Green county women and Hidayet et al.’s study (1999) among women who live in Alexandria, Egypt showed that most women reported that their age at menarche was 13 years old. Accordingly, in order to minimize women’s recall bias in reporting their age at menarche in this research, I used three categories in my survey. The mean age at natural menopause was compared between the groups. One-way ANOVA analysis of variance was applied to determine the variation among the groups. Pearson correlation coefficient was employed to determine whether there is an association between age at menopause and age at menarche among the participants.

Women were asked how many children they had and how many miscarriages they had experienced as well as their use, types, and duration of contraceptives. The contraceptive categories included pills, intra-uterine device, and coitus interruptus. The categories for the use of contraception ranged from Never used to Currently using. And women were asked to report the duration of the oral contraceptive that ranged from Less than a year to More than eight years. ANOVA one-way analysis of variance, ANCOVA analysis of covariance, Pearson Correlation, and regression analysis were applied to determine significant differences in age at natural menopause within and among each of the reproductive history categories.
6.5.4 Lifestyle Factors

Age at natural menopause was compared between smokers and non-smokers in the study. Smoking was determined by asking women if they smoked and for how long. T-test was applied to assess the significant differences between the women’s smoking habits and age at natural menopause. Women were asked whether or not they exercised within a year prior to the interview, and if so, they had to choose the type of exercise such as walking, swimming, and aerobics. Multiple regression analysis, Pearson Correlation, ANOVA one-way analysis were applied to estimate the influence of independent variables (body mass index and lifestyle factors) on age at natural menopause and menopausal symptoms.

6.6 Menopausal Knowledge, Attitudes, and Symptoms

In this study women were asked to relay their knowledge about menopause in an essay question and to identify the source of their knowledge by choosing among four categories: Family, Media, Friends, and Health professionals. More importantly, the questionnaire ascertained their attitudes toward menopause by selecting one or more from the following categories: As a disease, As a normal transition to postreproductive life, and As a sign of aging. In order to limit the period of recall during the interview, women were asked to report any unusual signs or problems within the prior three months that would indicate the commencement of menopause, such as, irregular menstruation, hot flashes, and anger. This method was adapted from the following research: Avis et al. (1993), Kaufert et al. (1988) and Lock and Kaufert (2001).

Menopausal symptoms in this study were grouped into four main categories according to the origin of the symptoms that were believed to be the outcome of
interaction between endocrinological, psychosocial, and cultural factors during
menopausal event: vasomotor (hot flashes, night sweats, and palpitation); somatic
(numbness, dizziness, bone pains, headache, fatigue, shortness of breath, and bleeding);
sexual behavior (loss of sexual desire, vaginal dryness, and loss of urinary control); and
psychological disorders (irritability, depression, anger, sleeping difficulty, difficulty
concentrating, and memory loss). This classification was elicited from the following
conducted studies: Al-Qattan and Alexander (1996), Avis et al. (1993), Baum (1990),
Boulet et al. (1994), Dusitsin and Snidvongs (1994), Greene (1976), Holte and Mikkelsen
(1991), Hunter et al. (1986), Hunter (1992), Kaufert et al. (1988), Kuh et al. (1997),
Malacara et al. (2002), McCoy (1990), McCraw (1991), McKinlay and Jefferys (1974),

All symptoms were recoded as being absent or present without any assessment of
their frequency or intensity in accordance with Avis et al. (1993), Kaufert et al. (1988),
Lock et al. (1988), McKinlay (1989) and Wasti et al. (1994). Multiple and linear
regression analyses, ANOVA one-way analysis of variance, ANCOVA analysis of
covariance, Pearson correlation coefficients, and t-test were applied to examine the
significant correlations and differences in age at natural menopause and symptoms of
menopause among and within these groups.
CHAPTER 7

RESULTS AND DISCUSSIONS I:
FACTORS THAT DETERMINE AGE AT NATURAL MENOPAUSE

This chapter gives and discusses the descriptive statistical results of the determinants of age at menopause among Saudi Arabian women. It first presents Saudi women’s mean and median age at natural menopause and establish whether there is a genetic determinant between mothers and daughters and their age at menopause. Second, it gives and discusses the symptoms that the respondents’ mothers experienced during the menopausal event. Third, the chapter describes the significant and non-significant relationship between the age at menopause and menopausal factors (anthropometrics, sociodemographic, reproductive history, and lifestyle), explaining any variations between my findings and the findings of prior cross-cultural studies on menopause. Finally, multivariate regression analyses are applied to test four independent variables (reproductive history, lifestyle, body size, and sociodemographic status) with age at natural menopause as the dependent variable.
7.1 Mean and Median Age at Natural Menopause

7.1.1 Results

In the current study, 156 (78.5%) of the initial 200 participants reported that their menstruation did not cease for consecutive 12 months. As shown in Table 7.1, age at natural menopause was reported by 44 women (including two women who had hysterectomies at ages 45 and 54 years old). Age at last menstrual period ranged between 40 and 55 years old. Age at natural menopause was reported by eight women at age 40; four women each at ages 45, 47, and 51; six women at age 53; and three women at age 55 (Table 7.1). The mean age at natural menopause was 48.06 years (SD 4.8), the median age at natural menopause among Saudi women was 49.0 years (SD 4.8), and the mode was 40 years (Table 7.2).

<table>
<thead>
<tr>
<th>Age at Natural Menopause</th>
<th>N = 44</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.0</td>
<td>8</td>
<td>4.0</td>
</tr>
<tr>
<td>45.00</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>46.00</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>47.00</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>48.00</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>49.00</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>50.00</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>51.00</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>52.00</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>53.00</td>
<td>6</td>
<td>3.0</td>
</tr>
<tr>
<td>54.00</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>55.00</td>
<td>3</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Table 7.1: Distribution of age at natural menopause.
Mean age at menopause (N = 44) 48.06  
Median age at menopause (N = 44) 49.0  
SD 4.8

Table 7.2: Mean and median age at natural menopause.

Figure 7.1: Distribution in recalled age at natural menopause.
Figure 7.1 shows the distribution of age at natural menopause among women in Al-Khobar. As can be seen in this figure, there is no continuous increase between the respondents’ ages and their ages at natural menopause. In this rectangle distribution, the respondents’ ages at menopause range from 40 years old to 55 years old. As shown in Figure 7.1, age at natural menopause was most frequently reported by women who reached menopause at 40 years old, followed by women who reached menopause at 53 years old. No respondent reported her age at natural menopause between 41 and 44 years.

### 7.1.2 Discussion

In this study, the mean age at natural menopause was 48.06 years among Saudi Arabian women in Al-Khobar, which is comparable to the following studies: Ayatollahi et al. (2003) in Iran, Bener et al. (1998) in the United Arab Emirates, Kwawukume (1993) in Ghana and Malacara et al. (2002) in Mexico. Other studies show variations in reported age at menopause: 50.9 years among Norwegian women (Holte 1992), 49.3 years in Greene County, New York (Leidy 1991), and 44.3 years among Mayan women (Martin et al. 1993).

According to Al Qattan and Alexander’s (1996) clinical study in Kuwait, the median age of natural menopause for Kuwaiti women was 49.5 years, relatively similar to the median age at menopause for Saudi women in the current study, which was 49.0 years, and one year later than the median age at menopause among Nigerian women, which was 48 years (Okonofua et al. 1990). Similar to the differences in mean age at menopause that the previous studies reported above, the median age at natural menopause also shows variations in cross-culturally conducted research (Table 7.3).
<table>
<thead>
<tr>
<th>Population</th>
<th>Age at menopause</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croatia</td>
<td>52.1 years</td>
<td>Fistonic et al. 2004</td>
</tr>
<tr>
<td>Ghana</td>
<td>48 years</td>
<td>Kwawukumne 1993</td>
</tr>
<tr>
<td>Greek</td>
<td>47 years</td>
<td>Beyene 1993</td>
</tr>
<tr>
<td>Iran</td>
<td>48 years</td>
<td>Ayatollahi et al. 2003</td>
</tr>
<tr>
<td>Mayan</td>
<td>44.3 years</td>
<td>Martin et al. 1993</td>
</tr>
<tr>
<td>Mexico</td>
<td>46.5 years</td>
<td>Garrido-Latorre 1996</td>
</tr>
<tr>
<td>Mexico</td>
<td>48 years</td>
<td>Malacara et al. 2002</td>
</tr>
<tr>
<td>Norway</td>
<td>50.9 years</td>
<td>Holte 1992</td>
</tr>
<tr>
<td>Pakistan</td>
<td>49.3 years</td>
<td>Badaruddin et al. 1993</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>48 years</td>
<td>Bener et al. 1998</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>49.3 years</td>
<td>Leidy 1991</td>
</tr>
<tr>
<td>Australia</td>
<td>51 years</td>
<td>Walsh 1978</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>51 years</td>
<td>Magursky et al. 1975</td>
</tr>
<tr>
<td>Finland</td>
<td>51 years</td>
<td>Luoto et al. 1994</td>
</tr>
<tr>
<td>Kuwait</td>
<td>49.5 years</td>
<td>Al Qattan and Alexander 1996</td>
</tr>
<tr>
<td>Nigeria</td>
<td>48 years</td>
<td>Okonofua et al.1990</td>
</tr>
<tr>
<td>Seven Southeast Asian</td>
<td>51 years</td>
<td>Visser et al. 1994</td>
</tr>
<tr>
<td>countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.A.</td>
<td>51 years</td>
<td>Stanford et al. 1987</td>
</tr>
</tbody>
</table>

Table 7.3: Mean and median ages at natural menopause in various populations.

As Garrido-Latorre et al. (1996) suggest, the previous variations in reported ages at menopause across cultures can be attributed to methodological problems such as “biased sample selection, retrospective recall errors, and inappropriate statistical analysis” (Gray 1976: 30). Variations in reported ages at natural menopause can also be
attributed to genetic background, biocultural factors, such as lifestyle, diet, infectious
disease, general health, and socioeconomic status, such as malnutrition, contaminated
environment, and difficulty to access medical care (Beyene 1986; Goodman 1980;

7.2 Mother’s Age at Menopause

7.2.1 Results

Out of 200 participants, 105 women were able to recall their mothers’ ages at
menopause, and 95 women said that they did not know when their mothers’ last
menstrual period occurred. Table 7.4 shows that there was no statistically significant
association (F = 0.274, p < 0.05) between daughters’ and mothers’ mean ages at
menopause among Saudi Arabian women. This finding might be due to the research
sample size and to the recall bias. Senior women might not be certain when they recall
their age at last menstruation (Gray 1976; MacMahon and Worcester 1966; McKinlay
1973; Paganini-Hill 1984). As Figure 7.2 illustrates, age heaping is common with women
recalling their mothers’ ages at menopause. It is normal for demographic findings to have
groups’ reported ages cluster at marginal intervals. The histogram shape presents that
there is no continuous increase in the respondents’ mothers’ ages at natural menopause.
The respondents’ mothers reached menopause at an average age of 49.9 years; few
women reported that their mothers’ ages at menopause were between 35, 43, 48, 53, and
65 years.
<table>
<thead>
<tr>
<th>Daughters’ mean age at menopause (N=17)</th>
<th>Mothers’ mean age at menopause (N=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>46.8 (SD 4.9)</td>
<td>49.9 (SD 4.8)</td>
</tr>
</tbody>
</table>

ANOVA: Not significant, $F = 0.274$, $p = 0.608$

Table 7.4: Daughters’ and mothers’ mean ages at natural menopause.

Figure 7.2: Distribution in mothers’ ages at natural menopause
7.2.2 Discussion

Comparable to my study, Leidy (1991), who conducted research among Green County, New York, women, demonstrated that out of 376 women, only 94 respondents knew their mothers’ ages at menopause with confidence. She found no significant linear association between daughters’ and mothers’ ages at natural menopause ($r = 0.248, p = 0.074$). Mean age at natural menopause in her study for the mothers was 48.9 years, ranging from 30 to 62 years old.

Premature menopause or premature ovarian failure refers to women whose menstruation ceases at age 40 or earlier. As several investigations have indicated, premature menopause cannot be determined by genetic factors alone. For example, even though fetuses with a single X chromosome, as in Turner’s syndrome, develop normal ovaries with complement primordial follicles, they experience ovarian failure because of the process of atresia (Cramer 1996; Howard 1990; Odell and Burger 2001; Torgerson 1997). In contrast, Bates (1990), Fitch et al. (1982) and Krauss et al. (1987) reported that women with partial deletion in the long arm of the X-linked chromosome reported early age at menopause and a family history of early menopause in two or more generations.

7.3 Mothers’ Menopausal Symptoms

7.3.1 Results

The most frequent menopausal symptoms of Saudi Arabian mothers that were reported by the 105 participants were as follows: 23 (22%) mothers experienced irregular bleeding; 12 (11%) mothers experienced depression; 9 (9%) mothers experienced night sweats; and 7 (7%) mothers experienced fatigue. Hot flashes, osteoporosis, anger, or palpitations were not significant symptoms during the mothers’ menopausal transition.
Only 17 daughters had reached menopause and were able to recall their mothers’ age at natural menopause. The average mother’s age of natural menopause was 49.9 years old (S.D. 4.8), ranging from 35 to 65 years old.

7.3.2 Discussion

In her research among Green County, New York, women, Leidy (1991) reported that 85 respondents (40%) recalled that hot flashes were the most bothersome menopausal symptom for their mothers, and 65 respondents (31%) recalled their mothers’ menopausal symptoms included psychological symptoms such as irritability, depression, and crying episodes. Twenty-seven respondents said that their mothers never discussed with them their menopause, and 23 women wrote that their mothers did not complain of any symptoms during the menopausal transition.

Compared to Leidy’s (1991) findings, the results of my study show that hot flashes, which are considered very significant among the Green County women, did not appear to be significant among the Saudi Arabian women whom I interviewed. This contrast is also true for the psychological symptoms during the menopausal event. Only 11% of the Saudi women, compared to 31% of the Green County women reported having experienced depression.

The above findings might be due to the research sample size as well as to cultural norms in Saudi Arabia where menopause is considered to be a natural physiological event that older women have to cope with, without complaining. As the women said to me during the interviews, they accept menopause as “God’s will.” Senior women used the Arabic expression, “Sin Al-Ya’as” (tr. “the desperate age”), when they referred to menopause. As this expression implies, menopause is treated as a private issue that
women do not discuss even with their daughters. That is why they cannot recall any unusual social behavior of their mothers.

7.4 Anthropometric measures

7.4.1 Body Size

7.4.1.1 Results

As Table 7.5 illustrates, there were no significant relationships between ages at menopause and the respondents’ heights. However, mean age at menopause shows a trend of later ages with taller women. On the other hand, the respondents’ weight and age at menopause were significantly associated ($F = 2.85, p = 0.04$). There is an inverse relationship between the respondents’ weight and age at natural menopause, respondents with an average weight between 80 kg. and 163 kg. reached menopause earlier than the respondents whose average weight was between 60.0 kg. and 73.0 kg. (Table 7.6).

<table>
<thead>
<tr>
<th>Height (cm)</th>
<th>N = 44</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>137 - 149</td>
<td>9</td>
<td>47.22</td>
<td>5.04</td>
</tr>
<tr>
<td>150 - 159</td>
<td>24</td>
<td>48.00</td>
<td>4.12</td>
</tr>
<tr>
<td>160 - 173</td>
<td>11</td>
<td>48.91</td>
<td>6.20</td>
</tr>
</tbody>
</table>

ANOVA: Not significant, $F = 0.30$, df = 2, $p = 0.74$

Table 7.5: Mean age at natural menopause and respondent’s height.
<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>N = 44</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.0-59.5</td>
<td>2</td>
<td>45.50</td>
<td>0.70</td>
</tr>
<tr>
<td>60.0-66.0</td>
<td>7</td>
<td>50.33</td>
<td>3.44</td>
</tr>
<tr>
<td>71.0-73.0</td>
<td>11</td>
<td>53.60</td>
<td>0.89</td>
</tr>
<tr>
<td>80.0-87.5</td>
<td>13</td>
<td>46.53</td>
<td>4.33</td>
</tr>
<tr>
<td>90.0-136.0</td>
<td>11</td>
<td>48.00</td>
<td>5.76</td>
</tr>
</tbody>
</table>

ANOVA: Significant, F = 2.85, df = 4, p = 0.04

Table 7.6: Mean age at natural menopause and respondent’s weight.

7.4.1.2 Discussion

Similar to my results, Kirchengast et al.’s (1999) study showed that there is a relationship between anthropometric parameters and age at menopause. Postmenopausal body fat, lean soft tissue mass, and postmenopausal bone mineral content were related significantly to the age at menopause. However, Kirchengast et al.’s findings are inverse to my study findings. In their study, women who were significantly taller and heavier reached menopause later than at 51 years old compared to lean women, whose menopause occurred early. These differences according to Kirchengast (1993) can be attributed to the higher portion of estrogen in heavier women that results from the aromatization process that transforms androgens to estrogens, which takes place in the adipose tissue (Bulun et al. 1999).
Similar to my findings, Stanford et al.’s (1987) research in Baltimore, van Noord et al.’s research (1997) in the Netherlands and Fistonic et al.’s study (2004) in Croatia showed no significant associations among respondents’ height and reported age at natural menopause. Comparable to my findings, Brand and Lehert’s (1978) research findings showed that women in the Netherlands who are 155 cm tall or taller reported later age at menopause than women who are less than 155 cm tall. However, unlike my findings, Brand and Lehert’s (1978) research findings showed a significant relationship between height and age at menopause.

Scragg’s (1973) research in New Guinea showed that undernourished women with an average height of 144.5 cm and average weight of 40.22 kg reported age at menopause approximately four years earlier (43.6 years) than better nourished women (47.3 years) with an average height of 153.8 cm and average weight of 51.4 kg. In my study among Saudi Arabian women undernourishment was not an issue, since many of the women I interviewed were in fact overweight. Therefore I could not make a comparison between the ages at menopause and the women’s nutrition status.

7.4.2 Body Mass Index

7.4.2.1 Results

Although body mass index differed among Saudi women, there were no significant statistical associations in mean ages at menopause between the two groups. Age at menopause appeared to decrease with the respondents’ higher rate of body mass index (BMI = 40.0 and higher) (Table 7.7). There was no correlation between age at menopause and the respondents’ BMI ($r = -0.20$, $p < 0.01$).
<table>
<thead>
<tr>
<th>Body mass index</th>
<th>N = 44</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity class 1 &amp; 2</td>
<td>11</td>
<td>50.09</td>
<td>3.83</td>
</tr>
<tr>
<td>Obesity class 3</td>
<td>33</td>
<td>47.39</td>
<td>4.95</td>
</tr>
</tbody>
</table>

**t-test:** Not significant, $F = 0.96$, $p = 0.33$

Table 7.7: Mean age at natural menopause and obesity class category.

### 7.4.2.2 Discussion

A longitudinal study is preferable research design than a cross-sectional study in determining the respondents’ body mass index, because I did not get any information regarding the respondents’ weight gain and/or loss across their lifespan that might affect their age at menopause. Furthermore, my research did not consider the dietary history components of the respondents during the pre-and postmenopausal event. Since high estrogen levels are associated with high fat intake (Bennet *et al*. 1990; Kaneda *et al*. 1997; Prentice *et al*. 1990), the respondents might have reported earlier age at menopause based on their fat consumption that might affect estrogen metabolism through changing the function of the hypothalamic-pituitary gonadal axis (Nagata *et al*. 1998).

Bedouin women usually eat red meat more than four times weekly compared to only one to two times a week for Hadar women. Hadar women prefer chicken, fish, and
vegetarian foods. The Bedouin population used to live in the desert and completely depended on their livestock, such as camels, sheep, chickens, and goats as well as on wild plants for their living. It was uncommon for Bedouins to eat fish, and they still do not value fish much. Bedouins consider red meat from camel and sheep as the most valuable food source that has a high nutritious value, which they say, only wealthy people can afford to eat. For example, a Bedouin family will show how much they value their guest by serving them red meat.

Similar to my study, Brambilla and McKinlay (1989), Fistonic et al. (2004), Luoto et al. (1994) and Malacara et al.’s (2002) investigations indicated that body mass index did not have influence on age at natural menopause. Comparable to my findings, Beser et al.’s (1994) results showed that obese women had a significantly earlier one-year age of natural menopause than non-obese women. However, in my study, this relationship was statistically not significant. They concluded that obese women have high concentrations of endogenous estrogens coupled with low levels of sex hormone-binding globulin, which leads to follicular growth, leading to more rapid follicular exhaustion and thus contributing to an earlier age at natural menopause among obese women.

(1985) stated that malnourished women tend to approach the age at menopause relatively earlier because of the fewer numbers of ovarian oogonia. As can be seen from these studies, there is a wide variation in the relationships between BMI and age at menopause. These variations can be attributed to biocultural factors, anthropometric methods, and the respondents’ recall bias.

7.4.3 Multivariate Regression Analysis

A multivariate regression analysis model was applied to test the relationship between the respondents’ body size (height, weight, body mass index) and their age at natural menopause.

7.4.3.1 Results

The multivariate regression analysis model was not significant between the respondents’ anthropometric measurements and reported age at natural menopause ($F = 1.31, p < 0.01$). There were positive insignificant correlations between the respondents’ height ($r = 0.12, p = 0.38$) and weight ($r = 0.03, p = 0.35$) and age at natural menopause, while the respondents’ body mass index had a negative correlation with age at natural menopause ($r = -0.20, p = 0.08$). Anthropometric measurements in this model explained 22% of variation in the respondents’ ages at natural menopause ($R^2 = 0.22$) (Table 7.8).
### Anthropometric measurements

<table>
<thead>
<tr>
<th></th>
<th>Correlation coefficients</th>
<th>F</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>0.12</td>
<td>0.87</td>
<td>0.38</td>
</tr>
<tr>
<td>Weight</td>
<td>0.03</td>
<td>0.93</td>
<td>0.35</td>
</tr>
<tr>
<td>Body mass Index</td>
<td>-0.20</td>
<td>-1.79</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Table 7.8: Variables entered into a linear regression model of variance in age at natural menopause and the respondents’ body size.

7.5 **Sociodemographic Factors**

7.5.1 **Ethnicity**

7.5.1.1 **Results**

Even though Bedouin and Hadar women reported relatively similar ages at menopause, there was no significant relationship between the mean age at natural menopause and ethnicity. This might be due to the small (N = 200) sample size of Hadar (N = 11) and Bedouin (N = 33) women who reached menopause, which might not be sufficient numbers to detect any statistically significant relationships between ethnicity and age at natural menopause (Table 7.9).
Table 7.9: Mean age at natural menopause and ethnicity.

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>N</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedouin</td>
<td>11</td>
<td>48.27</td>
<td>5.74</td>
</tr>
<tr>
<td>Hadar</td>
<td>33</td>
<td>48.00</td>
<td>4.53</td>
</tr>
</tbody>
</table>

t-test: Not significant, $F = -0.16, p = 0.87$

7.5.1.2 Discussion

Similar to my findings, the following research did not find any significant relationship between ethnicity and age at natural menopause: Goodman et al. (1978) among four ethnic groups in Hawaii, MacMahon and Worcester (1966) among American women, Okonofue et al. (1990) among Nigerian women, Stanford et al. (1987) among American women and Walker et al. (1984) among South African women.

However, in contrast to my findings, Bramson (1960) among South African Zulu women, Benjamin (1960) among South African women, Cramer (1996) and Kato et al. (1998) among American women and Frere (1971) among South African Bantu-speaking women reported a significant association between ethnicity and age at menopause. These previous investigations, which were also conducted on ethnic groups as in my study, indicated that there may be genetic predispositions that involve changes in ovarian function, which contribute to earlier or later menopausal age.
I expected in this study that there would be a difference in age at natural menopause between Hadar and Bedouin women, because they have different genetic makeups as well as different life histories. The Bedouin mainly descended from “Aljazerah Alarabia,” in the Nejd in the Arabian Island, whereas Hadar descended from the Arabian Island as well as from Egypt, Africa, the Arabian Peninsula, Iraq, Iran, the Far East, and etc. Moreover, reproductive histories differ between Bedouin and Hadar women, because Bedouin women tend to have an average of seven children compared to Hadar women, who average four children. Also, consanguinity (marrying within one’s own family) is seen more frequently among Bedouins and among Saudi Arabian women of African descent.

7.5.2 Marital Status

7.5.2.1 Results

The mean age at natural menopause does vary significantly between married and unmarried (single, divorced, and widowed) women ($t = 3.8$, $p < 0.05$) (Table 7.10). Married women reported age at natural menopause approximately four years earlier than unmarried women.
Marital status | N = 44 | Mean age at menopause | SD
---|---|---|---
Married | 30 | 46.8 | 4.9
Unmarried | 14 | 50.7 | 3.16

t-test: Significant $F = 3.8$, $p = 0.05$

Table 7.10: Mean age at natural menopause and marital status.

7.5.2.2 Discussion

As in my findings, the following investigations show a significant relationship between the respondents’ reported ages at natural menopause and their marital status (Beser et al. 1994; Brambilla and McKinaly 1989; Jaszmann et al. 1969; Leidy 1991; McKinlay and Jefferys 1972; Whelan et al. 1990). Previous researchers proposed that age at natural menopause can be determined by women’s marital status due to the sexual activity that causes a fluctuation in their endocrinology by increasing the level of estrogen circulating that can either accelerate or slow down the rate of follicular atresia (Cutler et al. 1987). I assume that the significant association between respondents’ marital status and age at menopause in my study might be due to biocultural factors. Since Saudi Arabia is a conservative society and Islam prohibits any sexual relationship between men and women before marriage. Only married women use birth control
methods, experience miscarriages, and become pregnant; thus, age at menopause might be significantly associated with women’s reproductive history in my study.

Unlike the findings in my study, Benjamin (1960), Fistonic et al. (2004), Johnston (2001), Lilienfield (1956), Meschia et al. (2000), Nagata et al. (1998), Seckin Neslihan et al. (1998) and Worcester (1966) indicated no association between marital status and age at natural menopause. The authors attributed these differences in the age at menopause could be due more to genetic differences than to demographic factors (Garrido-Latorre et al. 1996) (Table 7.11).
<table>
<thead>
<tr>
<th>Location</th>
<th>Significant association</th>
<th>No significant association</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Africa</td>
<td>Not significant</td>
<td>Benjamin (1960)</td>
<td></td>
</tr>
<tr>
<td>Not available</td>
<td>Significant</td>
<td>Beser et al. (1994)</td>
<td></td>
</tr>
<tr>
<td>Not available</td>
<td>Significant</td>
<td>Brambilla and McKinaly (1989)</td>
<td></td>
</tr>
<tr>
<td>Croatia</td>
<td>Not significant</td>
<td>Fistonic et al. (2004)</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>Significant</td>
<td>Jaszmann et al. (1969)</td>
<td></td>
</tr>
<tr>
<td>Blackfeet Native Americans</td>
<td>Not significant</td>
<td>Johnston (2001)</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>Significant</td>
<td>Leidy (1991)</td>
<td></td>
</tr>
<tr>
<td>Not available</td>
<td>Not significant</td>
<td>Lilienfield (1956)</td>
<td></td>
</tr>
<tr>
<td>Not available</td>
<td>Significant</td>
<td>McKinlay and Jefferys (1972)</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>Not significant</td>
<td>Meschia et al. (2000)</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>Not significant</td>
<td>Nagata et al. (1998)</td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>Not significant</td>
<td>Seckin Neslihan et al. (1998)</td>
<td></td>
</tr>
<tr>
<td>Not available</td>
<td>Significant</td>
<td>Whelan et al. (1990)</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>Not significant</td>
<td>Worcester (1966)</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.11: Comparison of cross-cultural findings by age at natural menopause according to the respondents’ marital status.
7.5.3 Education

7.5.3.1 Results

As Table 7.12 illustrates, women who had no education and women with 12 years of education reported similar age at menopause (48.15 years) and reported later age at menopause compared with women who had more than 12 years of education (47.06 years). However, age at natural menopause did not vary significantly with women’s level of education.

<table>
<thead>
<tr>
<th>Education</th>
<th>N</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>19</td>
<td>48.15</td>
<td>5.19</td>
</tr>
<tr>
<td>Primary &amp; Middle School</td>
<td>19</td>
<td>48.15</td>
<td>4.63</td>
</tr>
<tr>
<td>High School &amp; University and higher</td>
<td>6</td>
<td>47.06</td>
<td>4.84</td>
</tr>
</tbody>
</table>

ANOVA: Not significant, F = 0.046, df = 2, p = 0.95

---

Table 7.12: Mean age at natural menopause and education.
7.5.3.2 Discussion

Similar to my study, the following studies found that educational level did not have any significant influence on the age at natural menopause: Bener et al. (1998) in the UAE, Chompootweep et al. (1993) in Bangkok, Fistonic et al. (2004) in Croatia, Jaszmann et al. (1969) in the Netherlands, Johnston (2001) among Blackfeet Native American women, Meschia et al. (2000) in Italy and Seckin Neslihan et al. (1998) in Turkey.

McKinlay et al. (1985), Stanford et al. (1987), Beser et al. (1994) and Luoto et al. (1994) reported an inverse association between respondents’ educational status and age at natural menopause. In contrast, Bromberger et al. (1997), Garrido-Latorre (1996) and Luoto et al. (1994) indicated that there was a parallel association between the respondents’ level of education and their ages at menopause. Respondents with lower educational levels reported an early age at menopause compared to respondents with higher educational levels. The variation in the findings of these studies might be due to the interaction between intrinsic (biological/genetic) and extrinsic (environment, diet, and culture) factors that determined age at menopause. Moreover, methodological problems also might be attributed to the variation in the studies’ findings such as sample size, data gathering techniques, and different statistical packages for analyzing their data. Therefore, it is difficult to identify education alone as a factor that determines age at natural menopause.
7.5.4 Occupation

7.5.4.1 Results

Age at natural menopause varied significantly among women depending on their employment status (Table 7.13). The reported mean age at natural menopause was earlier (43.1 years) among women who used to work, followed by women who had never worked before (48.8 years old). Currently working women reported age at natural menopause relatively later than the previous groups (49.6 years).

<table>
<thead>
<tr>
<th>Occupation</th>
<th>N = 44</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never worked</td>
<td>29</td>
<td>48.82</td>
<td>4.47</td>
</tr>
<tr>
<td>Currently working</td>
<td>8</td>
<td>49.62</td>
<td>4.20</td>
</tr>
<tr>
<td>Used to work</td>
<td>7</td>
<td>43.14</td>
<td>4.14</td>
</tr>
</tbody>
</table>

ANOVA: Significant, $F = 5.36$, df = 2, $p = 0.00$

Table 7.13: Mean age at natural menopause and occupation.

7.5.4.2 Discussion

The significant association between the respondents’ occupational status and age at natural menopause in my study might be due to integration between other factors.
(reproductive history, lifestyle, and genetic background) and women’s occupational status that affects their endocrinological feedback as well as their ovarian function, which contributes to an earlier or later menopausal age. The women who used to work, whose mean age at menopause is significantly lower than the others, are usually Hadar women, who tend to work in public offices, while Bedouin women traditionally tend to be housewives.

Comparable to my results, Luoto et al. (1994) and Johnston’s (2001) studies found that there was a significant linear association between age at natural menopause and the respondents’ employment status. Luoto et al.’s (1994) research in Finland showed that white-collar women reported earlier age at menopause compared to women who belong to other sociodemographic groups (farmers, blue-collar service workers, and homemakers). Again similar to my findings, Luoto et al.’s (1994) findings showed that currently employed women reported later age at menopause than unemployed women. In contrast, the following studies demonstrated no significant relationship between employment status and age at menopause: Fistonic et al. (2004) among Croatian women and Seckin Neslihan et al. (1998) among Turkish women (Table 7.14).
<table>
<thead>
<tr>
<th>Location</th>
<th>Significant positive association</th>
<th>Significant negative association</th>
<th>No significant association</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croatia</td>
<td></td>
<td></td>
<td>No significant association</td>
<td>Fistonic et al. (2004)</td>
</tr>
<tr>
<td>Blackfeet Native Americans</td>
<td>Significant</td>
<td></td>
<td></td>
<td>Johnston (2001)</td>
</tr>
<tr>
<td>Finland</td>
<td>Significant</td>
<td></td>
<td></td>
<td>Luoto et al. (1994)</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td></td>
<td>No significant association</td>
<td>Seckin Neslihan et al. (1998)</td>
</tr>
</tbody>
</table>

Table 7.14: Comparison of cross-cultural findings by age at natural menopause according to the respondents’ employment status.

### 7.5.5 Family’s Annual Income

#### 7.5.5.1 Results

The results of the independent-sample t-test suggest that age at natural menopause was not significantly associated with the Saudi women’s family’s annual income. Twenty women whose family’s annual income was 32 thousand Riyals or under (1.00 SAR = 0.266 USD), which places them in a lower socioeconomic status, reported natural menopause relatively later (48.35) than the women whose family income was more than 32 thousand Riyals (Table 7.15).
Table 7.15: Mean age at natural menopause and family’s annual income.

<table>
<thead>
<tr>
<th>Family’s annual income</th>
<th>N = 44</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 32 thousand Riyals</td>
<td>20</td>
<td>48.35</td>
<td>4.40</td>
</tr>
<tr>
<td>Over 33 thousand Riyals</td>
<td>24</td>
<td>47.83</td>
<td>5.19</td>
</tr>
</tbody>
</table>

\[ t\text{-test: Not significant, } F = 1.59, \quad p = 0.21 \]

7.5.5.2 Discussion

My findings are consistent with Leidy (1991), MacMohan et al. (1960), McKinley et al. (1972), Okonofue et al. (1990), Thompson et al. (1973) and Wasti et al.’s (1994) findings that despite the variations among the women’s families’ annual income, the mean age at natural menopause did not vary significantly among the groups (Table 7.15). However, in the case of my study, family’s annual income might not be considered a significant determinate on age at menopause by itself, because poverty is not an issue in Saudi Arabian society. The majority of Saudi citizens’ economic status can be categorized as “Middle Class.” The lower income families receive help from both the government and from other sources because one of the five pillars of Islam, zakat,
commands Muslims to give a portion of their income to the poor every year. Therefore, family income would most likely not affect the women’s nutritional status.

Unlike my findings, Brambilla and McKinlay (1989), Garrido-Latorre (1996), Johnston (2001), Randhawa et al. (1987), Soberon et al. (1966), Stanford et al. (1987), van Noord et al. (1997), Vries et al. (2001) and Wyon et al.’s (1966) investigations found a positive association between age at natural menopause and the family’s annual income; women who had a higher family income tended to report later age at menopause.

Similarly, Luoto et al.’s (1994) study presented the influence of the sociodemographic factors on the mean age at menopause among Finnish women. In Finland, the mean age at menopause was 53.5 years for the upper white-collar women (upper-level employees with administrative, managerial, and professional), compared to 51.9 years for lower white-collar workers (supervisors, technicians, programmers), and 51.0 years for the homemakers. These results as the authors suggest may be due to high education levels since educated women began using hormones more often for perimenopausal symptoms than women with less education. Thus, highly educated women with later age at menopause would be classified as hormone users more often than less educated women, resulting in the differences in age at menopause.

7.5.6 Multivariate Regression Analysis

A multivariate regression analysis model was applied to test the relationship between the respondents’ sociodemographic factors (ethnicity, marital status, education, occupation, and family annual income) among the Saudi women in Al-Khobar and age at natural menopause.
7.5.6.1 Results

Age at natural menopause was not significantly associated with reproductive history factors ($F = 2.02, p < 0.01$). The respondents’ ages at natural menopause negatively correlated with ethnicity ($r = -0.02, p = 0.87$), education ($r = -0.14, p = 0.53$), occupation ($r = -0.35, p = 0.02$), and family’s annual income ($r = -0.01, p = 0.38$); and positively correlated with marital status ($r = 0.26, p = 0.14$). Only the respondents’ employment status had a significant negative correlation with age at natural menopause ($r = -0.35, p < 0.01$). Sociodemographic factors according to the multivariate regression analysis explained only 10.6% of variation of the respondents’ ages at natural menopause ($R^2 = 0.106$) (Table 7.16).

<table>
<thead>
<tr>
<th>Sociodemographic factors</th>
<th>Correlation coefficients</th>
<th>F</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td>-0.025</td>
<td>-0.15</td>
<td>0.87</td>
</tr>
<tr>
<td>Education</td>
<td>-0.140</td>
<td>0.62</td>
<td>0.53</td>
</tr>
<tr>
<td>Occupation</td>
<td>-0.359</td>
<td>-2.43</td>
<td>0.02</td>
</tr>
<tr>
<td>Marital status</td>
<td>0.269</td>
<td>1.48</td>
<td>0.14</td>
</tr>
<tr>
<td>Family annual income</td>
<td>-0.010</td>
<td>0.87</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Table 7.16: Variables entered into a linear regression model of variance in age at natural menopause and sociodemographic factors.
7.6 Reproductive History Factors

7.6.1 Age at Menarche

7.6.1.1 Results

Age at menopause according to Table 7.17 did not vary significantly by age at menarche. In this study, the mean ages at menopause of Saudi women whose age at first menstruation was 13 and over 13 years were closer. Saudi women, whose first menstruation was under 13 years, reached menopause relatively earlier (47.5 years) than did the other groups (48.2 and 48.7 years). There was no significant correlation between age at natural menopause and the age at menarche among the respondents ($r = -.109$, $p < 0.05$).

<table>
<thead>
<tr>
<th>Age at menarche</th>
<th>N = 44</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 13</td>
<td>26</td>
<td>48.30</td>
<td>5.01</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td>48.87</td>
<td>4.67</td>
</tr>
<tr>
<td>Over 13</td>
<td>10</td>
<td>46.80</td>
<td>4.56</td>
</tr>
</tbody>
</table>

ANOVA: Not significant, $F = 0.48$, $df = 2$, $p = 0.62$

Table 7.17: Mean ages at natural menopause and age at menarche.
7.6.1.2 Discussion

As in my findings, Leidy (1991) demonstrated that age at menopause among Green County women was not significantly correlated with age at menarche \((r = -0.219, p = 0.124)\), and was strongly associated with the women’s reproductive span \((r = 0.962, p < 0.01)\).

The insignificant relationship between women’s age at menarche and age at menopause in my study might be due to a recall bias. Many women do not recall their exact age at menarche. Furthermore, many of them do not have an exact record of their birth, and therefore do not know their exact birth date. Moreover, sample size is small to identify any significant statistical association between age at menarche and age at menopause. Moreover, age at menarche was not significantly associated with age at menopause because women’s reproductive history (weight at birth, irregular bleeding due to endocrinological fluctuations, sex-linked genetic disease which might contribute to ovarian failure) were not documented in this study.


In contrast to my research findings, the following studies showed that there was a positive linear correlation between age at menarche and the onset of menopause (Cramer et al. 1996; Meschia et al. 2000; Stopes 1936). Stopes found that women whose first
menstruation was over 16 years reported later ages at menopause, while Meschia and Cramer reported that women with earlier age at menarche entered menopause one year earlier than other groups of women in the sample study. Unlike Stopes’s (1936) research outcome, some research revealed that age at menarche is inversely related to age at menopause: Arshat et al. (1989) among Malaysian women, Boulet et al. (1994) among seven South-East Asian countries, Frisch (1987) among British women, Howell (1979) among !Kung women and Johnston (2001) among Blackfeet Native American women.

7.6.2 Cycle Length

7.6.2.1 Results

Age at natural menopause did not vary significantly with women’s past cycle length (Table 7.18) in this study. Saudi women with 3 to 5 days past cycle length and with 5 to 7 days past cycle length reported similar ages at menopause (48.0 years).

<table>
<thead>
<tr>
<th>Cycle length</th>
<th>N = 44</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5 days</td>
<td>11</td>
<td>48.27</td>
<td>5.51</td>
</tr>
<tr>
<td>5-7 days</td>
<td>33</td>
<td>48.00</td>
<td>4.63</td>
</tr>
</tbody>
</table>

t-test: Not significant, F = 0.985, p = 0.327

Table 7.18: Mean age at natural menopause and cycle length.
**7.6.2.2 Discussion**

A study among Blackfeet Native American women revealed no statistically significant association between menopausal ages and the respondents’ menstrual cycle lengths in the past (Johnston 2001). This was the case in my study findings, as well. The insignificant findings in my study might be due to the small sample size, which might not be statistically sufficient to establish any significant relationship between age at menopause and women’s menstrual cycle length in the past. The respondents’ memory bias might also be considered, because many women might not have paid attention to their cycle regularity in the past.

However, unlike my findings, Cramer *et al.* (1996) and Whelan *et al.* (1990) noted that women with shorter cycle lengths (less than 26 days) reached menopause 1.4 years earlier than women with longer cycle lengths (between 26 and 32 days). Moreover, Garrido-Latorre *et al.* (1996) discovered that women with irregular cycles entered menopause 1.8 years earlier than women with regular cycle.

**7.6.3 Parity**

**7.6.3.1 Results**

According to Table 7.19, the mean age at natural menopause appears to be not significantly associated with the number of children. Saudi women who have 5 children or more reached menopause six months later (48.1 years) than women who have 5 children or less (47.6 years).
<table>
<thead>
<tr>
<th>Number of children</th>
<th>N = 43</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>14</td>
<td>47.64</td>
<td>4.25</td>
</tr>
<tr>
<td>5+</td>
<td>29</td>
<td>48.13</td>
<td>5.13</td>
</tr>
</tbody>
</table>

\[t\text{-test: Not significant, } F = 0.65, p = 0.42\]

Table 7.19: Mean age at natural menopause and parity.

### 7.6.3.2 Discussion

Comparable to my findings, Brand and Lehert (1978), Goodman et al. (1978), Fistonic et al. (2004), Jaszmann et al. (1969), Johnston (2001), Malacara et al. (2002), McKinlay et al. (1985), Okonofue et al. (1990), Randhawa (1987), Walker et al. (1984), Walsh (1978) and Wasti et al.’s (1994) findings showed no significant relationship between parity and age at natural menopause. The findings of my study might be attributed to other factors. As Ginsburg (1991) and Gosden (1985) illustrated, neither pregnancy nor unilateral ovariectomy had a major influence on the ovarian follicle endowment, since small follicles are continuously lost throughout life through the process of follicular atresia. Moreover, sample size and methodological technique also might contribute to my study findings. For example, Leidy (1991) found a significant association between the number of children and age at menopause after she divided
women into two groups based on how many children they have and applied a t-test rather than one-way ANOVA analysis of variance statistical technique. In Leidy’s study, women who have less than 5 children reported age at natural menopause one year earlier than women who have 5 or more children.

However, several studies found that parous women reported later age at menopause than nulliparous women: Ayatollahi et al. (2003), Bener et al. (1998), Benjamin (1960), Beser et al. (1994), Brambilla and McKinlay (1989), Bromberger et al. (1997), Cramer et al. (1996), Garrido-Latorre (1996), Kato et al. (1998), Kongshavn et al. (1986), Luoto et al. (1994), McKinlay et al. (1992), Meschia et al. (2000), Nagata et al. (1998), Soberon et al. (1966), Stanford et al. (1987), Torgerson et al. (1994), Van Keep et al. (1979), van Noord et al. (1997), Vries et al. (2001), Wallace et al. (1979) and Whelen et al. (1990). The above studies assumed that years of amenorrhea during pregnancy and breastfeeding is associated with later age at menopause, because of less follicular exhaustion during the months of amenorrhea.

7.6.4 Number of Miscarriages

7.6.4.1 Results

There was no significant correlation between Saudi women’s age at natural menopause and the number of miscarriages (r = 0.14, p < 0.01) that they reported. According to Table 7.20, age at natural menopause did not vary significantly with the number of miscarriages. However, a woman who experienced more than 3 miscarriages reached menopause relatively three years later (50.00 years) than other women. Women who never had experienced a miscarriage and who experienced one, or two miscarriages reached menopause relatively at the same age, 47 years old.
Table 7.20: Mean age at natural menopause and number of miscarriages.

<table>
<thead>
<tr>
<th>Number of miscarriages</th>
<th>N = 43</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>16</td>
<td>47.37</td>
<td>4.96</td>
</tr>
<tr>
<td>1 &amp; 2</td>
<td>19</td>
<td>47.63</td>
<td>4.99</td>
</tr>
<tr>
<td>3,4 &amp; 5</td>
<td>8</td>
<td>50.00</td>
<td>4.82</td>
</tr>
</tbody>
</table>

ANOVA: Not significant, F = 0.87, df = 2, p = 0.42

7.6.4.2 Discussion

My study data might not be reliable because of my study sample size. Only 27 women out of 200 who reached menopause had experienced miscarriages, compared to 16 women who reached menopause and had not experienced miscarriages. Similar to my study, Fistonic et al. (2004), Leidy (1991), Nagata et al. (1998), Remen et al. (1974) and Whelan et al.’s (1990) studies found that there was no significant relationship between the respondents’ number of miscarriages and age at natural menopause. However, in contrast to my findings, Brand and Lehert (1978) and Pupianski (1967) indicated a significant association between number of miscarriages and age at menopause. Women
who experienced one or more miscarriages reported earlier age at menopause than women who never had a miscarriage.

7.6.5 Age at Last Pregnancy

7.6.5.1 Results

There was no correlation between the Saudi women’s age at the birth of their last child and their age at natural menopause (r = -0.075, p < 0.01). As Table 7.21 shows, the association between age at natural menopause and women’s age at the birth of their last child was not significant. My findings also indicated that women who gave birth to their last child before age 30 reached menopause later than did women who gave birth to their last child after age 30. On average, women who gave birth to their last child between ages 30 and 35 and after age 40 reported the same age at menopause, 48 years old.

<table>
<thead>
<tr>
<th>Age at last pregnancy</th>
<th>N = 42</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30 years</td>
<td>2</td>
<td>53.00</td>
<td>0</td>
</tr>
<tr>
<td>30-35 years</td>
<td>14</td>
<td>48.07</td>
<td>4.59</td>
</tr>
<tr>
<td>36-39 years</td>
<td>6</td>
<td>45.50</td>
<td>6.41</td>
</tr>
<tr>
<td>40+ years</td>
<td>20</td>
<td>48.30</td>
<td>4.57</td>
</tr>
</tbody>
</table>

ANOVA: Not significant, F = 1.28, df = 3, p = 0.29

Table 7.21: Mean age at natural menopause and age at last pregnancy.
7.6.5.2 Discussion

Comparable to Jaszmann et al. (1969), Kauppinen (1949), and Leidy’s (1991) findings, my findings also showed no relationship between age at last pregnancy and age at menopause among Saudi women. The lack of a relationship between age at last pregnancy and menopausal age in my study is inconsistent with the findings of Ayatollahi et al. (2003) and Brand and Lehert (1978) that demonstrated a significant relationship between age at last pregnancy and age at menopause. Women who gave birth to their last child at around 28 years old reported later age at menopause than women who gave birth to their last child before age 28.

7.6.6 Contraceptive Types and Use of Contraceptive

7.6.6.1 Results

There was no significant correlation between Saudi women’s choices of contraceptive type (r = - 0.235, p < 0.01) and age at natural menopause. According to Table 7.22, there was a difference in mean age at menopause among women who were taking the pill who reported age at menopause approximately two and a half years earlier than women who chose coitus interruptus as a method of contraception. Moreover, a Pearson correlation coefficient was conducted to examine the relationship between use of contraceptive and age at natural menopause and also between duration of oral contraceptive use and age at natural menopause. The findings showed that there was no significant correlation between both the use of contraceptives (r = 0.069, p < 0.01) and age at natural menopause and the duration of oral contraceptive (r = 0.186, p < 0.01) and age at natural menopause.
<table>
<thead>
<tr>
<th>Contraceptive types</th>
<th>N = 31</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pill</td>
<td>26</td>
<td>47.42</td>
<td>0.92</td>
</tr>
<tr>
<td>Coitus interruptus</td>
<td>5</td>
<td>49.00</td>
<td>2.39</td>
</tr>
</tbody>
</table>

**t-test:** Not significant, $F = 0.02$, $p = 0.88$

Table 7.22: Mean age at natural menopause and contraceptive types.

<table>
<thead>
<tr>
<th>Use of contraceptive</th>
<th>N = 33</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never used</td>
<td>26</td>
<td>47.42</td>
<td>4.70</td>
</tr>
<tr>
<td>Currently using</td>
<td>2</td>
<td>43.50</td>
<td>4.94</td>
</tr>
<tr>
<td>Stopped using</td>
<td>5</td>
<td>49.00</td>
<td>5.33</td>
</tr>
</tbody>
</table>

**ANOVA:** Not significant, $F = 0.93$, $df = 2$, $p = 0.40$

Table 7.23: Mean age at natural menopause and use of contraceptives.
7.6.6.2 Discussion

The insignificant relationship between Saudi women’s choices of contraceptive types and age at menopause might be due to the small sample size that cannot be statistically determined. Since only 31 women who had reached menopause reported having used the pill and coitus interruptus as a contraceptive method, I expected that there would be a significant relationship between the Saudi women’s use of contraceptives and their mean age at natural menopause. I assumed that oral contraceptive use would have a direct effect on gonadotrophin concentration, which in turn affects the follicular depletion rate, which accelerates or delays the age at natural menopause. I found that even though my findings were not statistically significant, the women who used to take the pill reached menopause about one and a half year earlier than did women who did not take the pill.

Similar to my findings, Brambilla and McKinlay (1989), Brand and Lehert. (1978), Bromberger et al. (1997), Chompootweep et al. (1993), Fistonic et al. (2004), Luoto et al. (1994) and Seckin Neslihan et al.’s (1998) investigations demonstrated that use of oral contraceptive did not show any influence on the age at menopause.

On the other hand, Ayatollahi et al. (2003), Cramer et al. (1995), Garrido-Latorre (1996), Johnston (2001), Sosa et al. (1994), Stanford et al. (1987), Torgerson et al. (1994), Van Keep et al. (1979), van Noord et al. (1997) and Vries et al.’s (2001) studies reported that there was a significant relationship between oral contraceptive use and age at natural menopause. Women who had ever used oral contraceptive reported later age at natural menopause than non-users. The previous researchers explained their findings based on the assumption that oral contraceptive use can accelerate age at menopause by
changing the gonadotrophin concentration, which in turn affects the growth of the ovarian follicles. FSH concentrations accelerate follicle depletion of the follicle pool and since oral contraceptives suppress FSH concentrations, there is delayed age at menopause where the follicle pool is at rest. Thus the researchers proposed that long-lasting use of oral contraceptives may delay menopausal age. Their assumption was supported by Telfer et al.’s (1991) clinical study on mice which showed that atresia of the mice’s antral follicles increased when they were exposed to exogenous progesterone (Ayatollahi et al. 2003; Vries et al. 2001).

**7.6.7 Multivariate Regression Analysis**

A multivariate regression analysis model was applied to test the relationship between the respondents’ reproductive history and age at natural menopause.

**7.6.7.1 Results**

According to Table 7.24, there was no significant relationship between age at natural menopause and reproductive history factors ($F = 0.407, p < 0.01$). Age at natural menopause had a negative linear association with the respondents’ cycle length in the past ($r = -0.019, p = 0.98$), age at last pregnancy ($r = -0.075, p = 0.58$), age at menarche ($r = -0.109, p = 0.47$), and number of children ($r = -0.125, p = 0.58$); and it had a positive linear association with the respondents’ number of miscarriages ($r = 0.128, p = 0.32$).
<table>
<thead>
<tr>
<th>Reproductive history factors</th>
<th>Correlation coefficients</th>
<th>F</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle length in the past</td>
<td>-0.019</td>
<td>0.02</td>
<td>0.98</td>
</tr>
<tr>
<td>Age at last pregnancy</td>
<td>-0.075</td>
<td>-0.55</td>
<td>0.58</td>
</tr>
<tr>
<td>Age at menarche</td>
<td>-0.109</td>
<td>-0.72</td>
<td>0.47</td>
</tr>
<tr>
<td>Number of children</td>
<td>-0.125</td>
<td>-0.55</td>
<td>0.58</td>
</tr>
<tr>
<td>Number of miscarriages</td>
<td>0.128</td>
<td>0.99</td>
<td>0.32</td>
</tr>
</tbody>
</table>

Table 7.24: Variables entered into a linear regression model of variance in age at natural menopause and reproductive history factors.

7.7  Lifestyle Factors

7.7.1  Exercise Habit

7.7.1.1 Results

According to Table 7.25, the Saudi women’s mean age at natural menopause did not vary significantly with exercise frequency. Mean age at natural menopause tended to be later (49.31 years) among women (N = 19) who had never exercised, compared to women (N = 25) who used to exercise and reached menopause earlier (48.12 years).
### Table 7.25: Mean age at natural menopause and exercise habit.

<table>
<thead>
<tr>
<th>Exercise pattern</th>
<th>N = 44</th>
<th>Mean age at menopause</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td>25</td>
<td>47.12</td>
<td>5.00</td>
</tr>
<tr>
<td>Not exercise</td>
<td>19</td>
<td>49.31</td>
<td>4.34</td>
</tr>
</tbody>
</table>

`t-test: Not significant, F = 1.35, p = 0.25`

### 7.7.1.2 Discussion

As my findings also indicated, both Leidy (1991) and Nagata et al.’s (1998) investigations found no significant association between exercise pattern and age at menopause. The findings of my study might be due to the small sample size that again cannot establish any significant association between exercise habit and age at menopause. Most likely, although the women do not exercise regularly, they do a lot of physical work taking care of their home and children. However, the respondents’ daily physical activity such as housework was not included in this study to detect its influence on the respondents’ age at menopause.
7.7.2 Multivariate Regression Analysis

A multivariate regression analysis model was applied to test the relationship between the respondents’ lifestyle and their age at natural menopause.

7.7.2.1 Results

The relationship between lifestyle factors and the respondents’ age at natural menopause was not significant according to the linear regression model ($F = 0.65$, $p < 0.01$). As Table 10.4 shows, smoking habits ($r = 0.249$, $p = 0.21$) as well as exercise patterns ($r = 0.049$, $p = 0.78$) had an insignificant positive linear association with the respondents’ age at menopause. On the other hand, types of exercise, such as walking, swimming, and aerobics, had an insignificant negative linear correlation with age at menopause ($r = -0.095$, $p = 0.66$) (Table 7.26).

<table>
<thead>
<tr>
<th>Lifestyle factors</th>
<th>Correlation coefficients</th>
<th>F</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking habits</td>
<td>0.249</td>
<td>1.27</td>
<td>0.21</td>
</tr>
<tr>
<td>Exercise patterns</td>
<td>0.049</td>
<td>0.27</td>
<td>0.78</td>
</tr>
<tr>
<td>Types of exercise</td>
<td>-0.095</td>
<td>-0.43</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Table 7.26: Variables entered into a linear regression model of variance in age at natural menopause and the respondents’ lifestyle factors.
7.8. Conclusion

Several determinants (heredity, anthropometric measurements, sociodemographic factors, reproductive history, and lifestyle) were statistically analyzed with Saudi women’s age at menopause to verify whether there is a significant association between the study factors and mean age at natural menopause. The study showed the following results:

(1) **Heredity.** There was no significant association between daughters’ and mothers’ mean ages at natural menopause.

(2) **Anthropometric measurement.** Only the respondents’ weight was significantly associated with age at natural menopause. Heavier women (80 kg. and 163 kg) reached menopause earlier than the respondents whose average weight was between 60.0 kg and 73.0 kg. Saudi women’s height and body mass index was not associated significantly with their mean age at natural menopause.

(3) **Sociodemographic factors.** Saudi women’s marital status and occupation status were significantly associated with age at natural menopause. Married women reported age at natural menopause approximately four years earlier than unmarried women. Women who used to work reported mean age at natural menopause earlier than women who never worked and women who were currently working. Saudi women’s ethnic background, educational level, and their family’s annual income were not significantly associated with their mean age at menopause.

(4) **Reproductive history.** None of the reproductive history factors (age at menarche, cycle length in the past, parity, number of miscarriages, age at last pregnancy,
and type and use of contraceptives) were statistically significant with the Saudi women’s mean age at natural menopause.

(5) **Lifestyle.** Exercise pattern was not statistically significantly associated with Saudi women’s mean age at natural menopause.
CHAPTER 8

RESULTS AND DISCUSSIONS II: MENOPAUSAL KNOWLEDGE, ATTITUDES, AND SYMPTOMS

This chapter presents and discusses Saudi women’s primary information regarding the menopausal event, their knowledge about this event, and whether their attitude toward menopause varies across age and ethnicity. Multivariate regression analyses also are applied to test the relationship between menopausal symptoms, women’s attitudes, and education.

The frequency of menopausal symptoms is also discussed in this chapter, followed by the association between the respondents’ menstrual status and the incidence of these symptoms. The type of remedy that women sought during the menopausal event to elevate their menopausal symptoms is also discussed in this chapter. A discussion follows each study result, explaining my findings and comparing them with other cross-cultural studies.

8.1 Primary Source of Menopause-related Information.

8.1.1 Results

As Table 8.1 illustrates, 110 women reported that the media was their primary source for obtaining information regarding the menopausal event and its symptoms, followed by family (N = 74), and friends (N = 63). From the entire sample, only 18
women said that they sought to obtain knowledge about the menopausal event from health professionals. During the interview, half of the Saudi women told me that they feel more comfortable to learn more about the menopausal event from watching television or listening to the radio. They consider menopause to be a biological event and it is important for them to learn about it from a physician on TV or the radio rather than go to a physician’s clinic or discuss the subject with their friends and families.

<table>
<thead>
<tr>
<th>Primary source</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>110</td>
<td>55</td>
</tr>
<tr>
<td>Family</td>
<td>74</td>
<td>37</td>
</tr>
<tr>
<td>Friend</td>
<td>63</td>
<td>31.5</td>
</tr>
<tr>
<td>Health professional</td>
<td>18</td>
<td>9.0</td>
</tr>
</tbody>
</table>

Table 8.1: Primary source of menopause-related information.

8.1.2 Discussion

Most of the Saudi women did not favor visiting a health specialist because they believe that menopause or the sign of ending their ability to reproduce is “God’s will”—God created women’s bodies this way and surely it is for her sake to stop reproducing at this age. A physician’s advice is only sought when there is an urgent case such as giving birth, chronic disease, or an accident.
Moreover, age is a sensitive issue for many Saudi women and they link reproductive cessation to the aging process. They always want to look younger and prefer not to discuss any psychological and physiological changes due to endocrinological fluctuations with their friends and families. Therefore, many of the respondents told me that they think that experiencing menopausal symptoms is a private issue which they do not want to share with their friends or families. Other women told me that they felt free to discuss any climacteric symptoms with their friends and families, because they were experiencing the climacteric symptoms at relatively similar times. So they discussed the severity and frequency of their symptoms and how to adjust to this event during gatherings with their friends.

Unlike my findings, Fistonic et al. (2004) who conducted their study among Croatian women found that 78% of the reporting women stated that their sources of menopausal knowledge were medical providers and the media; followed by only 11.2% of those respondents who learned about menopause from friends, and 3.7% of the respondents who had no knowledge at all about menopausal symptoms. Lock et al. (1988) found that the primarily sources of menopausal–related information among Japanese women were friends (69%) followed by magazines (57%), television (50%), and physicians (26%).

8.2 The Respondents’ Knowledge about Menopause

8.2.1 Results

In my study, most Saudi women reported that menstrual cessation is considered a sign of Sin Al-ya’as, which means “the desperate age.” As Table 8.2 demonstrates, women’s knowledge about the menopausal event was also associated with menopausal
symptoms, such as depression, hot flashes, anger, and hormone deficiency. Only a few women reported the following symptoms associated with menopause: osteoporosis (7.5%), joint pain (10.5%), vaginal dryness (9.5%), pain with intercourse (7.5%), and headaches (4.5%). In this study, five women (2.5%) thought that chronic disease, such as hypertension and diabetes, were associated with the onset of menopause. Almost three fourth of the respondents (N = 151) did not consider hot flashes as a sign of menopausal symptoms.

Eighty-one percent of the Saudi respondents linked their biological ability to reproduce to menstruation. In their opinion, a woman at age 50 can reproduce if she has a menstrual cycle despite whether her menstrual cycle is regular or irregular. This is why menopause is called “the desperate age” because women in Arab culture do feel desperate when they cannot reproduce anymore after their menstruation ceases.
<table>
<thead>
<tr>
<th>Respondent’s knowledge</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menstrual cessation</td>
<td>162</td>
<td>81</td>
</tr>
<tr>
<td>Depression</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Hot flashes</td>
<td>49</td>
<td>24.5</td>
</tr>
<tr>
<td>Anger</td>
<td>42</td>
<td>21</td>
</tr>
<tr>
<td>Hormone deficiency</td>
<td>41</td>
<td>20.5</td>
</tr>
<tr>
<td>Night sweating</td>
<td>32</td>
<td>16</td>
</tr>
<tr>
<td>Fatigue</td>
<td>32</td>
<td>16</td>
</tr>
<tr>
<td>Joints pain</td>
<td>21</td>
<td>10.5</td>
</tr>
<tr>
<td>Vaginal dryness</td>
<td>19</td>
<td>9.5</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Pain with intercourse</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Chest pressure</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Headache</td>
<td>9</td>
<td>4.5</td>
</tr>
<tr>
<td>Increased appetite</td>
<td>8</td>
<td>4.0</td>
</tr>
<tr>
<td>LDL cholesterol</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>Body bloating</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Hypertension</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Diabetes</td>
<td>5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Table 8.2: Respondent’s knowledge about the menopausal event.

**8.2.2 Discussion**

Almost all of the Saudi women, who reached menopause in this study, did not associate psychological symptoms such as depression, anger, or irritability that they experienced during the climacteric period with menopause or fluctuation in their endocrinology. They portrayed the event of menstrual cessation as the beginning of aging process. Comparable to my findings, Ruley-Kearns’s (1982) research among Papago women revealed that women’s knowledge about what menopause actually means was the
following: 47% said it was the beginning of old age; 35% said it meant no more children; 15% said that they did not know what menopause means; and 3% said it meant being alone or being left alone.

Most of the Saudi women simply said to me that they connect their psychological symptoms (anger, depression, and irritability) not to the menopausal event but to their social/family problems and their economic status. One woman told me that lately she has been feeling depressed and anxious because she has problems with her in-laws who live with her in the same house. Her in-laws always interfered in her life, causing problems between her and her husband. She did not attribute her psychological symptoms to approaching menopause, even though her menstrual cycle was irregular. Many postmenopausal women told me that they did not experience any menopausal symptoms. The only symptom that they were aware of was irregular menstruation followed by cycle cessation. Many Bedouin women told me that they are always complain from joint pain without noticing what caused it. Only twenty 25% of the respondents related the incidence of hot flashes to menstrual cessation.

Saudi women (N = 151 or 75%) did not consider the symptom of hot flashes, which is considered an important and initial sign of menopausal symptoms among Western women, to be a menopausal symptom. This can be attributed to the following reasons. (1) Premenopausal women told me that they do not connect hot flashes to menopause, because they have not experienced it yet and they have not heard about it from someone experiencing it. (2) Saudi Arabia’s climate is very hot in the summer and fall and mild in the winter and spring. Almost every house has at least one to two air-conditioning units. Women might experience incidents of hot flashes but if they are not
severe, they may attribute it to the hot weather. Thus they do not think of hot flashes as a bothersome symptom. (3) Some women told me that they experienced hot flashes before their menstruation ceased but they did not recognize that this vasomotor symptom was associated with their endocrinological changes that accompany the menopausal event.

8.3 The Respondents’ Attitudes toward Menopause

8.3.1 Results

Most women in this study (N = 163 or 81.5%) agreed that menopause is a natural transition from the years of fertility to the years of infertility, and every woman has to go through it and experience it. Eighty-one percent of the women told me during the interview that they perceived menopause as a natural transition and felt clean and relieved that they would not be getting pregnant anymore.

All of the Saudi women told me that they were happy because they had more time to pray and read the *Holy Quran* and to fast more often than before. This is because in Islam a menstruating woman is considered “impure” and therefore she cannot enter the mosque, or pray even in her own home, she cannot fast, and she cannot touch the *Holy Quran*. Therefore normally, when a woman is having her period, she has to wait for five to seven days every month until she can be considered “clean” again to resume her worship.

On the other hand, more than one-third of the women told me that they considered menopause a sign of aging and getting old. One postmenopausal woman told me that even though her menstruation had ceased three years ago, she pretended in front of her husband that she was still having her menstrual cycle.
A few women (N = 12 or 6%) told me that they considered menopause or menstrual cessation a disease that should be treated by either taking hormone replacement or using traditional medicines such as herbal remedies (Table 8.3). They told me that women become more vulnerable to diseases such as osteoporosis and vascular disease due to estrogen deficiency that accompanies menopause. They also said that during the menopausal event, many women suffer from hot flashes, depression, and irregular menstruation that affect their lives and make them embarrassed and uncomfortable in front of their family, relatives, friends, and coworkers.

<table>
<thead>
<tr>
<th>Respondents’ attitudes</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a natural transition</td>
<td>163</td>
<td>81.5</td>
</tr>
<tr>
<td>As a sign of aging</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>As a disease</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 8.3: Respondents’ attitudes toward the menopausal event.

8.3.2 Discussion

In general, menopause was welcomed among the Saudi Arabian women whom I interviewed, especially when their family size was complete and they had achieved an optimal number of children. This was because even though the women loved having
children, they were overwhelmed by childcare and were happy that they could finally live their lives for themselves. They were also happy to reach menopause because they could devote more time to worship. Finally, the women told me that when they grow older and become grandmothers, their opinion and advice are sought and they play a more important role in their families by taking care of their children and their families. They told me that everyone in the family respected them more than ever.

The Saudi women also told me that they strongly linked fertility, femininity, and youth with a woman’s ability to conceive. Therefore, they considered menopause to be a sign of aging and being old and weak, because after menopause, the woman’s body is biologically unable to conceive.

Like Saudi Arabian women’s attitudes toward menopause, Chirawatkul and Manderson’s (1994) ethnography study in Thailand, Flint’s (1975) study in India, Solway’s (1992) research in Botswana and Wasti et al.’s (1994) study in Pakistan reported that women refer to menopause as the end of menses, which signals that they regard menopause not as pathology, but as entry into a new, more spiritual phase of life. As in my research findings, these women viewed menopause as a welcome event that frees them from the inconvenience of menstruation and from the burden of pregnancy.

Leidy’s (1991) investigation among Green County, NY, women’s attitudes toward menopause revealed that 64% of women felt liberated from their menstrual periods, 53% said that approaching menopause did not change their feelings about being a woman, and 35% said that they did not think about menopause. Similar to the Saudi women in my study, 14% of the Green County women whom Leidy interviewed reported
that menopause meant the loss of fertility to them and they regarded it as an unpleasant event.

Comparable to my findings, Beyene’s (1989) research among the Mayan women illustrated that Mayan attitudes towards menopause are optimistic because menstrual cessation signifies freedom from pregnancy to them, as well as promoting their status and the end of household chores. Also, end of menstruation meant that they were free from the taboo of “menstrual flow,” since they believe menstruating women carry an evil wind that might cause harm to others. Mayan women’s perceptions toward menopause, like those of Saudi women’s, are the cessation of menses only, unlike the Western orientation toward menopause as an unavoidable illness and the beginning of the end of a woman’s useful life. Maoz et al. (1970) evaluated attitudes toward menopause and reported that 52% of the Oriental women expressed positive attitudes toward menopause such as freedom from menstruation and pregnancy, compared to only 21% of European women.

In addition, in a study Dennerstein (1993) conducted in Melbourne, Australia, postmenopausal women reported that most of the time they felt clear headed (72%), good natured (71%), useful (68%), satisfied (61%), confident (58%), loving (55%), and optimistic (51%). In the Newfoundland fishing village of Grey Rock Harbour, Davis’s (1986) research explained the meaning of menopause and women’s attitudes toward the menopausal transition. The women in Newfoundland used the term “the change” to refer to the climacteric event and menopause. They viewed menopause as the final phase of the menstrual cycle, the final cleanout that must last for the rest of life. To them the menopausal event was a normal, prolonged part of the aging process that all women go
through, from which there is no recovery because these women do not consider menopause as a disease.

8.4 The Respondents’ Attitudes toward Menopause across Age

8.4.1 Results

The Saudi women between ages 40 and 45 years old were more pessimistic regarding the menopausal event, as Table 8.4 illustrates. Sixty-five percent of the Saudi women viewed menopause as a sign of aging, compared to 57.2% who viewed menopause as a disease, and 37.7% who viewed menopause as a natural transition. On the other hand, older women whose ages ranged between 46 and 55 years old were more optimistic toward the menopausal event. Sixty percent viewed menopause as a natural transition, compared to 42.9% who viewed menopause as a disease, and 35% who viewed menopause as a sign of aging (Table 8.4).

<table>
<thead>
<tr>
<th>Respondent’s attitudes</th>
<th>Age range 40-45 years old (%)</th>
<th>Age range 46-55 years old (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a natural transition</td>
<td>38.3</td>
<td>61.7</td>
</tr>
<tr>
<td>As a sign of aging</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>As a disease</td>
<td>57.1</td>
<td>42.9</td>
</tr>
<tr>
<td>Have two attitudes</td>
<td>44.9</td>
<td>55.1</td>
</tr>
</tbody>
</table>

Table 8.4: Respondents’ attitudes toward menopause across age.
8.4.2 Discussion

As Table 8.4 shows, younger Saudi women tend to have a negative attitude toward the menopausal event compared to older women who have a positive attitude. Based on my interviews with the participants, I deduced that premenopausal women were more worried about the menopausal event and the consequences of the event on their health and wellbeing because of their unawareness of their physiological and emotional changes that generally accompanied this event. Several women whose ages ranged between 40 and 45 years old told me that they did not want to think about the menopausal event, because they were not yet prepared psychologically for it. They told me that they still have more than ten years to enjoy their lives, and it is always better to think about the menopausal event when it is really happening, because woman experience it at varied ages with different symptoms.

This attitude is unlike the attitudes of menopausal and postmenopausal women who tend to be more confident, feel better, and recover or cope well with the menopausal transition. Saudi women between the ages of 46 and 55 years old told me during their interview that before they experienced menopause, they were worried and scared about the consequences of menopause or the cessation of reproduction on their lives. However, after they had gone through the event, those worries subsided in some women and were reduced in others. Some women told me that they wish they could tell every woman to stop worrying about the consequences of menstrual cessation, because they now felt more pure and free from menstruation and the cramps that used to accompany it. Now they could enjoy their lives with their family and grandchildren, they were no longer worried about becoming pregnant again, they could fast any time, and could pray every day. The
participants who viewed menopause as a sign of aging and a disease generally had health problems such as chronic disease, bleeding, severe hot flashes, and depression, as well as social problems that accompanied the menopausal event.

Kraines et al. (1968), Mansfield et al. (1991), Neugarten (1973), Theisen et al. (1991) and Wood’s (1982) findings showed that premenopausal women tend to have more negative attitudes toward menopause than women who were experiencing irregular menstruation or had ceased menstruation. The findings of these studies were similar to my findings.

8.5 The Respondents’ Attitudes toward Menopause across Ethnicity

8.5.1 Results

As can been seen in Table 8.5, the respondents’ attitudes toward menopause did not only vary across ages but also across ethnicity. The differences between Bedouin and Hadar women’s attitudes toward the menopausal event were statistically significant; Hadar women in general tended to be more optimistic and possessed more positive attitudes toward menopause than did Bedouin women. As Table 8.5 shows, more than three-fourths of Hadar women viewed menopause as a natural transition compared to one-fourth of Bedouin women. And 6.6 % of the Hadar women viewed menopause as a sign of aging compared to 16.9 % of the Bedouin women (Table 8.5).
<table>
<thead>
<tr>
<th>Respondents’ attitudes</th>
<th>Bedouin N = 71</th>
<th>Hadar N = 122</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>As a natural transition</td>
<td>28</td>
<td>39.4</td>
</tr>
<tr>
<td>As a sign of aging</td>
<td>12</td>
<td>16.9</td>
</tr>
<tr>
<td>As a disease</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>Have two attitudes</td>
<td>27</td>
<td>14.0</td>
</tr>
</tbody>
</table>

Chi-square: Significant, $F = 21.265$, df = 3, $p=.00$

Table 8.5: Respondents’ attitudes toward menopause according to their ethnicity.

8.5.2 Discussion

The significant variations between Bedouin and Hadar women’s attitudes toward menopause according to their ethnicity, as Table 8.5 reveals, may be attributed to the sociodemographic and lifestyle variations between these two groups. Hadar women generally carried higher educational degrees, which might make them more knowledgeable about the biological and the psychosocial alternations that correlate with the menopausal transition. Hadar women have full or part time jobs and thus are more economically independent. Moreover, Hadar women are more westernized in their lifestyle; they plan to have a small family size, live in a nice house, travel to Europe or abroad every year, and keep their bodies in great shape by looking younger. Thus they
might manage the menopausal event by using hormone replacement therapy and manage their aging by doing plastic surgery.

8.5.3 Multivariate Regression Analysis

A multivariate regression analysis model was applied to test the relationship between menopausal symptoms, women’s attitudes, and education.

8.5.3.1 Results

According to the multivariate regression analysis, there was significant association between the respondents’ total menopausal symptoms reported and their attitudes toward the menopausal event and educational level ($F = 4.317, p < 0.01$). Table 8.6 illustrates a significant linear negative association between the respondents’ education level and total menopausal symptoms reported during the interview in this study ($r = -0.198, p = 0.00$). Moreover, the correlation between the respondents’ attitudes toward the menopausal event and total symptoms reported was significant ($r = 0.081, p = 0.09$). Also the respondents’ education level was positively associated with their attitudes toward menopause ($r = 0.257$).
<table>
<thead>
<tr>
<th>Entered variables</th>
<th>Correlation coefficients</th>
<th>F</th>
<th>P- value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education level</td>
<td>-0.198</td>
<td>-2.768</td>
<td>0.006</td>
</tr>
<tr>
<td>Attitude toward menopause</td>
<td>0.081</td>
<td>1.664</td>
<td>0.098</td>
</tr>
</tbody>
</table>

Table 8.6: Variables entered into a linear regression model of variance in total menopausal symptoms reported and the respondents’ education level and attitudes toward the menopausal event.

### 8.6 Menopausal Symptoms

#### 8.6.1 Results

The most common menopausal symptoms that Saudi women experienced during the menopausal transition include irregular menstruation (40.5%), hot flashes (38%), and anger (30.5%) (Table 8.7). Only a few respondents reported the prevalence of the following symptoms during the menopausal transition: loss of urinary control (9.5%), vaginal dryness (8.5%), and loss of sexual desire (4.5%) (Table 8.7). None of the Saudi women reported experiencing the following menopausal symptoms: body bloating, pain with intercourse, and chest pressure.
<table>
<thead>
<tr>
<th>Respondents’ symptoms</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irregular menstruation</td>
<td>81</td>
<td>40.5</td>
</tr>
<tr>
<td>Hot flashes</td>
<td>76</td>
<td>38</td>
</tr>
<tr>
<td>Anger</td>
<td>61</td>
<td>30.5</td>
</tr>
<tr>
<td>Irritability</td>
<td>55</td>
<td>27.5</td>
</tr>
<tr>
<td>Headache</td>
<td>54</td>
<td>27</td>
</tr>
<tr>
<td>Dizziness</td>
<td>54</td>
<td>27</td>
</tr>
<tr>
<td>Night sweating</td>
<td>53</td>
<td>26.5</td>
</tr>
<tr>
<td>Depression</td>
<td>53</td>
<td>26.5</td>
</tr>
<tr>
<td>Fatigue</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Palpitations</td>
<td>49</td>
<td>24.5</td>
</tr>
<tr>
<td>Sleeping difficulty</td>
<td>46</td>
<td>23</td>
</tr>
<tr>
<td>Joint pain</td>
<td>34</td>
<td>17</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>31</td>
<td>15.5</td>
</tr>
<tr>
<td>Bleeding</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Loss of urinary control</td>
<td>19</td>
<td>9.5</td>
</tr>
<tr>
<td>Vaginal dryness</td>
<td>17</td>
<td>8.5</td>
</tr>
<tr>
<td>Loss of sexual desire</td>
<td>9</td>
<td>4.5</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Memory loss</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Numbness</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Body bloating</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Increased appetite</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pain with intercourse</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chest pressure</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 8.7: Respondents’ symptoms during the menopausal transition.
**8.6.2 Discussion**

In this study, experiencing hot flashes among Saudi women varied. Many women told me that they suddenly felt warm all over their body and their face, even though their room temperature is cool. They tried to alleviate the hot flashes by drinking cold water, wearing light clothes, avoiding hot spicy foods, and getting closer to the air-conditioning unit in their homes. Few women told me that they sought their physician’s help to reduce the severity of the incidence of hot flashes and started taking hormone replacement therapy. Many Saudi women told me that they never experienced hot flashes during the menopausal event and the only thing that bothered them was that they were more depressed, angrier, and easily irritable about everything. I attributed the frequency of menopausal symptoms among Saudi women who complained the most about depression, irritability and anger after hot flashes to their role in the family and their socioeconomic status after the cessation of their menstrual cycle.

Even though Saudi Arabian postmenopausal women’s social status was enhanced as did the status of Rajput women (Flint 1975), in polygamous Muslim countries women feel insecure once they approach menopause (that is, completion of their child-bearing role) because they attribute menstrual cycle to youth and femininity, and once their menstruation ceases, they fear abandonment by their husbands who may remarry younger fertile women to give them more children.

Comparable to my study findings, Al Qattan and Alexander (1996) in Kuwait, Leidy (1991) in Green County, New York, Obermeyer *et al.* (2002) in Morocco, Rizk *et al.* (1998) in the United Arab Emirates and Wasti *et al.* (1994) in Pakistan showed that hot flashes were the most reported menopausal symptoms. Leidy (1991) found that the
most reported menopausal symptoms were the following: hot flashes (72%), mood changes (69%), irritability (63%), sweating (58%), and depression. On the other hand, almost one-third of the women in her study reported dizziness and 38% reported vaginal dryness, whereas in my study only seventeen women out of two hundred experienced vaginal dryness. Wasti et al.’s (1994) investigation among Pakistani women showed that hot flashes and anxiety (40%) followed by irritability (32%) and night sweats (28%) were the most frequently reported symptoms among postmenopausal women.

Inconsistent with my findings, Sarrel’s (1988) investigation among postmenopausal women attending a menopause clinic at the Yale Mid-Life Study Center showed the following complaints of reported symptoms: 58% experienced vaginal dryness and 39% reported pain with intercourse. In the current study, few Saudi women reported sexual behavior symptoms (loss of sexual desire, vaginal dryness, and loss of urinary control) that accompany the menopausal event. These findings may not necessarily indicate that the women did not experience these symptoms, but may be attributed to Saudi Arabian culture, where sexual life is a taboo topic that it is considered very private. Women in the interview felt very shy when they mentioned alterations in their sexual relationship with their husbands during and after menopause. They spoke to me in a very low voice even though we were alone, so no one could hear our interview. They tried to avoid talking about any topics associated with their sexual organ function changes during the menopausal event such as vaginal dryness or pain during the intercourse. Once they told me that they experienced hot flashes and urinary incontinence, I asked them if they experienced any symptoms related to sexual organ function, because I assumed that if a respondent experienced hot flashes and night sweats
during the menopausal event, she might also feel loss of sexual desire and vaginal dryness due to estrogen deficiency. Only one Bedouin woman was brave enough to tell me in a loud voice in front of her daughters and sisters that she has pain during sexual intercourse and she is bothered by the unpleasant smell of her vaginal discharge. Out of the 200 participants, none had experienced the following symptoms: body bloating, increased appetite, and chest pressure. This finding might again be due to either the small sample size or it may be that Saudi women simply do not experience these symptoms.

In contrast to my findings, Obermeyer et al.’s (1999) study in Lebanon illustrated that fatigue (52%) was the most bothersome menopausal symptom followed by nervousness (43%) and loss of sexual desire (33%). Comparable to my findings, pain with intercourse (5%), vaginal dryness (5%), and chest pressure (6%) were the lowest menopausal symptoms that had been reported among Lebanese women. In contrast to my findings, both Flint and Samil (1990) in Java and Lam et al. (2003) in Hong Kong reported that fatigue was the most reported menopausal symptom. Flint and Samil’s (1990) research among Javanese women showed that fatigue (62%) was the most frequent symptom, followed by weight gain (34%), atrophic vaginitis (14%); and hot flashes (20%). Lam et al.’s (2003) research in Hong Kong revealed that the most frequently reported menopausal symptoms were muscle and joint pain (56%), followed by fatigue or lack of energy (54%), and headaches (42%), while only 23.3% of the women reported hot flashes and 15.4% reported night sweats.
8.7 Menopausal Symptoms and Menstrual Status

8.7.1 Results

As Table 8.8 illustrates, hot flashes was the highest reported symptom among Saudi women with regular (27.5%) and irregular (41.5%) menstruation, and among menopausal women (54.5%). Psychological symptoms were strongly associated with respondents’ menstrual status. As Table 8.7 shows, 16.5% of premenopausal women reported that they became more depressed recently compared to 29.2% of perimenopausal women and 43.2% of postmenopausal women. Only 13.2% of premenopausal women reported that they became irritable lately compared to 32.3% of perimenopausal women and 50% of postmenopausal women.

Sexual behavioral symptoms in this study were also associated with the respondents’ menstrual status: 13.6% of postmenopausal women experienced vaginal dryness compared to 7.7% of perimenopausal women and 60.6% of premenopausal women. Moreover, loss of sexual desire was also associated with the respondents’ menstrual status: 9.1% of postmenopausal women reported loss of sexual desire, compared to perimenopausal and premenopausal women (3.1% and 3.3% respectively). Somatic symptoms such as: sleeping difficulty, joints pain, and shortness of breath were also related to the respondents’ menstrual status.
<table>
<thead>
<tr>
<th>Menopausal symptoms</th>
<th>Regular menstruation (N = 91)</th>
<th>Irregular menstruation (N = 65)</th>
<th>Menopausal women (N = 44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot flashes</td>
<td>27.5</td>
<td>41.5</td>
<td>54.5</td>
</tr>
<tr>
<td>Headaches</td>
<td>18.7</td>
<td>35.4</td>
<td>31.8</td>
</tr>
<tr>
<td>Depression</td>
<td>16.5</td>
<td>29.2</td>
<td>43.2</td>
</tr>
<tr>
<td>Joint pain</td>
<td>9.9</td>
<td>21.5</td>
<td>25.0</td>
</tr>
<tr>
<td>Fatigue</td>
<td>16.5</td>
<td>35.4</td>
<td>27.3</td>
</tr>
<tr>
<td>Dizziness</td>
<td>18.7</td>
<td>35.4</td>
<td>31.8</td>
</tr>
<tr>
<td>Loss of urinary control</td>
<td>5.5</td>
<td>16.9</td>
<td>6.8</td>
</tr>
<tr>
<td>Palpitations</td>
<td>17.6</td>
<td>35.4</td>
<td>22.7</td>
</tr>
<tr>
<td>Night sweating</td>
<td>17.6</td>
<td>36.9</td>
<td>29.5</td>
</tr>
<tr>
<td>Sleeping difficulty</td>
<td>18.7</td>
<td>24.6</td>
<td>29.5</td>
</tr>
<tr>
<td>Bleeding</td>
<td>6.6</td>
<td>21.5</td>
<td>22.7</td>
</tr>
<tr>
<td>Anger</td>
<td>16.5</td>
<td>40.0</td>
<td>45.5</td>
</tr>
<tr>
<td>Vaginal dryness</td>
<td>6.6</td>
<td>7.7</td>
<td>13.6</td>
</tr>
<tr>
<td>Loss of sexual desire</td>
<td>3.3</td>
<td>3.1</td>
<td>9.1</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>6.6</td>
<td>18.5</td>
<td>29.5</td>
</tr>
<tr>
<td>Numbness</td>
<td>0</td>
<td>3.1</td>
<td>0</td>
</tr>
<tr>
<td>Irritability</td>
<td>13.2</td>
<td>32.3</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Table 8.8: Percentages of menopausal symptoms and women’s menstrual status.

### 8.7.2 Discussion

There appears to be a steady increase between the number of premenopausal and postmenopausal women who reported psychological and somatic symptoms as well as sexual behavior that are connected to their menstrual status, which might indicate that
these symptoms are due to endocrinological fluctuations during the menopausal event (Fluhmann 1944). Unlike my findings, Chirawatkul and Manderson’s (1994) investigation of menopausal symptoms among Thai women revealed that irritability was the most frequent symptom (23.7 %) among women with regular menstruation; dizziness was the most frequent symptom among women with irregular menstruation (45.7 %) and postmenopausal women (22.2%). Depression was the lowest reported symptom among Thai women within the three categories. In Chirawatkul and Manderson’s (1994) study, the lowest reported symptom among women with regular menstruation was memory loss (1.1 %), among women with irregular menstruation was memory loss and difficulty concentrating (3.1 %), and among postmenopausal women was difficulty concentrating (2.3 %). In contrast to my findings, McKinlay et al. (1985) found that among women in Massachusetts lack of energy (38.1 %) was the highest reported symptom followed by hot flashes and sweats (38.0 %), and headaches (37.2 %), while only 5.4 % reported lack of appetite (Table 8.9).
Table 8.9: Percentages of menopausal symptoms and women’s menstrual status.

 Comparable to my findings, Kuh et al.’s (1997) research among British women pointed out that 60% of menopausal women were bothered by hot flashes, compared with 40% of women with irregular menstruation and 17% of women with regular menstruation. In contrast of my findings, Kuh et al.’s (1997) research showed that 35% of postmenopausal women reported being bothered by vaginal dryness and 24% reported being bothered by difficulty with intercourse; 25% of women with irregular menstruation
experienced vaginal dryness and 13% experienced difficulties with intercourse; and 11% of women with regular menstruation reported vaginal dryness and 8% experienced difficulty with intercourse. Postmenopausal women reported being bothered more by trouble sleeping (63%), compared with women with irregular menstruation (50%) and women with regular menstruation (40%) (Table 8.8).

### 8.8 Medication Use during the Menopausal Transition

#### 8.8.1 Results

In my study, only 36 women reported that they visited physicians for the following symptoms: irregular menstruation (13%), headaches (3%), and loss of urinary control (1.5%). The most common treatments that were used by the respondents to alleviate any discomfort were vitamins (19.5%) followed by calcium supplements (17%), traditional medicine (13.5%), and finally hormone replacement therapy (9.5%) (Table 8.10).

<table>
<thead>
<tr>
<th>Medication use during the menopausal transition</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamins</td>
<td>39</td>
<td>19.5</td>
</tr>
<tr>
<td>Calcium supplement</td>
<td>34</td>
<td>17.0</td>
</tr>
<tr>
<td>Traditional medicine</td>
<td>27</td>
<td>13.5</td>
</tr>
<tr>
<td>Hormone replacement therapy</td>
<td>19</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Table 8.10: Medication use during the menopausal transition.
8.8.2 Discussion

Most Saudi Arabian women in this study preferred to cope with menopausal symptoms naturally in their lives and to get used to them by ignoring them, rather than using medications to alleviate their symptoms. This is due to the belief in Muslim culture that menopause is a natural event and it is God’s will for every woman to experience it. The difference among the menopausal symptoms that the women reported might be due to the number of children the women have, their age at menarche, health status, a family tragedy, and use of oral contraceptives. Moreover, most of these women avoided taking hormone replacement therapy (HRT) either because they did not have sufficient knowledge about the subsequent health retardation due to estrogen deficiency during menopause (such as osteoporosis, and cardiovascular disease) or because they did not know how to cope with and adjust to this event by seeking medication treatment. Saudi women might also avoid HRT because of their awareness of its risk factors such as increased risk of breast cancer and endometrial cancer.

Unlike Saudi Arabian women, 89.7 % of the Kuwaiti women visited physicians because of vasomotor symptoms (hot flashes, night sweats and palpitations), followed by 68% complaining from psychological symptoms (irritability, insomnia, and depression), and 18% complaining from irregular bleeding (Al Qattan and Alexander 1996). Moreover, one-half of the Kuwaitis in the Al Qattan clinical study were taking estrogen-progesterone replacement compared to only 9.5% of Saudi Arabian women in my study. The greater number of Kuwaiti women (50%) who use HRT as a treatment during the menopausal event in contrast to Saudi women (9.5%) may be due to the nature of the population sample, which included only women who visited the clinic. Or it may be due
to the fact that a greater number of Kuwaiti women tend to be educated and more westernized than Saudi women, who are more traditional.

As in my findings, Obermeyer et al.’s (1999) research in Lebanon and Obermeyer et al.’s (2002) study in Morocco found that few women were taking hormone replacement therapy as medication during the menopausal event. Fifteen percent of Lebanese women reported taking hormone replacement therapy during the menopausal transition compared to 20% who reported taking calcium supplements, and a few who were taking vitamins. Obermeyer et al.’s (2002) study in Morocco revealed that only 4% of women took calcium supplements, and 5% of women chose hormone replacement therapy to manage their symptoms during the menopausal event.

Wasti et al.’s (1993) investigation among Karachi women in Pakistan illustrated a strong correlation between socioeconomic status and medication sought for menopausal symptoms. Thirty-seven percent of women who belong to high socioeconomic status visited doctors for their menopausal problems compared to 6% of women who belonged to lower socioeconomic status. However, Saudi’s women socioeconomic status was not considered as an issue that determined whether they seek a physician’s assistance during the menopausal event, because medical care in Saudi Arabia is free. More than economics, it may be tradition and women’s knowledge and attitude toward menopause that have a strong association with the women’s choice to seek medication to alleviate their symptoms during menopause. Comparable to my findings, Lock et al.’s (1988) research among Japanese women revealed that 60% of the sample did not discuss the occurrence of hot flashes with their doctors, with less than 20% experiencing hot flashes some of the time and only 7% discussing the prevalence of hot flashes with a doctor.
Table 8.11: Percentage reporting of medication use during menopause across three countries (data from Kaufert et al. 1988; Lock et al. 1988; Mc Kinlay et al. 1987).

<table>
<thead>
<tr>
<th>Medication use during the menopausal transition</th>
<th>Japan %</th>
<th>Canada %</th>
<th>USA %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamins/minerals</td>
<td>20.1</td>
<td>29.7</td>
<td>38.4</td>
</tr>
<tr>
<td>Herbs/teas</td>
<td>16.0</td>
<td>4.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Hormone replacement therapy</td>
<td>2.7</td>
<td>6.4</td>
<td>8.1</td>
</tr>
<tr>
<td>Relief for upset stomach</td>
<td>22.0</td>
<td>8.6</td>
<td>11.0</td>
</tr>
<tr>
<td>OTC pain reliever</td>
<td>13.8</td>
<td>45.3</td>
<td>62.6</td>
</tr>
</tbody>
</table>

The following research presents cross-cultural variations in medication use during menopause that are comparable to my findings. Researchers in Manitoba, Canada (Kaufert et al. 1988), in Japan (Lock et al. 1988), and in Massachusetts, USA (Mc Kinlay et al. 1987) addressed that during the menopausal event the frequent medication that was used among Massachusetts women was vitamins and minerals (38.4%) compared to 29.7% Canadian and 20.1% Japanese women who used vitamins and minerals. Moreover, relief from upset stomach was the most reported medication use during menopause among the Japanese women (22%) compared to 11% Massachusetts women and 8.6% Canadian women who used medication for upset stomach. According to the Table 8.11, Canadian women (45.3%) and Massachusetts women (62.6%) were using over the
counter pain reliever (OTC) more frequently during the menopausal event compared to other medications, while only 13.8% of Japanese women were taking OTC during menopause (Table 8.11).

8.9 Conclusion

The primary source for obtaining information regarding the menopausal event among Saudi women was media, followed by family and friends. Few women sought to obtain knowledge about the menopausal event from health professionals. Saudi women’s knowledge about the menopausal event was linked to menstrual cessation, which is considered a sign of Sin Al-ya’as, meaning “the desperate age.” Depression, hot flashes, anger, and hormone deficiency were also associated with menopausal symptoms. Saudi women’s attitudes toward menopause vary significantly between Bedouin and Hadar women. Hadar women tended to have more positive attitudes toward the menopausal event than did Bedouin women. The most common menopausal symptoms that Saudi women experienced during the menopausal transition included irregular menstruation, hot flashes, and anger. Few women reported the prevalence of the following symptoms: loss of urinary control, vaginal dryness, and loss of sexual desire. Body bloating, pain with intercourse, and chest pressure during the menopausal transition were not reported by the Saudi women. There was a correlation between menopausal symptoms and women’s menstrual status, but the correlation was not statistically significant. Hot flashes was the highest reported symptom among Saudi women with regular and irregular menstruation and among postmenopausal women. Depression was also associated with women’s menstruation status but was not statistically significant. The most common treatments that were used by Saudi women during the menopausal event to alleviate any
discomfort were vitamins followed by calcium supplements, traditional medicine, and finally, hormone replacement therapy. Only a few Saudi women reported that they visited a physician during the menopausal event.

These results illustrate that even though the menopausal event is a universal biological transition that every woman experiences, the prevalence of menopausal symptoms can be attributed to the interaction between endocrine changes, chronological aging, psychological or social factors, environmental change, and cultural attitudes toward menopause. An example that supports this statement is the Melbourne Women’s Midlife Health Project (1993), which revealed that women who reported fewer menopausal symptoms were more educated nonsmokers; exercised at least once a week, less stressed, and had positive attitudes toward menopause. However, women who reported high levels of symptomatology were associated with negative attitudes toward menopause, unhealthy lifestyles, interpersonal stress, and financial problems.
CHAPTER 9

RESULTS AND DISCUSSIONS III:
MENOPAUSAL FACTORS AND PREVALENCE OF SYMPTOMS

Chapter 9 first presents the descriptive statistical results of the relationship between the respondents’ anthropometric measurements, sociodemographic factors, reproductive history, and lifestyle factors and the prevalence of menopausal symptoms. Each factor is followed by a discussion to explain and compare my study findings with other cross-cultural research on menopause. For each respondent, I added all the symptoms that she experienced during the menopausal event and labeled them “reported total menopausal symptoms.” A statistical analysis was applied to determine whether there is a significant association between menopausal factors and the total number of symptoms that each respondent reported experiencing during the reproductive cessation event.

9.1 Body Size

9.1.1 Results

The respondents’ body mass index and the prevalence of their menopausal symptoms were statistically analyzed, based on a biological explanation for this association. Golub (1992) found that there is a positive correlation between both types of
estrogen (estrone and estradiol) and postmenopausal women’s weight. Adrenal androgens in adipose tissue are converted to estrone (a weak estrogen). Estrone is further converted into estradiol by the liver. And since estrogen deficiency is assumed to trigger vasomotor symptoms, heavier women were expected to report lower prevalence of vasomotor symptoms (Golub 1992).

In my study, although the number of the Saudi women who reported menopausal symptoms varied by their body mass index, the differences are not statistically significant (Table 9.1). Only 1% of the overweight women (BMI = 25.0-29.9 kg/m²) reported menopausal symptoms compared to 5.0 % of women who were categorized into obesity class 1 (BMI = 30.0-34.9 kg/m²), 13.5 % of women who were categorized into obesity class 2 (BMI = 35.0-39.9 kg/m²), and 49.5 % of women who categorized into obesity class 3 (BMI = 40 kg/m² and over). In other words, 99 women whose body mass index was at 40 kg/m² (or over) reported the highest symptom scores compared to 27 women whose BMI was between 35-39.9 kg/m², 10 women whose BMI was between 30-39 kg/m², and two women who reported menopausal symptoms that belong to the overweight category (Table 9.1).
<table>
<thead>
<tr>
<th>Body mass index</th>
<th>Reported number of total menopausal symptoms</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over weight</td>
<td>2</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Obesity class 1</td>
<td>10</td>
<td>18</td>
<td>5.0</td>
</tr>
<tr>
<td>Obesity class 2</td>
<td>27</td>
<td>44</td>
<td>13.5</td>
</tr>
<tr>
<td>Obesity class 3</td>
<td>99</td>
<td>136</td>
<td>49.5</td>
</tr>
</tbody>
</table>

Chi-square: Not significant, $F = 3.916$, $df = 3$, $p = 0.271$

Table 9.1: Frequency of menopausal symptoms according to BMI.

### 9.1.2 Discussion

Similar to my findings, Gold *et al.* (2000), and Tonkelaar *et al.*’s (1996) research reported that women with a body mass index of 27 kg/m² or higher reported more frequent menopausal symptoms such as hot flashes, night sweats, urine leakage, and joint stiffness, than women with a body mass index of 19-26.9 kg/m² (or less). However,
unlike my findings, Campagnoli et al. (1981), Erlik et al. (1982) and Schwingl et al.’s (1994) investigations demonstrated that there was a significant association between vasomotor symptoms (hot flashes and perspiration) and women’s body weights with slender women reporting more somatic symptoms than the moderate weight or overweight women.

9.2. Sociodemographic Factors

9.2.1 Ethnicity

9.2.1.1 Results

The number of respondents who reported menopausal symptoms varied almost by 50% in ethnicity, but the difference was not statistically significant. As Table 9.2 shows, Hadar women (N = 126) tended to report more menopausal symptoms than Bedouin women (N = 74). As Table 9.3 shows, Hadar women were experiencing menopausal symptoms more frequently than the Bedouin women, except for memory loss. There was no significant difference in memory loss reported between the two ethnic groups.
<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Reported number of total menopausal symptoms</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedouin</td>
<td>47</td>
<td>74</td>
<td>23.5</td>
</tr>
<tr>
<td>Hadar</td>
<td>90</td>
<td>126</td>
<td>45.0</td>
</tr>
</tbody>
</table>

Chi-square: Not significant, $F = 1.354$, df = 1, $p = 0.245$

Table 9.2: Frequency of menopausal symptoms according to ethnicity.
<table>
<thead>
<tr>
<th>Menopausal symptoms</th>
<th>Ethnicity</th>
<th>Bedouin</th>
<th>Hadar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vasomotor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot flashes</td>
<td></td>
<td>27</td>
<td>49</td>
</tr>
<tr>
<td>Night sweats</td>
<td></td>
<td>22</td>
<td>31</td>
</tr>
<tr>
<td>Palpitations</td>
<td></td>
<td>20</td>
<td>29</td>
</tr>
<tr>
<td><strong>Somatic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Numbness</td>
<td></td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Bone pain</td>
<td></td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Headaches</td>
<td></td>
<td>19</td>
<td>35</td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td></td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td><strong>Psychological disorders</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irritability</td>
<td></td>
<td>19</td>
<td>36</td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td>18</td>
<td>35</td>
</tr>
<tr>
<td>Anger</td>
<td></td>
<td>24</td>
<td>37</td>
</tr>
<tr>
<td>Sleeping difficulty</td>
<td></td>
<td>17</td>
<td>29</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Memory loss</td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Sexual behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of sexual desire</td>
<td></td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Vaginal dryness</td>
<td></td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Loss of urinary control</td>
<td></td>
<td>6</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 9.3: Frequency of menopausal symptoms according to ethnicity.
9.2.1.2 Discussion

The differences between Hadar and Bedouin women in reporting the incidence of menopausal symptoms might be due to the following factors: Saudi Hadar women tend to be thinner than Bedouin women, more physical active, higher educated, and employed. Moreover, Hadar women generally are more acculturated to the western values of youth and femininity, more knowledgeable about the menopausal event and the health problems that are commonly associated with this event, and generally have negative attitudes toward menopause.

In contrast, Saudi Bedouin women are usually illiterate and unaware of the physiological and psychosocial changes that accompany menopause. They are usually housewives who devote their lives to taking care of their family and are highly integrated in kin networks. Bedouin women tend to have positive attitudes toward menopause, because wisdom and respect are more highly valued among them than youth and femininity. Based on these differences, “Hadar” women who have been acculturated by Western values tend to report greater incidence of menopausal symptoms because of their higher awareness and sensation of the prevalence of these symptoms than traditional “Bedouin” women.

Similar to my findings, the following studies also found differences in the reported symptoms of menopause among ethnic groups. Wright (1982) found that the prevalence of menopausal symptoms was experienced differently between traditional and acculturated Navajo women, but these differences in reported symptoms were statistically not significant. Bart (1970) and Patrick (1970) discovered that European women reported menopausal symptoms more frequently than black women. Gold et al.’s (2000)...
investigation showed that Japanese and Chinese women reported less menopausal symptoms except for forgetfulness and heart pounding than non-Hispanic Caucasians. African-American women reported fewer symptoms such as urine leakage and difficulty sleeping than Caucasian women, and more frequent vasomotor symptoms and vaginal dryness. Also, Hispanic women reported more frequent vaginal dryness, urine leakage, heart pounding, and forgetfulness than did non-Hispanic women. Chompootweep et al. (1993), Goodman et al. (1977), Lindgren et al. (1993) and Lock (1991) reported that the prevalence of hot flashes was less frequently reported among Asian women than Caucasian women. And this difference might be attributed to the high consumption of soy product among Asian women.

As the above studies reveal, the variations in the symptoms experienced during the menopausal event can be due to biocultural factors, because even though the biological mechanism of menopause is similar in every woman, the prevalence of the symptoms that coincide with it vary.

9.2.2 Marital Status

9.2.2.1 Results

As can be seen in Table 9.4, the variations between the respondents’ marital status and frequency of reported menopausal symptoms were found to be significant (p < 0.05). Married women (N = 163) tended to report more frequent menopausal symptoms than did unmarried women (single, divorced, widowed) (N = 37) (Table 9.4).
<table>
<thead>
<tr>
<th>Marital status</th>
<th>Mean number of menopausal symptoms</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>76.6</td>
<td>163</td>
<td>52.5</td>
</tr>
<tr>
<td>Not married</td>
<td>23.35</td>
<td>37</td>
<td>16.0</td>
</tr>
</tbody>
</table>

Chi-square: Significant, $F = 6.807$, $df = 1$, $p = 0.009$

Table: 9.4: Frequency of menopausal symptoms according to marital status.

### 9.2.2.2 Discussion

My findings showed that the difference in the prevalence of menopausal symptoms according to the Saudi women’s marital status was significant. Married women had almost four times more symptoms than did unmarried women (Table 9.4). This may be due to endocrinological causes that have to do with the fact that married women have a different life history, such as sexual activity, use of birth control, pregnancies, and miscarriages. The difference can also be due to the fact that a married Saudi woman may have a more stressful life with taking care of many people, including not only her family but also her in-laws.

Comparable to my findings, Gold et al. (2000) and Jaszmann et al. (1969) found a significant relationship between the respondents’ marital status and the prevalence of...
menopausal symptoms. Gold et al. (2000) conducted an investigation among women who lived in seven USA sites (Boston, Chicago, Detroit, Los Angeles, Newark, Oakland, and Pittsburgh). Jaszmann et al. (1969) conducted a study among menopausal women in The Netherlands. In both studies, there was a significant relationship between the women’s marital status and the prevalence of menopausal symptoms. Married women reported more frequent menopausal symptoms such as vasomotor symptoms (hot flashes, sweating, cold hands and feet), urine leakage, and vaginal dryness, than non-married women (single, divorced, widowed). Unlike Gold et al. (2000) and Jaszmann et al.’s (1969) findings, Boulet et al. (1994) demonstrated that single women with no husband or partner reported more frequent psychological complaints, such as anxiety, depression, impatience, and irritability than women with partners (Table 9.5).

Inconsistent with the above research’s finding, Thompson et al. (1973) showed no significant association between the respondents’ marital status and the prevalence of menopausal symptoms.
Table 9.5: Comparison of cross-cultural findings by frequency of the menopausal symptoms according to the respondents’ marital status.

<table>
<thead>
<tr>
<th>Location</th>
<th>Significant positive association</th>
<th>Significant negative association</th>
<th>No significant association</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>South-east Asia</td>
<td>Significant</td>
<td></td>
<td></td>
<td>Boulet et al. (1994)</td>
</tr>
<tr>
<td>USA</td>
<td>Significant</td>
<td></td>
<td></td>
<td>Gold et al. (2000)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Significant</td>
<td></td>
<td></td>
<td>Jaszmann et al. (1969)</td>
</tr>
<tr>
<td>Not available</td>
<td></td>
<td>No significant association</td>
<td></td>
<td>Thompson et al. (1973)</td>
</tr>
</tbody>
</table>

**9.2.3 Education**

**9.2.3.1 Results**

The respondents’ educational levels are significantly associated with the prevalence of reported menopausal symptoms. Women (N = 48) with no education and women (N = 51) with twelve years of education reported menopausal symptoms more frequently compared to 12.0 % of women with six years of education, 9.0 % of women with nine years of education, and 11.5 % of women with sixteen and higher years of
education (Table 9.6). In addition, Table 9.6 shows that the respondents with nine years of education reported the fewest menopausal symptoms compared to the other groups.

<table>
<thead>
<tr>
<th>Education</th>
<th>Reported number of total menopausal symptoms</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>37</td>
<td>48</td>
<td>18.5</td>
</tr>
<tr>
<td>Primary (6 years)</td>
<td>24</td>
<td>31</td>
<td>12.0</td>
</tr>
<tr>
<td>Middle school (9 years)</td>
<td>18</td>
<td>27</td>
<td>9.0</td>
</tr>
<tr>
<td>Secondary (12 years)</td>
<td>35</td>
<td>51</td>
<td>17.5</td>
</tr>
<tr>
<td>University and higher (+16 years)</td>
<td>23</td>
<td>43</td>
<td>11.5</td>
</tr>
</tbody>
</table>

Chi-square: Not significant, F = 7.315, df = 4, p = 0.120

Table 9.6: Frequency of the menopausal symptoms according to the respondents’ education.

9.2.3.2 Discussion

Comparable to my findings, Boulet et al. (1994), Golub (1992), Jaszmann et al. (1969), Kuh et al. (1997), Polit et al. (1980) and Sternfeld et al.’s (1999) studies showed that less educated women reported more menopausal symptoms (hot flashes, cold sweats,
irritability, depression, headaches, and tearfulness) than higher educated women. In addition, according to Gold et al. (2000), less educated American women reported more menopausal symptoms such as vaginal dryness, forgetfulness, heart pounding, and vasomotor symptoms than did higher educated women. According to the authors, the negative correlation between the respondents’ educational levels and the prevalence of climacteric symptoms can be due to life current stress and poor physical and psychological health in the past. As Wadsworth (1991) revealed, I also believe that there is a strong association between Saudi women’s educational levels and the reported incidence of their menopausal symptoms. Saudi women with higher education tend to seek medical care more often and are more likely to acknowledge general as well as specific health problems. They also have a wider range of disease management resources and varied strategies to cope with any physical discomfort.

In contrast to my findings, Flint and Samil (1990) among Indonesian women found that migrant educated women reported more frequent menopausal symptoms (fatigue, atrophic vaginitis, weight, and hot flashes) than did migrant non-educated women. Wadsworth’s (1991) findings led him to conclude that women’s educational levels is a strong determinant on women’s health status, lifestyle, and health care.

**9.2.4 Occupation**

**9.2.4.1 Results**

According to Table 9.7, the number of respondents who reported menopausal symptoms varied by their employment status, but was not statistically significant. Housewives (N = 127) tended to complain more about menopausal symptoms than Saudi Arabian women who were currently working (N = 50) or who used to work (N = 23).
<table>
<thead>
<tr>
<th>Employment status</th>
<th>Reported number of total menopausal symptoms</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not working</td>
<td>101</td>
<td>150</td>
<td>50.5</td>
</tr>
<tr>
<td>Currently working</td>
<td>36</td>
<td>50</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Chi-square: Not significant, $F = 0.37$, df = 1, $p = 0.53$

Table: 9.7: Frequency of menopausal symptoms according to the respondents’ employment status.

### 9.2.4.2 Discussion

Even though there appears to be an association between employment status and the respondents’ total menopausal symptoms in my study, this association is not statistically significant (Table 9.7). This might again be due to the small sample size of my research. Almost all Saudi Arabian women’s employment is sedentary such as teaching, medicine, working in banks, and beauty salons. Since the adrenal androgens are converted to estrogen in adipose tissue, and menopausal symptoms such as somatic and vasomotor symptoms are caused by estrogen deficiency (Aloysio et al. 1988; Judd et al. 1980; Hunter 1990; Nisker et al. 1980; Thompson et al. 1973; Utian 1976; Vermeulen 1980).
1980; Wren and Allen 1994), heavier women were expected to report a lower prevalence of vasomotor symptoms. Similar to my findings, Obermeyer et al. (2002), who conducted their study among Moroccan women, revealed that there was no significant relationship between employment status and prevalence of symptoms.

Similar to my findings, Bart et al. (1971), Boulet et al. (1994), Frey (1982), Golub (1992), Polit et al. (1980) and Severne (1982) found that housewives tended to report significantly more frequent psychological and vasomotor symptoms such as hot flashes, palpitations, and dizziness, than did employed women. However, in these studies, unlike in my study, this relationship was statistically significant. Flint and Samil (1990) explained the relationship between employment status and menopausal symptoms to the lifestyle type. Working women were more likely to be sedentary than non-working women, which led to more weight gain because of less physical activity during office hours. My study findings are in accordance with the findings of these clinical studies. Sixty-four percent of Saudi women who never worked were grouped in class 3 obesity compared to 25% currently working Saudi women who had the same BMI. The same association between the respondents’ BMI and employment status existed in women who belonged to obesity class 1 and 2 (Table 9.8).

Also according to my findings in this study, there was an inverse association between the total reported menopausal symptoms and the respondent’s BMI. For example, 6.6% of women who reported five menopausal symptoms belonged to obesity class 3, compared to 9.1% of women who belonged to obesity class 2, and 16.7% women who belonged to obesity class 1. Golub (1992) provided further explanations for the association between women’s employment status and reported menopausal complaints.
He said that employed women tend to report fewer menopausal symptoms because in
general healthier women, whether menopausal or not, are more likely to be working.
Furthermore, women who have fine positions at work and are satisfied with their jobs
tend to adjust and cope with the menopausal transition better than non-employed women.

<table>
<thead>
<tr>
<th>Body mass index categories</th>
<th>Employment status</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity class 1</td>
<td>Never worked</td>
<td>61.1</td>
</tr>
<tr>
<td></td>
<td>Currently working</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>Used to work</td>
<td>16.7</td>
</tr>
<tr>
<td>Obesity class 2</td>
<td>Never worked</td>
<td>61.4</td>
</tr>
<tr>
<td></td>
<td>Currently working</td>
<td>27.3</td>
</tr>
<tr>
<td></td>
<td>Used to work</td>
<td>11.4</td>
</tr>
<tr>
<td>Obesity class 3</td>
<td>Never worked</td>
<td>64.0</td>
</tr>
<tr>
<td></td>
<td>Currently working</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>Used to work</td>
<td>11.0</td>
</tr>
</tbody>
</table>

Table 9.8: Percentage of respondents’ employment status according to their obesity
categories.

In contrast to my research results, Kuh et al. (1997) found that British working
women reported more frequent menopausal symptoms, such as hot flashes, cold sweats,
vaginal dryness, difficulty with intercourse, anxiety, and depression, compared to women
with other employment statuses. According to the authors, these findings might be caused
by work stress; employed women tended to be less tolerant of vasomotor and somatic symptoms and felt embarrassed when incidences of hot flashes occurred at work. On the other hand, Avis et al. (1997), Gold et al. (2000), Schwing et al. (1994) and Wilbur et al.’s (1998) research illustrated that women with part-time employment status reported more menopausal symptoms such as heart pounding, forgetfulness, and difficulty sleeping compared to housewives and women with full-time employment status.

9.2.5 Family’s Annual Income

9.2.5.1 Results

As Table 9.9 demonstrates, the number of respondents who reported menopausal symptoms varied by the women’s families’ annual income, but the differences were not statistically significant. Women whose family’s annual income was under 53 thousand Saudi Riyals reported climacteric symptoms most frequently than did women whose family’s annual income was 54 thousand Saudi Riyals and higher.
<table>
<thead>
<tr>
<th>Family’s annual income</th>
<th>Reported number of total menopausal symptoms</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 53 thousand SR</td>
<td>81</td>
<td>114</td>
<td>71.1</td>
</tr>
<tr>
<td>54+ thousand SR</td>
<td>56</td>
<td>86</td>
<td>65.1</td>
</tr>
</tbody>
</table>

Chi-square: Not significant, $F = 0.801$, df = 1, $p = 0.371$

Table 9.9: Frequency of menopausal symptoms according to respondents’ family’s annual income.

9.2.5.2 Discussion

Campagnoli et al. (1981), Green and Cooke (1980), McKinlay and Jefferys (1974), Obermeyer et al. (2002) and Thompson et al. (1973) reported no significant relationship between socioeconomic status and the prevalence of menopausal symptoms. These results are similar to my findings in this study among Saudi Arabian women. My study findings are comparable with Jaszmann et al. (1969) in The Netherlands, Van Keep and Kellerhalls (1974) in Switzerland and Compagnoli et al. (1981) in Italy conducted studies which revealed that women who belong to a lower socioeconomic status were
reporting more severe menopausal symptoms than did women of high status; however, my findings are not statistically significant. Moreover, Kuh et al. (1997) found that women with a lower socioeconomic status in childhood reported more frequent psychological symptoms such as depression and anxiety compared to their cohorts. Van Keep and Kellerhals (1974) revealed that menopausal complaints were less severe among women of the higher social classes who also recovered more significantly after passing the menopausal event than did lower-class women.

On the other hand, Wasti et al.’s (1994) study among Pakistani women revealed that women who belong to a lower socioeconomic status reported fewer symptoms. According to the authors, this parallel association between family’s annual income and menopausal symptoms can be due to the fact that women who belong to a lower socioeconomic class tend to consider problems such as vasomotor symptoms minor, and therefore overlook them.

9.3 Reproductive History Factors

9.3.1 Results

As can be seen in Table 9.10, the relationship between the prevalence of menopausal complaints and the number of children is statistically significant. There is an inverse association between the reported incidences of total menopausal symptoms with the Saudi women’s number of children. The respondents who had no children and up to six children reported more menopausal symptoms, in contrast to the respondents who had between seven and thirteen children. Table 9.10 also illustrates that there was an inverse association between respondents’ number of miscarriages and the total reported menopausal symptoms. Saudi women who had not experienced a miscarriage and who
had experienced three miscarriages reported the highest incidence of total menopausal symptoms compared to respondents who had experienced between four and seven miscarriages. However, this relationship was statistically not significant (Chi-square = 0.493, 1 df, p = 0.483). Age at last pregnancy, age at menarche, and cycle length in the past were not statistically significant in relation to the prevalence of menopausal symptoms (Table 9.10).

In contrast to the number of miscarriages factor, age at last pregnancy showed a consistent positive relationship with the number of symptoms. However, the relationship was not statistically significant between age at last pregnancy and total menopausal symptoms. Respondents whose ages at last pregnancy were above 36 years of age reported more frequent menopausal symptoms than those whose ages at last pregnancy were 35 years old or younger, respectively.

According to Table 9.10, the relationship between the respondents’ ages at menarche and the total menopausal symptoms was inverse, but not statically significant. Respondents (N = 94) whose age at menarche was under thirteen years reported the highest total menopausal symptoms compared to women whose ages at menarche were thirteen and over thirteen years old. Although there was no significant association between the respondents’ cycle length in the past and the reported total menopausal symptoms, 106 respondents whose cycle lengths in the past were between five and seven days reported the highest prevalence of the total menopausal symptoms, compared to 21 and nine respondents whose menstruation cycle length in the past were between three and five days and between one to two days, respectively.
<table>
<thead>
<tr>
<th>Reproductive history</th>
<th>Reported number of total menopausal symptoms</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 – 6</td>
<td>86</td>
<td>140</td>
<td>44.10</td>
</tr>
<tr>
<td>7 – 13</td>
<td>46</td>
<td>55</td>
<td>23.58</td>
</tr>
<tr>
<td></td>
<td>Chi-square: Significant, F = 8.905, df = 1, p = 0.003</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of miscarriages</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3</td>
<td>124</td>
<td>182</td>
<td>63.91</td>
</tr>
<tr>
<td>4-7</td>
<td>7</td>
<td>12</td>
<td>6.18</td>
</tr>
<tr>
<td></td>
<td>Chi-square: Not significant, F = 0.493, df = 1, P = 0.483</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age at last pregnancy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Younger than 35 yr</td>
<td>47</td>
<td>74</td>
<td>36.15</td>
</tr>
<tr>
<td>Older than 36 yr</td>
<td>83</td>
<td>118</td>
<td>63.84</td>
</tr>
<tr>
<td></td>
<td>Chi-square: Not significant, F = 3.192, df =1, p = 0.074</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age at menarche</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 13 yr</td>
<td>68</td>
<td>94</td>
<td>34.0</td>
</tr>
<tr>
<td>13 yr</td>
<td>38</td>
<td>55</td>
<td>19.0</td>
</tr>
<tr>
<td>Over 13 yr</td>
<td>31</td>
<td>51</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>Chi-square: Not significant, F = 2.058, df = 2, p = 0.357</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cycle length in the past</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2 days</td>
<td>1</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>3-5 days</td>
<td>21</td>
<td>36</td>
<td>10.5</td>
</tr>
<tr>
<td>5-7 days</td>
<td>106</td>
<td>151</td>
<td>53.0</td>
</tr>
<tr>
<td>Over 8 days</td>
<td>9</td>
<td>12</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>Chi-square: Not significant, F = 2.621, df = 3, p = 0.454</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9.10: Frequency of menopausal symptoms according to the respondents’ reproductive history.
9.3.2 Discussion

Recall bias may have skewed my findings, since many of the Saudi women could not remember for sure their age at menarche, nor could they remember their cycle length. In many cases, the Saudi women also did not know their age at last pregnancy, because, as I have explained earlier, they did not know their birth date with certainty. Furthermore, although I observed variations between the Saudi women’s reproductive history factors and the prevalence of menopausal symptoms, the sample size in my study was not sufficient to establish a statistically significant association. The number of children was the only reproductive history factor that showed a statistically significant association with the prevalence of menopausal symptoms among Saudi women. This significant relationship can be a result of hormonal fluctuations due not only to pregnancy, but also miscarriages, breastfeeding, the woman’s health status, and her use of birth control.

Similar to my findings in this study, Batrinos et al. (1979) in Greece revealed that the prevalence of hot flashes was not associated with the respondents’ age at last pregnancy. However, the number of months of amenorrhea due to pregnancies had a significant relationship with the reported incidence of hot flashes, 64.7% nulliparous women or women with 1-19 months of pregnancies complained about a high incidence of hot flashes compared to 29.6% women with 40-59 months of amenorrhea. Unlike my findings, Medical Women’s Federation (1933) and Thompson et al. (1973) found no significant relationship between parity and the prevalence of menopausal symptoms. On the other hand, Jaszmann (1973) found that menopausal complaints were not associated with the number of pregnancies, but with age at last pregnancy. Women at an older age at
last pregnancy tended to report more menopausal complaints compared to women who were younger at last pregnancy (Table 9.11).

<table>
<thead>
<tr>
<th>Location</th>
<th>Significant positive association</th>
<th>Significant negative association</th>
<th>No significant association</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td></td>
<td>Significant</td>
<td></td>
<td>Batrinos et al. (1979)</td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td>No significant association</td>
<td></td>
<td>Jaszmann (1973)</td>
</tr>
<tr>
<td>Not available</td>
<td></td>
<td>No significant association</td>
<td></td>
<td>Medical Women’s Federation  (1933)</td>
</tr>
<tr>
<td>Not available</td>
<td></td>
<td>No significant association</td>
<td></td>
<td>Thompson et al. (1973)</td>
</tr>
</tbody>
</table>

Table 9.11: Comparison of cross-cultural findings by frequency of the menopausal symptoms according to the respondents’ parity.

9.4 Lifestyle Factors

9.4.1 Exercise Patterns

9.4.1.1 Results

There was no significant relationship between the prevalence of menopausal symptoms and women’s exercise patterns (Table 9.12). Menopausal symptoms were
reported more frequently by Saudi women who exercised sometimes (N = 86) and who never exercised (N = 80), compared to only 15 women who used to exercised, and 12 women who exercised every day.

<table>
<thead>
<tr>
<th>Exercise patterns</th>
<th>Reported number of total menopausal symptoms</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every day</td>
<td>12</td>
<td>15</td>
<td>6.0</td>
</tr>
<tr>
<td>Some times</td>
<td>55</td>
<td>86</td>
<td>27.5</td>
</tr>
<tr>
<td>Used to</td>
<td>15</td>
<td>19</td>
<td>7.5</td>
</tr>
<tr>
<td>Never</td>
<td>55</td>
<td>80</td>
<td>27.5</td>
</tr>
</tbody>
</table>

Chi-square: Not significant, $F = 2.707$, df = 3, $P = 0.439$

Table 9.12: Frequency of menopausal symptoms according to exercise patterns.

**9.4.1.2 Discussion**

Even though the association between physical activity and the prevalence of menopausal symptoms was not significant in my study, Saudi women who never exercised and who exercised some times reported more menopausal symptoms than those women who exercised every day as Table 9.10 shows. The relationship between women’s physical activity and the incidence of menopausal symptoms can be attributed to the
thermoregulatory center during the menopausal transition that can be affected by the impairment of GnRH secretion that is caused by the hypothalamic opioid neuron activities. The mechanism such as physical activity might decrease the incidence of hot flashes through increasing the peripheral serum levels of β-endorphins associated with increasing the central opioid activity among menopausal women (Aleem et al. 1985; Shoupe et al. 1987; Tepper et al. 1987).

Similar to my findings in this study, Hunter (1993), Slaven et al. (1997), Sternfeld et al. (1999), Wilbur et al. (1990) and Wilbur et al.’s (1992) cross-sectional studies did not show any significant association between menopausal vasomotor symptoms and physical activity. Comparable to my findings, Gold et al. (2000), who conducted research among multi-ethnic populations in the USA found that women who were obtaining less physical activity reported more menopausal symptoms, such as heart pounding, joint stiffness, forgetfulness, and difficulty sleeping, than did women who were more physically active. However, in Gold et al.’s (2000) research, unlike in my study, this relationship was statistically significant. Cumming et al. (1985), Dennerstein et al. (1996), Gold (2000) research, Hammar et al. (1990), Hunter (1992), Slaven et al. (1997) and Wilbur et al. (1992) illustrated that somatic symptoms as well as anxiety were associated significantly with lack of exercise. Physically active postmenopausal women reported fewer incidences of menopausal symptoms and had better health status, compared to sedentary women.

Psychological factors have also been found to affect the age of menopause. For example, depression in women may lead to early menopause, due to a more precipitous or qualitatively different decline in endogenous estrogen levels (Harlow et al. 2000).
Sternfeld’s (1999) study showed that physical activities, including recreation, housework, child care, and occupational activity, help to decrease the symptoms of menopause. Even if the activity does not decrease the risk of frequent hot flashes, it may lessen the psychological, somatic sequence of vasomotor disruption. For example, the Swedish study by Hammar et al. (1990) reported a lower prevalence of moderate or severe hot flashes among regularly active perimenopausal women.

9.5 Conclusion

The association between anthropometric measurements, sociodemographic status, reproductive history, and lifestyle factors and the reported menopausal symptoms among Saudi women in this study was not statistically significant, even though the reported menopausal symptoms varied between the women.

Saudi women’s marital status and the number of children were the only determinants significantly associated with the prevalence of reported menopausal symptoms. Married women reported more frequent menopausal symptoms than did unmarried women. Saudi women who had no children and or up to six children reported the highest incidence of total menopausal symptoms compared to respondents who had between seven and thirteen children. Women’s experiences of menopausal symptoms have been explained cross-culturally, presenting the menopausal event as an outcome of biocultural factors.

The menopausal symptoms Saudi Arabian women reported in my study and their attitudes toward menopause can be attributed to the women’s beliefs, changes in the women’s household structure, and atmospheric temperature. Beliefs played a major role in explaining the women’s awareness of their menopausal symptoms since almost all the
respondents reported that the onset of menopause is a normal event that every woman has
to go through; it is God’s will, which every woman must respect and cope with, without
complaint. This belief resulted in the majority (81%) of Saudi women having a positive
attitude toward menopause. Most of them considered menopause a natural transition.

The time that a Saudi woman goes through the menopausal transition, usually
coincides with many changes in her household, such as her daughters getting married and
leaving home to live with their in-laws, or her sons marrying, bringing in a new bride into
the family, and having children. Suddenly, she has to adjust to a new role as a mother in
law and a grandmother. These dynamic changes in the household structure have a major
influence on older women’s psychological and physiological health. A grandmother in
Saudi Arabian culture is expected to be wise and to make many important decisions
regarding her family. Consequently, as most of the women in this study reported, they
had less time to devote to themselves and hence just ignored their symptoms because they
were less aware or simply did not recognize the prevalence of symptoms caused by
endocrinological changes during the menopausal event. Moreover, the majority of the
women in this sample did not have a basic biological knowledge about the
endocrinological feedback that triggers the onset of menopause and causes menopausal
symptoms. Therefore they did not make a connection between a bodily discomfort and
hormonal fluctuations due to menopause.

Atmospheric temperature can also be considered one of the triggers to the
prevalence of vasomotor symptoms among the Saudi Arabian women who participated in
this study. Agoestina and Van Keep (1984), Coope et al.’s (1978) and Coope (1995)
research explained that the low number of complaints of menopausal symptoms such as
vasomotor symptoms in Asian countries might be partly due to the climate. In hot climate countries, women are less aware of their body thermoregulatory changes that are accompanied with endocrinological fluctuations during the menopausal transition compared to women who live in colder climates and who can clearly recognize the incidence of vasomotor symptoms.
CHAPTER 10

CONCLUSION

10.1 Introduction

The significance of this study is that it is the first empirical research about menopause among Saudi Arabian women in Al-Khobar conducted from the perspective of biological anthropology. Moreover, the research is a community survey that includes women from different socioeconomic classes, different cultures, and ethnic backgrounds. It is a cross-sectional study distributed across a normal sample population and was not drawn from a clinical population (Al-Qattan and Alexander 1996; McKinlay and McKinlay 1973; Rinehart and Schiff 1985). The interviews conducted in this research were based on the face-to-face interview, which limits any mistakes that can be made by the respondents regarding any questions due to their misunderstanding.

In this dissertation menopause has been viewed from the biocultural and lifespan perspectives. Both perspectives illustrate that even though the menopausal event is a universal biological transition that every woman experiences the prevalence of menopausal symptoms can be attributed to the interaction between endocrinological fluctuations, aging, psychological or social factors, environmental change, and cultural

The findings of this research are consistent with the previously conducted studies across cultures on menopausal factors and symptoms. Saudi women’s mean and median age at natural menopause as well as their reported menopausal symptoms were compared and analyzed with the previous cross-cultural research. The findings showed menopause as a complex life history event and an outcome of the interaction between multi-factors that are varied depending on their vitality between populations.

10.2 Theoretical Implications

The findings of the current study support the biocultural perspective of menopause. As Leidy (1994) stated, the menopausal event cannot be separated from women’s ongoing life. The current study showed that the Saudi women’s weight, marital status, and employment status were significantly associated with their mean age at natural menopause. These findings can be attributed to the Saudi women’s culture interacting with their health condition in general and age at menopause and the prevalence of the menopausal symptoms in particular. Saudi culture is overwhelmingly Islamic and traditional. Saudi women generally do not exercise outside their homes, and the natural place for women according to the Holy Qur’an is their homes. Moreover, not all Saudi women have the financial capability to own a home treadmill or a swimming pool to exercise.

In addition, a social gathering is considered a major event among Saudi Arabian women’s schedules, especially with their family and neighbors. The Holy Qur’an encourages Muslims to visit their family and their neighbors; they will receive good
deeds from God by keeping in contact with them. According to Saudi Arabian culture, accepting a host’s invitation reflects the respect and status you show them. Usually these visits are accompanied by a huge table full of various kinds of foods and drinks. The table’s size reflects the host’s hospitality and your relationship to them. Guests have to eat everything that is offered to them; refusal to eat means one is insulting the host. As a consequence of these Saudi Arabian traditions, the following studies conducted in the Arabian Peninsula reported that almost one-third of the women were considered to belong to obese class 1 (AlIsa 1997; Al-Mahroos 2000; AlNuaim et al. 1996; Zurayk et al. 1997). Furthermore, being overweight has been linked to age at natural menopause and menopausal symptoms (Besar et al. 1994; Brand and Lehert 1978; Campagnoli et al. 1981, Erlik et al. 1982; Gold et al. 2000, Gray 1976; Karim et al. 1985; Kato et al. 1998; MacMahon and Worcester 1966; Schwingl et al. 1994; Seckin Neslihan et al. 1998; Tonkelaar et al. 1996; Vries et al. 2001).

As my findings illustrated, age at natural menopause among Saudi women is strongly associated with Saudi women’s weight. My findings are comparable to Besar et al.’s (1994) findings. As Besar et al. (1994) demonstrated, obese women tend to report early age at menopause because of their bodies containing higher concentrations of endogenous estrogens coupled with low levels of sex hormone-binding globulin, than lean women, which leads to follicular growth, leading to more rapid follicular exhaustion and thus contributing to an earlier age at natural menopause.

10.3 Results

The association between Saudi women’s life history and their ages at natural menopause and menopausal symptoms are tested in this study and compared with other
cross-cultural research on menopause. The research findings illustrate that Saudi women’s age at menopause is associated with biological factors, whereas their experiences of menopausal symptoms are shaped by their cultural attitudes and perceptions toward the menopausal event. Based on the current research questions addressed in chapter one, the study’s findings show the following:

1. Are the mean and median ages at natural menopause among Saudi Arabian women who live in Al-Khobar comparable to the findings of previous cross-cultural studies?

The current study findings showed that the mean and median ages at natural menopause among Saudi Arabian women who live in Al-Khobar were comparable to the findings of previous cross-cultural studies. Out of 200 Saudi respondents, only 44 women had reached menopause. The average age (48.06 years) at natural menopause among Saudi Arabian women in my study was relatively similar to the average age that Bener et al. (1998) found among United Arab Emirates women (48.0 years). The median age (49 years) at natural menopause among Saudi Arabian women in my study was also comparable to the median age that Al Qattan and Alexander (1996) found among Kuwaiti women (49.5 years).

2. Is there a relationship between respondents’ reproductive history, daily lifestyle, dietary habit, socioeconomic status, and health and their ages at natural menopause?

The current study showed that only the respondents’ weight, marital status, and employment status were significantly associated with Saudi women’s mean age at natural menopause. And none of the menopausal factors (height, body mass index, ethnicity,
educational level, family’s annual income, age at menarche, cycle length in the past, parity, number of miscarriages, age at last pregnancy, type and use of contraceptives, and exercise pattern) that have been used in this dissertation were statistically significantly associated with Saudi women’s average age at menopause. Moreover, the research findings showed that there was no association between daughters’ and mothers’ mean ages at menopause. Since Saudi women consider menopause a normal and personal event, they did not discuss it with their families. However, many of the daughters were able to recall having observed that their mothers were going through menopause. Almost half (105) of them were uncertain about their mothers’ age at menopause but they had observed their mothers’ most frequent menopausal symptoms (irregular bleeding, depression, night sweats, and fatigue). According to the respondents, hot flashes, osteoporosis, anger, or palpitations were not significant symptoms during the mothers’ menopausal transition, due to their beliefs about menopause being a natural transition and their unawareness of what symptoms to expect.

(3) Are the symptoms at natural menopause among Saudi Arabian women who live in Al-Khobar comparable to the findings of previous cross-cultural studies?

The prevalence of menopausal symptoms among Saudi women in my study was comparable to the prevalence of menopausal symptoms that Al Qattan and Alexander (1996) and Bener et al. (1998) found among the Arabian Gulf women. These findings can be attributed to the fact that Islam is the predominant religion in Arabian Gulf countries. People share the same cultural values as well as belonging to the same genetic pool. Consanguineous marriage is common in the Arabian Gulf countries because it is considered socially supportive and sensitive of family and tribal status. In addition,
almost all of the Arabian Peninsula women share the same lifestyle. Smoking is considered a shameful habit; thus, almost all of the women are non-smokers. Because of the gender restriction, especially in Saudi Arabian society, the prevalence of physical exercise is almost nonexistent among Saudi women, since they normally do not go around in public places.

The most common menopausal symptoms that Saudi women experienced during the menopausal transition are irregular menstruation, hot flashes, and anger. Only a few women reported the prevalence of the following symptoms: loss of urinary control, vaginal dryness, and loss of sexual desire. Body bloating, pain with intercourse, and chest pressure were also not reported by the Saudi women during the menopausal transition. The most common treatments that were used by Saudi women during the menopausal event to alleviate any discomfort were vitamins followed by calcium supplements, and traditional medicine. Only a few women reported taking hormone replacement (9.5%) during the menopausal event and visited physicians (9%) during the event.

(4) Is there a relationship between respondents’ reproductive history, daily lifestyle, dietary habit, socioeconomic status, and health and the symptoms they experience during the menopausal event?

The findings of this study illustrate that Saudi women’s marital status and the number of children were the only determinants significantly associated with the prevalence of reported menopausal symptoms. Married women reported more frequent menopausal symptoms than did unmarried women. Saudi women who had no children and up to six children reported the highest incidence of total menopausal symptoms compared to respondents who had between seven and thirteen children.
(5) How do women’s perceptions and attitudes toward the menopausal event affect the menopausal symptoms women experience?

The Bedouin women were more willing to participate in my study and were more eager to learn more about the menopausal event than were the Hadar women. Women’s health at menopause and their attitude toward the menopausal event is strongly determined by their cultural attitudes towards health, disease, and medical treatments, and their access to healthcare (Kaufert and Gilbert 1986; Kaufert 1996). There was a relationship between Saudi women’s attitude toward menopause across ages; however, this association was not statistically significant. My study findings showed that the differences between Bedouin and Hadar women’s attitudes toward the menopausal event were statistically significant. Hadar women in general tended to be more optimistic and have more positive attitudes toward menopause than did Bedouin women. Almost one-fourth (28%) of the Bedouin women viewed menopause as a natural transition compared to more than three-fourths (73%) of Hadar women.

For Saudi Arabian women, the media was the primary source to obtain information regarding the menopausal event, followed by family and friends. Most of the Saudi women linked only menstrual cessation, which is considered a sign of *Sin Al-ya’as*, or “the desperate age,” to the menopausal event. Depression, hot flashes, anger, and hormone deficiency were also associated with menopausal symptoms. Irregular menstruation, hot flashes, and anger were the most common menopausal symptoms that Saudi women experienced during the menopausal transition. There was no correlation between women’s menstrual status and menopausal symptoms.
The insignificant findings of this research can be attributed to the following factors:

(1) Small sample size: out of 200 respondents, only 44 Saudi women had reached menopause and this number is not statistically sufficient to indicate a significant relationships between the study variables. Although the associations between menopausal factors in this study and the average age at menopause and menopausal symptoms were not significant, most of the findings showed that there were differences between the study factors and the reported age at menopause and reported menopausal symptoms among Saudi women.

(2) Recall bias of the respondents’ age. Age at menopause in this study was determined by the respondent’s recalled age, which might not be accurate because some of the Saudi women in my sample did not have a birth certificate.

10.4 Recommendations for Future Research

Further study is needed to elucidate the determinants of age at menopause and whether population differences reflect heritable variations in reproductive biology or whether they are evidence of the potential malleability of this biology by a variety of environmental factors over the lifespan such as childhood diet, disease (autoimmune disorder), and intensive physical work. A standardized questionnaire about menopause should be applied cross-culturally to detect the effects of biocultural factors that were discussed in this study and both the onset of menopause and prevalence of menopausal symptoms. Additional research is necessary to determine the effect of genetic heritage on age at natural menopause among Saudi Arabian women. Autopsy studies can be conducted to detect the relationship between the onset of menopause and the number of
oocytes available at birth and the number of ovarian follicles that undergo atresia. Moreover, it would be beneficial to investigate whether the number of ovarian oocytes and the rate of atresia are determined mostly by genetic heritage or by environmental setting. Further studies among twins, sisters, and mothers-daughters are needed to prove the relationship between familial patterns and age at menopause among Saudi Arabian women.

It is important to observe the relationship between respondents’ reproductive history factors and the onset of menopause among Saudi women. A clinical research is necessary to understand the mechanisms that are responsible for the initiation of follicular growth, also known as primordial follicle activation and follicular acceleration. This would include collecting and measuring the pituitary gonadotropin hormones (follicle stimulating hormone [FSH], luteinizing hormone [LH]), estrogen, progesterone, estradiol, estrone, testosterone, and androstenedione to confirm the onset of menopause among the respondents by using radioimmunoassay techniques. Endocrinological comparisons between and within each reproductive history variables before as well as after the menopausal event would also be useful.
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