Abstract

VIEWS OF AMERICAN VERSUS INDIAN SPEECH LANGUAGE PATHOLOGISTS ON DIAGNOSING AND TREATING PARKINSON’S DISEASE

By Rakshita Banwasi

The present study investigated the role of a speech-language pathologist (SLP) in diagnosing and treating patients with Parkinson’s disease (PD). Forty SLPs from the U.S. and forty from India were selected at random from the American Speech Language Hearing Association and Indian Speech Language Hearing Association directory respectively. Participants completed a 15-minute oral survey. An initial phone call was made to determine the date and time for conducting the survey and to obtain consent. The results suggested that the American SLPs are significantly more aware of the basic facts regarding diagnosing and treating patients with PD, including specific speech and language techniques. This difference is mainly due to the greater caseload for the American SLPs and the issue of referrals of patients with PD to the Indian SLPs. Prior experience in dealing with patients with PD led to greater SLPs knowledge of diagnosing and treating PD. Most of the American SLPs obtained their knowledge about PD through workshops and continued education units while majority of the Indian SLPs relied on the internet to obtain their information on PD. Only a few of them did obtain their information through classroom education, workshops, and other resources.
# Table of Contents

## CHAPTER I

Introduction ................................................................................................................. 1

  * Statement of the problem ................................................................. 5
  * Purpose of study ................................................................................. 5

## CHAPTER II

Literature review ........................................................................................................ 6

  * Types of Parkinsonism ................................................................. 6
  * Genetic basis for PD ................................................................. 10
  * Speech Features .............................................................................. 12
  * Swallowing Disorders ................................................................. 13
  * Respiratory Problems associated with PD ................................... 14
  * Diagnosis ......................................................................................... 15
  * SLPs role in clinical evaluation of speech production ................... 18
  * Treatment ......................................................................................... 19
    * Pharmacotherapy ........................................................................... 20
      * Traditional drugs ........................................................................ 20
      * Ayurveda ..................................................................................... 22
    * Surgical Procedures ..................................................................... 22
    * Music Therapy .............................................................................. 24
    * Paramedical Therapies .............................................................. 24
    * Speech Therapy .......................................................................... 25
    * Alternate and Augmentative Communication ........................... 30
CHAPTER III

Methods……………………………………………………………………32

Data……………………………………………………………………32

Research questions and hypothesis…………………………32

Subject and Procedures……………………………………33

Informed Consent………………………………………………34

Ethical Considerations……………………………………..35

Statistical Analysis………………………………………35

CHAPTER IV

Results………………………………………………………………..36

Subjects…………………………………………………………..36

Data Analysis………………………………………………37

CHAPTER V

Discussion……………………………………………………42

Role of SLPs in diagnosing and treating patients with
PD………………………………………………………………42

Knowledge of treatment for speech and language symptoms of
PD………………………………………………………………43

Awareness of basic facts regarding PD……………………44

Relationship between prior experiences in treating patients with PD
and the SLPs ability to provide treatment for patients with PD……45

Sources of obtaining information…………………………….46
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conclusion</td>
<td>48</td>
</tr>
<tr>
<td>Limitations</td>
<td>50</td>
</tr>
<tr>
<td>Implication for Future Research</td>
<td>50</td>
</tr>
<tr>
<td>References</td>
<td>52</td>
</tr>
<tr>
<td>Appendix 1</td>
<td>58</td>
</tr>
<tr>
<td>Appendix 2</td>
<td>63</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

1. PARK Genes ................................................................. 11
2. Stages of PD ............................................................... 17
3. Demographic characteristics of all the subjects ...................... 36
4. Information obtained by SLPs in class ............................... 40
5. Information obtained by SLPs through workshops .................. 40
6. Information obtained by SLPs through internet ..................... 41
7. Information obtained by SLPs through other sources .............. 41
ACKNOWLEDGEMENTS

I would like to take this opportunity to thank the members of my thesis committee Dr. Alice Kahn, Dr. Fofi Constantinidou, and Dr. Jerry Stonewater for their constant guidance and support during the making of this document. I would especially like to thank Dr. Alice Kahn who constantly motivated me throughout my thesis from the beginning to the very end, and for all the confidence she showed in me during my research work. I also want to thank Dr. Fofi Constantinidou who gave me good suggestions on my writing technique which helped my paper flow better.

Very special thanks to Raghavan for all his help, support and encouragement throughout the thesis process and for proof reading my paper. Sincere thanks to all the speech language pathologists who participated in the study. This section would not be complete without a mention of the most important people in my life, my parents and my sister. I owe a special thanks to them for their generous support and love throughout my life. Any written words would be less to express my gratefulness towards my family. I dedicate my thesis to my family.
CHAPTER I

Introduction

Parkinson’s disease (PD) is a progressive movement disorder characterized by decrease in spontaneous movement, gait difficulty, postural instability, rigidity, and resting tremor. A small group of neurons, called the substantia nigra, located in the basal ganglia, contain the neurotransmitter dopamine. When these pigmented neurons degenerate and die, dopamine is depleted. Decreased dopamine results in the presence of Lewy bodies (cytoplasmic inclusions found in cells of the substantia nigra) and in PD. Depletion of dopamine hampers extrapyramidal system function, which maintains muscle tone during voluntary movements and controls postural balance (Vogel & Carter, 1995).

Parkinson’s disease was first described in 1817 by Dr. James Parkinson, a general practitioner, who called the condition “shaking palsy”. The first symptoms appear after loss of at least 80% of pigmented neurons with a similar decrease in dopamine production. The major features of the disease are resting tremor, bradykinesia, and rigidity; also referred to as the cardinal signs of PD. The symptoms may remain mild for a long period of time or may progress steadily. Eventually, the tremor spreads, and most of the muscles become rigid. The individual’s posture may be stooped, and there may be slow, jerky movements, shuffling, and unsteady gait. Loss of facial expression leads to a mask-like facial expression and a flat affect. Depression is also present in approximately 30% of cases. Dysphagia with increased oral –pharyngeal transit time and impaired airway protection may also occur and increase the chances of aspiration pneumonia (Vogel & Carter, 1995). At least 50% of people with PD experience difficulty with swallowing (The National Parkinson Institute, 2000). Severe cases of the disease may
require a nasogastric tube for intravenous feeding. There is a greater prevalence of dementia in idiopathic PD, but it is rarely an early symptom- always occurring with advanced stages of the disease. Dementia occurring earlier in the course of the disease indicates Alzheimer’s disease or multi-infarct dementia (Nutt, Hammerstad, Gancher, 1992).

**Etiology of PD**

Most cases of PD are idiopathic. Toxins, dietary changes, heredity, infectious processes, or a combination of these may be responsible for the degeneration or malfunction of cells in the substantia nigra (Helm, 1979). Trauma is another potential cause for PD. Any factor that damages the substantia nigra can lead to PD. One in 100 persons in the Unites States is affected with PD and about 40,000 new patients are diagnosed yearly (Rajput & Birdi, 1997). One in 40 individuals over the age of 65 is affected with PD (Tanner, 1996). The symptoms of PD are seen in 15% of those between the ages of 65-74 and in almost 30% of those between ages 75-84 (Ford-Martin, 2001). The disease affects both genders equally, with a higher incidence after age 50 years. It is hypothesized that recent changes in lifestyle and the environment have caused the incidence and prevalence of the disease to increase in persons under 40 years of age.

Over the last decade the number of patients with PD in India appears to be slowly increasing (Rajput & Birdi, 1997). The majority of the population of India lives in the rural areas. Rural living has been suggested by several studies to increase the relative risk of the development of PD (Rajput & Birdi, 1997). Rural living is usually associated with agricultural industry, and work in this environment also has been suggested to increase the risk of developing PD (Rajput & Birdi, 1997). These observations have raised the issue as to whether pesticide and herbicide use may increase the risk of PD.
Communication and cognitive deficits associated with PD

The speech characteristics of PD have been described as hypokinetic dysarthria. This type of dysarthria is characterized by short rushes of speech, imprecise articulation, monopitch, monoloudness, and reduced overall loudness. Occasional hypernasality may also be present (Tanner, 1996). The physiologic basis for inability to vary pitch is stiffness of the vocal cords within the larynx. Voice volume and speech intelligibility may deteriorate rapidly during an utterance and vocal tremor may be present (Ramig, Fox, Sapir, Morrison, 2001). Volume change is generally the first noticeable symptom and the patient begins to speak softly. The patient’s voice is loud at the beginning of a sentence and then fades, the voice may also sound breathy, tremulous, high-pitched hoarse or strident. Words may become slurred and strident (Ramig et al, 2001).

Written communication may also be affected by PD. “Micrographia”, handwriting in which the height of the letters is small and becomes increasingly smaller as the patient writes, is a common feature (Tanner, 1996). Memory and cognitive changes can appear at any stage in the progression of PD, but are more often reported by individuals who have had the disease for many years (Camburn, Countryman, & Schwantz, 1996). Cognitive impairment in PD patients may be manifested by deteriorating short-term memory, increasing disorientation especially in time and place, personality changes, difficulty in coping with complex or abstract material and poor retention (Swinburn & Morley, 1996). The presence of dementia with accompanying loss of communication is a complicating factor.
Management of PD

Early intervention is the key in the treatment of all motor speech disorders including PD. Team treatment by doctors, neurologists, dietitians, occupational therapists, physical therapists, family members, and speech-language pathologists, contribute to a PD patient’s therapy. SLPs evaluate memory and concentration skills and help with strategies and therapy procedures to address the deficits. They also recommend recall strategies to aid in carrying out daily activities, and assist the patient in regaining control over planning and preparing for daily routines and events. Developing and improving effective communication skills and swallowing techniques are also primary roles of an SLP when treating an individual with PD (Vogel & Carter, 1995). Compensatory strategies maximize communicative effectiveness by compensating for reduced understandability or other abnormal parameters of speech. SLPs also evaluate the best augmentative device for the individual. According to Liberman (2001), once a referral is made and an initial appointment is scheduled, the SLP evaluates the speech, voice, and swallow characteristics of the individual with PD. The SLPs then recommends a specific course of treatment, focusing on improving the overall effectiveness of communication and/or swallow function.

A typical management program for patients with PD educates the person and his/her caretaker about the disorder; maintains optimum communication skills for as long as possible, and monitors any associated swallowing problems. SLPs also provide support to the person with PD and his/her caretaker as the disease progresses (Swinburn & Morley, 1996).

Recent treatment approaches are designed to increase life span of the individuals with PD and to improve their overall quality of life. The stage of the disease directs the treatment options
best suited for the particular individual. SLPs need to be well informed regarding these treatments, the potential outcomes and the side effects.

Statement of the problem

SLPs are important members of the diagnostic and intervention team for a patient with PD. PD is less common in India as against the United States, though there has been a gradual increase in the number of people diagnosed with PD in India over the past few years (Rajput & Birdi, 1997). Because Indian SLPs have fewer number of PD patients on their caseload, they may be unaware of the increasing treatment options available for patients with PD. The National Institutes of Health and other research organizations award research dollars to biomedical scientists who study PD. This type of funding is not as extensive in India. This proves that extensive research is being carried out regarding the diagnosis and treatment of patients with PD in the United States as opposed to India. As a result, the American SLP is presumably much more aware and proficient in dealing with PD.

Purpose of the study

This study compares the views of American versus Indian SLPs on their perceptions and knowledge in diagnosing and treating patients with PD. The purpose of the study is to survey the clinical knowledge of SLPs serving patients with PD and the level of confidence they place in their ability to provide diagnosis and professional treatment to these persons. This information is critical for educational training programs in curriculum development and for health service agencies meeting the continuing education needs of these professionals.
CHAPTER II

Literature review

Parkinson’s disease (PD) is a slow, progressive, chronic, neurological disease that attacks a small area of cells in the midbrain known as the substantia nigra. A gradual degeneration of these cells causes a reduction in the neurotransmitter dopamine. The resulting decrease in dopamine creates the symptoms of PD (National Parkinson’s Institute, 2000). PD affects almost every aspect of a person’s daily activities: writing, speaking, walking, memory, concentration, posture, balance, and swallowing. Parkinson’s disease affects about 1 in every 100 Americans over the age of 60 years. An estimated 1.5 million people in the United States are diagnosed with PD, which is more than the combined number of people with other neurological diseases such as muscular dystrophy and multiple sclerosis (National Parkinson’s Institute, 2000). Parkinson’s is second to Alzheimer’s disease as the most common neurodegenerative disease of aging (National Parkinson’s Institute, 2000).

Types of Parkinsonism

Different types of PD have unique clinical manifestations (Jankovic & Stacy, 1992). Although the manifestations of most Parkinsonian conditions are similar to one another, they are clinically distinguishable (Vogel & Carter, 1995). The two major Parkinsonian-like conditions often mistaken for PD are post-encephalitic Parkinsonism (PEP) and progressive supranuclear palsy (PSP) or Steele-Richardson-Olszewski Syndrome (Vogel & Carter, 1995). The symptoms and signs of PEP are similar to those of PD, but the former usually involves more autonomic dysfunction such as marked atrophy of the midbrain and pons resulting in subcortical dementia. In the early 1960’s three new entities; Shy-Drager syndrome, Striatonigral degeneration, and Progressive Supranuclear Palsy (PSP) were described (Swinburn & Morley, 1996). Shy-Drager
refers to a condition in which the earliest and most severe symptom is insufficiency of the autonomic system, followed by PD symptoms. Striatonigral degeneration is a neurological disorder caused by a disruption in the connection between two areas of the brain-the striatum and the substantia nigra. These two areas work together to enable balance and movement. Striatonigral degeneration is a type of multiple system atrophy (MSA). Symptoms of the disorder resemble some of those seen in Parkinson's disease, including rigidity, instability, impaired speech, and slow movements (National Institute of Neurological Disorders and Stroke, 2002). The current classification includes Shy-Drager syndrome and striatonigral degeneration under the common heading of multiple system atrophy (MSA) (Rajput & Birdi, 1997). Ramig, Fox, Countryman, and Pawlas (1995), described the following types of Parkinsonism:

1. Idiopathic (IPD)- 80%
2. Symptomatic (toxins, trauma, post encephalitic) (PEP)
3. Parkinson plus syndrome (PPS)
   a. Multiple System Atrophy (MSA)
   b. Progressive Supranuclear Palsy (PSP)
   c. Shy-Drager Syndrome
4. Young Onset Parkinson disease (YOPD) - 5-10% 21-39 years of age

A number of patients (5-7%) suffer from drug induced PD (Ford-Martin, 2001, Swinburn & Morley, 1996). This condition is due to long term use of certain neuroleptic drugs which inhibit the conduction of nerve impulses by blocking the release or transmission of dopamine in the substantia nigra and striatum (Pearce, J.M.S., 1992). These drugs include neuroleptic drugs and
tranquilizers such as Haldol and Thorazine given for psychosis, vertigo, unsteadiness, schizophrenia and other psychiatric conditions (Ford-Martin, 2001, Swinburn & Morley, 1996).

Resting tremor is a variable characteristic feature of PD. Some patients typically have resting tremor alone for 5 years without developing other Parkinsonian signs or symptoms. This finding suggested the existence of a separate subtype, namely, tremulous PD (Chang, M., Chang, T., Lai, &, Sy, 1995). An investigation by Jankovic and Stacy (1992) suggests that patients with resting tremor as the dominant Parkinsonian symptom generally have less bradykinesia and slower progression of the disease. One of the intriguing questions is whether the different subgroups represent variations of PD, or are etiologically distinct entities. Another controversial issue is whether an isolated resting tremor has the same etiology as PD or could be attributed to essential tremor. Recently, MRI became the preferred neuro-diagnostic tool in the evaluation of PD and Parkinson plus syndrome because it allows in vivo brain imaging and biochemical analysis and has been used to evaluate patients with Parkinsonism (Chang, M., Chang, T., Lai, &, Sy, 1995).

Essential Tremor is often confused with PD, but is very different from PD. It is called benign essential tremor, because it usually does not result in a marked disability. It is a chronic movement disorder characterized by involuntary rhythmical trembling or oscillation of body parts-usually hands. The pathophysiology of ET is not known. No pathological findings are known to be associated consistently with ET (Chang et al., 1995). However it is hypothesized that the cerebellar-brainstem-thalamic-cortical circuits probably are involved. The trembling usually begins on both sides symmetrically unlike the trembling of PD that is usually on one side. Essential tremor may begin insidiously with the patient unaware of the trembling until it is
pointed out. Trembling in the hand is the most common symptom of essential tremor (Liberman, 2001). In most essential tremor patients, the trembling worsens when the patient voluntarily maintains his hands in a fixed posture or position. This is called postural tremor. In some patients, tremors worsen when the patient performs voluntary movements. This type is called an action, or a kinetic, or a movement tremor. Sometimes tremors worsen when the person performs a goal directed voluntary movement. This is called essential tremor. Most essential tremor patients exhibit all three types of tremor. Rarely do they exhibit rest tremors, which is a characteristic feature of PD. Persistent trembling for at least two years in the absence of any underlying condition and symptoms of PD raises the possibility of essential tremor. There is a strong family history in essential tremor. The frequency of trembling in essential tremor as measured by an accelerometer is more rapid than the trembling of PD. The trembling of essential tremor is temporarily suppressed by alcohol. Essential tremor affects males and females equally and is 20 times more common than PD. It may also begin in adolescence in few cases. As time passes, the trembling in most patients increases. Essential tremor patients develop varying degrees of disability resulting mainly from trembling, unlike PD where the disability results mainly from the slowness of movement and/or the rigidity. In essential tremor trembling increases and worsens over decades but a sudden increase in tremors usually indicates PD. In essential tremor, following tremor in the hands, trembling of head, voice, tongue, palate, legs and trunk occurs either in combination or in isolation. Some researchers (Chang et al., 1995) believe that essential tremor patients eventually develop PD; others believe that PD and essential tremor are part of a spectrum of diseases that incorporate the basal ganglia (Liberman, 2001).
**Genetic basis of PD**

Since Gowers (1995) originally noted that approximately 15% of his PD patients reported an affected family member, the role of genetic factors in PD has been the subject of intense scrutiny. However, the genetic basis for PD is controversial. The critical factor in assessing genetic risk to relatives is the age of onset of the proband. The earlier the age of PD onset, the greater the likelihood that genetic factor plays a dominant role (Gowers, 1995). An earlier study by Martin and his colleagues, Young and Anderson, (1973) analyzed 130 cases of familial occurrence of PD. Twenty-six percent of the probands and fifteen percent of spouses reported at least one affected relative. They calculated that risk to siblings of an isolated case of PD varies with age of onset, being approximately 1 in 12 when the age of onset is between 35 and 45 years, 1 in 20 between 45 and 55 years, 1 in 26 for 55 to 65 years, and 1 in 71 for older than 65 years. Studies of twins have revealed substantial genetic contribution to PD (Reiss, Kuhn, & Kuger, 2000), while other studies have failed to identify specific genotypic associations with PD (Jenner, 1999). An autosomal dominant inheritance pattern with reduced penetrance is being described in an increasing number of families with PD (Reiss, Kuhn, & Kuger, 2000).

To date, four disease gene loci for PD have been localized within the human genome and are named as PARK1 (localized on chromosome 4q21-23), PARK2 (localized on chromosome 6q25-27), PARK3 (localized on chromosome 2p) and PARK4 (localized on chromosome 4p15) respectively depending upon their sequence of delivery (Reiss, Kuhn, & Kuger, 2000). PARK1, PARK3 and PARK4 are autosomal dominant and PARK2 is autosomal recessive (Reiss, Kuhn, & Kuger, 2000). PARK2 is a juvenile form of Parkinsonism found mainly in the Japanese population. The following table (table 1) by Warner & Schapira (2003) provides a clear picture of the 4 PARK genes:
Table 1

PARK genes

<table>
<thead>
<tr>
<th>Gene</th>
<th>Inheritance</th>
<th>Locus</th>
<th>No. of families</th>
<th>Kind of families</th>
<th>Clinical features</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARK 1</td>
<td>AD</td>
<td>4q21-q23</td>
<td>13</td>
<td>Italian</td>
<td>Early onset, rapid progression</td>
</tr>
<tr>
<td>PARK 2</td>
<td>AR</td>
<td>6q25-27</td>
<td>&gt;60</td>
<td>Japanese</td>
<td>Juvenile onset dystonia</td>
</tr>
<tr>
<td>PARK 3</td>
<td>AD</td>
<td>2p</td>
<td>6</td>
<td>Unknown</td>
<td>Late onset PD</td>
</tr>
<tr>
<td>PARK 4</td>
<td>AD</td>
<td>4p15</td>
<td>1</td>
<td>Unknown</td>
<td>Early onset dementia, postural tremor</td>
</tr>
</tbody>
</table>

Note: AD refers to Autosomal Dominant; AR refers to Autosomal Recessive.

A case for genetic contribution to Parkinson’s disease is based on the occurrence of well defined but rare families who clearly have an inherited form of PD. The higher incidence of the disease in homozygous twin pairs, and the occurrence of familial clusters of PD suggest a genetic origin for PD. The increased risk of infants in the relatives of an affected individual also suggests a genetic origin for this disease (Jenner, 1999). The risk of developing PD in the relatives of an affected individual is increased by 2.5-3.5 times compared to individuals from families where PD has not occurred. About 10-15% of the cases with PD report another family member with the disease (Jenner, 1999).
Speech Features

Speech impairments associated with PD can constitute a critical social, psychological, and economic handicap. Mutch, Strudwick, Roy and Downie (1986), who surveyed 262 cases with PD, found that while 65% reported with speech difficulties, only 4.4% had seen a SLP. PD affects several aspects of speech. These problems range from mild to severe, but usually fall within the moderate range. According to the Parkinson's Institute (2000), 40% of people with PD reported that a change in their speech or voice was a first symptom. The physical symptoms that can occur in the limbs can occur in the speech system. Speech of patients with PD is termed as hypokinetic dysarthria, which reduces the muscle movement used for speech production including the muscles used for breathing, and musculature of the larynx, soft palate, throat, tongue, lips, and jaws. PD, however, primarily affects the coordination and movement of the muscles used for respiration, phonation, and articulation. Another condition, known as vocal fold bowing, can also occur indicating laryngeal abnormalities. This condition occurs because the vocal folds do not close completely, causing air to escape creating a soft, or weak sounding, or loss of voice (Swinburn & Morley, 1996). Other phonatory characteristics reported include breathiness, vocal tremors, a strained or strangled voice, and irregular pitch variation. All of these symptoms result from changes in the muscle control or from compensatory techniques used by the individual. The PD patient’s speech may be very rapid, soft, fading, and breathy. There may also be indistinct pronunciation, uncontrollable repetitions, and a monotone voice (Swinburn & Morley, 1996). Imprecise articulation often affects consonants. One manifestation of this is the impaired ability of PD patients to perform diadochokinetic tasks such as rapid movements of the lips, tongue tip and back of the tongue required for /pa/, /ta/, /ka/, and /pataka/ repetitions (Schulz, 2002). Clinical observations of subjects with PD suggest that they have an
impaired perception of their own speech and voice abilities. When soft speaking subjects are questioned about their reduced loudness, a common reply is to say that their loudness is fine, but their spouse has a hearing loss (Ramig & Fox, 1997). Reduced vocal loudness may be the result of reduced amplitude and firing rates of one of the major vocal fold adductor muscle, the thyroarytenoid (Schulz, 2002). Patients and their families regard speech difficulties as responsible for much embarrassment and social isolation.

Prosody is defined as that aspect of spoken language, which consists in correct placing of stress and pitch on syllables and words. It is responsible for conveying subtle changes of meaning, independently of words or grammatical order. It makes a major contribution to emotional content of speech. Scott & Caird (1983) pointed out that the abnormal prosody in PD may convey to others that the patient is demented, depressed, and apathetic. Facial expressions and gestures are also part of the emotional content of communication, and their deficiency in PD contributes to the same impressions.

Swallowing Disorders

The swallowing problems occurring with PD interfere with quality of life. Dysphagia disorders may be mild to severe, and may lead to eating problems, choking, coughing, saliva build up, and excessive drooling (Pengilly, 1996). The most frequent abnormalities are delayed swallow reflex, decreased pharyngeal peristalsis, decreased laryngeal elevation, and decreased tongue mobility (Nutt, Hammerstad & Gancher, 1992). The reported incidence of swallowing dysfunction in PD ranges from 30-52% (Potulska, Freidman, Krolicki & Spychala, 2003). The symptoms correlate with the severity and duration of the disease. Aspiration pneumonia due to dysphagia is a leading cause of death in patients with PD (Potulska, Freidman, Krolicki & Spychala, 2003).
Potulska, Freidman, Krolicki and Spychala (2003) evaluated swallowing disorders in patients with PD. They decided to combine the assessment of dysphagia limit, EMG technique and scintigraphy, which allowed the investigation of all phases of swallowing. It should be noted that 20 ml is the amount of water that a healthy individual can swallow at one time and is called the dysphagia limit. In scintigraphy a patient is administered with a substance capable of emitting gamma rays, to allow imaging and functional study of an organ, tissue or system. The EMG technique used for assessment of swallowing reflex and laryngeal movement displayed a delay of triggering EMG activity i.e. delays in triggering the swallowing reflex, and prolonged laryngeal movements. Decreased dysphagia limit was also evident. Patients with advanced stages of the disease experienced a disrupted pharyngeal phase in addition to oral dysphagia. The researchers concluded that the mechanism of swallowing disorders in PD may be related to extrapyramidal and autonomic system disorders. The cardinal symptoms of PD- tremor, bradykinesia and rigidity are responsible for oral dysphagia. Pharyngeal dysphagia results from delayed oral delivery, in coordination of striated muscles, reduced somatosensory stimuli and abnormal autonomic function. Dysphagia is a very frequent symptom of PD although in the early stages it may be asymptomatic (Potulska, Freidman, Krolicki & Spychala, 2003).

Respiratory Problems Associated with PD

Pneumonia remains the most frequent cause of death in patients with PD despite the development of effective therapeutic regimen (Shill & Stacy, 2002). The primary pathological defect in PD, the destruction of substantia nigra and loss of dopaminergic neurons, combined with the side effects of medication used to treat the condition, affect the pulmonary system at multiple levels. These defects contribute to the impairment of upper airway function as well as
chest wall compliance and lead to problems with swallowing and cough that predispose to the development of pneumonia, the leading cause of mortality (Shill & Stacy, 2002).

**Diagnosis of PD**

In a random sample of 45 patients with PD, Oxtoby (1982) found that 49% of the subjects had speech difficulties but less than 4% had been referred to a SLP. Recent efficacy research showed that SLPs do have a role in diagnosing and treating patients with PD (Swinburn & Morley, 1996). The development of effective means of early identification of persons at risk for PD is important. Early identification allows the individual to develop treatment strategies which in turn could minimize societal burden posed by the neurodegenerative disease (Rajput & Birdi, 1997). At present it is not known if PD can be diagnosed or detected before clinical signs are present. Several strategies have been proposed for identifying PD before severe symptoms cause the affected individual to seek medical attention. These include biochemical measures (used to detect dopamine and its metabolites from plasma, urine and CSF), physiologic testing positron-emission tomography (direct measure of dopaminergic activity) and early identification of the symptoms. Presently a variety of lab tests may be done to rule out other diagnoses (Tanner, 1996). Tests for other causes of Parkinsonism include brain scan, blood tests, lumbar puncture and X-rays (Ford-Martin, 2001). MRI allows in vivo brain imaging and biochemical analysis and has been used to evaluate patients with Parkinsonism. MRI is known to be a reliable laboratory marker to diagnose Parkinson’s disease. Detecting the symptoms of the disease early on will contribute towards a confirmed diagnosis of Parkinson’s disease in the later stages (Tanner, 1996).
Physicians usually use ratings scales to determine the severity of the disease. These scales summarize the salient symptoms, signs, and disabilities at any stage of the disease. They are based on evaluation of the symptoms, and an assigned weighted numerical value for each symptom. The scales differ in the symptoms evaluated and value assigned to each. As per Lieberman, Gopinathan, Neophytides and Goldstein, (1990) the more frequently used scales are:

- North Western University Parkinson Disease Disability Scale (Canter, De la Torre, Mier, 1971)
- Unified Parkinson’s Disease Rating Scale (UPDRS) (Fahn, Marsden, Calne, Goldstein, 1987)
- Schwab England ADL scale also known as Columbia University Scale (Gillingham, Donaldson, 1969)
- Webster Scale (Webster,1968)
- Hoehn and Yahr Scale (Hoehn and Yahr,1967)

Since its introduction in 1987 by Fahn, Marsden, Calne and Goldstein, the UPDRS has been used extensively by researchers and clinicians around the world. Another popular and widely used scale is the Hoehn and Yahr Scale. Table 2 shows the different stages of the disease as per the Hoehn and Yahr Scale according to whom PD is categorized into the following 5 stages
Table 2

Stages of the disease

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>No visible disease</td>
</tr>
<tr>
<td>Stage I</td>
<td>Disease that involves only one side of the body</td>
</tr>
<tr>
<td>Stage II</td>
<td>Disease that involves both sides of the body, but does not impair balance</td>
</tr>
<tr>
<td>Stage III</td>
<td>Disease that impairs balance or walking</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Disease that markedly impairs balance or walking</td>
</tr>
<tr>
<td>Stage V</td>
<td>Disease that results in complete immobility</td>
</tr>
</tbody>
</table>

Stages 0-II are mild disease; Stage III is moderate disease; Stages IV-V are marked or advanced disease (Lieberman, Gopinathan, Neophytides & Goldstein, 1990).

Functional disability scales have also been developed to rate the patient’s ability to perform activities of daily living and are used in conjunction with the rating scales (Lieberman, Gopinathan, Neophytides & Goldstein, 1990).
SLPs role in clinical evaluation of speech production

A thorough evaluation of speech requires: 1) an analysis of the acoustic features of speech, 2) an analysis of the phonetic characteristics, 3) an analysis of motor and sensory functions of speech organs, which is obtained by careful physical examination, and 4) an overall rating of functional intelligibility obtained by observation of the patient and study of the taped samples of conversational speech (Sarno, 1985).

Following is a brief description of the 4 steps of a speech evaluation:

1) Acoustic Description of Speech- includes a description of phonation, rate, intensity, pitch, voice quality and intonation based on a careful analysis of a taped speech sample. Instrumental analysis can be obtained through spectral analysis (spectrographic data).

2) Phonetic Description of Speech- includes a description of the phonetic patterns of speech used by the speaker. The speech sample required for this is obtained by having the patient read aloud, tell a story or describe pictures. The speech of the patient is then transcribed in International Phonetic Alphabet to find the errors in speech.

3) Analysis of motor and sensory functions of speech organs- this includes the following:

   A) Examination of the Oral Peripheral Mechanism. (Note should be made for the presence of tremors, myoclonus, fasciculation or an abnormal oral cavity). B) Reflexive Functions. (An estimate of the impairment of reflexive functions, like chewing, swallowing, and coughing, can be made by observations and patient’s reports). C) Examination of Repetitive Movements. (Diadochokinetic rate, sustained phonation, and other repetitive movements of speech musculature are observed). PD patients usually perform significantly below the normal range in this series of measures. D) Rating of Intraoral Sensation- this includes gross measurement of sensation of the tongue, upper and lower lips, and pharynx, by pin prick and two-point
discrimination as well as measurements of position-sense, graphesthesia and stereognosis of these parts.

4) Rating of Functional Intelligibility- this reflects how well the speaker can make himself be understood despite whatever speech impairment he might exhibit. This provides an important indicator of the patient’s social and vocational adequacy (Sarno, 1985).

Treatment

No cure or prevention has yet been found for this degenerative disease. Several methods are used for treatment including drug therapy, collagen injections into the vocal folds to help them close properly, surgical options like deep brain stimulation and thalamotomy, and the use of augmentative communication devices (National Parkinson Institute, 2000).

Ideally the line of treatment is as follows (Ramig, Fox, Countryman, and Pawlas, 1995):

1. Pharmacology (Levodopa being the most common)

2. Surgery
   a. Pallidotomy
   b. Thalamotomy
   c. Fetal cell transplants, Stem cell transplants
   d. Adrenal cell transplants

3. Music therapy

4. Paramedical Modalities

5. Speech Treatments

6. AAC
Pharmacotherapy

Pharmacotherapy can be divided into traditional treatment methods and alternative treatment methods. Traditional drugs are used to increase dopamine levels in the brain and include L-dopa, MAOB and COMPT inhibitors. Alternative drug methods incorporate herbal treatments such as Ayurveda.

1) Traditional drugs

The choice of drugs is customized to the patient and to the disease severity. Drugs remain the most efficacious and useful symptomatic medication for treating patients with PD. The main function of the drugs prescribed for PD is to replace depleting dopamine. Although many antiparkinsonian drugs are effective during several stages, physicians generally reserve certain drugs for particular stages of the disease in order to minimize side effects and maximize the drugs’ effectiveness. Pharmacological treatment for PD is complex. Initially anticholinergics were the sole therapy for PD. These block the action of the neurotransmitter acetylcholine, which increases the activity of dopamine. These drugs were somewhat effective in alleviating tremor but had little effect on bradykinesia and rigidity. Therefore as the disease progressed, patients soon became totally disabled. Today anti-cholinergic medications are used primarily in early PD when tremor is the primary complaint. They are used as ancillary drugs but have no major role in treating the disease (Vogel & Carter, 1995).

For the past 6-7 years, Levadopa/L-dopa, a dopamine agonist, has been the standard treatment for PD. Once in the central nervous system, levadopa is converted to dopamine, replacing the lost dopamine that leads to Parkinsonian symptoms. The desired effects of this drug are decreased rigidity, increased facility of movement, and decrease in resting tremor. Approximately 80% of patients demonstrate initial improvement with levadopa. This is called L-
dopa “honeymoon”. The dosage of the drug is gradually increased until adequate control of symptoms is achieved without side effects (Vogel & Carter, 1995). Although levadopa is the most common drug used for decreasing the symptoms of PD, its effects last usually for 5 years and higher doses leads to increased dyskinesia (Ford-Martin, 2001). Findings appear to show mixed results in improvement of speech production through the use of L-dopa. Subjective assessments of speech following L-dopa therapy have noted improvements in overall speech adequacy, clarity of articulation, normalcy of nasal resonance, and temporal aspects of speech (rate, pause and rhythm). Another subjective report noted improved intelligibility after L-dopa treatment, primarily as a result of improved vocal loudness (Schulz, 2002). Schulz (2002) studied the short-term and long-term effects L-dopa on speech production. Short-term L-dopa therapy had a favorable influence in the form of improved voice quality, pitch variation, and articulation. After 4 years of L-dopa treatment, 75% of persons with PD either maintained or improved over their initial improvement in speech, compared to the short-term effects.

Besides, dopamine agonists, MAO-B inhibitors (monoamine oxidase inhibitor Type B) and COMT inhibitors are also widely used. Selegiline is currently the sole MAO-B inhibitor available. It regulates the concentration of dopamine in the brain and improves the Parkinsonian motor symptoms, and delays for several months the need for L-dopa treatment. COMT inhibitors act to restrict the peripheral metabolism of L-dopa, thus enhancing brain availability of the drug. Entacapone is the sole COMT inhibitor available worldwide. It is an adjunct to L-dopa and provides reduced off time, increased on time and enhanced motor functions (Rascol, et al., 2003). There is a possibility that using a COMT inhibitor from the start of L-dopa therapy might reduce the risk for developing motor complications (Rascol, et al., 2003).
2) Ayurveda

Practitioners of Ayurveda or traditional Indian medicine have prescribed macuna seeds (Mucuna pruriens) to treat PD for over 4,000 years. Mucuna seeds contain a natural form of L-dopa, an anti-Parkinson drug (Ford-Martin, 2001). Ayurvedic treatment includes a judicious combination of oral ingestion of medicated edible fats, sedation, medicated enemas, and massage with medicated oils, laxative and usage of medicated herbs. The most prominent herbs include:

1) Atmagupta (seed of Mucuna pruriens),
2) Aswagandha (root of Withania somnifera), 3) Bala (root of Sida cordifolia) and 4) Paraseekayavanee (dry fruit of Hyocyamus reticulatis). Clinical research studies in the English language are available only regarding Atmagupta (Mucuna pruriens). Atmagupta has been used by humans in the Indian system of medicine for several centuries, with no report of serious adverse reactions. In 1978, an uncontrolled trial among patients with PD suggested that a powder made from the whole bean of Mucuna seed decreased the incidence of side effects when compared to synthetic levadopa (Vaidya, et al., 1978). Additional research is needed to define the precise role these herbs might have in the complex treatment of patients with PD (Caspi & Thomson, 1999).

Surgical Procedures

Ablative surgical procedures are alternatives to pharmacological treatment. These procedures include pallidotomy, thalamotomy, and deep brain stimulation of the globus pallidus or subthalamic nucleus. Pallidotomy creates a small lesion in the globus pallidus and is performed to decrease bradykinesia. Balance and speech may improve even after a single, unilateral surgery. Medial pallidotomy represents a surgical option for improving motor functioning in PD patients in whom medical therapy is problematic. It has proven helpful in
reducing the severity of Parkinsonian signs in both younger and older patients. Benefit from the surgery was established on the basis of improvement in motor functions, timed tests, activity of daily living and duration of daily functional “on” time (Uitti, et al., 2000). As a result there has been a rejuvenated interest in this surgery for PD. It has been frequently performed over the past 5 years (Uitti, et al., 2000).

Thalamotomy creates a small lesion in the motor area of the thalamus and has been up to 89% effective in alleviating tremor (Vogel & Carter, 1995). However, loss of muscle tone and impairment of balance and speech are associated risks and occur with greater frequency in bilateral surgeries (Vogel & Carter, 1995).

Bilateral deep brain stimulation provides substantial improvement in motor functions during off periods and reduction in motor complications (Rascol, et al., 2003). However there are side effects to the surgical procedure in terms of mechanical defects, and infections. The expertise required to perform the surgery and the high costs of the surgery have prevented the widespread use of this surgical technique (Rascol, et al., 2003).

The newer techniques like fetal nigral transplantation and stem cell and gene therapy are promising but there is not enough research to prove their efficacy with PD patients (Rascol, et al., 2003). Because of the difficulty in obtaining fetal tissue at the proper stage of development, ethical concerns, and the lack of US federal funding of research in this area, few patients have been treated (Nutt, Hammerstad, Gancher, 1992).
Music Therapy

Music has become a legitimate therapeutic modality due to its capacity to evoke a variety of psychophysiological reactions. These reactions include, among others, reducing agitation and anxiety, facilitating communication, and improving mobility. Music is said to be unique in that it can penetrate the mind and body directly (Caspi & Thompson, 1999). Music acts to stimulate the senses, evoking feelings and emotions, and causes physiological and mental responses as it energizes the body and the mind. Essentially, music therapy is the building of a relationship between the patient and a trained therapist using music as the basis for communication. Both musical instruments and the human voice are used to explore the world of sound. Typically the therapist and the patient take an active part in the therapy sessions through playing, singing and listening. A growing body of literature supports the use of music as a therapeutic modality in a variety of conditions ranging from autism to stroke (Caspi & Thompson, 1999). PD is one of the clinical entities for which music therapy was postulated to improve quality of life by maximizing social, physical and psychological functioning. Swallow (1987) showed in a small group of PD patients that music in conjunction with physiotherapy and speech therapy, can regularize walking patterns, prevent akinetic freezing, improve speech, promote relaxation, and improve posture and control of upper limb movement. Music was provided predominantly in the form of singing used to improve speech, breathing and posture. The music was matched to the patient’s own rhythm of movement and then changed periodically to let the patient match the music pattern in an effort to maximize movement control. When muscle activity is synchronized to auditory rhythm, it becomes more regular and efficient, regardless of the type of music that is being used (Caspi & Thompson, 1999).
**Paramedical therapies**

Anecdotal evidence from patients, health professionals, and the Parkinson’s disease society strongly supports the use of paramedical therapies in the comprehensive management of PD, in addition to optimal medical and surgical treatment. Nonpharmacological / paramedical treatments are also important components of the PD treatment regimen. These paramedical therapies include physiotherapy, occupational therapy, speech and language therapy, dietary education and psychological support for both the patient and his family. Despite this support for paramedical therapies, several surveys have demonstrated that only 3 to 29 % of patients with PD have seen a paramedical therapist (Deane et al., 2002).

Paramedical therapists treating people with PD provide appropriate exercises, aids, education, and provide advice that aim to help patients to get better understand and cope with their disease. The core areas of physiotherapy relate to gait, balance, posture and transfers. Occupational therapists use therapeutic techniques and provide aids and adaptations to allow normal work, self-care, and leisure activities to continue. S/he assists the patient in activities of daily living, particularly dressing, personal hygiene, and eating. Speech and language therapists treat patients with specific exercises and advice about speech and swallowing.

**Speech therapy**

Until 1970’s, there was little evidence to indicate the efficacy of speech therapy for dysarthria of PD. Procedures emphasizing articulation therapy; rate control; and other methods for improving prosody; and counseling in the use of pragmatic functions resulted in little carry-over from clinic to patient’s natural environment (Vogel & Carter, 1995). In the 1980’s, speech therapy for patients with PD was initially centered on the prosodic aspects of speech, sometimes including other areas (Schulz, 2002). In the 1990’s speech therapy for PD has focused on the
voice itself (vocal loudness) and many individuals with reduced loudness resulting from PD seek speech therapy from a certified SLP (Schulz, 2002).

Isometric exercises to achieve vocal fold closure and emphasizing increasing, calibrating, and maintaining voice volume/loudness have improved overall speech intelligibility (Vogel & Carter, 1995). Manipulation of speech rate is also often used as a strategy to increase overall speech intelligibility in dysarthric patients (Hammen, 2002). In a study conducted to compare two different speech therapy techniques for patients with PD, Scott & Caird (1981) suggested that intonational/prosodic exercises rather than proprioceptive neuromuscular facilitation are much more practical to use with this population. The two techniques in the study were: a) intonational exercises that aimed at improving and recognizing variations in pitch, contour, volume and duration and b) proprioceptive neuromuscular facilitation which aimed at generating intensive, multisensory input and proprioceptive feedback from manipulation of normal feedback patterns. Each treatment was given for 10 one-hour sessions over two weeks in the patient’s home and patterns were assessed after each course of treatment, and after 6 months.

Thomson and Robertson (1981) conducted a pilot study in which a small group of patients with PD were given a two-week residential intensive speech therapy program. The study examined the long-term effects of intensive (35-40 hours over 2 weeks) prosodic therapy. Therapy targeted respiration, pitch variation, vocal loudness, articulation, strength and speed of the articulators, rate of speech, intonation and stress patterns and communication intelligibility. The results of this study were positive in terms of every aspect of speech. Following this, they decided to investigate whether similar results would be obtained with a non-residential program. The study aimed at evaluating the efficacy of intensive speech therapy with PD patients. The program consisted of group sessions each day, which was devoted to teaching and practice of
techniques directly designed to improve method, capacity and control of respiration. Coordination and control of voice production with emphasis on pitch variation and loudness, range and strength and speed of articulatory muscular movements and intelligibility of communication were also targeted. Participants were encouraged to listen carefully to each other and monitor each other’s performance. Each patient received approximately 3 1/2 to 4 hours treatment daily. The results suggested that speech therapy given on an intensive daily basis improve almost every aspect of motor and speech production in a person with PD.

Overall traditional speech therapy methods for dysarthric individuals with PD typically administered once or twice a week and emphasizing articulation, rate, and prosody intervention have been largely ineffective (Ramig, 1990). In contrast, intensive voice therapy methods administered almost daily and emphasizing simple phonatory effort tasks, have been found to produce favorable and long-term results in dysarthric individuals with PD (Ramig, Sapir & Baumgartner, 2001). Over the past 10 years, research has been conducted focusing on improving speech disorders in patients with PD by directing attention to phonation (voice) as a key treatment element. Although disordered voice has been observed in the majority of individuals with PD, it has been given little attention in treatment and has been overlooked for its contribution to improving speech intelligibility (Oxtoby, 1982).

Ramig (1990) developed an intensive treatment program to improve vocal fold adduction and overall voice and speech production in individuals with PD. The rational for development of this program was a) limited or inconsistent effects of surgical and pharmacological treatment on speech and voice, b) limited or inconsistent effects of traditional speech therapy focusing on articulation and rate and c) high incidence of disordered voice and its role in decreasing intelligibility. This treatment is known as the Lee Silverman Voice Treatment (LSVT). It has the
following essential components: exclusive focus on voice, specifically vocal loudness, stimulation of high-effort productions with multiple repetitions, intensive delivery of treatment (4 individual sessions a week for 4 weeks or 16 sessions in a month), and enhancing sensory awareness of increased vocal loudness. It also focuses on effort - calibration and quantification of behaviors (Ramig, 1990). The patient is constantly stimulated (“think loud”/ “think shout”) throughout the session to produce good quality voice with maximum effort during sustained phonation and in reading and conversational speech tasks. The individuals are also constantly reminded to monitor the loudness of the voice and the effort it takes to produce it. The idea of training loudness and the specific techniques of LSVT bring together clinical concepts from literature in the areas of motor speech and voice (Ramig, Fox, Sapir, & Countryman, 1995). LSVT integrates these components in a manner specifically designed for individuals with PD. The initial development of LSVT was based on the hypothesis that reduced drive to respiratory and laryngeal musculature underlies reduced vocal loudness and monotonous speech observed in individuals with Parkinson’s disease. Therefore, the primary aim of treatment was to increase drive to respiratory and laryngeal musculature by stimulating and training increased loudness. Ramig et al., (1995) examined individuals with PD (n=26) who received LSVT increased vocal sound pressure level (SPL) from 8-13 dB across a variety of speech tasks in comparison with changes from 1-2 dB SPL for an alternative treatment group (n=16). Changes that accompanied increased vocal SPL included increased duration of sustained vowel phonation, maximum range of fundamental frequency, and fundamental frequency variability during speech, and reductions in rate of speech. Further examinations of phonatory source characteristics pre-to post treatment have documented improved vocal fold adduction as measured by videostroboscopy. Several acoustic, aerodynamic, stroboscopic and electroglottographic studies have demonstrated
significant improvement in glottic closure, vocal fold vibratory movements, sound pressure level (SPL), and voice fundamental frequency (Fo) range and modulations following LSVT (Ramig, Fox, Sapir, Morrison, 2001). Preliminary perceptual studies have already documented improvement in voice loudness, pitch inflection, speech intelligibility, and functional communication following LSVT (Ramig, et al., 2001). Ramig and her colleagues also suggested that LSVT was significantly more effective than respiratory therapy (RET) in improving the overall SPL and immediately post-treatment and maintaining those improvements at 2 years follow up. LSVT does not produce phonotrauma instead it improves voice quality and is a technique that is gaining popularity (Ramig, et al., 2001).

In LSVT, sensory awareness training has been incorporated through the essential treatment concept of calibration. The patient knows and accepts the amount of effort needed to consistently increase vocal loudness to a level that is within normal limits. This helps reduce the patient’s feeling that he is constantly shouting (Ramig, et al., 2001). Cognitive functioning may affect an individual’s ability to benefit from speech treatment. An estimated 40-60 % of patients with PD experience decreased cognitive functioning (Ramig, et al., 2001). LSVT has been administered to a range of PD patients with mild-moderate dementia with positive treatment outcomes.

In addition to providing voice therapy, SLPs also work on decreasing the rate of speech. Speaking rate differs as a function of speaking task. Reading tasks have natural boundary markers, such as commas and periods that cue a speaker to pause. In conversational speech it is the cognitive flow of the individual and conversational turn taking that most often determine the location and duration of pauses. Clinicians may divide the types of rate control into 2 categories: rigid and rhythmic approaches. Rigid approaches, such as pacing board and alphabet
supplementation are designed to have maximum control over the speaker’s rate. One of the earliest reports on the use of rate control in dysarthria was Helm’s (1979) description of the use of a pacing board to reduce palilalia (a very fast rate of speech) in a person with PD (Hammen, 2002). The pacing board is a narrow, rectangular board with a set of colored squares separated by a ridge or divider. The person taps his/her finger on each square for each word. This movement provides an external method of pacing speech and yields a word-by-word production style.

Another rigid method of rate control is finger tapping. In this approach the person taps his finger while saying a word. The advantage of this is that no external device is required. Delayed auditory feedback (DAF) is the most common rhythmic rate control method that is primarily used in the treatment of stuttering but has an effect on dysarthria as well. Studies have shown reduction in the words per minute spoken and a consequent increase in intelligibility with this technique (Hammen, 2002; Vogel & Carter, 1995; Scott & Caird, 1981).

Each of these studies suggests that speech therapy can be beneficial to the patient with PD. There are differences in the experimental designs, the assessments used and the type of treatment offered and there are contraindications about the long-term benefits (Johnson & Pring, 1990).

Alternate and Augmentative Communication

In a few individuals with PD, speech and voice may become so impaired that it is difficult to communicate even basic needs and thoughts. In this case it may be wise to consider an alternative augmentative device (AAC) to enhance communication skills. The devices range from hand-made communication books to sophisticated computerized equipment.

The SLPs in the United States are conducting extensive research to identify the most appropriate instrument to diagnose a person with PD. They are also experimenting to determine
the most beneficial speech therapy technique to use with this population. Currently speech therapy in combination with optimal pharmacological intervention has proven to be the most efficacious therapeutic method for improving voice and speech function. This leads to the fact that they do play a role in diagnosing and treating a person with PD. There is not much literature to support the research that is being conducted by Indian SLPs on the different therapeutic approaches for PD.

Future studies should investigate the effects of other combined treatment approaches. Perhaps the combination of pharmacological, surgical and speech treatment will prove to be the superior approach for improving the communication abilities for persons with PD.
CHAPTER III
Methods and Procedures

Data

This study used a self-developed survey as the instrument in data collection. The survey was designed to gather information on the views of American and Indian SLPs in diagnosing and treating PD (See appendix A). The survey has 2 parts with a total of 48 questions. Part 1 (38 questions) refers to the actual questions regarding diagnosing and treating patients with PD. Part 2 (10 questions) involves demographic information.

Research Questions and Hypothesis

R1: Are there differences between American and Indian SLPs perceptions on the role in diagnosing and treating patients with PD?

H1: It is hypothesized that American SLPs will report that they have a more active role in diagnosing and treating patients with PD as compared to their Indian counterparts.

R2: Are there differences between American and Indian SLPs in their knowledge / awareness of treatments regarding speech and language symptoms of PD?

H2: It is hypothesized that American SLPs will have better knowledge of a treatment for speech and language symptoms of PD as compared to Indian SLPs.

R3: Is there a relationship between experience in dealing with patients with PD and the SLPs knowledge in diagnosing and treating a person with PD?

H3: It is hypothesized that prior experience of dealing with PD patients, positively affects all the SLPs knowledge to diagnose and treat a person with PD.

R4: Are there differences between American and Indian SLPs regarding basic knowledge/ facts on PD?
H4: It is hypothesized that Indian SLPs will demonstrate less awareness of basic facts of PD than American SLPs.

R5: How does each of the groups gain knowledge regarding PD?

H5: It is hypothesized that as a group, Indian SLPs gain more knowledge about speech and language disorders via the internet as against the American SLPs who gain more knowledge through a variety of sources like internet, workshops, and continued education.

Subjects and Procedures

The subjects were American SLPs from the Tri-State region (Ohio, Kentucky and Indiana) and Indian SLPs, selected at random from all over the country of India. There are fewer SLPs in India as compared to the U.S. There are over 1,00,000 members of ASHA. Considering the vast population of the country of India there are roughly only about 7000-8000 SLPs all over the country. This is the reason for not restricting the SLPs to one particular region.

A total of 80 subjects were involved in the study, 40 Indian and 40 American ranging in ages from 25-60+. Considering that majority of SLPs are females all subjects selected were females.

The American SLPs were chosen at random from the Tri-State region (Ohio, Kentucky and Indiana) from the ASHA (American Speech and Hearing Association) Directory. Every fifth person on the list was selected. If this person did not fall into the inclusion criteria then she was not contacted. For e.g. if the person who was fifth on the list either did not wish to participate or did not fall in the inclusion criteria, then instead of the sixth person the eleventh SLP was contacted. This procedure was continued for both countries until 40 people were selected. The Indian SLPs from all over the country of India were chosen from the ISHA (Indian Speech and Hearing Association) Directory. The subjects selected from both countries were working in an
adult setting only and all those working in a school or pediatric setting were excluded from the study to validate the results. Initially, a phone call was made to all the participants to get their approval for participating in a phone survey and to set a date for the actual survey if they were not able to participate when first called. If the subjects did not wish to participate they were free to indicate their denial at that point.

The subjects were asked to complete a 15-minute oral survey, consisting of 48 questions. Because it was a phone interview, the location of the research was either at home or at work, as decided by the subject. The interview was at a time agreed by the investigator and the subject. All data was treated as confidential. All the surveys for American SLPs were recorded on a different color paper as compared to the ones for the Indians. This helped distinguish between the two. The subjects had the option of requesting the results, for the study as a whole, but not for individual surveys. Once the subject’s responses were entered in the computer the actual surveys were shredded. All data was stored electronically and only the investigator had the password for data access.

The actual survey and the script for the interview are attached as Appendix A and Appendix B respectively.

_Informed consent_

Once the subjects had been selected at random, an initial phone call was made to recruit subjects for the study. The subjects’ survey was the actual informed consent i.e. the SLPs gave their consent to participate in the study by agreeing to be a subject.
Ethical considerations

No individual participated in the study without her permission. Subjects had the right to withdraw from this study at any point of time. All the subjects’ records were kept confidential and the names of the subjects were not associated with the test results.

Statistical Analysis

All the analysis of the data was done on the SAS program. A total of 3 statistical tests were used to analyze the data. The tests used were: the Chi square test of independence (H1, H5), Independent samples t-test (H2, H4) and Correlation or Regression Analysis (H3). The alpha level was set at .05 to determine significance.
CHAPTER IV
RESULTS

Subjects

The subjects for this study included eighty speech language pathologists. Forty were from India and forty from the states of Ohio, Kentucky and Indiana. Table 3 displays the demographic characteristics of the two groups of subjects.

Table 3

Demographic characteristics of all the subjects

<table>
<thead>
<tr>
<th></th>
<th>American</th>
<th>Indian</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of subjects</td>
<td>n = 40</td>
<td>n = 40</td>
</tr>
<tr>
<td>Age range</td>
<td>40 - 50 years</td>
<td>25 - 40 years</td>
</tr>
<tr>
<td></td>
<td>( \mu = 45, \text{ S.D} = 5 )</td>
<td>( \mu = 32, \text{ S.D} = 7 )</td>
</tr>
<tr>
<td>No of years worked</td>
<td>( \mu = 18 \text{ years} )</td>
<td>( \mu = 8 \text{ years} )</td>
</tr>
<tr>
<td></td>
<td>S.D = 6, range = 5-25 years</td>
<td>S.D = 7, range 2-20 years</td>
</tr>
<tr>
<td>Range of patient load per year</td>
<td>50-100</td>
<td>0-10</td>
</tr>
</tbody>
</table>

The average age of the American SLPs included in the study was 45 years old as compared to those from India, 32 years old. This difference in the ages is of significance because of the fact that older the SLP more will be her years of work experience and greater will be her knowledge of speech and language disorders. The table also shows that the American SLPs on an
average had more number of years of work experience and a greater number of patients with PD on their caseload as compared to their Indian counterparts.

Data Analysis

Data analysis is presented according to the research questions.

Research Question 1:

Are there differences between American and Indian SLPs perceptions on the role in diagnosing and treating patients with PD?

The answer to question number 37 on the survey was used to analyze data pertaining to this question. In order to answer the above question, a Chi square test of Independence was performed. \( \chi^2 (1) = 2.0513, p = .1 \). There is no significant difference between the two groups. The two groups do not differ in their responses. Both groups responded similarly to this question indicating that SLPs have a role in the diagnosis and treatment of patients with PD. All of the U.S. SLPs responded that they had a role and 38 out of 40 (95%) Indian SLPs also agreed to that statement.

Research Question 2:

Are there differences between American and Indian SLPs in their knowledge / awareness of treatments regarding speech and language symptoms of PD?

The following questions on the survey were used to analyze the data pertaining to this question: 24, 25 and 26. This question was answered by performing independent samples T-test \((\alpha = .05)\). Results are as follows: \( t (63) = 5.27, p = 0.001 \). The American group provided significantly more correct responses as compared to the Indian group. The mean and standard deviation of the American group is higher as compared to the Indian group and is as follows:
mean = 2.65, SD = 1.47. The mean and standard deviation of the Indian group is as follows: mean = 1.22, SD = 0.86.

The American SLPs are also more aware of the different treatment options available for treating patients with PD. This could be attributed to the large caseload of American SLPs and to increasing research being carried out in the U.S. Even though not all the American SLPs are trained in any particular treatment technique to remediate the speech symptoms in these patients, they are aware of the existence and benefits of the technique.

Research Question 3:

Is there a relationship between experience in dealing with patients with PD and the SLPs knowledge in diagnosing and treating a person with PD?

The 2 variables compared were answers to demographic question number 10 and correct answers to all 38 questions on the survey. In order to answer the above question, a Pearson Product Correlation Coefficient was performed at .05 alpha level between number of patients with PD and the ability to answer the questions on the survey. There is a positive moderate correlation between prior experience in dealing with a patient with PD and the SLP’s knowledge (as measured in the next hypothesis) in diagnosing and treating a person with PD. Analysis of the data, shows that r = 0.4456, p <0.0001. These results suggest that as the SLP gains more experience in treating patients with PD, their overall knowledge on the disease improves.

Research Question 4:

Are there differences between American and Indian SLPs regarding basic knowledge / facts on PD?

Overall of the 40 subjects from each group, it appears that the American SLPs are more aware of the basic facts or knowledge on PD. The answer to all 38 questions on the survey was
used to analyze the data pertaining to this question. An independent samples t-test $t\ (76) = 8.00. p = .001$, indicates that the number of correct responses was significantly higher in the American group ($mean=30.925, SD = 4.1534$) versus Indian group ($mean=22.775, SD = 4.9224$).

**Research Question 5:**

*How does each of the groups gain knowledge regarding PD?*

The information from demographic question number 7 on the survey was utilized for analyzing data pertaining to this question. Based on the tables 4-7 below, the current results indicate that the SLPs from the 2 countries use different sources of information. A Chi square test on Independence was performed to answer this question. Information obtained via the internet $\chi^2 (1) = 11.4286, p= 0.0007$. 75% of observed Indian sample used internet to obtain information, and 0% of the American sample obtained their information via the internet. There is a significant difference between the two groups. Information obtained through workshops $\chi^2 (1) = 43.0769, p <.001$. 30% of observed Indian sample used workshop, and 100% of American group did so. There is a significant difference between the two groups. Information obtained in classroom $\chi^2 (1) = 68.8372, p<0.0001$. 37% of the Indian group and 0% of the American sample obtained their information in class. There is a significant difference between the 2 groups. Information obtained through other sources $\chi^2 (1) = 38.5185, p<.0001$. Only 10% of the Indian group obtained information from other sources as compared to 100% of the American group. There is a significant difference between the 2 groups.
Table 4 shows the group wise analysis for information obtained in class.

**Table 4**

<table>
<thead>
<tr>
<th>Group</th>
<th>No</th>
<th>Yes</th>
<th>$\chi^2 (1) = 68.8372, p&lt;0.0001$</th>
</tr>
</thead>
<tbody>
<tr>
<td>American</td>
<td>40</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>25</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

Table 5 shows the group wise analysis for information obtained through workshops.

**Table 5**

<table>
<thead>
<tr>
<th>Group</th>
<th>No</th>
<th>Yes</th>
<th>$\chi^2 (1) = 43.0769, p &lt; .001$</th>
</tr>
</thead>
<tbody>
<tr>
<td>American</td>
<td>0</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>28</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>
Table 6 shows the group wise analysis of information obtained through internet

Table 6

<table>
<thead>
<tr>
<th>Group</th>
<th>No</th>
<th>Yes</th>
<th>$\chi^2$ (1) = 11.4286, p= 0.0007</th>
</tr>
</thead>
<tbody>
<tr>
<td>American</td>
<td>40</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>10</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Table 7 shows the group wise distribution of information obtained through other sources

Table 7

<table>
<thead>
<tr>
<th>Group</th>
<th>No</th>
<th>Yes</th>
<th>$\chi^2$ (1) = 38.5185, p&lt;.0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>American</td>
<td>0</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>36</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER V
Discussion

The primary objective of this study was to compare the views of Indian versus American Speech Language Pathologists on diagnosing and treating patients with Parkinson’s disease. Several issues were studied. These included the SLPs role in diagnosing and treating patients with PD, the SLPs knowledge on treating speech and language symptoms in patients with PD, awareness of basic facts regarding PD, relationship between prior experience in treating patients with PD and the SLPs ability to provide treatment for patients with PD, and the source of obtaining information for the SLPs.

*Role of the SLPs in diagnosing and treating patients with PD*

Both groups of SLPs believe that they do have a role in diagnosing and treating patients with PD, but the American SLPs are actively involved as compared to their Indian counterparts. The greater the number of patients with PD on their caseload, the more experienced are the American SLPs in providing diagnosis and treatment for a patient with PD. The greater the experience of these SLPs, the more involved they are when diagnosing and treating a patient with PD.

There are few adult or geriatric hospitals in India as compared to the U.S. Only a few leading hospitals in India provide speech and language therapy for the geriatric population which means that few geriatric patients appear on the Indian SLPs caseload. Also there is an issue of referral from the neurologists who do not strongly believe in the role of a SLP in diagnosing and treating a patient with PD. This in turn suggests that majority of the Indian SLPs are not actively involved in the diagnosis and treatment of adults with neurological impairments, including PD.
Knowledge of treatment for speech and language symptoms of PD

The recent development of the Lee Silverman Voice Treatment (LSVT) program in America improved the outlook for treating patients with PD. The LSVT treatment program produces promising results regarding improvement of the speech symptoms in patients with PD. The effects of this technique last longer than traditional speech therapy techniques used by SLPs to remediate speech and language symptoms. Even the American SLPs who are not certified in this technique are aware of the technique and its promising benefits. This can play a very important role in the treatment of patients with PD. The American SLP can provide traditional speech and language therapy in addition to providing the LSVT program if she is certified.

On the other hand, majority of the Indian SLPs are neither aware of this technique nor certified to provide the treatment. A few of the Indian SLPs who have graduated in the last 5-6 years are aware of the existence of the technique and its benefits. Most of the older generation SLPs, in search of better treatment techniques, come to the U.S. to learn about the latest developments in the field. These SLPs in turn are passing on their knowledge to the younger generation, which may be why most of the younger generation SLP’s are now aware of the latest developments in the field. These SLPs, who are aware of the program, are unable to provide this treatment as they are not certified. The patients stand to lose out because no SLP in India is trained / certified in the LSVT program.
Awareness of the basic facts regarding PD

The field of Speech Language Pathology has been in existence in America for over 70 years. Research is constantly being carried out in this field. The results of ongoing research are available to the American SLPs through a variety of sources including workshops, presentations, classroom information, and journal articles. Because there is an equal focus of geriatrics and pediatrics in the U.S. health industry, there are separate adult hospitals, nursing homes and long term care facilities. This allows SLPs a chance to specialize in geriatrics and take courses specific to adult disorders in graduate school. They also receive information about these disorders on their job, through first hand information in dealing with patients and by reading more about a disorder, its diagnosis and treatment options.

In India the field of speech language pathology is slowly growing and has been in existence only for the past 15-20 years. Greater emphasis is placed on pediatrics as compared to geriatrics. Few hospitals in India provide speech and language therapy for adults. Recently (over the past 4-5 years), with a greater increase of awareness of the filed, the scenario is changing and more information on adult speech and language disorders is being provided to the Indian SLPs through university graduate programs. As the awareness of the field of speech language pathology increases, both public and private hospitals are considering opening new wards or units exclusively for geriatric population. Considering these facts and the results of the survey, it can be said that the American SLPs definitely have more knowledge of the basic facts of PD and most other adult disorders.
Relationship between prior experience in treating patients with PD and the SLPs ability to provide treatment for patients with PD

“Every patient is different / No two patients are the same” or “You always learn something new on your job everyday”. These statements tell us that there is always something new to learn from every patient. Therapists who diagnose and treat patients with a particular disorder have more experience in dealing with the disorder, and more knowledge about that disorder. American SLPs have a greater caseload of patients with PD because of the greater incidence of this disease in the U.S. The caseload of patients with PD for the American group is 50-100 patients per year and it is 0-10 patients for the Indian group. This provides the American SLPs with greater hands on experience in diagnosing and treating patients with PD and an overall increase in the knowledge on the disease.

There is a lesser incidence of PD in India. There is also the issue of patient referral by neurologists and the maturation of the field of communication disorders in India. As a result there are fewer numbers of patients with PD on a SLPs caseload. The fewer the patients with PD evaluated or treated, lesser will be the experience in evaluating or treating a patient with PD.

Thus there is a positive moderate relationship between prior experience and the SLPs ability in diagnosing or treating a patient with PD. While this relationship is significant it is not a very strong suggestive that knowledge is gained by other sources besides experience.
Sources for obtaining information

The U.S. leads with respect to research in the field of PD. American SLPs have easy access to research concerning diagnosing and treating patients with PD. Journal articles, books and workshops on PD are more easily accessible in the U.S. than in India, forcing the Indian SLPs to resort to the internet to obtain most of their knowledge on diagnosing and treating PD. The information obtained through internet is not always reliable, which raises the question about accuracy of the knowledge obtained by Indian SLPs.

Also the American Speech and Language Hearing Association requires all the SLPs to have continued education hours, encouraging them to attend workshops or presentations. This is of dual advantage to them because they can obtain the necessary information and keep up with the latest happenings in the field and simultaneously obtain continued education hours. The Indian Speech and Hearing Association on the other hand, does not require its members to obtain continuing education credits.

Most the university libraries in India also do not subscribe to American, British or Australian journals or do not have books from American authors. Only a few libraries all over India actually subscribe to international journals, or buy books from foreign authors. This is due to the high costs required for the same. Not all SLPs may have access to these libraries, forcing them to gain their information mainly through the internet. Since the internet is a source for obtaining majority of their information, the Indian SLPs should make use of this and should look up online journals and should also participate in online workshops offered by various institutions worldwide.
Interestingly none of the American SLPs reported to having obtained information through the internet. This is a strange finding considering that almost 99% of the Americans own a computer as compared to India where easy access to the computer is not available. Roughly a small percentage of the population of India own a computer and the vast majority are forced to go to a cyber café or an internet center to access the internet. A possible explanation for this is that most of the American SLPs interviewed were in the age range of 40-45 years. These SLPs may not be having a good knowledge on the use of a computer or may not be competent enough to use the computer.

Another interesting result of the study is that few Indian SLPs in addition to gaining their information on PD through internet, also obtained their information through other sources such as classroom information, other professionals like neurologists, or from their own colleagues who had evaluated or treated a patient with PD, or sometimes even through patient referral. A few of the Indian SLPs reported that they obtained most of their knowledge on PD only on patient referral, which forced them to look up information regarding diagnosing and treatment of the disease.

It was surprising to note that none of the American SLPs obtained their knowledge through classroom education. The average age range of the American SLPs in the sample was 40-50 years. Overall it was found that all the SLPs in the American group have been practicing for 20-25 years. They graduated at a time ago when the university curriculum did not include detailed information on PD. Most of the SLPs in this group obtained their information on PD from workshops, and other sources like patient care or from other professionals (like neurologists, and nurses). Nowadays graduate programs in speech language pathology in the U.S. provide a balance between developmental and acquired neurological disorders.
The Indian SLPs on the other hand were not restricted to one particular age group and there was diversity with respect to their ages. Some of the SLPs in this group are recent university graduates whose curriculum included detailed information on PD. Because Indian SLPs do not have ready access to the American, British or Australian journals or workshops, they rely mostly on the internet to gain their knowledge about PD. Results indicate that a small number of Indian SLPs did obtain their knowledge on PD through workshops in addition to internet or other sources.

Conclusions

The present study led to the following general conclusions:

1. American SLPs have a more active role in diagnosing and treating patients with PD as compared to their Indian counterparts.

2. American SLPs have a better knowledge of treatment for speech and language symptoms of PD as compared to Indian SLPs. American SLPs, even if uncertified in the LSVT program for treating the speech symptoms in patients with PD, are aware of the existence and the promising benefits of such a program. The majority of Indian SLPs are neither aware nor certified in such a program.

3. Prior experience in dealing with PD patients, positively affects all the SLPs knowledge of diagnosis and treatment of PD. The greater the number of patients with PD on their caseload, the better are the American SLPs in diagnosing and treating patients with PD, and greater the knowledge they have gained regarding the disease.

4. Indian SLPs demonstrated less awareness of basic facts of PD than American SLP’s.
5. Indian SLPs gained more knowledge about speech and language disorders via the internet as compared to the American SLPs who gained more knowledge through a variety of sources.

The results indicate that there is a greater incidence of PD in America as compared to the India. There is also an issue of referral to SLPs. Fewer neurologists refer adult patients with neurological disorders to SLPs. Another issue in India is the development of the field of speech language pathology. It is similar to how it was in the U.S. when the field was developing: initially the focus was on children and then medical aspects developed. In India at present this medical aspect of the field is slowly developing which may be the potential reason for fewer referrals to SLPs.

The American SLPs greater caseload of patients with PD, leads to the fact that the American SLPs are more aware about the various facts regarding diagnosing and treating patients with PD. The U.S. also leads with respect to research in the field of PD on account of greater funding available to the researchers in this country. The American SLPs have more access to this ongoing research concerning diagnosing and treating patients with PD. They also have easy access to journal articles and there are a lot more workshops on PD in the U.S. than in India, forcing the Indian SLPs to resort to the internet to obtain knowledge on diagnosing and treating PD. The information obtained through internet is not always reliable, which raises the question about accuracy of the knowledge obtained by Indian SLP’s. However by referring to online journals and searching for online workshops this group could make use of the internet in a more positive manner.
Limitations

Considering the large number of SLPs in the U.S., the questionnaire was administered to only 40 SLPs. This was mainly to have equal number of subjects in the study. There are fewer SLPs in India. Although a phone interview was a quicker way to obtain data from subjects, the questionnaire had to be shortened. Answering a lot of questions on the phone can be very tiring. A survey that would be mailed would have targeted more subjects.

Because it was a phone interview, all the questions on the survey had to be answered as yes/no/unsure, so as not to lose the interest of the SLPs. This restricted the SLPs responses and did not permit them to elaborate on any of the questions on the questionnaire.

The field of speech language pathology is still growing in India, unlike the U.S. where it has been around for over 70 years and still continues to grow. SLPs in the U.S. are therefore more experienced in terms of number of years they have worked and number of patients diagnosed and treated. This is not the case in India, as the field has been active only during the last 10 years. This is one of the major reasons why there is a greater difference between the SLPs in America and India in terms of knowledge, experience and awareness.

Implications for Future Research

The field of speech language pathology is dynamic. In the U.S., there is constant research targeting adult neurological speech and language disorders. Research should be made available or should be more easily accessible to the Indian SLP through increased online journals and online courses. It would also be ideal to educate the neurologists in India about the role of a SLP in diagnosing and treating adult neurological disorders like PD, ALS, MS, and Alzheimer’s. Future research could focus on the outcomes of such education or awareness programs. Educating the neurologists will lead to an increase in the number of referrals for a SLP and their
active participation in diagnosing and treating such patients, like the American SLPs. The more actively they are involved with such patients, the greater will be their drive and motivation to learn about the latest research in these areas. In India, accurate figures for the overall number of patients with PD in India, the number of patients with PD on a SLPs caseload, rate of PD and different types of PD are not available. Overall there is lacking research on the subject of PD in India, which needs to be the focus of future studies.
References


Florham Park, NJ.


National Institute of Neurological Disorders and Stroke (2002). NINDS Striatonigral Degeneration Information Page


Appendix A: Survey

Role of a Speech Language Pathologist in Diagnosing and Treating Parkinson's disease: Comparing the views of American vs. Indian Speech Language Pathologists.

This is a survey to compare the views of American versus Indian Speech Language Pathologists on the role of a speech language pathologist in diagnosing and treating people with Parkinson’s disease. Please answer the questions truthfully and to the best of your knowledge. Every part of this survey will remain confidential. Indicate your responses as true/false/unsure unless indicated.

1) PD is not differentiated into stages.
   true               false               Unsure

2) PD is 2\textsuperscript{nd} to Alzheimer’s as the most common neurodegenerative disease of aging.
   true               false               Unsure

3) PD usually affects people younger than 40 years of age.
   true               false               Unsure

4) Some drugs prescribed to treat psychosis can cause PD.
   true               false               Unsure

5) It has been proven that there is a genetic origin for PD.
   true               false               Unsure

6) The primary symptoms of PD are:- pill rolling tremor, bradykinesia, muscle rigidity, postural instability and festinating gait.
   true               false               Unsure

7) PD patients always present with dementia during later stages.
   true               false               Unsure

8) PD is not fatal.
   true               false               Unsure

9) PD patients always present with emotional changes at the later stages.
10) The following are the types of PD (answer yes/no/unsure):
   a) Drug Induced Parkinsonism  
   b) Essential Tremor  
   c) Shy Drager Syndrome  
   d) Progressive Supranuclear Palsy

11) Cognitive linguistic deficits are a part of PD.

12) Dysphagia is a common symptom in PD.

13) Flat affect is atypical of PD.

14) The memory and cognitive changes in PD can appear at any stage in the progression of the disease, but are more often reported by individuals who have had the disease for many years.

15) PD is different from Essential Voice Tremor.

16) Rate of speech remains unimpaired in PD.

17) The speech of PD patients may be affected due to secondary respiratory problems.

18) Change of voice is the first symptom of PD.

19) The frequency of tremors in Essential Voice Tremor is same as that of PD.

20) Managing speaking rate improves speech intelligibility in PD patients.

21) The voice characteristics in Essential Tremor are different from that of PD.
22) A main goal a speech therapist would address in a PD patient at any stage of the disease is developing and improving an effective communication system.

23) Various drugs are used to treat PD, but L-dopa is most common.

24) The main focus of the Lee Silverman Voice Treatment (LSVT) program is improving vocal loudness, maximum phonatory effort and voice awareness.

25) Increased speech intelligibility and overall speech improvement have been found after patient’s initiation of L-dopa treatment.

26) LSVT is not very effective in treating the speech symptoms of PD patients as compared to the traditional speech therapy techniques used in the treatment of these patients.

27) The effectiveness of L-dopa lasts for longer than 5 years.

28) There are definitive tests to diagnose PD.

29) High doses of L-dopa lead to dyskinesia.

30) Compensatory strategy like using an AAC device for a PD patient, maximizes communicative effectiveness by compensating for decreased intelligibility and abnormal patterns of speech.

31) Besides L-dopa there are other drugs that are prescribed for the PD patients depending upon their severity and the stage of the disease.
32) Treating dysphagia is an important goal to target during speech therapy for PD patients.
   
true false unsure

33) X-rays, brain scans and lumbar puncture are not effective in diagnosing PD.
   
true false Unsure

34) Surgical procedures like thalamotomy and pallidotomy are not so effective in the treatment of PD symptoms.
   
true false Unsure

35) Stem cell research and tissue transplantation from embryonic cells are gaining popularity as a treatment method for PD.
   
true false unsure

36) Ayurveda (a traditional Indian medicine prescribing seeds for treating PD) is effective in reducing the symptoms of PD.
   
true false unsure

37) An SLP has a role in diagnosing and treating patients with PD.
   
true false unsure

38) Do you think alternative forms of treatment like yoga, massage, acupuncture etc are effective in the treatment of PD?
   
true false unsure

1) What settings have you worked in?
   Acute, Rehab, Nursing Home, Home Health, Others

2) The facility and setting where you are currently working
   Acute, Rehab, Nursing Home, Home Health, Others

3) What is your title? _______________________

4) How long have you been working? ____________

5) What city do you work in? ______________
6) Which of the following best describes the highest degree that you have obtained?

   Undergraduate  Graduate  Doctorate

7) How do you primarily obtain your information about Parkinson's disease?
   a) Classroom education  b) Workshops (CEU’s)
   c) Online (Internet)  d) Others
   If others please specify ______________________

8) Have you had specialized training in any particular therapy technique used to remediate PD?
   Yes  No

9) What age group do you fall under? (How old are you?)
   20-30  31-40  41-50  50-60

10) Approximately how many Parkinson’s disease patients have you evaluated or treated in your career?
    0-10,  11-25,  26-50,  51-100  >100
Appendix B: Script for the Interview

Script for the interview

My name is Rakshita Banwasi. I am a second year graduate student at Miami University, Ohio, USA. As part of my thesis, I have developed a survey to determine the views of American versus Indian speech language pathologists, regarding their role in diagnosing and treating Parkinson’s disease. This call is to know if you would be interested in participating in my survey. It is an oral survey that is approximately 15 minutes long. Your answers would help to further the research in the area of Parkinson’s disease. The results of the survey will be used to complete the study. If you would like a copy of the results, please let me know of a mailing address or an email address where I could send the results. In any published version of the results, you will not be personally identified. Your name will not be linked with your answers to the survey questions. Participation in this study is voluntary and you may discontinue participation at any time or refuse to answer specific questions. If you agree to participate in the survey, we can set up a convenient date and time to complete the survey. If you have any questions feel free to contact Dr. Alice Kahn (513 523 2508) or me at the department of Speech pathology and Audiology, Miami University. The Indian subjects can contact me at my residence (022-24142213 or 022-4121094). You could also email us at kahna@muohio.edu or raks_18@yahoo.com. If there are any questions regarding your rights as a participant you may call the Office for Advancement of Scholarship and Teaching at (513) 529 3734.