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L. Hartelius
P. Svensson

Department of Logopedics
and Phoniatrics,
University of Göteborg, Sweden

Speech and Swallowing Symptoms Associated with Parkinson's Disease and Multiple Sclerosis: A Survey

Key Words

Dysarthria · Dysphagia · Parkinson's disease · Multiple sclerosis · Neurologic disease · Rehabilitation

Abstract

A survey of approximately 460 patients with Parkinson's disease (PD) or multiple sclerosis (MS) shows that speech and swallowing difficulties are very frequent within these groups. Seventy percent of the PD patients and 44% of the MS patients had experienced impairment of speech and voice after the onset of their disease. Forty-one percent of the PD patients and 33% of the MS patients indicated impairment of chewing and swallowing abilities. The speech disorder was regarded as one of their greatest problems by 29% of the PD patients and by 16% of the MS patients. Only a small number of patients, 3% of the PD and 2% of the MS group, had received any speech therapy.

Sprech- und Schluckstörungen bei Parkinson- und Multiple-Sklerose-Kranken

Eine Umfrage unter rund 460 Patienten mit Parkinson-Krankheit und multipler Sklerose (MS) hat gezeigt, dass Sprech- und Schluckbeschwerden weit verbreitet sind. Siebzig Prozent der Parkinson-Kranken und 44% der MS-Patienten gaben an, seit ihrer Erkrankung an Sprech- und Stimmstörungen zu leiden. Einundvierzig Prozent der Parkinson-Kranken und 33% der MS-Patienten berichteten über Kau- und Schluckbeschwerden. Sprechschwierigkeiten wurden von 29% der Parkinson-Kranken und 16% der MS-Patienten als eines der grössten Probleme bezeichnet. Nur wenige, etwa 3%, haben eine Logopädin besucht.

Troubles de la parole et de la déglutition associés à la maladie de Parkinson et à la sclérose en plaques

Une enquête portant sur près de 460 personnes atteintes de la maladie de Parkinson ou de sclérose en plaques (MS) montre que les troubles de la parole et de la déglutition sont très fréquents dans ces collectifs. 70% des parkinsoniens et 44% des patients atteints de MS estiment que leur élocution et leur voix se sont détériorées sous l'effet de la maladie. 41% des parkinsoniens et 33% des patients atteints de MS ont rapporté une détérioration de la mastication et de la déglutition. Les difficultés de la parole ont été considérées comme le problème majeur par 29% des parkinsoniens et 16% des patients atteints de MS. Seuls 3% des parkinsoniens et 2% des patients atteints de MS ont consulté une orthophoniste.

Lena Hartelius, Per Svensson
Department of Logopedics and Phoniatrics
Sahlgren's Hospital
S–413 45 Gothenburg (Sweden)

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In Scandinavia, Parkinson's disease (PD) and multiple sclerosis (MS) are the two most common progressive neurological diseases. The estimated overall prevalence of PD is approximately 150/100,000 individuals, and of MS 50–130/100,000 individuals [1]. Both PD and MS are frequently associated with the type of speech disorder known as dysarthria. Dysarthric speech is characterized by impairment of the motor speech processes which are involved in regulating speech breathing, voicing, articulation and nasal resonance. Dysarthrias have typical manifestations according to the particular disease process involved and the specific type or site of lesion [2].

The prevalence of speech disorder in the PD population is high. According to a study by Logemann et al. [3], signs of vocal dysfunction were demonstrated by 89% of 200 PD patients, and articulation disorders were noted in 45% of the patients. In addition, disorders of rate (e.g., repetition of syllables, too long pauses) were noted among 20%, and hypernasality (too much nasal resonance due to velopharyngeal insufficiency) in 10% of the patients. A survey carried out by the Parkinson's Disease Society in Britain among its members revealed that at least 49% of those responding experienced speech difficulties, whereas merely 3.4% had received speech therapy [4].

Impaired speech has often been considered as one of the cardinal symptoms of MS, particularly what has been referred to as 'scanning speech' [5]. However, the published reports differ greatly concerning the frequency of dysarthric speech signs in MS. This variation apparently reflects differences of design, definitions, and selection of patients among those investigations. In spite of what is often assumed, dysarthria is not necessarily a universal characteristic of MS. Darley et al. [6] studied 168 patients with MS and found that 41% of the patients displayed a deviant speech performance (28% to a slight degree and 13% to a more severe degree), whereas 59% of the patients had essentially normal speech. In a survey of communication disorders in individuals with MS, 23% of 656 respondents reported that 'speech or other communication disorders' were a symptom of their disease [7].

Muscle groups and structures of the mouth and pharynx which are active during speech production also play an important role in swallowing. Some of the neural subsystems and pathways are shared, as well. It is hardly surprising, therefore, that disorders of communication and swallowing tend to co-occur in patients with neurological diseases.

The direct and indirect causes of swallowing difficulties, dysphagia, are manifold. If the hypoglossal nerve is involved, the patient's lingual control of chewing and oral transit will be reduced. When the glossopharyngeal nerve is affected, there may be a delay and reduced muscle activity in the pharyngeal phase of swallowing. If the vagus nerve is involved, the patient's laryngeal function and airway protection may be compromised [8].

PD patients have been noted to have difficulties in controlling and propelling the bolus with the tongue, initiating the swallow, clearing the pharynx of residue, and avoiding aspiration [8, 9]. Dribbling or drooling is another common problem, as is spilling due to tremor of the hand and arm.

MS patients, particularly those with brain stem involvement, are also reported to have swallowing difficulties. Dysphagia may develop early or late in the disease process and may take several forms. In a group of 29 patients studied by Daly et al. [10], 16 (55%) had experienced difficulties in swallowing. The most frequent problems were choking and 'sticking' of the bolus. The authors also studied esophageal motility and found evi-

dence of incoordination and diffuse spasm in 15 of 26 patients.

The possibilities of evaluation and treatment of dysarthria and dysphagia are progressing rapidly and can offer many of these patients better means of communication and thereby a higher quality of life, e.g. by using computer-based communication devices. Direct speech training can also in certain cases facilitate and improve speech and/or the ability to swallow [8, 11, 12].

The purpose of this questionnaire study of PD and MS patients is to determine: (1) the frequency, type, and severity of speech and swallowing problems experienced by these individuals; (2) what kind of rehabilitation measures they had received, and (3) their wish for more or other types of rehabilitation.

Materials and Method

Questionnaire

The questionnaire forms sent to the PD and MS groups differed slightly (25 versus 22 items; some question items being relevant to one diagnosis only). Using forced-choice items, information was sought about background data, such as sex, age and employment status; about general data on diease history and medical services provided, and finally, concerning specific swallowing and speech problems as well as further rehabilitation needs.

Selection of Subjects

The questionnaires were distributed through the local chapters of The Parkinson Disease Society, and The Multiple Sclerosis section of the Association of the Neurologically Disabled. Their members live primarily in the Gothenburg region in the south-western part of Sweden.

A total of 375 questionnaires were sent to PD individuals and 278 to individuals with MS. The questionnaire forms and the included instruction paragraph clearly indicated for whom the questions were intended, but it was assumed that some patients would need the assistance of their family members or nursing staff to fill out the forms.

Table 1. Background characteristics of patients

Patient characteristics		Percentage of patients	
		PD (n = 230)	MS (n = 200)
Male		56	32
Female		44	68
Age			
PD	< 40 years	1	
	40–50 years	1	
	50–60 years	13	
	60–70 years	41	
	> 70 years	44	
MS	< 30 years		3
	30–40 years		17
	40–55 years		38
	55–70 years		34
	> 70 years		8
Duration of illness			
	< 1 year	1	0
	1–3 years	11	6
	3–10 years	51	24
	> 10 years	37	70

Analysis

Apart from analysis of the distribution of observations on different variables, the Pearson's coefficient of correlation was used to describe the relations between different variables.

Results

Data were collected over a 5-month period. Of the PD group 258 (69%) responded, and of the MS group 203 (73%). Partially completed questionnaires were included. Consequently, percentage calculations are based on the number of responses to each particular item.

Background Data (table 1)

As expected, the sex distribution shows about equally many males (56%) and females (44%) in the PD group, whereas in the MS

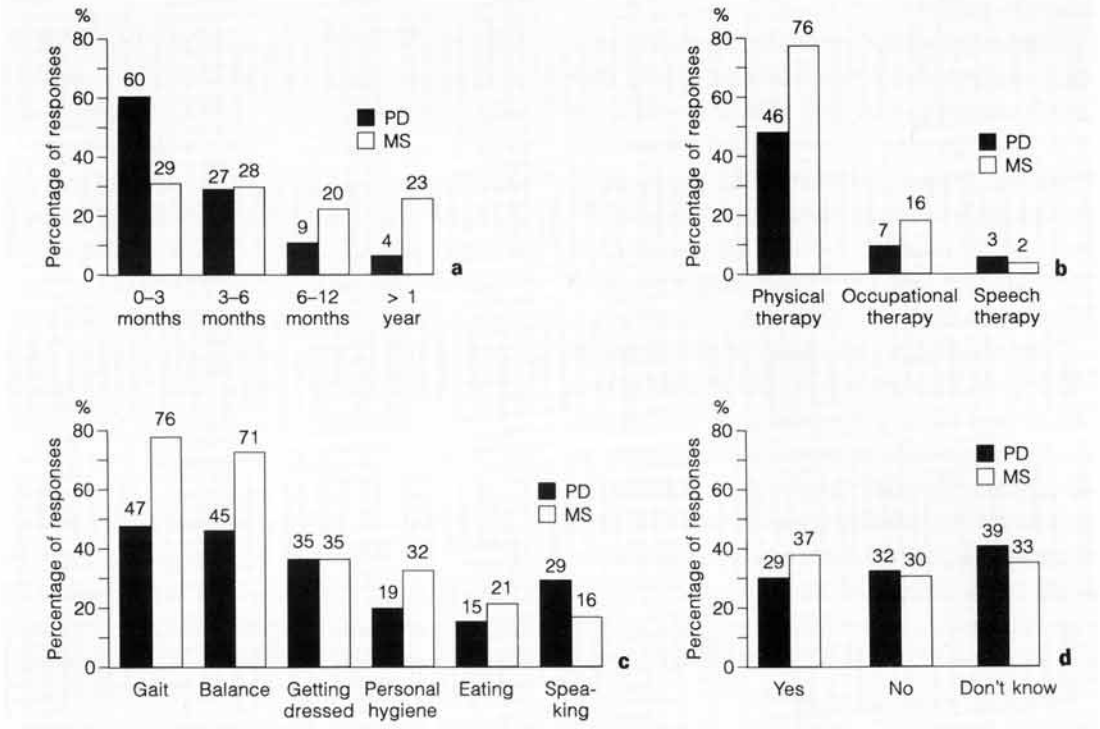

Fig. 1. a Time since last visit to doctor (n = 226 PD, 198 MS). **b** Other prescribed treatments beside drug therapy (n = 258 PD, 203 MS). **c** Greatest perceived problems at present (n = 258 PD, 203 MS). **d** Have you received the desired amount and type of rehabilitation? (n = 239 PD, 184 MS).

group there is a greater proportion of females (68%). The age distributions are typical, as well: in the PD group 85% are above 60 years of age, in the MS group 58% are below 55 years.

The duration of the disease was considerably shorter in the PD group, typically 3–10 years. The individuals with MS, however, are younger and have had their disease longer (70% for more than 10 years). This is again as expected, since MS is usually characterized by a relatively early onset and slow progression of symptoms (table 1).

The employment status in part reflects the age distribution; in the PD group (median age 60–70 years), 10% work part- or full-time; in the MS group (median age 40–55 years), 25% are gainfully employed. The remaining subjects are retired or on sick leave.

Greatest Perceived Problems and Type of Rehabilitaton Received (fig. 1)

PD individuals visit their doctor frequently: 60% did so during the last 3 months, as opposed to 29% in the MS group. As a result of the visit, 45% of the PD patients had their medication changed,

Physical therapy was prescribed for 46% of the PD patients and 76% of the MS patients. Occupational therapy was prescribed for 7% (PD) and 16% (MS). Very few PD and MS patients, only 2–3%, had received any speech therapy.

Particularly the subjects who had MS experienced gait and balance to be among their greatest present difficulties. Speech problems were noted by 29% of the PD group and 16% of the MS group. Seventy-two percent of the PD individuals had problems with their handwriting. According to 67% of the PD group, the severity of their symptoms fluctuates during the day or from day to day.

Approximately one third of the subjects have indicated satisfaction with the type and amount of rehabilitation which they have received. Roughly the same proportion do not, and equally many are uncertain.

Speech and Swallowing Difficulties

No less than 70% of the PD subjects and 44% of the MS subjects consider themselves to have impaired speech and voice as a consequence of their disease (fig. 2a). Mastication and swallowing are more difficult than prior to their disease according to 41% (PD) and 33% (MS) of the patients (fig. 2b). The risk of choking on food or drink is the most frequently indicated problem (fig. 3d). Drooling is more common in PD than in MS (fig. 3e).

PD subjects have greater difficulties in making themselves heard, and their speech is less intelligible than that of the MS subjects (fig. 4). The most frequently indicated speech and voice problems (table 2) are weak, hoarse and/or monotonous voice, and imprecise articulation. It is also common for both groups to experience their speech as being too slow, or difficult to initiate.

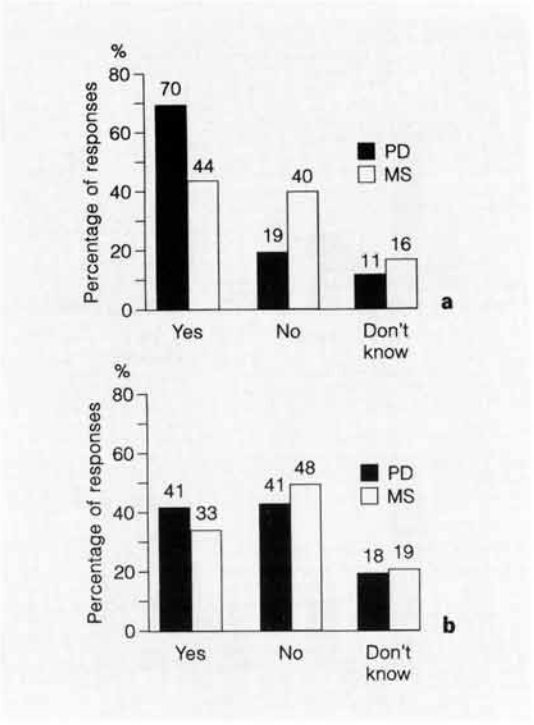

Fig. 2. a Speech and voice is worse than prior to disease onset (n = 249 PD, 189 MS). **b** Ability to chew and swallow is worse than prior to disease onset (n = 249 PD, 191 MS).

Speech and Swallowing Characteristics in Patient Subgroups

In an effort to further characterize speech and swallowing symptoms in individuals with MS, the following subgroups were identified: group I – subjects without problems of ambulation, or arm and hand motility; group II – subjects with problems of ambulation only; group III – subjects with ambulation problems, and weakness or lack of arm and hand control, and group IV – subjects with ambulation problems, and weakness and lack of arm and hand control.

Groups I and II correspond to early stages of the disease, whereas groups III and IV correspond to later stages. Eighty-seven subjects

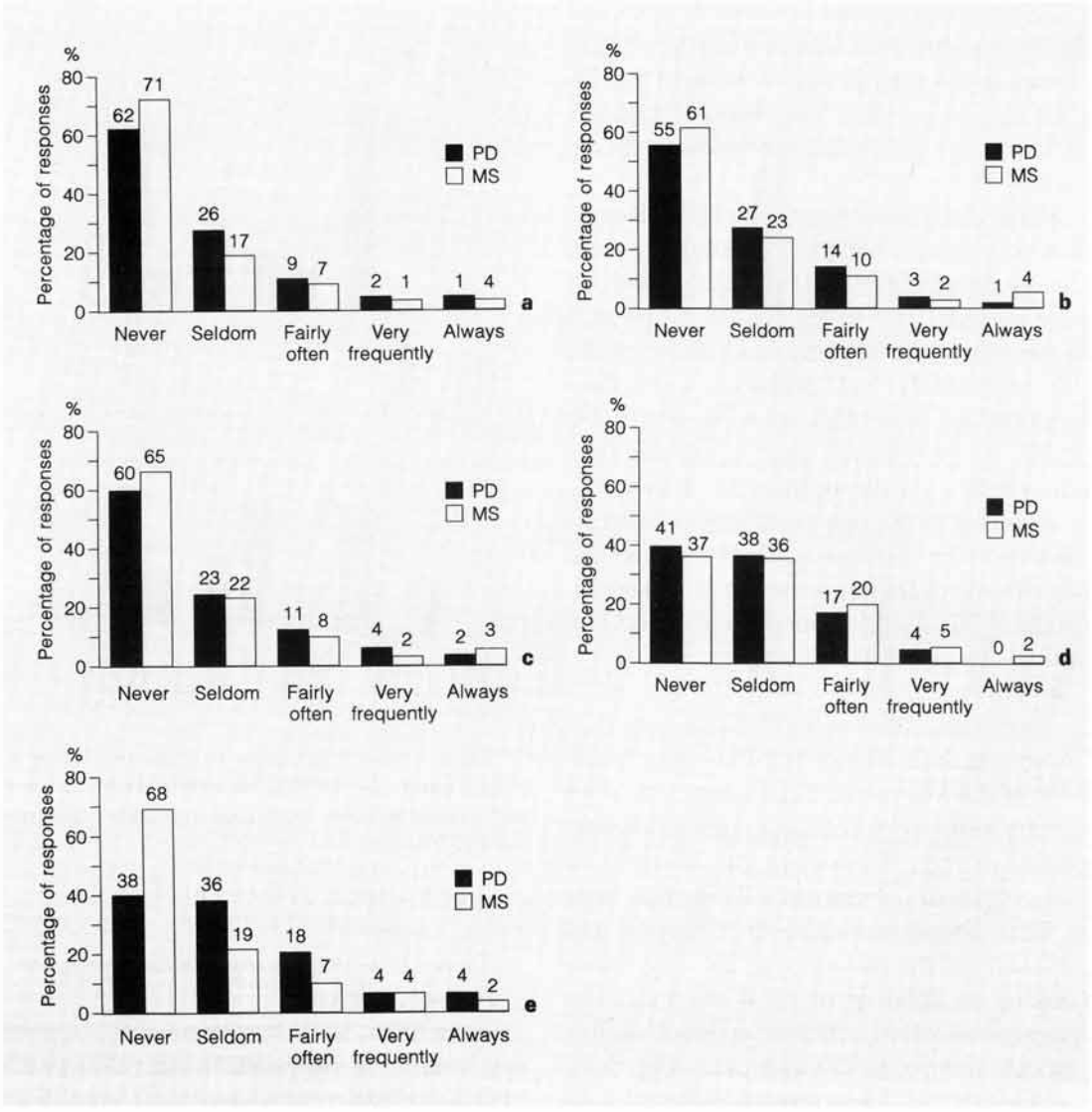

Fig. 3. Frequency of perceived swallowing difficulties. **a** Chewing (n = 245 PD, 184 MS). **b** Swallowing solids (n = 244 PD, 187 MS). **c** Swallowing liquids (n = 246 PD, 182 MS). **d** Chokes on food or drink (n = 248 PD, 188 MS). **e** Drink or saliva escaping between lips (n = 249 PD, 189 MS).

fall into groups I and II; 89 subjects into groups III and IV. Table 3 shows the responses of each subgroup concerning speech/voice and mastication/swallowing. The subjects in groups III and IV, i.e. those with more pronounced problems of gait and arm/hand function, tend to have more difficulties with speech and swallowing, as well.

Statistical calculations show significant correlations among variables concerning

Table 2. Most frequently reported voice and speech problems (in percentage of total number of patients indicating one or more response alternatives)

Voice and speech problems	Percentage of responses	
	PD (n = 195)	MS (n = 200)
Weak voice	61	43
Hoarse voice	32	17
Monotonous voice	17	13
Imprecise articulation	36	33
Speech is too slow	11	17
Speech is too fast	6	5
Stuttering	9	5
Tremor	10	7
Too nasal	4	6
Difficulties getting started	27	34
Impaired stress or speech rhythm	5	10

Table 3. Impairment of speech and swallowing abilities after the onset of MS

	Yes %	No %	Don't know, %	n
Impaired speech and voice after disease onset				
Group I	33	48	19	27
Group II	29	56	15	59
Group III	46	30	24	50
Group IV	67	25	8	39
Impaired ability to chew and swallow after disease onset				
Group I	19	55	26	27
Group II	22	58	20	60
Group III	36	48	16	50
Group IV	51	33	16	39

Respondents were divided into subgroups according to the presence of other motor symptoms. Group I and II consist of patients with no or slight problems of ambulation, group III and IV consist of patients with problems of gait, and arm and hand motility.

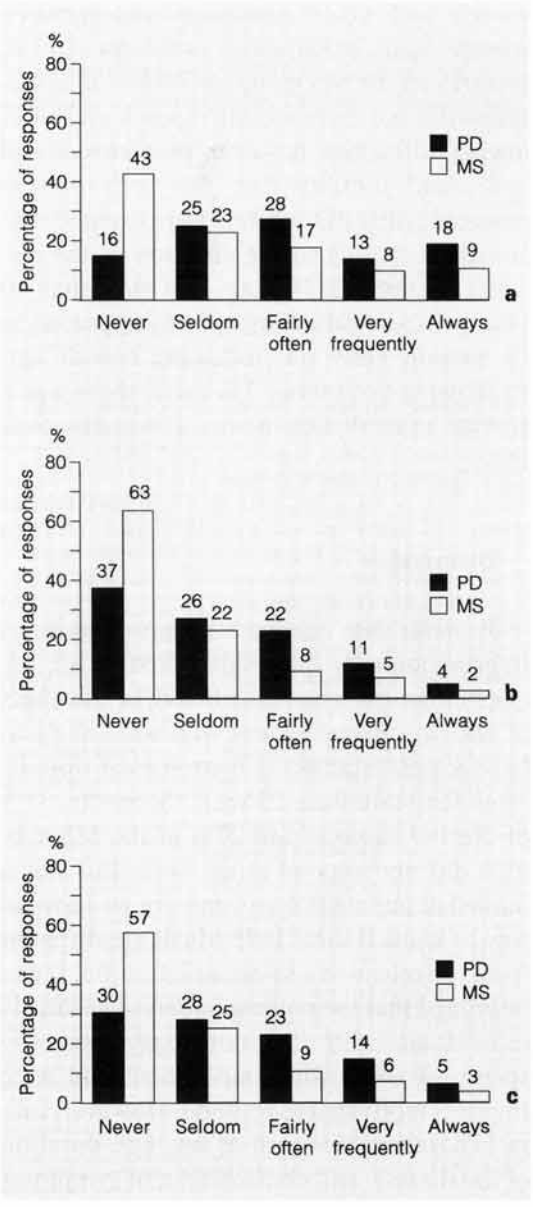

Fig. 4. Frequency of perceived speech difficulties. **a** Difficulties in making oneself heard in noise or in a group of people (n = 248 PD, 187 MS). **b** Family and friends find it hard to understand one's speech (n = 248 PD, 187 MS). **c** Unfamiliar listeners find it hard to understand one's speech (n = 249 PD, 189 MS).

speech and voice problems, and between speech and swallowing problems ($p < 0.0001$). In the MS group, problems of ambulation did *not* correlate with speech and swallowing difficulties; however, problems of arm and hand motility did. No such pattern emerged when PD subjects were divided into groups according to the duration of the disease (1–3 years, 3–10 years, and more than 10 years). In general, all symptoms appeared to be present early on, including speech and swallowing symptoms. Likewise, there was a general exacerbation across symptoms over time.

Discussion

At least two factors warrant a cautious interpretation of the results: First of all, the questionnaires were distributed to members of patient interest groups who were likely to have a well-established neurological disease, often for more than 10 years. Secondly, 31% of the PD subjects and 27% of the MS subjects did not respond at all. Since this was a mailed anonymous questionnaire we have no way to know if these individuals are different from the others in a systematic fashion. It can be argued that the nonresponders were largely individuals who did not experience any speech or swallowing impairment and were thus less motivated to respond. However, subject characteristics such as sex, age, duration of the disease, and constellation of symptoms would indicate that both groups were fairly representative of the PD and MS populations at large.

It appears that the medical needs of these patients were well looked after in certain areas, e.g. frequent visits to their physician by the PD patients, and three quarters of the MS patients getting referrals for physical therapy. It is worth noting that one third of the respondents stated that their rehabilitation needs had been met. On the other hand, only 2–3% had seen a speech pathologist, although 42% (PD) and 18% (MS) had difficulties in making themselves understood when speaking, and although 15–30% considered speech and swallowing to be a major problem. Obviously there is a discrepancy between the presence of symptoms and accessibility of treatment. It is also worth noting that of the PD patients who answered 'No' or 'Don't know' to the question 'Have you received the amount and type of rehabilitation you desire?', 34% wanted more speech therapy and 21% speech or writing aids.

In the PD group a strong positive correlation was evident between the duration of the disease and the severity of symptoms, including speech and swallowing. Previous studies of MS patients have shown the occurrence and degree of dysarthric speech signs to be primarily correlated with the severity of general neurologic signs of the disease [6]. This is in agreement with our findings in MS subgroups of more frequent speech and swallowing symptoms in subjects with greater motoric problems. In reports on the successive appearance of MS symptoms speech difficulties are considered a late symptom [13]. According to Beukelman et al. [7] one can also expect more communication difficulties in the variety of MS that has rapid progression of symptoms.

A large proportion of PD and MS subjects (70 and 44%) have stated that speech and voice functions are worse than prior to their disease. Early symptoms could be a weak or hoarse voice, imprecise articulation, and difficulties in projecting the voice or making oneself understood. Deterioration of swallowing functions, such as drooling, or a tendency to choke at mealtimes was noted by 41% (PD) and 33% (MS).

A conclusion to be drawn from this study is a much more frequent need than previously

realized to refer patients with progressive neurological diseases for evaluation and treatment of speech or swallowing symptoms. In this case, as for most other types of rehabilitation, early referral means that more options are available.

Acknowledgements

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