Original Research Article

Pattern and treatment of Parkinson's disease at different health care levels in Bangladesh: a hospital based survey

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ABSTRACT

Background: Parkinson's disease (PD) is a condition in which part of the brain becomes progressively damaged over many years. This study represents the pattern of Parkinson's disease and help to identify various drugs which are being used at different health care levels in Bangladesh.

Methods: Cross-sectional technique was applied as study design in this research work. We accessed the patients with formulated questionnaire of the Department of Neuroscience of National Institute of Neurosciences and Hospital, Dhaka Medical College and Hospital and Bangabandhu Sheikh Mujib Medical University (BSMMU) for data collection from January 2017 to August 2019. 100 patients were selected in the ages between 25-80 years, among them 66 were male and 34 females.

Results: A total number of 100 Parkinson's disease patients (male 66%, female 34%) were recruited for this study. Genetic factor (56%) is the main cause of PD found in this study. Among various symptoms, the prominent symptoms were voice disorders (96%), slowness of movement (90%), mask-like face expression (86%), tremor (80%), sensory and sleep difficulties (78%), excessive sweating (60%) and insomnia (56%). It was observed that along with physiotherapy, drugs used to manage PD were levodopa (14%), carbamazepine (12%), quetiapine (12%), haloperidol (11%), pramipexole (10%), trihexyphenidyl HCl (10%), carbidopa (8%), amlodipine (8%) and clonazepam (8%).

Conclusions: Disgrace exists in the personal life and social context of the PD patients which also unfavourably affects their psychosocial aspects of life. Our population-based data provide evidence for a protective effect of Parkinson's disease in our country.

Keywords: Parkinson's disease, Motor system disorder, Tremor, Rigidity, Bradykinesia, Drugs

INTRODUCTION

Parkinson's disease (PD) is one of the mysterious and intricate form of the neurological ailments. It is a common neurodegenerative disorder that can cause major incapacity and lessened class of life. It is a longstanding degenerative disorder of the central nervous system. PD is the second greatest common neurodegenerative ailment after Alzheimer's disease and affects roughly seven million people worldwide. The proportion in a population at a given time is about 0.3% in industrialized countries. PD is more common in aged people (60-80 years). Few studies have claimed that it is more common in men than women. In contrast, some studies failed to distinguish any alterations between the two sexes.[1] At initial stage, the supreme evident are shaking, rigidity, slowness of movement, and walking.[2] Thinking and behavioural difficulties may also occur. Dementia becomes common in the progressive stages of the disease. Depression and anxiety are also found in more than a third of persons

having PD. The key motor indicators are jointly termed parkinsonism.[2] The four crucial indications are tremor or trembling in hands, arms, legs, jaw, and face; rigidity or stiffness of the limbs and trunk; bradykinesia or slowness of movement; and postural uncertainty or impaired balance and coordination. As these symptoms become more pronounced, patients may have trouble in walking, talking, or completing other simple tasks indicating the disease as chronic and progressive.[2,3]

In early 19th century, the first description of PD was given by James Parkinson. He was British physician and published a paper on what he called the shaking palsy.[4] For the next century and a half, scientists tracked the causes and treatment of the disease. They defined its range of symptoms, distribution among the population, and prospects for cure.[3] In the early 1960s, researchers recognized a major brain defect that is a symbol of the disease. PD occurs when certain nerve cells, or neurons, that induce a chemical named dopamine in an area of the brain known as the substantia nigra, die or become impaired. Dopamine is a chemical messenger which supports muscle activity. Missing of dopamine directs the nerve cells of the striatum to fire out of regulation and eventually patients become unable to direct or regulate their activities in a typical manner. It has been reported that Parkinson's patients may have a loss of 80 percent or more of dopamine-producing cells in the substantia nigra. The reason of cell death or impairment is unknown but important findings by researchers continue to yield attractive novel hints to the disease. This discovery pointed to the first successful treatment for Parkinson's disease and suggested ways of devising new and even more effective therapies.[3]

Although there is no cure for Parkinson's disease, there are several measures that can be taken to improve a patient's quality of life. These measures include drug and surgical therapy. The additional possibilities available include making changes in lifestyle, and engaging physical and speech therapy. In a complex situation, a surgical alternative may be sought. There are several surgical options available, these include pallidotomy, deep brain stimulation (DBS), thalamic stimulation, pallidal stimulation and subthalamic DBS.[5] In this study, we examined the status of Parkinson's disease in Bangladesh along with its treatment pattern.

METHODS

Participants

The current study was conducted at department of neuroscience of national institute of neurosciences and hospital, Dhaka medical college and hospital and bangabandhu sheikh mujib medical university (BSMMU) from January 2017 to August 2019. The survey was carried out on 100 patients with signs and symptoms of Parkinson's disease and patients with drug therapy with

the disease. Physicians at the said hospitals were also consulted. Irrespective of age and sex, any patient who developed some signs and symptoms of Parkinson's disease came to the studied institutions were included in this study. The patient who did not develop enough signs and symptom were excluded from the study. All data were collected by direct questioning to the patients and no data were obtained over the telephone, e-mail, mail etc.

Questionnaire design

A questionnaire was formulated which comprised statistics regarding the patient's identity, background history, biophysical characteristics, type of Parkinson's disease the patient suffering from, underlying cause(s), signs and symptoms, types of treatment, drug treatment. The technical terms were clarified in details for better understanding of the participants. The patients were well-versed about the aim of the study before answering the queries and it was also made clear to the participants before answering session that who were unwilling to join in the study should feel free to withdraw. No multi-response answers for single-response questions were considered for data analysis.

Statistical analysis

SPSS for windows™ (version 12.0) was applied for the data analysis and data were presented as mean.

Ethics approval and consent to participate

The experiment was approved by the institutional animal ethical committee (SUB/TAEC/11.01) of stamford university Bangladesh as well as national institute of neurosciences and hospital, Dhaka medical college and hospital and bangabandhu sheikh mujib medical university.

RESULTS

General characteristics such as sex, age, living area, marital status, educational background, occupation of the studied patients at three tertiary care hospitals in Bangladesh are presented in Table 1. It has been found that married male people living in rural area over fifty years are more prone to Parkinson's disease. It is also observed that people having age 20 or less than 20 are not likely to PD. Clerical, unemployed and technical people are less susceptible to PD. Moreover, professional and skilled worker having secondary level education were in highest proportion of PD in Bangladesh.

Biophysical characteristics (weight, height, pulse rate, body temperature and blood pressure) of the studied patients at three tertiary care hospitals in Bangladesh are presented in Table 2.

Table 1: General characteristics of the patients with Parkinson's disease.

Parameter	Characteristics	Number (n=100)
Sex	Male	66
	Female	34
Age (in years)	Less than 0	0
	0-20	0
	21-30	10
	31-40	10
	41-50	20
	51-60	30
	61-70	30
Living area	Rural	56
	Urban	24
	S-Urban	20
Marital status	Married	80
	Unmarried	20
Educational status	Illiterate	2
	Can read only	6
	Can write a letter	20
	Secondary School Certificate	36
	Higher Secondary School Certificate	24
	Graduate or higher	12
Occupational status	Clerical	4
	Professional	30
	Technical	10
	Skilled worker	30
	Unemployed	4
	House wife	22

Table 2: Biophysical characteristics of the patients with Parkinson's disease.

Parameter	Characteristics	Number (n=100)
Weight (kg)	40-45	4
	46-50	4
	51-55	12
	56-60	20
	61-65	12
	66-70	15
	71-75	14
	76-80	10
	81-85	6
	86-90	2
Height (m)	1.524-1.829	80
	1.219-1.524	20
Pulse rate	Normal (60-100 beats per minute)	36
	Abnormal (below 60 or over 100)	64
Body temperature	Normal (36.5ºC-37.2ºC)	60
	Abnormal (below 36.5ºC or over 37.2ºC)	40
Blood pressure	Normal (120/80 mmHg)	20
	High (130-140 / 85-90 mmHg)	60
	Low (90/60 mmHg)	20

Table 3: Types, causes, and signs and symptoms of Parkinson's disease.

| Parameter	Concerned area	Number (n=100)
Types	Primary or idiopathic	20
	Secondary or acquired	50
	Hereditary parkinsonism	20
	Parkinson plus syndromes	10
Causes	Pesticide exposure	10
	Head injuries	14
	Living in the country or farming	12
	Exposure to heavy metals	8
	Genetic factor	56
Signs and symptoms	Tremor	80
	Slowness of movement	90
	Voice disorders	96
	Sensory and sleep difficulties	78
	Insomnia	56
	Excessive sweating	60
	Bradykinesia	30
	Muscular Rigidity	42
	Mask- like face expression	86
	Postural instability	50
	Festination	40
	Respiratory dysfunction	90
	Autonomic dysfunction	54
	Orthostatic hypotension	26
	Day time drowsiness	48
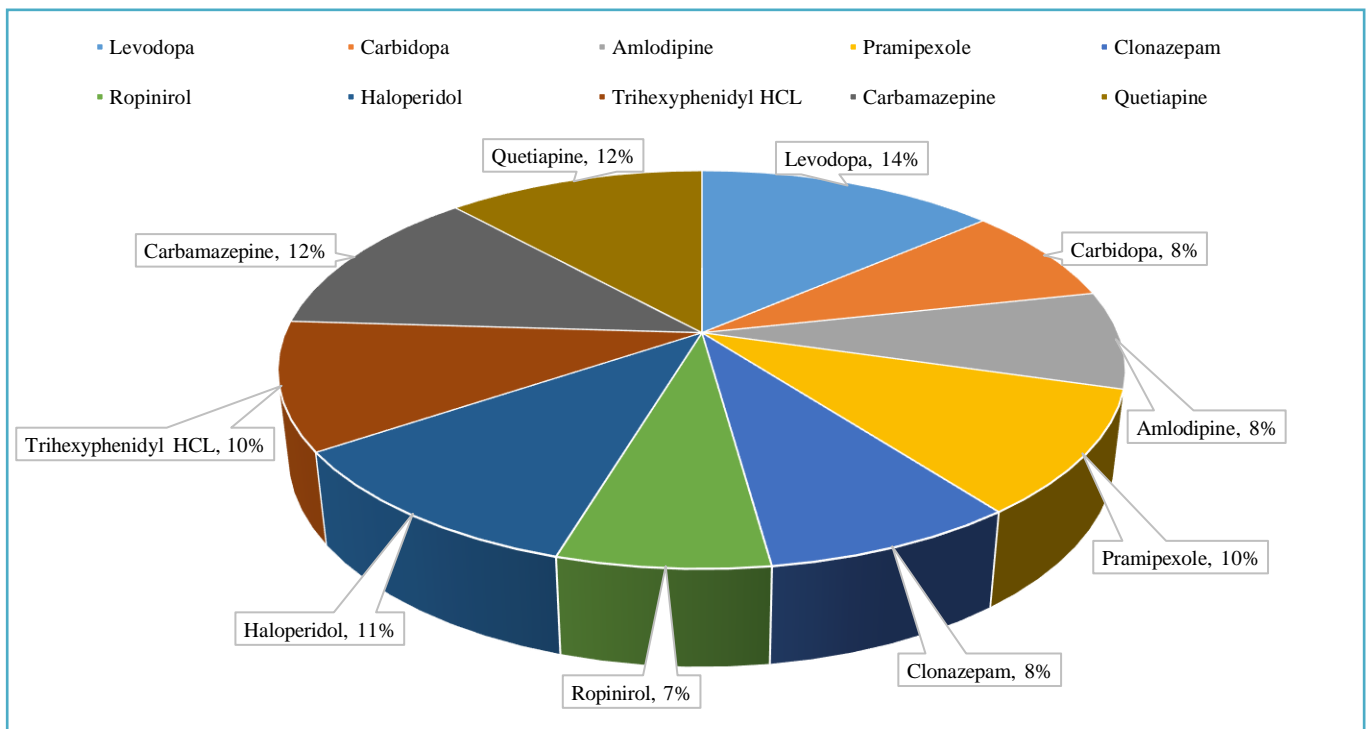
Figure 1: Drugs used in the treatment of different forms of Parkinson's disease at three tertiary care hospitals in Bangladesh.

It was seen that most of the patients have body weight of 51-70 kg with abnormal pulse rate and high blood pressure. People with height ranges between 1.524-1.829 meters are more prone to PD. Types, causes, and signs

and symptoms of PD observed during the survey at three tertiary care hospitals in Bangladesh are presented in Table 3. Secondary or acquired type of PD is more likely to occur which is predominantly caused by genetic factor. Voice and movement disorder are the most common symptom of PD found in this study in Bangladesh (Table 3).

As there is no cure for Parkinson's disease, there are several drugs that are used to control PD namely levodopa, carbidopa, quetiapine, carbamazepine, trihexyphenidyl HCl, amlodipine, ropinirol, clonazepam, haloperidol and pramipexole (Figure 1).

DISCUSSION

Parkinson's disease (PD) is the second greatest common neurodegenerative disorder after Alzheimer's disease affecting numerous people globally with devastating socioeconomic effects on individuals, their families and society.[6] According to the latest WHO data published in 2017 Parkinson's disease deaths in Bangladesh reached 539 or 0.07% of total deaths. There is no diagnostically definite test for PD yet, so the diagnosis is clinical in nature. In the clinical setting, PD is commonly missed or misdiagnosed since many symptoms of PD are also common to other diseases both neurodegenerative and non-neurodegenerative. The diagnosis and treatment of PD typically occurs when the disease has already progressed to a relatively progressive stage in which motor symptoms are clearly evident and substantial neurophysiological damage has already taken place. At this theme, any possibility of delaying disease progression or, achieving neuroprotection may already be out of reach. A meta-analysis of the worldwide data showed a rising prevalence of PD with age (all per 100,000): 41 in 40 to 49 years; 107 in 50 to 59 years; 173 in 55 to 64 years; 428 in 60 to 69 years; 425 in 65 to 74 years; 1087 in 70 to 79 years; and 1903 in older than age 80.[7] As per the survey result, ageing is closely related to PD (60% of patient with PD were aged over 50 years).

Damages in motor function such as tremor, slowed movements, loss of voluntary movements, muscular rigidity and postural instability cause problems with mobility and interfere with activities of daily living. Problems with balance and gait (rhythmic stepping movements for travel) can lead to falls and injuries, and the inability to perform everyday tasks. Other symptoms include poor hand co-ordination, problems with handwriting, and a sensation of tremor (shaking) in the arm. Early PD's symptoms often include pre-motor indicators such as depression, dementia, feeling tired and weak, reduced ability to smell and to detect odours, acting out vivid dreams during sleep (REM sleep behaviour disorder), along with problems with blood pressure, heart rate, sweating, and digestion of food. Visual symptoms often precede the clinical diagnosis and increase over time.[8] Symptoms differ significantly from person to person and can occasionally take years to

progress to a point where they cause problems. In our study, symptoms such as tremor, slowness of movement, voice disorders, sensory and sleep difficulties, insomnia, excessive sweating, bradykinesia, muscular rigidity, mask-like face expression, postural instability, festination, autonomic dysfunction, orthostatic hypotension, day time drowsiness were found in PD patients (Table 3). Among these symptoms, the prominent symptoms were voice disorders (96%), slowness of movement (90%), mask-like face expression (86%), tremor (80%), sensory and sleep difficulties (78%).

In our study, it has been stated that male had higher incidence than female similar to that reported in other countries.[9-11] Family history of PD and previous history of depression were the other risk factors likely to predispose to PD. Environmental risk factors such as rural living, well water drinking, farming, and pesticide exposure have been described previously.[12] Speech impairment has been reported in 60-80% of the PD patients which reaches up to 100% in the later stages.[13] It was found that 96% patients showed voice disorder. The central mechanism for speech impairment in PD patients is the activation of superior temporal gyrus.[14] Memory disturbances and dementia are known to occur in later stages of PD. Patients with early PD can have subtle disturbances in neuropsychological testing.[15] Respiratory dysfunction in PD is well-known and causes both obstructive and restrictive patterns.[16] In our study, we found that 90% of patients have respiratory dysfunction in various degrees. The dysfunction was mitigated with medications (LD), probably due to the reduction in rigidity and bradykinesia leading to better coordination of muscles. Routine pulmonary function monitoring, even in asymptomatic patients, may be necessary to anticipate any significant respiratory dysfunction and consequent effective intervention.

Autonomic dysfunction is well-known in PD and is found to be present in 54% of the patients.[17] The cardiac autonomic dysfunction manifests as declined response of heart rate and blood pressure to autonomic stimulation.[18] There is no study from Bangladesh assessing autonomic functions in PD. It has been found that LD improves the heart rate variability due to increased vagal tone.[19] Orthostatic symptoms have a high specificity but low sensitivity for detection of OH in patients with PD. Orthostatic hypotension (OH) has been reported in 20-58% of PD. In our study, we found 26% of the patients had OH. Depression in PD may be reactive depression as a result of chronic illness as well as a result of neurodegeneration. The degeneration of subcortical nuclei such as hypothalamus, locus coeruleus, dorsal raphe, and ventral tegmental area and loss of dopamine and noradrenaline innervation in the limbic system have been implicated as a cause of depression in the PD patients.[20,21]

PD is challenging to diagnose, since there are no well-established biomarkers to decide if the disease is present.[22,23] There is no diagnostically conclusive test for PD, so the diagnosis is clinical in nature and is made by identification of slowness of movements (bradykinesia) and at least one of the following symptoms: resting tremor, muscle rigidity, and postural instability.[24] Standard current methodologies to PD diagnosis depend on the presence of motor symptoms; therefore the diagnosis is mainly clinical, and may occur at later stage of the disease, when significant irreversible neurological damage may have already occurred and there is no opportunity to delay disease progression. However, the combination of a new definition of PD (to include early pre-motor symptoms) and new diagnostic tools may allow for early diagnosis, and therefore treatment of the disease. In this study, activities of daily living were measured following the administration of medications. The commonly prescribed drugs for the treatment of PD were levodopa (14%), carbamazepine (12%), quetiapine (12%), haloperidol (11%), pramipexole (10%), trihexyphenidyl HCl (10%), carbidopa (8%), amlodipine (8%), clonazepam (8%) and ropinirol (7%). In our study, levodopa was the most frequently prescribed PD medication. Earlier studies have also reported levodopa as the most commonly recommended PD medication, ranging from 37.4% to 90.0%.[25,26] Those who underwent cleansing or eliminating therapy prior to the intake of medicines had significantly better outcomes. Physical therapy, which is non-invasive, is an essential part of treatment for PD.

CONCLUSION

The current study might contribute for better understanding of Parkinson's disease pattern in Bangladesh and it will be helpful for depth research in this area. More research is required to be encouraged, so that the characteristics of the disease in the Bangladeshi population can be understood which may bring a better treatment and management strategy.

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