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ORIGINAL ARTICLE

Frequency of Orthostatic Hypotension in Parkinson's Disease

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ABSTRACT

Background: Parkinson's Diseases (PD) cause some non-motor issues that could lead to disability. One of such determinal non-motor symptoms is orthostatic hypotension (OH) which is still understudied in our local setting despite of its high prevalence worldwide among patients of PD.
Aim: To determine frequency of orthostatic hypotension in Parkinson's disease
Methods: This Cross-sectional study was conducted at Department of Neurology, Mayo Hospital, Lahore for 6 months after the approval of synopsis [April 9, 2018 till Oct 9, 2018]. A sample of 95 cases was selected using non probability consecutive sampling from 95 patients of Parkinson's Disease aged 25 years and more. After taking consent from patient and recording sociodemographic information, a lying-to-standing orthostatic test was performed to evaluate the orthostatic hypotension and SBP and DBP was recorded. All data was collected using a self structured proforma and analyzed using SPSS v 21.
Results: The mean age of cases was 47.46 ± 8.97 years with male to female ratio of 1.97:1. The mean systolic and diastolic blood pressure was 120.60 ± 11.80 and 86.20 ± 8.68 respectively. The frequency of orthostatic hypotension was seen in 51(53.7%) while other 44(46.3%) cases did not have orthostatic hypotension.
Conclusion: Through the findings of this study we conclude that frequency of orthostatic hypotension in Parkinson's disease is very much high i.e. 53.7% with highest frequency in cases with longer duration of disease.
Keywords: Autonomic diseases, Parkinson's disease, Systolic blood pressure, diastolic blood pressure, Orthostatic hypotension,

INTRODUCTION

Parkinson's disease (PD) is second most prevalent chronic disorder that usually becomes progressive with time and is associated with instability of posture and dysfunctionality of gait in its advanced stages[1]. Some common features that characterize PD include rigidity, postural instability, bradykinesia and resting tremors[2]. The prevalence of PD is higher among men and those of older age (50-59 years)[3]. The global prevalence of PD has been reported as 0.43% for 60-69 years, 1% for 70-79 years old and 1.9% for >80 years[4,5]. Almost 25% patients with PD develop cognitive dysfunction at some time during the course of their disease.[6] Diagnosis of PD is made clinically based on symptoms such as resting tremors, bradykinesia, rigidity and instability of posture. Progression of these symptoms gradually over time and stagnant response to levopoda therapy are also characterization of the disease[7].

Moreover, other non-motor signs including autonomic problems, sensory malfunctioning, changes in eyesight, mood swings, sleep disorders and other cognitive issues are also induced due to PD. These changes cause functional and cognitive impairments and usually do not respond to standard treatment[8,9]. PD patients develop swift body changes such as a repeated shift in mobility and immobility and do not have a satisfactory response to conventional pharmacological management[10].

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A number of non-motor symptoms associated with PD may contribute to functional disabilities. Orthostatic Hypotension (OH) is one of the commonest non-motor symptoms that cause cognitive loss and disability. However, this goes understudied and remains ignored and hence untreated, especially in our country.

The frequency of OH is most prevalent among patients of Atypical Parkinson's[11,12]. In one study the prevalence of orthotic hypotension was 24.1% among patients of PD[13] whereas in another study this prevalence was as high as 45%[14]. Presence of OH among PD patients may cause generalized weakness, instability, tiredness, loss of cognition as well as more risk of falls[11]. While some studies correlate it with increasing age, other report duration of disease and medicines of PD as a cause of OH. Some studies, on the other hand, show insignificant correlation of PD with duration of disease. r=0.182 with =0.064[12]

The literature available for prevalence of Parkinson's disease as well as its correlation with potential risk factors is quite controversial. Moreover, very limited data is available in our local setting despite of high frequency of OH observed in PD patients. It is therefore important to explore further regarding prevalence of OH in PD patients as well as its possible correlation with duration and severity of disease. It is important to study these factors so that early screening for OH could be made in PD patients and proper management plan could be devised for better clinical outcomes. Also, appropriate prevention strategy could be opted to avoid further complications such as cardiovascular autonomic dysfunction in PD patients.

MATERIAL AND METHODS

This Cross-sectional study was conducted in Department of Neurology, Mayo Hospital, Lahore for 6 months [April 9, 2018 till Oct 9, 2018]. A sample of 95 was calculated using expected percentage of orthostatic hypotension as 45%[14] with 10% margin of error and 95% confidence level. The data was collected using Non probability consecutive sampling from all patients (males and females) older than 25 years of age presenting with Parkinson's disease. The patients with history of Parkinson-plus syndromes as well as Secondary Parkinsonism, having lesion in Basal ganglia on MRI, having Alzheimer's disease and other neurodegenerative disorders and other malignant diseases were excluded from the study.

After taking consent from Ethical committee and participants, socio demographic and clinical information was recorded on a structured proforma. Parkinson's disease was diagnosed on the basis of Movement Disorder Society Clinical Diagnostic Criteria for established Parkinson's Disease[11], and to diagnose orthostatic hypotension, a lying-to-standing orthostatic test was performed. The test was done in morning when the patients had not taken any medicine and were fasting. Afterwards, they were asked to lay down and SBP and DBP readings were taken after five minutes of spine rest. The SBP and DBP were again recorded after asking them to stand for three minutes. Orthostatic hypotension was diagnosed using the criteria of 30mmHg drop of SBP and 15mmHg drop of DBP within 3 min of standing, compared with BP in position of sitting or supine position and absence of medication, dehydration and any other history of disease that may potentially explain such autoimmune dysfunctionality. All the collected data was entered and analyzed using IBM SPSS version 22. Qualitative data like gender and orthostatic hypotension was presented as percentages and frequencies. Quantitative data like age, duration of disease and systolic blood pressure was presented as means and standard deviations. Data was stratified for age, gender and duration of disease to address effect modifiers. Post stratified Chi-square test was used taking p-value ≤ 0.05 as significant.

RESULTS

The mean age of cases was 47.46 ± 8.97 years with minimum and maximum age of 25 and 60 years (Table 1). There were 63(66.3%) male and 32(33.7%) female cases with male to female 1.97:1 (Fig. 1). The mean duration of disease was 11.50±3.66 years with minimum and maximum age of 6 and 18 years (Table 2). The mean systolic and diastolic blood pressure was 120.60±11.80 and 86.20±8.68 respectively (Table 3). According to operational definition, the frequency of orthostatic hypotension was seen in 51(53.7%) while other 44(46.3%) cases did not have orthostatic hypotension (Fig-2).

When data was stratified for age, in cases that had orthostatic hypotension there were 22(43.1%) who had age 25-45 years and 29(56.9%) cases had 46-60 years of age while in those who did not have orthostatic hypotension there were 14(31.8%) cases whose age was 25-45 years and 30(68.2%) cases were 46-60 years of age. The frequency of orthostatic hypotension was statistically same in both age groups, p-value > 0.05 (Table 4). When data was stratified for gender, in cases who had orthostatic hypotension there were 34(66.7%) male and 17(33.3%) female cases while in those who did not have orthostatic hypotension there were 29(65.9%) male and 15(34.1%) female cases. The frequency of orthostatic hypotension was statistically same in both gender, p-value > 0.05 (Table 5). When data was stratified for duration of disease, in cases who had orthostatic hypotension there were 12(23.5%) who had disease since 5-10 years and 39(76.5%) cases had duration of disease since > 10 years while in those who did not have orthostatic hypotension there were 29(65.9%) cases who had disease since < 5 years and 15(34.1%) cases had disease since > 10 years. The frequency of orthostatic hypotension was statistically higher in higher duration of disease i.e. >10 years, p-value <0.001 (Table 6).

Table 1: Descriptive statistics of age (years)

	Age (years)
Mean	47.46
S.D	8.97
Range	35.00
Minimum	25.00
Maximum	60.00

Fig-1: Gender distribution of the cases

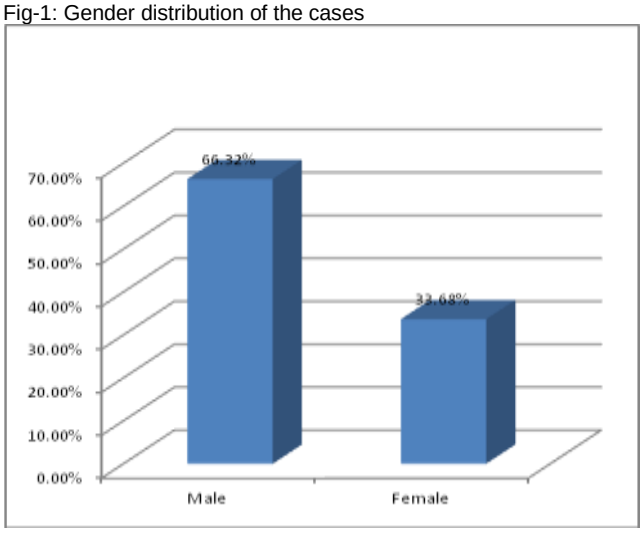

Table 2: Descriptive statistics of duration of disease (years)

	Duration of disease (years)
Mean	11.50
S.D	3.66
Range	12
Minimum	6
Maximum	18

Table -3: Descriptive statistics of systolic and diastolic blood pressure

	Systolic BP	Diastolic BP
Mean	120.60	86.20
S.D	11.80	8.68
Range	40.00	30.00

Minimum	100.00	70.00
Maximum	140.00	100.00

Fig-2: Frequency distribution of Orthostatic hypotension

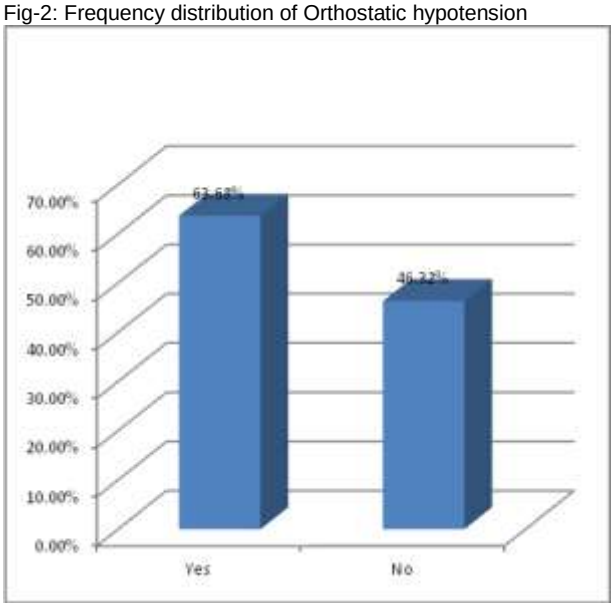

Table -4: Comparison of frequency of hypotension with respect to age groups (years)

Age groups	Orthostatic hypotension		Total
	Yes	No	
25-45 years	22(43.1%)	14(31.8%)	36(37.9%)
46-60 years	29(56.9%)	30(68.2%)	59(62.1%)
Total	51(100.0%)	44(100.0%)	95(100.0%)

Chi-square = 1.28 p-value = 0.257

Table -5: Comparison of frequency of hypotension with respect to gender

Gender	Orthostatic hypotension		Total
	Yes	No	
Male	34(66.7%)	29(65.9%)	63(66.3%)
Female	17(33.3%)	15(34.1%)	32(33.7%)
Total	51(100.0%)	44(100.0%)	95(100.0%)

Chi-square = 0.006 p-value = 0.938

Table -6: Comparison of frequency of hypotension with respect to duration of disease (years)

Duration of disease	Orthostatic hypotension		Total
	Yes	No	
5-10 years	12(23.5%)	29(65.9%)	41(43.2%)
≥10 years	39(76.5%)	15(34.1%)	54(56.8%)
Total	51(100.0%)	44(100.0%)	95(100.0%)

Chi-square = 17.29 p-value <0.001

DISCUSSION

Parkinson's disease is a neurodegenerative disorder that is complex and progressive in nature[15]. It accompanies a number of motor and non-motor symptoms that lead to functional and cognitive disabilities[16]. One of the commonest non-motor symptoms include orthostatic hypotension (OH), which goes untreated mostly and becomes a cause of functional disability and frequent falls[17]. In previous studies, OH was considered to develop in later stages of disease; however, recent studies have suggested that this can develop at prodromal stage of PD. However, the consensus about the onset of disease is lacking[18].

It is presumably caused by degenerative peripheral autonomic nervous with progression of disease[19]. Due to such abnormalities, vasoconstriction becomes defective and there is a pooling of venous blood, which causes insufficient response towards gravitational force on circulatory system[20].

Majority of the signs and symptoms of orthostatic hypotension are caused by retinal and cerebral hypoperfusion such as nervousness, dizziness, sighting black spots and even loss of consciousness [21]. Existence and extent of these symptoms are directly associated with the level of BP drop, however, auto-regulation of cerebral vasculature as well as spine blood pressure at base level may also contribute. A study reported that about 35% of PD patients with SBP dropped to 60mmHg in tilt-table testing show no symptoms at all[22].

Typically, a drop of SBP by ≥ 20 mm Hg or of ≥ 10 mm Hg for DBP within three minutes of standing actively or head-up tilt. However, in recent literature a drop of 30 mm Hg has been recommended for patients with abnormal spine BP levels[23]. A study reported significant association of orthostatic hypotension with worse clinical outcomes as well as mortality[24].

Despite of the debilitating impact of OH among PD patients, the issue has gained increased attention just in recent years. A number of studies have started studying the frequency and effects of OH in PD patients and a few comprehensive reviews have also been published focusing on diagnosis, patho-physiology, as well as treatment options of OH among patients of PD [25]. However, local literature is still very limited on the said topic and needs attention to find latest prevalence and further aspects of OH.

Despite the increasing amount of research concerning this subject, the prevalence of OH in PD stated in the literature has a wide range; i.e., 10–58% [26]. The frequency of OH was found in 51(53.7%) while other 44(46.3%) cases did not have orthostatic hypotension. Another study reported that the estimated prevalence of OH in PD was 24.1% (95%CI:16.2–34.3). [13] In current study the frequency is higher than the reported stud.[13] In another study, prevalence of OH in PD was reported also reported low as we found 45%.[14] Similarly another cross-sectional study reported the prevalence of OH as 51.6%, with almost equal distribution among symptomatic and asymptomatic cases [27]. These findings are almost similar to our statistics.

One systematic review was published by PubMed and Embase in 2011 in which only specifically defined studies uptill 2009 were selected. The pooled prevalence reported by this article was 30.1% (95%CI:22.9%-38.4%). However, they emphasized the need of further original studies and a careful interpretation of these results due to a high heterogeneity in available data[28]. In our study, OH correlated with duration of disease >10 years as well, which is confirmed in another study too, in which both disease

duration as well as doses of medicines effected OH in PD patients [11], while in another study the correlation between OH and duration of disease was insignificant r=0.182 with =0.064[12].

CONCLUSION

It is concluded that frequency of orthostatic hypotension in Parkinson's disease is considerably high i.e. 53.7%. This frequency was higher among patients with longer duration of disease. It is therefore recommended that duration of disease should be kept in mind to treat the cases in order gain optimum treatment outcome.

Author contribution: AQ: Design, Idea conception, Conceived the original data, Theoretical Formulation, Analytical Calculation, Manuscript Writing, **EH:** Data Analysis, Literature Search, Plagiarism Removal, **MSZ:** Data Analysis, Literature Search, Theoretical Formulation, **J:** Literature Search, Plagirisam Removal, Analytical Calculation, **MM:** Idea Conception, Data Analysis and Literature Search, **MA:** Theoretical formulation, Data Analysis and Final Write Up

Conflict of Interest: There is no conflict of interest

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