Original Article

Factors Influencing Development of Depressive Illness among Parkinson's Disease Patients

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Abstract

Background: Depressive illness is present among Parkinson's disease (PD) patients. **Objective:** The purpose of the present study was to see the influencing factors of development of depressive illness among Parkinson's disease patients. **Methodology:** This comparative cross-sectional study was carried out in the Department of Neurology and Department of Psychiatry at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from July 2009 to June 2011 for a period of two (2) years. Parkinson's disease patients who were attended at the movement disorder clinic and general OPD of Department of Neurology and in-patient department of Neurology at BSMMU, Dhaka were selected as study population. Patients with Parkinson's plus syndrome, with dementia or other causes of parkinsonism like vascular or drug induced parkinsonism were excluded from this study. Data were collected by filling structured clinical questionnaire, then filling up of 'structured clinical interview for DSM-IV Axis I disorders' (SCID-CV) and self-reported 'Depression scale` questionnaire. Parkinson disease was diagnosed by neurologist by the presence of two or more of the four cardinal criteria namely tremor, rigidity, bradykinesia and postural instability. Then patients were screened for depression by a psychiatrist of Department of Psychiatry at BSMMU, Dhaka. **Result:** A total of 100 Parkinson's disease patients were interviewed and 80 patients ultimately participated in the study. The mean age of total Parkinson's disease patients was 57.71±12.36 years ranging from 35 to 82 years with highest percentage (35%) had age group 65 years or above, 28.7% in 55 to 64 years, 22.5% in 45 to 54 years and lowest percentage (13.8%) in age group less than 45 years. Among 80 Parkinson's disease patients, depression was present in 34 (42%) patients and was absent in 46 (58%) patients. Diabetes mellitus (p=0.125), hypertension (p=0.097), hypothyroidism (p=1.000), other illness (p=0.595), family history of PD (p=0.758) and levodopa use (p=0.661) were not significantly associated with the development of depressive illness in Parkinson's disease. **Conclusion:** Diabetes mellitus (DM), hypertension (HTN), hypothyroidism, other illness, family history of PD and levodopa use do not significantly influence in the development of depressive illness among the Parkinson's disease. *[Journal of National Institute of Neurosciences Bangladesh, 2019;5(2):106-110]*

Keywords: Risk factors; development; depressive illness; Parkinson's Disease

Introduction

Parkinson's disease is observed in all countries and in all socio-economic classes. In Asians the incidence is one third to one-half than in whites[1]. The disease is frequent in North America, where there are approximately one million patients, constituting about 1% of the population over the age of 60 years in the USA[2]. In European countries it is more than 1.0% individual older than 55 years of age and more than 3.0% of those older than 75 years of age[3]. There is no community data in Bangladesh regarding its prevalence.

Depression is a serious medical condition that affects thoughts, feelings, and the ability to function in everyday life. The central features of depressive disorders are depressed mood, pessimistic thinking, and lack of enjoyment, reduced energy and slowness. Of these, depressed mood is usually, but not invariably the most prominent symptom[4]. Depression can occur at any age. The lifetime risk of major depressive disorder in community samples varied from 10.0% to 25.0% for women and from 5.0% to 12.0% for men[5]. In Bangladesh prevalence of major depression in general population is 4.6% cases[6].

The etiology of depression in PD is complex and may be due to a combination of endogenous (neurochemically based) and exogenous (environmental) factors. Exogenous factors are a reaction to being diagnosed with a disabling, chronic illness for which there is no known cure[7]. It may be endogenous and caused by neurological changes associated with the disease process itself. The favoured hypothesis for the etiology of depression in PD is that it occurs as a primary consequence of brain dysfunction[8]. Changes in three major neurochemical systems are involved in the etiology of PD, namely, dopamine, noradrenaline and serotonin (5HT). These neurotransmitter pathways are intimately associated. Depression has been linked in particular to serotonergic neurotransmitter pathways[9]. Degeneration of dopaminergic neurons of the mesocorticolimbic pathway may cause dysfunction of the orbitofrontal cortex, which secondarily affects serotonergic connections of the dorsal raphae nucleus. Disruption of serotonergic pathways may be an important factor in the increased prevalence of depression in PD patients[10].

Some risk factors for development of Parkinson's disease are positive family history, male gender, head injury, exposures to pesticides, consumption of well water and rural living. Factors linked to a reduced incidence of Parkinson's disease are coffee drinking, smoking, use of NSAIDs and estrogen replacement in post-menopausal women[11]. This present study was undertaken to see the influencing factors of development of depressive illness among Parkinson's disease patients.

Methodology

This was a comparative cross-sectional study. This study was carried out in the Department of Neurology and Department of Psychiatry at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from July 2009 to June 2011 for a period of two (2) years. Parkinson's disease patients who were attended at the movement disorder clinic and general OPD of Department of Neurology and in-patient department of Neurology at BSMMU, Dhaka were selected as study population. Prior to commencement of this study, this research protocol was approved by the Local Ethical Committee of BSMMU, Dhaka. Patients with Parkinson plus syndrome, with dementia or other causes of parkinsonism like vascular or drug induced parkinsonism were excluded from this study. Data were collected by face to face interview by filling structured clinical questionnaire, then filling up of 'structured clinical interview for DSM-IV Axis I disorders' (SCID-CV) and self-reported 'Depression scale` questionnaire[12]. Parkinson's disease was diagnosed by neurologist by the presence of two or more of the four cardinal criteria namely tremor, rigidity, bradykinesia and postural instability. Then patients were screened for depression by a psychiatrist of Department of Psychiatry at BSMMU, Dhaka who used SCID-CV. Patients were considered to have depression if they had 5 or more of the 9 symptoms of the major depressive episode criteria and mood disorder due to a general medical condition criteria of the DSM-IV-TR using the SCID-CV. Mini Mental State Examination (MMSE, Bangla version) was done to exclude dementia in PD patients. To exclude vascular lesions and other degenerative disorders, a good number of patients underwent radiological investigations (MRI or CT scan of brain). Thyroid function tests (Free T4 and TSH) and blood glucose were done to detect associated hypothyroidism and diabetes mellitus respectively. Patients were requested to report with the investigation reports. All data were recorded systematically in preformed data collection form. Quantitative data were expressed as mean and standard deviation and qualitative data as frequency distribution and percentage. Statistical analysis was performed by using SPSS for windows version 20.0. Association was analyzed by logistic regression analysis. 95% confidence limit was taken. 'P' value was taken as <0.05 as level of significance.

Results

A total of 100 Parkinson's disease patients were interviewed and 80 patients ultimately participated in the study. Patients were interviewed for presence of depression and divided into two groups considering presence of depression and different variables were compared between two groups.

Table 1: Age and sex distribution of the study patients (n=80)

Age Group	Male	Female	Total	P value
<45 Years	7(11.5%)	04(21.1%)	11(13.8%)	0.281*
45 to 54 Years	13(21.3%)	05(26.3%)	18(22.5%)	0.754*
55 to 64 Years	18(29.5%)	05(26.3%)	23(28.7%)	0.788*
≥65	23(37.7%)	05(26.3%)	28(35.0%)	0.363*
Total	**61(100.0%)**	**19(100.0%)**	**80(100.0%)**	
Mean ± SD	58.49±11.99	55.21±13.50	57.71±12.36	0.31**

**= p value was calculated from unpaired student's t-test; *= P value was calculated by Chi-square test corrected by Fisher's Exact test

The mean age of total Parkinson's disease patients was 57.71±12.36 years ranging from 35 to 82 years with highest percentage (35%) had age group 65 years or above, 28.7% in 55 to 64 years, 22.5% in 45 to 54 years and lowest percentage (13.8%) in age group less than 45 years. The mean age of male patients was 58.49±11.99 years and of female patients was 55.21±13.50 years. It was found that among male patients, highest percentage (37.7%) had age group 65 years or above, and lowest (11.5%) in age group less than 45 years; whereas among female patients, highest percentage (26.3%) was found in each of the three groups from 45 years and above and 21.1% in age group less than 45 years. Analysis revealed statistically non-significant age difference between male and female patients in any age group (p>0.05) (Table 1).
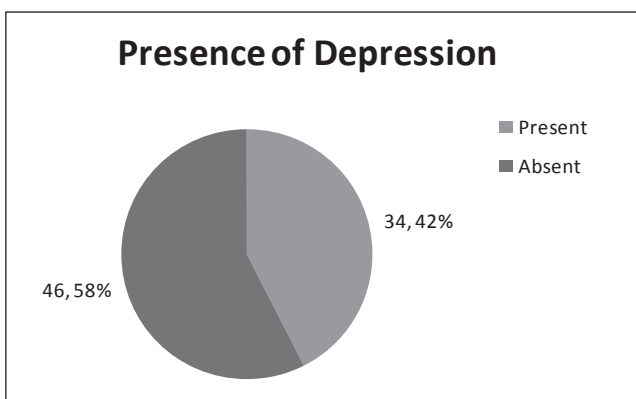

Figure I: Pie diagram showing presence of depression in Parkinson disease patients (n=80)

Among 80 Parkinson's disease patients, depression was present in 34(42%) patients and was absent in 46(58%) patients. 95% confidence interval for population range was between 31.67% to 53.33% (Figure I).

Table 2: Presence of Co-morbidities in Study Groups

Co-Morbid Illnesses	Group A	Group B	P value
Diabetes mellitus	11.8%	23.9%	
Hypertension	32.4%	21.7%	
Other illness	11.8%	15.2%	>0.05
Hypothyroidism	0.0%	2.2%	

*Group A=PD with depression; Group B=PD without depression

Considering co-morbid illnesses, family history and levodopa use it was found that among the depressed patients 11.8% also suffered from diabetes mellitus (DM), 32.4% from hypertension (HTN) and 11.8% from other illness but none from hypothyroidism. Among the non-depressed patients 23.9% suffered from diabetes mellitus (DM), 21.7% from hypertension (HTN), 15.2% from other illness and 2.2% from hypothyroidism. Family history of PD was present only in 5 (6.3%) patients. Among them 5.9% had been suffering from depression and 6.5% not. Levodopa was used by 61.3% of total PD patients and 38.7% were drug free. In the depressed group 61.8% patients used levodopa and 38.2% were drug free. Analysis revealed that there was no statistically significant difference in terms of co-morbid illnesses, family history and levodopa use between depressed and non-depressed patients (p>0.05) (Table 2).

Table 3: Factors influencing development of depression in patients of PD

Variables of Interest	Crude Odds ratio (95% CI for OR)	P value	Adjusted Odds ratio (95% CI for OR)	P value
DM	0.4(0.1-4.6)	0.169	0.3(0.8-1.3)	0.125
HTN	1.7(0.6-4.6)	0.286	2.6(0.8 - 8.2)	0.097
Hypothyroidism	0.0(0.0-5.2)	1.000	0.0(0.0-)	1.000
Other illness	0.7(0.2-2.6)	0.751	0.7(0.1 – 2.8)	0.595
Family H/O PD	0.8(0.2-4.7)	1.000	0.7(0.1-5.1)	0.758
Levodopa use	0.9(0.4-2.2)	0.853	1.2(0.5-3.2)	0.661

Binary logistic regression analysis

Model Fit: All the 6 variables observed to be associated with development of depressive illness in the patients of Parkinson disease were directly entered into the binary logistic regression model. Hosmer and Lemeshow goodness-of-fit test demonstrated that the model was a perfect fit for the data (p = 0.365). After Binary Logistic

Regression no variable was significantly associated with the development of depressive illness in Parkinson's disease (p>0.05) (Table 3).

Discussion

This cross-sectional study was carried out in the department of Neurology and department of Psychiatry, Bangabandhu Sheikh Mujib Medical University from July 2009 to June 2011 for a period of two years. A total of 100 Parkinson's disease patients were interviewed and 80 patients ultimately participated in the study. Data were collected by face to face interview by filling structured clinical questionnaire, then filling up of structured clinical interview for DSM-IV Axis I disorders (SCID-CV) and self-reported 'Depression scale' questionnaire[12]. Patients were divided into two groups considering presence of depression and different variables were compared between two groups. In this study it was found that 42% of Parkinson's disease patients suffered from depression with 95.0% confidence interval for population range between 31.67% to 53.33%. This finding is much above the general population prevalence of Bangladesh (4.6%). It was found in a WHO supported country wide survey[6]. Moreover this finding is highly similar to previous studies on depression in Parkinson's disease patients. Veiga et al[13] found 42%, Cummings[14] 40%, Aarsland et al[15] 37%, Starkstein et al[16] 41%, Anguenot et al[17] 50% and Santamaria et al[18] found 32% depression in Parkinson's disease patients. However, Tandberg et al[8] reported a rate of 7.7% of major depression based on DSM-III, revised criteria and 25.1% based on a score of 17 or higher on the BDI. Therefore, there are variations of frequency due to use of different tools and different cut off scores. Still the rate is quite high in various studies. This finding will probably attract attention of clinicians to search carefully for depression routinely in Parkinson's disease patients.

The mean age of total Parkinson's disease patients was 57.71±12.36 years with 58.49± 11.99 years for male and 55.21±13.50 years for female. Highest percentage (37.7%) had age group 65 years or above. Depression was more common in older age group. This age of study population was consistent with previous study by Salam[19] who in his study entitled 'Serum testosterone level and its relation with depression in Parkinson disease' and Saha[20] who in his study entitled 'Natural history of Parkinson disease' found that the mean age of study population was 59.09±9.45 years for cases and 58.37±10.49 years for control; and 52.6±14 years respectively.

In this study there were several chronic incurable co-morbid illnesses like hypothyroidism, DM, hypertension which also may be associated with depression. Among the depressed patients 11.8% also suffered from diabetes mellitus (DM), 32.4% from hypertension (HTN) and 11.8% from other illness but none from hypothyroidism. Gold et al[21] in a study on 250 depressed patients showed that 20 (8%) patients had some degree of hypothyroidism including subclinical hypothyroidism. Verma et al[22] in a study among five hundred and thirty-seven patients of DM found that the prevalence of depressive symptoms was 31.1%. There is also growing evidence supporting a relationship of depression to higher blood pressure (BP) levels and hypertension (HTN), which are important precursors to heart and vessel damage[23]. However in this study none of the co-morbid illnesses was significantly associated with the development of depressive illness in PD (p>0.05). So these illnesses did not influence the frequency of depression in this study.

Regarding family history of PD, 6.3% patients had family history of PD; 5.9% of patients had been suffering from depression and 6.5% had no depression. No statistically significant difference in terms of family history between depressed and non-depressed patients (p>0.05) was found. Though positive family history of PD is considered as a risk factor for depression[24] small sample size might be a factor in this study. However, Pankratz et al[25] in a study on 840 familial PD found no association of depressive symptoms with any genetic variant of PD.

Regarding use of levodopa therapy in study patients, which itself may cause depression; it was found that there was no statistically significant difference between depressed and non-depressed patients in terms of its use (P>0.05). This is consistent with Menza et al[26] who showed that depression and anxiety disorders in PD do not appear to be due to side effects of levodopa therapy. After Binary Logistic Regression none of the co-morbid illnesses, family history of PD and use of levodopa therapy was significantly associated with the development of depressive illness in Parkinson's disease (p>0.05).

Conclusion

Depression is quite common in Parkinson's disease patients. It is common in older age group. Diabetes mellitus (DM), hypertension (HTN), hypothyroidism, other illness, family history of PD and levodopa use do not significantly influence in the development of

depressive illness among the Parkinson's disease. Further large scale multi-center study should be carried out to see the real scenario regarding the development of depressive illness among the PD patients.

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