A Study on Diabetes and Parkinson's Disease in a Tertiary Care Centre at Central Tamilnadu

S. Elangovan[1], Shameer Palliyali[2], Jithin Antony Bose[3], Jayasankar VR[4]

ABSTRACT

Introduction: Parkinson's disease (PD) is one of the chronic neurodegenerative disorder and is the most common cause of parkinsonism, which is a syndrome manifested by rest tremor, rigidity, bradykinesia, and postural instability. Diabetes whether is a risk factor for developing PD is a question often raised for many years and to date there are conflicting data on association of diabetes and Parkinson's disease. Study aimed to study the effect of glycemic status on Idiopathic Parkinson's disease (PD) and to identify the modifiable and non modifiable risk factors in idiopathic Parkinson's disease (PD).

Material and methods: Consecutive patients with a diagnosis of idiopathic parkinson's disease(PD) satisfying UK Parkinson's disease society brain bank clinical diagnostic criteria attending the department of neurology during the period January 2019 to December 2019 were included in the study. Study design was a cross sectional, observational study.

Results: Total of 70 patients were enrolled in the study. Tremor was the most common motor symptom. 53.3% of subjects had one or the other non motor symptoms. Diabetes was present in 38.6% of subjects. Mean FBS among the cases was 112. 36% of the subjects had poor control of diabetes based on their HbA1C values (HbA1C >7). There was statistically significant relation between glycemic control and clinical stage of PD with a P value <0.05.

Conclusion: Prevalence of diabetes in PD is significantly higher compared to general population statistics. PD patients had favourable lipid parameters. Poor glycemic control among PD with diabetes had statistically significant relationship with clinical stage.

Keywords: Diabetes, Parkinson's Disease

INTRODUCTION

Parkinson's disease (PD) is one of the chronic neurodegenerative disorder and is considered as the most common cause of parkinsonism, which is a syndrome manifested by rest tremor, rigidity, bradykinesia, and postural instability. There are only few population based studies calculating the exact incidence and prevalence of PD in India. The prevalence of PD in industrialized countries is estimated at 0·3% of the entire population and almost 1% in people over 60 years of age.[1] In a study conducted at Bangalore district in South Karnataka the prevalence rate of Parkinson's disease was found to be 33 per 100,000 (crude prevalence) and 76 per 100,000 (age adjusted).[2] Various risk factors are being studied and postulated in PD. Gender, environmental factors such as rural living and pesticide exposure has been found as important risk factors in the previous studies. Diabetes whether is a risk factor for PD is a question often raised for many years and to date there are conflicting data on association of diabetes and Parkinson's disease. Also clinical data on the risk of developing new diabetes in relation to Parkinson's disease are limited. Chronic systemic inflammation and mitochondrial dysfunction are common to pathogenesis of both diabetes and PD and the same being postulated as one reason for substantiating diabetes as a risk factor for PD. In this study we tried to figure out any association between glycemic status and clinical stage of PD and to through light to other possible risk factors of PD and effect on anti-parkinsonism drugs on glycemic status.

MATERIAL AND METHODS

Present study was a cross sectional, observational study conducted on Consecutive patients with a diagnosis of idiopathic parkinson's disease (PD) attending the department of neurology during the period January 2019 to December 2019 was taken for the study.

Inclusion criteria

UK Parkinson's disease society brain bank clinical diagnostic criteria was applied for inclusion.

Step 1. Diagnosis of Parkinsonian Syndrome

- Bradykinesia and
- At least one of the following - Muscular rigidity, 4-6 Hz rest tremor, postural instability not caused by primary visual, vestibular, cerebellar, or proprioceptive dysfunction

Step 2. Supportive prospective positive criteria for Parkinson's disease

Three or more required for diagnosis of definite Parkinson's disease in combination with step one. Supportive criteria includes unilateral onset, rest tremor present, progressive

[1]Assistant Professor, Department of Neurology, Goverment Thanjavur Medical College, Thanjavur-613004, Tamilnadu, [2]Senior Resident, Department of Neurology, Goverment Thanjavur Medical College, Thanjavur-613004, Tamilnadu, [3]Senior Resident, Department of Neurology, Goverment Thanjavur Medical College, Thanjavur-613004, Tamilnadu, [4]Senior Resident, Department of Neurology, Goverment Thanjavur Medical College, Thanjavur-613004, Tamilnadu, India

Corresponding author: Dr. Shameer Palliyali, MD**, Senior Resident, Department of Neurology, Goverment Thanjavur Medical College, Thanjavur-613004, Tamilnadu, India

How to cite this article: S. Elangovan, Shameer Palliyali, Jithin Antony Bose, Jayasankar VR. A study on diabetes and parkinson's disease in a tertiary care centre at central Tamilnadu. International Journal of Contemporary Medical Research 2020;7(6):F1-F4.

DOI: http://dx.doi.org/10.21276/ijcmr.2020.7.6.5

BY-NC-ND

disorder, persistent asymmetry affecting side of onset most, excellent response (70-100%) to levodopa, severe levodopa-induced chorea, levodopa response for 5 years or more, clinical course of ten years or more.

Exclusion criteria

History of repeated strokes with stepwise progression of parkinsonian features, history of repeated head injury, history of definite encephalitis, oculogyric crises, neuroleptic treatment at onset of symptoms, more than one affected relative, sustained remission, strictly unilateral features after 3 years, supranuclear gaze palsy, cerebellar signs, early severe autonomic involvement, early severe dementia with disturbances of memory, language, and praxis, Babinski sign, presence of cerebral tumor or communication hydrocephalus on imaging study, negative response to large doses of levodopa in absence of malabsorption and MPTP exposure.

Patients satisfying inclusion criteria was enrolled in the study and information collected by direct interview using a questionnaire, a detailed clinical examination, relevant laboratory investigations and radiology was noted. PD onset is defined as the year in which one of the cardinal signs was first noted. Motor symptoms and signs like tremor, rigidity, bradykinesia and postural instability were documented. Non-motor symptoms like sleep disorders, depression, pain, cognitive symptoms and autonomic symptoms were assessed with due importance. For each patient sleep quality was assessed using Parkinson's disease sleep scale (PDSS). Presence of depression in the subjects was screened using Hamilton Depression (HAM-D) Rating Scale. The presence of diabetes and current medication among cases was assessed by medical history (as self-reported) and reviewing old medical records. Clinical staging for PD was done using Modified Hoehn and Yahr Scale. Unified Parkinson's Disease Rating Scale (UPDRS) III was also calculated in all subjects. Diabetes diagnosis was based on American diabetes association (ADA) criteria. In all patients FBS/PPBS, HbA1c was done. In patients with diabetes total duration of diabetes and duration of diabetes before the diagnosis of PD was noted. Cognitive assessment was done using Montreal Cognitive Assessment (MoCA). Detailed drug history regarding antipsychotics, oral hypoglycemic agents, and anti-parkinson drugs was taken.

RESULTS

Total of 70 patients were enrolled in the study. 64% of subjects were in the age group 40-60. 2% of subjects had age < 40 years. Mean age was 54.8. 70% of subjects were males and 30% females. 14 patients belonged to lower middle, 41 patients upper lower, 15 patients lower socioeconomic class as per Modified Kuppuswamy scale. Tremor was the most common motor symptom. Most common sign was bradykinesia followed by tremor. Mean duration of PD was 3.6 years. 40% of subjects had duration of PD between 2 and 5 years. Postive family history was present in 3 cases.

53.3% of subjects had one or the other non motor symptoms. Among the non motor symptoms most common was sleep disorder which was present in 35% of subjects. Of the sleep disorders 75% had difficulty in staying asleep,20% sleep initiation difficulty,5% with symptoms suggestive of day time sleepiness. Depression was present in 31.7% of the subjects of which 30% had moderate to severe depression with a score >17 as per HAM-D rating scale (Table -1).

Autonomic symptoms included constipation, urinary

Non-motor symptoms(%)	
Sleep disorder	35
Depression	31.7
Cognitive dysfunction	34
Autonomic dysfunction	26
Pain	28
Olfactory dysfunction	4.2

Table-1:

Autonomic dysfunction(%)	
Constipation	35
Urinary symptoms	15
Postural giddiness	32
Sexual dysfunction	18

Table-2:

Chronic illnesses(%)	
Diabetes	38.6
Hypertension	20
CAD	7.1
Hypothyroidism	2.8

Table-3:

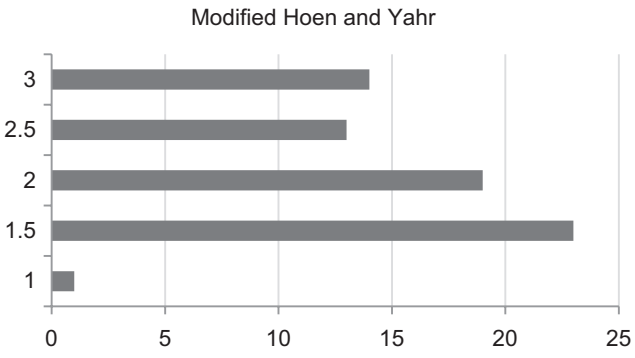

Figure-1:

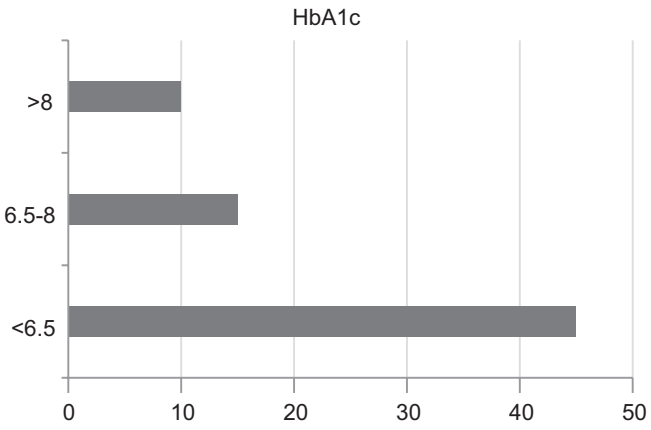

Figure-2:

symptoms, features of postural hypotention such as postural giddiness/syncope and sexual dysfunction (Table-2).

Diabetes was present in 38.6% of subjects. 18.6% of subjects had diabetes duration more than 5 years. Mean duration of diabetes before the diagnosis of PD was 1.14 years in subjects with onset of diabetes before PD diagnosis. Hypertension was present in 20% of cases (Table-3).

44% of subjects were smokers. 38% were alcoholics. 2 cases had history of intravenous drug abuse. Substance abuse was present in 7 subjects. Mean score by Modified Hoehn and Yahr Scale was 2.1 (figure 1). 26 cases had moderate or advanced PD (with a score of more than 2).

30% of subjects had a MoCA score between 18 and 26 suggestive of mild cognitive impairment. 3 patients scored between 11 and 17. Mean FBS among the cases was 112. 15 cases had HbA1c value between 6.5 and 8. 10 cases had HbA1c value >8 (figure-2).

Mean UPDRS III score was 32.Among the lipid parameters mean total cholesterol was 165mg/dL, LDL of 92mg/dl and Triglyceride of 110mg/dL.4 patients had antipsychotic medication intake during the course of illness, but none of them were before the onset of PD. Out of the patients with diabetes 19 subjects were on oral hypoglycemic agents (OHA) alone,1 case on insulin alone and 6 cases on both OHA and insulin. Analyzing the antiparkinsonism treatment among the subjects 36 were on Levodopa alone and 34 cases were taking any of the other agents including dopa agonists, amantidine, COMT inhibitors in addition to Levodopa.

DISCUSSION

Both Parkinson's disease and diabetes are chronic illnesses which needs longterm medical care and most often result in significant morbidity. Some of the past literature suggested that diabetes mellitus has been linked with PD, and they have in common similar pathogenic pathways.[3] Contact to environmental factors and genetic susceptibility play an important role in the etiology and evolution of both diabetes mellitus and PD. It is also previously documented that insulin and dopamine may exert reciprocal regulation between PD and diabetes.[4] In our study mean age was 54.8 which was lower when compared to 62.9 in a study by Ravan et al.[5] As in our study male gender was identified as a risk factor in various previous studies. In a study conducted by Behari et al the risk factors also included that of male gender with higher incidence (1:3.96).[6] Contact to environmental risk factors such as rural living, farming, and pesticide exposure have been described as possible risk factors previously.[7] 52% of the subjects were farmer by occupation and 70% from rural areas, this was in accordance with previous study. Smoking of cigarettes is one among the most studied risk factors for PD, and one of the few for which very consistent results were obtained. Tobacco smoking was found to have associated with less risk of PD in previous studies, though in our study 44% of subjects were smokers.[8] Prevalence of diabetes in general population in Tamil nadu as per a study conducted by Arun Nanditha et al revealed 21.9 in cities and 13.4 in periurban villages. Compared to which the prevalence of diabetes was very high in our study group which was 38.6%.[9] The documented prevalence of major depression in PD ranges from 4% to as high as 70%. Non-motor symptoms in PD includes affection of sleep–wake cycle regulation, cognitive function, regulation of mood, autonomic nervous system function as well as sensory function and pain perception. Sleep disorders are amongst the most common non-motor problems of PD. 35% of subjects in our study had one of the sleep disorders. Of the sleep disorder 75% had difficulty in staying asleep. Many studies have found incidences of RBD between 15% and 40%.It is also described as a preclinical marker of PD.[10] In our study 28% of patient had RBD symptoms. Painful sensations which is not explained by osteoarthritic conditions, neuropathy are observed in 40–50% of patients with PD in different series. In our study pain was observed in 28% of subjects. In a study by Shulman LM et al depression was found in 36% of patients with PD. In our study 31.7% had depression of which 30% had moderate to severe depression with a score >17 as per HAM-D rating scale. Lipid profile in our subjects showed low mean Triglyceride,LDL and total cholesterol. A study by Xiaoyan Guo et al in Chinese population found lower levels of total cholesterol, LDL-C and TG than controls, they also found high levels of total cholesterol and LDL-C may be associated with low prevalence of PD.

36% of the subjects had poor control of diabetes based on their HbA1C values (HbA1C >7). We also found statistically significant relation between glycemic control and clinical stage of PD with a P value <0.05.Those with poor glycemic control had unfavourable score with Modified Hoehn and Yahr Scale and UPDRS III score. In a meta-analysis conducted by Lin Lu et al they found that diabetic individuals may have a reduced incidence of PD despite significant heterogeneity.[11] Various case control studies had contrasting finding on association of diabetes and PD. In our study the prevalence of DM in subjects was significantly high compared to the general population statistics.

It is being suggested that some of the same environmental factors that put individuals at increased risk for PD also put them at almost same risk for diabetes. Diabetes and PD patients was found to share disruption in common mechanistic pathways. It is also postulated that PD patients have impaired insulin signaling and they are also glucose intolerant. All the patient in our study was on Levodopa and henceforth the effect of Levodopa on glycemic status couldn't be deducted. There was no statistically significant difference between patients on insulin and those on OHA alone, with respect to clinical staging of PD.

CONCLUSION

Prevalence of diabetes in PD is significantly higher compared to general population statistics. PD patients had favourable lipid parameters. Poor glycemic control among PD with diabetes had statistically significant relationship with clinical stage. In order to establish causal relationship between PD and diabetes we need further large scale case control studies in future.

REFERENCES

1. Nussbaum RL, Ellis CE. Alzheimer's disease and Parkinson's disease. N Engl J Med 2003; 348: 1356–64.
2. Gourie-Devi M, Gururaj G, Satishchandra P, Subbakrishna DK Neuroepidemiology. 2004; 23:261-8.
3. Santiago JA, Potashkin JA. Shared dysregulated pathways lead to Parkinson's disease and diabetes. Trends Mol Med 2013;19:176–186.
4. Craft S, Watson GS. Insulin and neurodegenerative disease: shared and specific mechanisms. Lancet Neurol 2004;3:169–178.
5. Ravan A, Ahmad F, Chabria S, Gadhari M, Sankhla C. Non-motor symptoms in an Indian cohort of Parkinson's disease patients and correlation of progression of non-motor symptoms with motor worsening. Neurology India. 2015;63:166–74.
6. Behari M, Srivastava AK, Das RR, Pandey RM J Neurol Sci. 2001;190:49-55.
7. Priyadarshi A, Khuder SA, Schaub EA, Priyadarshi SS Environ Res. 2001;86:122-7.
8. Seidler A, Hellenbrand W, Robra BP, Vieregge P, Nischan P, Joerg J, Oertel WH, Ulm G, Schneider E. Possible Environmental, Occupational, and Other Etiologic Factors for Parkinson's Disease: A Case-Control Study in Germany. Neurology. 1996; 46:1275-84.
9. Nanditha A., Snehalatha C., Satheesh K., Susairaj P., Simon M., Vijaya L., Raghavan A et al. Secular trends in diabetes in India (STRIDE–I): Change in prevalence in 10 years among urban and rural populations in Tamil Nadu. Diabetes Care 2019;42:476-485.
10. Comella CL, Nardine TM, Diederich NJ, Stebbins GT. Sleep-related violence, injury, and REM sleep behavior disorder in Parkinsons disease. Neurology 1998; 51: 526– 529.
11. Lu L, Fu D-l, Li H-q, Liu A-j, Li J-h, et al. Diabetes and Risk of Parkinson's Disease: An Updated Meta-Analysis of Case-Control Studies. PLoS one 2014;9: e85781.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 27-04-2020; **Accepted:** 13-05-2020; **Published:** 14-06-2020