



Original Research Article

Impulse control disorder in the patients of Parkinson's disease: various correlations

Varun Gupta¹, Anis Jukkarwala^{2,*}

¹Dept. of Psychiatry, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

²Dept. of Neurology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India



ARTICLE INFO

Article history:

Received 25-04-2020

Accepted 15-05-2020

Available online 20-07-2020

Keywords:

Impulse control disorder

Parkinson's disease

dopaminergic drugs

ABSTRACT

Background: Dopaminergic medications applied in Parkinson's disease (PD) are associated with Impulse control disorder (ICD). Risk factors of ICD in PD include younger age, male sex and personal or family history of addiction. ICDs are under-acknowledged because of shyness or ignorance. Early detection of ICDs by correlations is of vital importance.

Objectives : To estimate the point prevalence of ICD in the local cases of PD using the series of rating scales and to examine the association of various ICD manifestations in these patients.

Materials and Methods: This observational study was conducted in 54 cases (parkinsonian patients) & 53 control (non-parkinsonian), who underwent Unified Parkinson's Disease Rating Scale (UPDRS). For screening, tests like Modified Minnesota Impulsive Disorders Interview, DSM IV-RT, PDQ-39 Summary Index & various others were applied consecutively. Patients with Mini Mental state examination (MMSE) score less than 24 and those who already had mood or psychiatric disorders were excluded. A standard calculation of Levodopa equivalent daily dose (LEDD) was applied to all. SPSS 20.0 was used for various statistical tests.

Results : Overall incidence of one or more ICDs among Parkinson's disease patients was 23 out of 54 (42.59%) compared to 3 out of 53 (5.66%) in healthy control group. Hypersexuality 9(16.66%) and compulsive buying 9(16.66%) was found to be more common ICD in PD patients as compared to control. Impulse control disorders like punding, gambling, sex adventures, binge eating, impulsiveness were significantly different and worse in the Parkinson's disease.

Conclusion : PD and/or its treatment is more prognostic of ICDs than these 'so-called' harbingers like younger age, male gender or addiction.

© 2020 Published by Innovative Publication. This is an open access article under the CC BY-NC license (<https://creativecommons.org/licenses/by-nc/4.0/>)

1. Introduction

Technically impulse control disorder (ICD) implies a group of behavioural disorders manifesting as a failure to control an impulse or temptation to act irresistibly so that the outcome is harmful to self or others.¹ In the past decade, it has been established that the dopaminergic medications applied to cure the motor symptoms in Parkinson's disease (PD) are associated with an increased risk for ICDs like pathological gambling, compulsive buying, sexual behaviour, compulsive eating and behavioural problems

like punding, hobbyism, etc. Compulsive anti-parkinsonian drug use or dopamine dysregulation syndrome (DDS) is sometimes associated with the development of ICDs in PD.²

These complications affect 6-15.5% of the patients.² But the frequency of ICD in PD is highly variable (15%–40%) depending on certain features of the population³ and they often appear, or even worsen, after starting dopaminergic drugs or increasing dose. Movement disorder entails pathetic histories of family ruin, relationship problems, litigations, or even more commonly, distress and grief of patients with PD and caregivers.

Other than the high dose of dopamine agonists (DA), risk factors associated with ICD in PD include young age of

* Corresponding author.

E-mail address: anis_jw@yahoo.com (A. Jukkarwala).

onset of PD (early forties, for example), male sex, originally novelty seeking personality, previous episodes of mental lability like depression/ neurosis/ psychosis etc, personal or family history of addiction, and perhaps some genetic propensities.⁴

ICDs are under-acknowledged in clinical practice. Most patients don't open up spontaneously about ICD - either because of shyness or ignorance (that it can be related to PD and/or its treatment). Early detection of ICDs by such correlations is of vital importance and patients must be queried directly about such aberrant behaviours.⁵ That's why, in this study, we correlated the prevalence of ICD in Indian patients of PD and the possible predictive associations.

2. Materials and Methods

This was a single-centre, hospital based study using a direct, structured interview of PD patients by a team consisting of neurologist and psychiatrist. Cross-sectional collection of data through purposive non-probability sampling was planned in this observational (parkinsonian and non-parkinsonian) prevalence study. We included the patients from the hospital out-patient department (OPD) of a tertiary care teaching hospital of southern Rajasthan for six months and randomized them with symptoms of parkinsonism without differentiating them here to fore into undiagnosed, drug-naïve diagnosed or on-treatment diagnosed patients.

All subjects during the study period underwent first screening tool of Unified Parkinson's Disease Rating Scale (UPDRS) for PD⁶ and case were diagnosed on basis of United Kingdom Parkinson's Disease Society (UKPDS) Brain Bank diagnostic criteria. The modified Hoehn and Yahr (H&Y) staging was done by the neurologist in the clinic visit. Mini Mental State Exam (MMSE)⁷ was applied and both cases and controls who scored less than 24 in MMSE in the clinic screening visit were excluded out to remove the confounding factor and association between cognitive impairment and ICD. All patients were informed about the aim of the study and all patients provided written informed consent as per WHO guidelines. This study was conducted after taking the approval from institutional ethics committee.

All patients were interviewed by psychiatrist by direct interview and diagnosis of ICD (current or premorbid) and other behavioural disorders were made. The psychiatrist was blinded to the drugs prescribed to the patients. Each patient underwent a psychiatry interview first alone and then with reliable adult bystander. The nature of tools and the objective were explained to the patient and family. After the screening tools Jay Modified Minnesota Impulsive Disorders Interview (JM-MIDI)⁸ if there was a positive response to the gateway question (≥ 1) for the five ICRB modules (compulsive buying, compulsive gambling, compulsive sexual behaviour, compulsive eating

and punding behaviour) then, the remaining questions were applied. The Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition, Text Revision, DSM IV-RT) was used for the diagnosis of pathological gambling (≥ 5 out of maximum 10 scores) and compulsive eating and punding. Hypersexuality was diagnosed using operational diagnostic criteria of hypersexuality.⁹ McElroy's criteria (A+B+C) was used for compulsive shopping (McElroy's), provisional criteria was used for diagnosing dopamine dysregulation syndrome (Giovanni). Impulsivity was diagnosed using Barratt impulsivity scale (BIS-II).¹⁰ The total impulsiveness score was calculated as the sum of attentional impulsiveness, motor impulsiveness, non-planning impulsiveness. The Eysenck personality inventory¹¹ comprising of 56 questions was used to assess extroversion (score >13) and neuroticism (score >9). Depression, Anxiety & Stress (DASS)¹² scale used to evaluate depressive anxiety and stress.

PDQ-39 summary index¹³ was used to assess the quality of life (QoL) in patients with PD. Levodopa equivalent daily dosages were calculated using the formula: 100 mg of regular levodopa = 133 mg of controlled release levodopa = 1mg of pramipexole = 5mg of ropinirole = 1mg of rasagiline = 100mg of amantadine = 0.33 x L DOPA dose of entacapone.¹⁴

For comparison and calculation of statistical relevance, SPSS 20.0 was used. We used Pearson's Chi-Square test for inequality of variance of categorical variables (as in our case of binary outcome like addicted/ not addicted). The sample's variance can be compared to that of the population by χ^2 test when population variance is unknown. As χ^2 test is asymptotic test and it gives only approximate value of p, Yate's correction was applied.¹⁵

The Mann-Whitney test can deal in unequal size samples (as in our case) was used as non-parametric test for independent samples (our case and control group was different). The program processed it synonymous to Wilcoxon Rank Sum test – as MWW test. Ordinal to dichotomous comparisons (like socioeconomic status versus binary outcome of behavioural deviances like addiction/ gambling etc. assessed only as present/ absent) are best done by this method.¹⁵ Instead, a binary logistic regression model (prescribed for categorical variables) was performed to correlate factors that could independently associate with ICDs. Level of significance was set at $p < 0.05$ and various statistical parameters were presented with their 95% confidence intervals.¹⁵

3. Results

Total 54 PD patients and 53 controls were compared after fulfilling inclusion and exclusion criteria. Overall incidence of one or more ICDs among PD patients was 23 (42.59%) compared to 3 (5.66%) in healthy control group. The control group incidentally had insignificant

difference in socioeconomic status but otherwise, it was involving many significant differences like lower age and less female patient. The elderly and male dominated population in case group was suffering more on the count of depression, anxiety and stress. Hypersexuality 9(16.66%) and compulsive buying 9(16.66%) was found to be more common ICD in PD patients as compared to control. Other aberrant behaviours like punding 7(12.96%), dopa dysregulation 7(12.96%), compulsive eating 5(9.26%) and gambling 1(1.85%) were also more prevalent and significant in patients with PD as compared to control and worse in the case group. (Table 1)

4. Discussion

ICDs are common in PD patients and it is even more in patients who are on dopamine agonist therapy. So it will be good to identify ICDs in patients of Parkinson disease to make therapeutic decisions and avoiding important social, economic and legal problems for patients.^{16,17}

Younger and masculine preponderance in control group might be the reason behind more addiction pattern– with time and age, these issues are usually resolved or at least minimised. Zhang et al study compared two groups of PD instead – one with manifest ICD and other without in which earlier onset of the disease, higher dose of dopamine agonist, severe cognitive impairment and dyskinesia were independent risk factors associated with impulse control related disorders (ICRDs).¹⁷ This finding is consistent with the current study findings that use of dopamine agonist is more associated with ICD as seen in cases compared to control. Decline in cognition in case group might be due to PD or psychiatric co morbidities like depression/stress which would lead to decline in MMSE score and may potentiate impulsive behaviours.

In our case group, commonest ICD was hypersexuality (16.66%) and compulsive buying (16.66%) – may be because these behaviours are least obstructed by others. Hypersexuality was shown as a dominant ICD in other studies^{18–20} too but in our study it's even more relevant because healthy control group being male dominated and less aged was otherwise expected to be sexually more indulgent.

But as we enucleate, we see less marital disturbances in the case group – added to sympathy for suffering, it is conducive to higher familial support for otherwise harmless hypersexuality or compulsive buying. Moreover, there is an age-old implication^{21,22} as well as recent reaffirmation of antiparkinsonian drugs (which healthy subjects of the control group miss) in hypersexuality.^{23,24}

Recent studies^{23–25} implicate antiparkinsonian drugs (especially those which target D₃ receptors, though MAO-B inhibitors have also been implicated²⁶) in compulsive gambling/shopping and binge eating too. As most PD patients are on antiparkinsonian drugs, the outcome was

expected.

Like our study, Chazeron et al¹⁹ compared healthy general population against PD patients and found no association of alcohol/ tobacco addiction to PD. Expectedly, abstinence was higher in PD group while harmful consumption was more in healthy controls (like in our study, the control group had higher addiction average) and sexual addiction incidence was only found in PD patients in that study; just like present study in which it was found significantly more in PD group as compared to control.

Like our study, Fan et al²⁰ too found hypersexuality as the most common ICDs. In the study by Solla et al,²⁷ ICD was significantly associated with motor complications, with all ICDs associated with longer disease duration and higher L-dopa equivalent daily dose. After treating hypersexuality of 6 PD patients by withdrawal or decrease of the therapeutic doses, Mamikonyan et al²⁸ categorically declared that dopaminergic agonist is implicated in the genesis and continuation of hypersexuality symptoms as well as those of other ICD. Theoretically, this hypersexuality of PD has been differentiated from that of dementia. Hypersexuality in Parkinson's disease was characterized by sexual compulsivity while hypersexuality in dementia was characterized by sexual disinhibition, although there was an overlap in some characteristics.²⁹

Dopaminergic drugs applied to manage PD are producing “reward-seeking” behaviours, called ICDs, which include the hypersexuality as well as pathological gambling, compulsive shopping, binge eating, dopamine dysregulation syndrome, hobbyism, and punding. Such behavioural changes in PD patients may result from abnormal dopaminergic stimulation caused by a “combination of disease progression, dopaminergic medication, and environmental and genetic factors”.³⁰

Gender is also a risk factor as males are more likely to develop hypersexuality and gambling, while it seems to be equally divided between males and females regarding binge eating and compulsive shopping.²⁹ Here too, epidemiology differs as some studies¹⁷ report that binge eating, pathological gambling and compulsive buying is more frequent in female.

Yet another study (a meta-analysis) found that hypersexuality and gambling seem to be more prevalent among males, while a female preponderance has been shown for compulsive shopping and binge eating.³¹ Similar results of male preponderance to gambling and hypersexuality were also found in our study and supporting the Molde et al meta-analysis.³¹ To complicate even more, a review³² gives different incidences of different ICDs in a tabulated form by various authors worldwide.

5. Limitations

The study involved healthy people in control group – hence, internal comparison of graded responses in PD with and

Table 1: Characteristics of various parameters in case versus control group

	Mean (case) N=54	Mean (Control) N= 53	P-value
Age (years)	63.43 ± 9.60	47.02 ± 15.99	0.0122*
Sex	F 20 (37%) M 34 (63%)	F 13 (24.53%) M 40 (75.47%)	0.0231*
Socioeconomic status			
L=lower	L 20 (37%)	L 22(41.51%)	
M = middle	M 31 (59%)	M 28 (52.83%)	0.1137
U = upper	U3(5.55%)	U3 (5.66%)	
Marital status			
(D= divorcee)	D 1(1.85%)	D1(1.88%)	
(M= married)	M51 (94.44%)	M44(83.02%)	0.0466*
(U= unmarried)	U0 (0%)	U7 (13.21%)	
(W= widow)	W2 (3.7%)	W1(1.88%)	
Smoking and alcohol	3(5.55%)	8 (15.09%)	0.0116*
MMSE	26.22 ± 1.78	29.21 ± 1.78	0.0396*
Total ICDs	23 (42.59%)	3 (5.66%)	
Compulsive buying	9 (16.66%)	1(1.88%)	0.0122*
Gambling	1 (1.85%)	0(0%)	0.0439*
Hypersexuality	9 (16.66%)	1(1.88%)	0.0126*
Eating	5(9.26%)	0 (0%)	0.0129*
Punding behaviour	7(12.96%)	1(1.88%)	0.0126*
Dopa dysregulation	7(12.96%)	0 (0%)	0.0112*
Total impulsiveness	59.61 ± 6.59	55.49 ± 8.69	0.1676
Attentional	14.63± 2.44	14.47 ± 3.35	0.1996
Motor	18.74 ± 3.71	16.87 ± 4.39	0.2324
Nonplanning	26.39 ± 3.71	24.34 ± 4.82	0.1621
Personality dimension			
Extrovert	6.13 ± 2.27	6.13 ± 2.47	0.1937
Neuroticism	3.98 ± 2.50	2.58 ± 1.84	0.2021
Psychotism	6.11 ± 1.92	5.40 ± 1.79	0.2312
Lie	3.52 ± 1.24	3.91 ± 1.99	0.2634
Depression	10.5± 7.04	2.87 ± 4.24	0.0233*
Anxiety	7.94 ± 6.08	2.30± 3.10	0.0245*
Stress	9.22 ± 7.24	3.34 ± 3.73	0.0356*
PDQ -39 score	28.45±17.99	-	

*p value significant

without ICDs was not possible. Secondly, study sample was small enough to elicit zero occurrences on many counts in control group – which could not be fairly compared against case group by simple χ^2 test. Some of the subjects in the control group were relatives of the patients, and ‘genetic-cultural associations among subjects of the case and control groups’ was not fully ruled out.

6. Conclusion

This study concludes that male dominated elderly PD patients had less incidences of addiction, but still compared to healthy controls, had more incidences of ICDs. It clarifies that PD and/or its treatment is more prognostic of ICDs than these ‘so-called’ precipitating factors.

7. Source of Funding

None.

8. Conflict of Interest

None.

References

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5[®]). American Psychiatric Pub; 2013.
2. Sharma A, Goyal V, Behari M, Srivastva A, Shukla G, Vibha D, et al. Impulse control disorders and related behaviours (ICD-RBs) in Parkinson's disease patients: Assessment using "Questionnaire for impulsive-compulsive disorders in Parkinson's disease" (QUIP). *Ann Indian Acad Neurol*. 2015;18(1):49.
3. Martinez-Castrillo JC. Impulse control disorders in Parkinson's disease: a hard-turning point. *J Neurol, Neurosurg Psychiatry*. 2019;90(1):2.
4. Callesen MB, Scheel-Krüger J, Kringelbach ML, Möller A. A Systematic Review of Impulse Control Disorders in Parkinson's Disease. *J Parkinsons Dis*. 2013;3(2):105–38.
5. Weintraub D, Hoops S, Shea JA, Lyons KE, Pahwa R, Driverdunkley ED. Validation of the questionnaire for impulsivecompulsive disorders

- in Parkinson's disease. *Mov Disord.* 2009;24:1461–7.
6. Kupryjanow A, Kunka B, Kostek B. UPDRS tests for diagnosis of parkinson's disease employing virtual-touchpad. In 2010 Workshops on Database and Expert Systems Applications. IEEE; 2010.
 7. Folstein MF, Folstein SE, Mchugh PR. Mini-mental state examination: MMSE-2. Psychological Assessment Resources; 2010.
 8. Sarathchandran P. Impulse control disorders in parkinsons disease in South Indian cohort. PhD diss., SCTIMST; 2012.
 9. Voon V, Hassan K, Zurowski M, de Souza M, Thomsen T, Fox S, et al. Prevalence of repetitive and reward-seeking behaviors in Parkinson disease. *Neurol.* 2006;67(7):1254–7.
 10. Reise SP, Moore TM, Sabb FW, Brown AK, London ED. The Barratt Impulsiveness Scale–11: Reassessment of its structure in a community sample. *Psychol Assess.* 2013;25(2):631–42.
 11. Bodling AM, Martin T. Eysenck Personality Inventory. . *Encyclopedia Clin Neuropsychol.* 2011;p. 1007–8.
 12. Parkitny L, McAuley J. The Depression Anxiety Stress Scale (DASS). *J Physiother.* 2010;56(3):204.
 13. Neff C, Wang MC, Martel H. Using the PDQ-39 in routine care for Parkinson's disease. *Parkinsonism Relat Disord.* 2018;53:105–7.
 14. Tomlinson CL, Stowe R, Patel S, Rick C, Gray R, Clarke CE, et al. Systematic review of levodopa dose equivalency reporting in Parkinson's disease. *Mov Dis.* 2010;25:2649–53.
 15. Armitage P, Berry G, Matthews JNS. *Statistical Methods in Medical Research.* Blackwell Science, Oxford; 2001.
 16. Izzo VA, Donati MA, Ramat S, Primi C. Impulse control disorders in Parkinson's disease: A systematic review on the psychometric properties of the existing measures. *PLOS ONE.* 2019;14(6):e0217700.
 17. Zhang Y, He AQ, Li L, Chen W, Liu ZG. Clinical characteristics of impulse control and related disorders in Chinese Parkinson's disease patients. *BMC Neurol.* 2017;17(1):98.
 18. Joutsa J, Martikainen K, Vahlberg T, Voon V, Kaasinen V. Impulse control disorders and depression in Finnish patients with Parkinson's disease. *Parkinsonism Relat Disord.* 2012;18(2):155–60.
 19. de Chazeron I, Llorca PM, Chéreau-Boudet I, Blanc O, Perriot J, Ouchchane L, et al. Hypersexuality and pathological gambling in Parkinson's disease: A cross-sectional case-control study. *Mov Dis.* 2011;26(11):2127–30.
 20. Fan W, Ding H, Ma J, Chan P. Impulse control disorders in Parkinson's disease in a Chinese population. *Neurosci Letters.* 2009;465(1):6–9.
 21. Uitti RJ, Tanner CM, Rajput AH, Goetz CG, Klawans HL, Thiessen B, et al. Hypersexuality with Antiparkinsonian Therapy. *Clin Neuropharmacol.* 1989;12(5):375–83.
 22. Vogel H, Schiffter R. Hypersexuality - a Complication of Dopaminergic Therapy in Parkinson's Disease. *Pharmacopsychiatry.* 1983;16(04):107–10.
 23. Moore TJ, Glenmullen J, Mattison DR. Reports of Pathological Gambling, Hypersexuality, and Compulsive Shopping Associated With Dopamine Receptor Agonist Drugs. *JAMA Intern Med.* 2014;174(12):1930–3.
 24. Vitale C, Santangelo G, Trojano L, Verde F, Rocco M, Grossi D, et al. Comparative neuropsychological profile of pathological gambling, hypersexuality, and compulsive eating in Parkinson's disease. *Mov Dis.* 2011;26(5):830–6.
 25. Bostwick JM, Hecksel KA, Stevens SR, Bower JH, Ahlskog JE. Frequency of new-onset pathologic compulsive gambling or hypersexuality after drug treatment of idiopathic Parkinson disease. *Mayo Clin Proc.* 2009;84:310–6.
 26. Simonet C, Fernández B, Cerdán DM, Duarte J. Hypersexuality induced by rasagiline in monotherapy in Parkinson's disease. *Neurol Sci.* 2016;37:1889–90.
 27. Solla P, Cannas A, Floris GL, Orfino G, Costantino E, Boi A, et al. Behavioral, neuropsychiatric and cognitive disorders in Parkinson's disease patients with and without motor complications. *Prog Neuropsychopharmacol Biol Psychiatry.* 2011;35(4):1009–13.
 28. Mamikonyan E, Siderowf AD, Duda JE, Potenza MN, Horn S, Stern MB, et al. Long-term follow-up of impulse control disorders in Parkinson's disease. *Mov Dis.* 2008;23(1):75–80.
 29. Tayim NA. Hypersexuality in Neurological Disorders (Doctoral dissertation, UCL (University College London)).
 30. Nakum S, Cavanna AE. The prevalence and clinical characteristics of hypersexuality in patients with Parkinson's disease following dopaminergic therapy: A systematic literature review. *Parkinsonism Relat Disord.* 2016;25:10–6.
 31. Molde H, Moussavi Y, Kopperud ST, Erga AH, Hansen AL, Pallesen S, et al. Impulse-Control Disorders in Parkinson's Disease: A Meta-Analysis and Review of Case-Control Studies. *Front Neurol.* 2018;9:330.
 32. Bhattacharjee S. Impulse control disorders in Parkinson's disease: Review of pathophysiology, epidemiology, clinical features, management, and future challenges. *Neurol India.* 2018;66(4):967.

Author biography

Varun Gupta Resident

Anis Jukkarwala Associate Professor

Cite this article: Gupta V, Jukkarwala A. **Impulse control disorder in the patients of Parkinson's disease: various correlations.** *IP Indian J Neurosci* 2020;6(2):87-91.