

Original Research Reports

Impulsive Behavior and Associated Clinical Variables in Parkinson's Disease

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Background: Parkinson's disease (PD) is a degenerative brain disorder accompanied by the loss of dopaminergic neurons and the presence of motor and non-motor symptoms. **Objective:** We performed a cross-sectional, questionnaire-based analysis of impulsive behavior in our PD clinic population to assess prevalence and associated characteristics. **Results:** We found a higher prevalence of impulsive behavior

(29.7%) than previously reported, and found multiple, concurrent impulsive behaviors in 26% of subjects reporting impulsive behavior. **Conclusions:** Our findings contribute to the growing awareness of impulsive behavior in PD, and support the need for longitudinal studies to assess changes in impulsive behaviors in Parkinson's patients.

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Impulse control disorders are a group of disorders, including pathological gambling, hypersexuality, and compulsive shopping, which are characterized by compulsive engagement in a behavior despite adverse consequences, diminished control over the problematic behavior, and an urge prior to, and a hedonic sense during, performance of the behavior.¹ Impulse control disorders have been recently described in patients with Parkinson's disease (PD).^{2–4} It remains unclear, however, whether these impulse control disorders or impulsive behaviors are a consequence of the disease itself, due to underlying personality traits,⁵ are secondary to the pharmacological management of the disease,³ or a complex interplay of all these factors.^{2,6}

Impulsive behaviors appear to be related in PD to the phenomenon of dopamine dysregulation syndrome (DDS).² DDS refers to the behavioral syndrome in PD characterized by dopamine medication abuse, which can be accompanied by a mood disorder and/or impulsive behavior.⁷ The reported prevalence of impulsive behaviors varies widely, with the variation attributed to particulars of the screening methods and definitions of the abnormal behavior.² The prevalence of pathological gambling in PD

patients, for instance, has been reported variously at 0.05%–7%.^{3,8} Most studies of PD have focused only on the more common impulse control disorders, such as pathological gambling and compulsive sexual behavior, but have not performed comprehensive analyses of all such disorders.

Other investigators have suggested that the use of dopamine replacement therapies, in particular dopamine agonists, is a risk factor for the development of impulsive behaviors.^{3,4,9} Other potential risk factors that have been

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cited include male gender,⁹ younger age of PD onset,^{9,10} pre-existing impulse control or substance abuse disorders, depression, impulsivity,^{9,11} and novelty-seeking personality trait.^{4,12}

Anecdotal evidence in our PD clinic population suggested a higher prevalence of impulsive behaviors than previously reported, with some of the observed behaviors meeting criteria for impulse control disorders. We defined impulsive behavior (IB) as the presence of pathological gambling, trichotillomania, kleptomania, pyromania, compulsive exercise, compulsive buying, compulsive sexual behavior, or intermittent explosive disorder. These disorders were all included as there has been speculation that all may be behavioral manifestations of the same underlying pathophysiology of reward dysregulation.¹³ Information on binge eating was not collected in our survey. Dopamine abuse and punding, defined as repetitive, pointless behaviors, which have been associated with DDS,¹⁴ were grouped together as DDS.

The aim of this work, therefore, was (1) to determine the prevalence of impulsive behaviors in our PD clinic population assessing for a wider range of impulse control disorders than previously examined, and (2) to identify clinical variables associated with these behaviors. We hypothesized, first, that when behavior is viewed categorically, we would see a higher prevalence of impulsive behavior in our PD population than previously reported, and second, that the presence of impulsive behavior would be associated with male gender, younger age of PD onset, and higher daily dose of dopamine replacement therapy.

METHOD

Subjects

We performed a cross-sectional study to determine the prevalence of impulsive behaviors in our PD clinic population. Participants included 128 adults aged ≥ 18 years meeting criteria for PD, were recruited through the University of Minnesota PD database, and were screened for study inclusion and exclusion criteria (see below) based on medical records. Potential subjects were notified by mail of the study and its aims, and then contacted by telephone to determine their willingness to participate. The study was approved by the University of Minnesota Institutional Review Board. Participants provided voluntary, written informed consent, and were recruited over a 2-year period (2007–2009).

Study Inclusion Criteria

Inclusion criteria included a diagnosis of idiopathic PD (U.K. Brain Bank Criteria) and ability to provide informed consent. Subjects included those newly diagnosed, on anti-Parkinson's medications, and those who had undergone deep brain stimulation surgery for PD.

Study Exclusion Criteria

Exclusion criteria included: (1) atypical Parkinsonism, defined as a poor and less-sustained response to traditional anti-Parkinson medications (e.g., L-dopa and the dopamine agonists), more rapid disease progression, and generally a poorer prognosis; (2) abnormal screening brain MRI at 3.0Tesla (performed for routine clinical evaluation of PD); (3) presence of dementia (Mini Mental Status Exam score < 23), or neurological disease other than PD; and (4) inability to understand or complete the surveys.

Assessments

After informed consent, relevant clinical data were collected from medical records. Additionally, participants were mailed (or given during a routine clinic visit) a self-report questionnaire described below. Questionnaire compliance was sought by telephone calls to those subjects who had not returned completed forms within 2 weeks.

Clinical Characteristics

Data regarding demographics, medical history, medication type and dosage, and history of impulsive behaviors were collected using the self-report questionnaire.

Levodopa-equivalent daily dose (LEDD) in milligrams (mg), including the dopamine agonists, was calculated using the formula $[\text{Levodopa/Carbidopa}] + [\text{Levodopa/Carbidopa-CR}] \times 0.75 + [\text{Levodopa/Carbidopa} + (\text{Levodopa/Carbidopa-CR} \times 0.75)] \times 0.25$ if on Tolcapone + $(\text{Pramipexole} \times 67.75) + (\text{Pergolide} \times 100) + (\text{Ropinirole} \times 16.67) + (\text{Bromocriptine} \times 10)$.¹⁵

Disease State Characterization

PD disease severity assessments using the Unified Parkinson's Disease Rating Scale (UPDRS) were obtained from medical records, and had been performed within 48 months of survey completion.

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