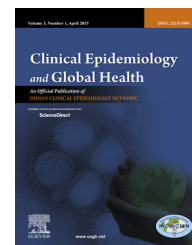


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## Original Article

# Epidemiology and associated risk factors of Parkinson's disease among the north Indian population



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## ABSTRACT

**Background:** Parkinson's disease (PD) is complicated with several cardiovascular risk factors such as diabetes, obesity and hypertension. The epidemiological exploration of PD patients in regard to north Indian population is limited in literature. Thus, present study aimed with an epidemiological study of PD and its associated risk factors among the north Indian population. **Methods:** We examined total 384,000 individuals, out of which 260 patients with PD were diagnosed and identified during the period of September-2011 to August-2015. Sociodemographic and clinical status of patients was recorded. Blood pressure and depressive status were measured by expert clinicians as per standard protocol.

**Results:** In present explorative study the prevalence of PD, 67.71 per 100,000 individuals has been observed. The observed male/female ratio was 2.66. On Beck Depression Inventory scale for the measurement of depression, 55% depressive PD patients have been observed which included 40% and 15% PD patients with minor and major depression, respectively. Arterial systolic/diastolic blood pressure <130/80, 130/80 to 139/89 and ≥140/90 mmHg have been observed in 23.85%, 35.77% and 40.38% of patients with PD, respectively. Genetic history, head injury/trauma, type-2 diabetes and association of Alzheimer's disease were 5.40%, 7.31%, 6.54% and 3.46% observed among the patients with PD, respectively.

**Conclusions:** The study concluded that PD with 67.71 (per 100,000) of prevalence rate can be associated with several risk factors such as male gender, genetic history, head injury/trauma, type-2 diabetes, Alzheimer's disease, depression and blood pressure among the populations of North India.

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## 1. Introduction

The shaking palsy is a first research paper published by James Parkinson in 1817, which described the Parkinson's disease (PD) as a neurodegenerative disorder of the central nervous system.<sup>1</sup> PD is the second most common neurodegenerative disorder and is categorized in a group of movement disorders.<sup>2</sup> Loss of dopamine and its related neurotransmitter, norepinephrine, leads to the development of different sign and symptoms of PD, such as tremor (trembling in head, hands, legs, arms and jaw), rigidity (stiffness of the trunk and limbs), bradykinesia (slowness of movement) and postural instability (impaired balance). These symptoms are observed after loss in 60–80% or more of the dopamine producing cells in the brain of substantia nigra.<sup>1,2</sup>

Increased oxidative stress is a contributing factor of PD and major depression, which may be responsible for the pathogenesis of the disease.<sup>3,4</sup> Acute stress leads to increase in dopamine release while chronic stress leads to decrease in dopamine content.<sup>5</sup> Thus, chronic stress may be responsible for the loss of dopamine and development of PD. Stressful life of individuals, such as emotional stress, can be responsible for the development of PD. Depression is a factor which is present in all stages of patients with PD.<sup>5</sup> Depression exerts adverse effects on the quality of life. It is also associated with decline in motor function and increased PD severity.<sup>5</sup>

The epidemiological exploration of PD has been performed throughout the world by numbers of observers. Among them many population based studies suggest that PD associated with number of diseases, such as diabetes mellitus, central obesity, hypertension, depression and so forth.<sup>5–8</sup> Hu et al. reported that type-2 diabetes has been associated with PD.<sup>9</sup> Another study has been demonstrated that diabetes was associated with deteriorated rigidity and gait; and not associated with bradykinesia or tremor.<sup>10</sup>

The prevalence of PD differs from country to country. The prevalence of PD is more for Europe and North America than in West Africa and Asia. Its prevalence also varies within the countries.<sup>11</sup> The generalized incidence of PD for India is lowest from all over the world (70 per 100,000 normal populations). However, the Parsi community in Mumbai (a district of India) representing world's highest incidence of PD (328 per 100,000 population).<sup>11</sup> Due to such epidemiological variation as well as lack of literature regarding the epidemiological study of PD and its associated risk factor among north Indian population, the present study aimed to observe epidemiological and associated risk factor of PD among the north Indian population. The studied associated risk factors also include observations of arterial blood pressure (ABP) and depressive status of the patients with PD.

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## 2. Materials and methods

The study was conducted in the Department of Biochemistry and association with Department of Neurosurgery, Institute of Medical Sciences (IMS), Banaras Hindu University (BHU), Varanasi, Uttar Pradesh, India from September-2011 to August-2015. All the study subjects were selected and

collected the data from the neurosurgery out patient department (OPD) of Sir Sunder Lal Hospital (a tertiary health care center), IMS, BHU. Most of the patients who came to OPD of Sir Sunder Lal Hospital are belonging to the population of Uttar Pradesh, Bihar, Jharkhand and Madhya Pradesh of North India. The study was approved by our institutional ethical committee and all works were done under the guidelines of ethical regulation.

A total 384,000 individual screened at Neurosurgery OPD of Sir Sunder Lal Hospital, IMS, BHU, from September-2011 to August-2015. Out of these, 260 patients with PD were identified and included in the study as cases. Predefine clinical details such as age, gender; duration of disease, nature of residence, marital status; education and occupation of the patients with PD were recorded. Along with this, history of head injury/trauma, ABP and depressive status were also recorded.

ABP was measured with mercury sphygmomanometer from the right arm of the patients after at least 10 min of seating. ABP was taken three times in every individual after 10 min of interval and its mean was considered.<sup>12</sup> Depressive symptoms of patients with PD were measured with the Beck Depression Inventory (BDI) method, which is based on 21 self questionnaires. Each questionnaire scored as 0, 1, 2 and 3. A total score below 17, 17–30 and above 30 were considered as no depression, minor (mild) depression and major depression (severe depression) respectively.<sup>13,14</sup> These are slightly modified values of BDI method for staging of depression, because of PD patients complicated with different behavioral lifestyle and motor dysfunction. All these things were done by expert neurosurgeons.

### 2.1. Inclusion and exclusion criteria

All the patients who had visible signs and symptoms of PD (tremor, rigidity, bradykinesia and postural instability) with positive CT scan report were included in the study as cases. The subjects who enrolled in neurosurgery OPD and agreed to sign informed consent form were included in the study. No use of hypotensive/hypertensive drugs prior to 3 months for ABP measurement was recommended for cases. In the way of selection of cases; some genetic disorders that mimicking the PD like symptoms such as miscoding encephalitis, Wilson's disease and so forth were excluded from the cases. The patients who receipt any neuroleptic medication within 180 days prior to the index date were also excluded from the cases. Any subjects who did not agree to sign informed consent form were also excluded from the study.

### 2.2. Statistical analysis

Standard non-parametric, Chi-square ( $\chi^2$ ) test, was used for the evaluation of significance value. Microsoft-Excel and M-STAT software were used for calculation. P value less than 0.05 was considered as significant.

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## 3. Results

The calculated prevalence of PD in our study was 67.71 per 100,000 individuals. Out of total 260 cases of PD, 76.69% of male

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