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Epidemiological Study of Parkinson's disease in the Population of Khyber Pakhtunkhwa-Pakistan

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Abstract: Parkinson's disease (PD) is a neurological disorder characterized by motor impairment affecting millions of people globally. Significantly, in Pakistan, approximately 450,000 PD cases have been reported previously. This study aims to ascertain the prevalence of PD in Khyber Pakhtunkhwa, a province of Pakistan. Interviews were conducted with PD patients, admitted to the Department of Neurology, Lady Reading Hospital, Peshawar. Already prepared questionnaires were used to record clinical and demographic data based on age, gender, comorbidities, and family history. Clinically, it was identified that Parkinson's patients showed different features such as tremors, muscle rigidity, bradykinesia, difficulty walking, dementia, frequent falls, weakness, difficulty speaking, sleeplessness, apathy, and dyskinesia. According to the statistical analysis, PD primarily affected those between the ages of 55 and 64, and it was more common in men than women. The significance of this study was to explain the epidemiological and clinical features of PD in the KP province of Pakistan. The current study will support accurate diagnosis and treatment as well as disease management.

Keywords: Parkinson's disease, Gender, Age groups, Prevalence.

1. Introduction

Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by motor and non-motor symptoms having a significant effect The loss of dopaminergic neurons is the primary cause of the disease, along with genetics and environmental factors.11 17 Approximately 10 million people in the world are affected by PD.8 The prevalence and incidence of the disease have increased during the last 20 years.4 About one million PD patients are reported in North America, 13 individuals per 100,000 people are affected in the US, and 60,000 new cases of PD are reported each year.4 PD affects about 18 people in every 100,000 people in China and 65-125 in every 100,000 people in Europe.2 In Pakistan, approximately 450,000 PD patients are reported, with a rate of about 219 cases for every 100,000 individuals.8 Parkinson's disease is the second most prevalent neurological disorder after Alzheimer's disease. PD is concerned with symptoms of motor dysfunction and tremors like bradykinesia, stiffness, and postural reflex impairments, where bradykinesia is the key characteristic related to the degree of dopamine deprivation.5 Other symptoms like worries, depression, sadness, low blood pressure, abnormal sensations, constipation, and muscle spasms may also be seen.16 The etiology of PD in most of the patients remains unclear; however, in 5%–10% of cases, some genetic factors have been studied to be responsible for the disease.16 The remaining 90% of PD cases are categorized as sporadic. 3 16 The majority of people were affected in old age, ranging from 50-60 years 12 13. The diagnosis of PD is based on clinical symptoms, family his-

tory, and physical examination. The diagnosis is also dependent on the development of motor fluctuations and the patient's reaction to dopamine drugs.15 The disorder's motor symptoms are the diagnostic features which often start asymmetrically and include a soft voice (hypophonia), a masked face (which first appears as a decreased blink rate), small handwriting (micrographia), stiffness (rigidity), slowness of movement (bradykinesia), stumbling steps, and balance issues. About 30% of patients first show a lower extremity tremor, along with lip, jaw, or even tongue tremors at rest. Since head and vocal tremors are unusual, essential tremors should be considered when making a differential diagnosis in these situations.9

Globally, PD is a major contributor to morbidity, especially in aging populations, but there is a lack of epidemiological studies of the disease in many low- and middle-income countries, including Pakistan. Khyber Pakhtunkhwa (KP), a province of Pakistan with diverse environmental exposures and weak socio-economic conditions, presents a higher rate of the disease. Consanguinity is also a prominent characteristic of KP regions, which may also contribute to unique genetic disease conditions. Besides poor environmental and socio-economic conditions, the limited healthcare availability and cultural restrictions may also pose challenges in the accurate and early diagnosis of neurological disorders, including PD. This study aims to address the existing knowledge gap by conducting an understanding of Parkinson's disease in the KP population. These research findings will support the global understanding of PD epidemiology while also helping in accurate diagnosis, management, and public health interventions, especially in the KP population.

2. Materials And Methods

Study setting and ethical approval

The data was collected in a period of 10 months, i.e., from March to December 2023, by visiting the individuals at the Department of Neurology, Lady Reading Hospital (LRH), Peshawar, Pakistan. Written informed consent was collected from PD patients, signed by their guardians. The study was conducted with the approval of the ethical committee of the Institute of Biotechnology and Genetic Engineering (IBGE), the University of Agriculture Peshawar, and the Human Resource Department (HRD) of the hospital.

Data sampling

The study included 62 patients in a city who had been diagnosed with probable PD. The people who attended Peshawar's Lady Reading Hospital were the main subject of the study. Multiple choice questions, a description of the patient being examined, the patient's age, readily observable signs and symptoms, comorbidities, and each patient's name and gender were all included in the specifically created questionnaire. All the patients (n=62) willingly participated and provided the required clinical information and history of the disease.

Statistical Analysis

The samples were subjected to statistical analyze the prevalence of the disease in both male and female patients. Utilizing appropriate statistical methods, the data were examined to determine the prevalence of PD at Lady Reading Hospital, Peshawar, KP. The age distribution of the enrolled patients is shown in Figure 1, which reveals that the patients aged 55 to 64 years were frequently affected with PD. The clinical features of PD patients are shown in Figure 2.

3. Results

Gender-specific prevalence

A total of 62 PD patients, 39 (63%) were men and 23 (37%) were women. The prevalence in males was higher (63%) than in females (37%).

Age-specific prevalence

In the study of 62 patients, the majority (37%) belonged to the age group of 55-64 years, followed by 65-74 years, as shown in Fig.1.

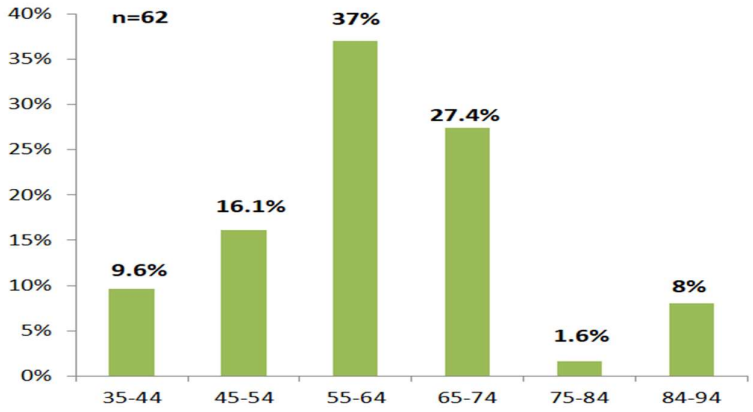

Figure 1: Age-wise prevalence of Parkinson's disease

Clinical features

Clinically, the Parkinson's patients showed different features such as tremors, muscle rigidity, bradykinesia, difficulty walking, dementia, frequent falls, weakness, difficulty speaking, sleeplessness, apathy, and dyskinesia. Tremor (74.4%), bradykinesia (54.8%), muscle rigidity (24.1%), dysphagia (20.9%), dysarthria (16.1%), pain in shoulder (16%), walking difficulty (6.4%) and weakness (8%) were the frequently expressed signs and symptoms among the patients. Figure 2 shows different signs and symptoms in PD patients.

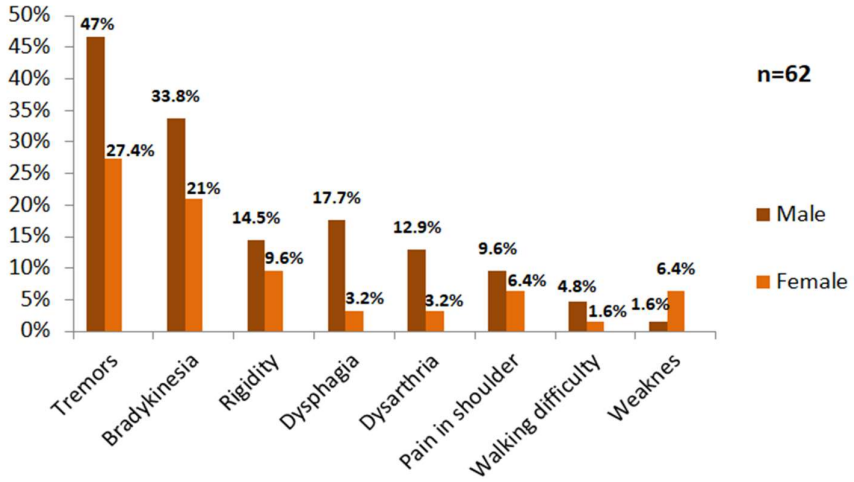

Figure 2: Most prevalent symptoms of Parkinson's disease

Comorbidities

The comorbidity of PD with other disease conditions like dementia, diabetes, hypertension, hypotension, gastrointestinal disease, heart disease, blurred vision, and dermatitis are shown in Fig 3, where hypertension (26%) is the frequently occurring disease condition followed by diabetes (6.4%), heart disease (6.4%), dementia (6.4%) and gastro problems (5%).

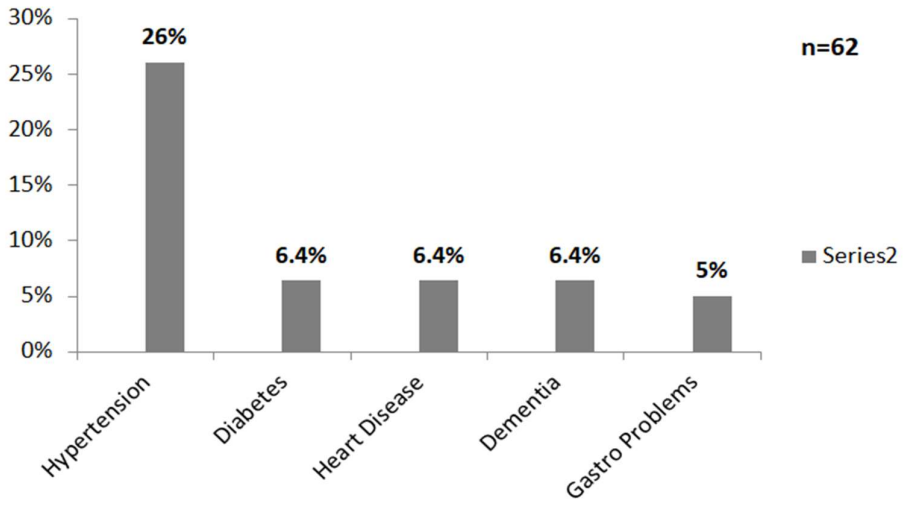

Figure 3: Comorbidities with Parkinson's disease

4. Discussion

Parkinson's disease is a complex neurodegenerative brain disorder affecting millions of people globally. There are few studies available on the epidemiology and prevalence in Pakistan, particularly in KP regions. The goal of this epidemiological study was to evaluate the prevalence of PD on the bases of patient's age, gender, clinical features, and comorbidities in different regions of Khyber Pakhtunkhwa, Pakistan. In the current study, some interesting variations in the rate of prevalence of PD on the bases of age, sex and clinical features have been identified. We discovered that the prevalence of PD in men (63%, n=39) was higher than women (37%). In previous studies, it was also reported that the ratio of PD was almost 2 times higher in men than women. The increased prevalence ratio of PD in men may be due to their exposure to toxins, head injury, estrogen's neuroprotective effects, mitochondrial malfunction, and the X-linked genetic risk factors.19 Women are less prone to get PD is, one of the most well-established gender distinctions in the condition.6 Age is the major risk factor for PD and we also investigated that the age of the majority of PD patients in Pakistan was from 55-64 years which clearly shows the impact of age on the disease. The etiology of PD is under investigation, but the only risk factor is age and PD is very common in people with the age above 50 years.18. In our study, the three most common symptoms that were identified among patients with Parkinson's disease were tremors (74.4%), bradykinesia (54.8%) and rigidity (24.1%) which were parallel to the previous reports1 10 while some of the patients also had dysphagia (20.9%), dysarthria (16.1%), pain in shoulder (16%), walking difficulty (6.4%) and weakness (8%). The PD patients had a propensity to develop orthostatic hypotension7 and nocturnal hypertension14 (Sommer et al., 2011). Other comorbidities including diabetes (6.4%), heart disease (6.4%), and dementia (6.4%), and gastro problems (5%) were also seen in some of the patients, but hypertension (26%) was the most common.

5. Conclusion

According to the results of the current study, there is a correlation between age and the prevalence of PD, which is higher in men than women. Bradykinesia and tremors are the most prevalent features among PD patients. Most cases of the condition can be seen in those who are 55 to 64 years old.

6. Limitations

No similar study has been conducted in other provinces of Pakistan regarding the age and gender-based prevalence of PD as well as its clinical features. For a detailed understanding of the epidemi-

ology and prevalence of the disease in various age groups and genders, as well as its clinical features and the association of other comorbidities with PD, more research study is needed. Population-based crossed sectional studies can be done to investigate the prevalence of PD in other parts of Pakistan. Clinical phenotyping studies should be done to compare PD symptoms and clinical features across different age groups and genders. Genetic and molecular studies should be done to investigate genetic liability and biomarkers correlated with PD, and their relationship to clinical features and comorbidities.

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