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CLINICAL STUDIES / ETUDES CLINIQUES

THE CLINICAL PROFILE OF IDIOPATHIC PARKINSON'S DISEASE IN A SOUTH AFRICAN HOSPITAL COMPLEX - THE INFLUENCE OF ETHNICITY AND GENDER

LE PROFIL CLINIQUE DE LA MALADIE DE PARKINSON IDIOPATHIQUE DANS UN HÔPITAL SUD-AFRICAIN : INFLUENCE DE L'APPARTENANCE ETHNIQUE ET DU GENRE

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ABSTRACT

Background
Idiopathic Parkinson's Disease (IPD) has not been well studied in Black African populations. Data on the demographics, phenotype differences with Caucasoid populations, severity and frequencies of IPD in Black Africans is scant.

Aim
To determine the impact of ethnicity and gender on the phenotype of IPD in South African patients.

Method
This was a hospital based study. One hundred and forty-six patients from the movement disorder clinics were screened. Fifty patients with IPD met the inclusion criteria. The data collection was in the form of a questionnaire and clinical evaluation which included a mental status examination (MMSE), and illness staging.

Results
Thirty-five patients were Black African, eleven were of white European descendant, three were of Indian descent and one had mixed ancestry. Twenty-eight of the patients were female. There were no significant gender differences within or between the different ethnic groups. Seventy- one percent of Black and ninety-one percent of White participants had classic IPD presentations. A resting tremor was found in fifty-nine percent of all males in the study but in ninety-four percent of females. In the Black IPD patients, thirty one percent had early onset IPD (age of onset less than 50 years) with a gender ratio of M:F=1:6. Twenty nine percent had an akinetic-rigid syndrome with erect posture and no tremor (gender ratio of M:F = 7:4) and seventy four had cognitive impairment (gender ratio of M:F =8:5).

Conclusion
The phenotype of IPD in the majority of our study population is of the classic IPD type. In a third of our Black patients the onset was early and in almost a third the presentation was akinetic. One of the main limitations was that the majority of the patients served by these hospitals are Black, making it difficult to recruit an adequate number of White patients.

Keywords: Parkinson's disease; Gender; Ethnicity

INTRODUCTION

There have been no studies comparing the phenotype of Idiopathic Parkinson's disease between Black and White patients. The classic profile of Idiopathic Parkinson's Disease (IPD) is based on the data derived from European and

North American populations. The diagnosis of IPD is made on clinical grounds. Extensive research on clinic-pathological correlations was conducted by Lees and colleagues from Queen's Square in the UK from 1988 (4) to 2001 (7). Little is known about IPD in people of African origin.

AIM

The aim of this study was to determine whether ethnicity and gender have any influence on the clinical presentation of patients with IPD who attend the Neurology clinic at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) and Chris Hani Baragwanath Hospital (CHBH) compared with the published European and North American clinical phenotypes.

METHOD

Study design and study population:

This was an observational study conducted in two parts: a questionnaire and clinical evaluation.

The questionnaire (appendix 1)

Consisted of 22 questions pertaining to demographic information such as age, gender, race and clinically relevant history such as age of onset, family history, time to diagnosis, and the presence of specific symptoms.

The second component consisted of a series of clinical examination and a series of tests, namely, the Mini Mental State examination (3) (grading of cognitive impairment), the Hoehn and Yahr score (5;6) (grading of physical disability) and Schwab and England activities of daily living scale (S&E) (11).

The study population consisted of patients known with Idiopathic Parkinson's Disease who attend the Movement disorder/ Neurology clinics at Charlotte Maxeke Johannesburg Academic Hospital and Chris Hani Baragwanath Hospital in Johannesburg, South Africa. We offered participation to all the patients who visited the clinic during the study period. A total of one hundred and forty-six patients were screened.

Inclusion criteria:

A diagnosis of Idiopathic Parkinson's Disease (IPD) in keeping with the Queen Square Brain Bank (QSBB) criteria11. This is a universally accepted list of diagnostic criteria for IPD (7). Able to give consent Sufficient level of education to complete the MMSE

Exclusion criteria:

A movement disorder other than IPD. Secondary Parkinson's Disease due to neuroleptic drugs, vascular lesions. Cognitive impairment too severe to enable consent for participation in the study Refusal of participation Features of a Parkinson's-Plus syndrome

A total of 50 patients met the inclusion criteria during the recruitment period.

The demographic and clinical data gathered was tabulated in an excel spread sheet and descriptive and inferential statistics we performed using SPSS software.

The findings were then compared to previous descriptions in Africa as well as Europe and North America.

For purposes of this study, •Early onset Parkinson's Disease (EOPD) is defined, according to literature, as Age of Onset (AOO) of 50 years or younger. •Cognitive impairment is defined as a MMSE score of less than 25. •Erect posture is defined as an angle of spinal kyphosis less than 20 degrees, and a stooped posture as an angle of more than 40 degrees (1). •Time to diagnosis will be abbreviated as TTDx.

RESULTS

50 patients were included in the study. Thirty-five (70%) were Black African, eleven (22%) were of European descent, three (6%) were of Indian descent, and one (2%) had mixed-ancestry. There was a slight female preponderance of 56%. The mean age of the participants was 63 years old (range 36-83). There were several clear trends that came to the fore when comparing ethnic and gender groups. The clearest differences were in age of onset, posture, rigidity, and tremor. However, not all of the differences proved to be statistically significant.

Table 1: Demographic and illness staging differences.

Black n=35					**White n=11**				**P-value**
	Mean	Range	95% CI			Mean	Range	95%CI	
Age	60.8	51-76	55,8:65,8		Age	67,2	44-83	61,6:72,8	0.089
AOO	54.31	12-78	49,6:59		AOO	60,7	43-78	53,5:67,9	0,164
TTDx	20,3	0-120	53.5-67.9		TTDx	56,7	0-360	22,8:136,3	0,33
MMSE	25	15-90	20.9:29:2		MMSE	24,6	13-30	20,9:28,3	1,0

H&Y	2,5	1-5	2,2:2,8	H&Y	2,45	1-5	1,6:3,3	0,75
S&E	61.8	10-90	53,6:70,0	S&E	66	20-90	43,1:89	0,51

AOO= age; TTDx= Time to diagnosis; MMSE= Mini mental state examination; H&Y= Hoen and Yahr score; S&E= Schwab and England activities of daily living scale.

Table 2: Descriptive analysis for black versus white patients.

	Symptom Prevalence			**Significance of Difference**
	Black n(%)	**White n(%)**	**p-value**	**Likelihood ratio (LR)**
Appendicular rigidity	**19 (54,3)**	**10(90,1)**	**0.033***	**5,95**
Axial rigidity	28 (80)	4 (45,5)	0.34	
Stooped posture	**11 (31,4)**	**8 (72,7)**	**0.039***	**4.3**
Erect posture	**24 (68.6)**	**3 (27.3)**		
Magnetic gait	32 (91,4)	0	1.0	
Festining gait	7 (20)	4 (36,4)	0.42	
bradykinesia	33 (94,3)	11(100)	1.0	
Falling	14 (40)	4 (36,40)	1.0	
Fam hx	3 (8,6)	2 (18,2)	0.58	
Tremor	9 (25,7)	100	0.42	
Orthostatic hypotension	5 (14,3)	0		

* indicates statistical significance with a p-value of less than 0.05

Famhx= Family history

Table 3: Differences in symptom prevalence for gender.

	Male		**Female**		**P-value**
	Mean	95% CI	Mean	95% CI	
Age	60,1	53,2:67	64,6	60,3:68,9	0,4
AAO	56	50,5:61:5	56,5	51,1:61,8	0,9
TTDx	33,8	0,2:67,5	22	10,2:33,4	0,4
Mmse	26,4	19,5:33,3	24	22,6:25,3	0,42
H&Y	2,5	2:3	2,5	2,1:2,9	1,0
S&E	63,3	51,6:75,1	64,1	54,5:73,7	0,9
	Prevalence of clinical signs (%)		Comparison		
	Male	Female	p-value	LR	
Appendicular rigidity	63,6	64,3	0.79		
Axial rigidity	95,5	64,3	0.34		
Stooped posture	50	39,3	0.60		
Magnetic gait	5	7	1.0		
Festining gait	27,3	25	1.0		
bradykinesia	100	93,9	0.50		
Falling	36,4	42,9	0.60		
Fam hx	9	17,9	0.24		
tremor	**59,1**	**93,9**	**0.010***	**7.7**	
Orthostatic hypotension	0	4			

* indicates statistical significance with a p-value of less than 0.05

AOO= age; TTDx= Time to diagnosis; MMSE= Mini mental state examination; H&Y= Hoen and Yahr score; S&E= Schwab and England activities of daily living scale; Fam hx= Family history.

Table 4: Chief clinical differences found in this study.

	BLACK	WHITE
MEAN AAO	56,6	60,7
%EOPD	31	18
%COGNITIVE IMPAIREMENT	74	18
%AKINETIC-RIGID SYNDROME	29	9
%CLASSIC IPD	71	91

AOO= Age of onset; EOPD= early onset Parkinson's Disease.

DISCUSSION

There have been a few studies investigating Idiopathic Parkinson's Disease in African American populations. In a study from Northern California, USA in 2003, the relationship between race and gender in patients with IPD was reported (12). The results showed an older age of onset in Whites compared to Blacks, Hispanics and Asians. The incidence of IPD was 91% higher in men than in women. A cross-sectional epidemiological study conducted across the USA in 2010 of US Medicare beneficiaries aged 65 and older, showed that there was a 50% lower incidence of IPD in Blacks compared to Whites (14).

In Africa, a systematic review reported from a Nigerian group in 2006 featuring articles that were published between 1944 and 2004 from 13 African countries, including South Africa concluded that the incidence and prevalence rates of IPD appeared lower in Africa than those in Europe and North America (9). In 2010, the same group published a study that investigated the clinical profile of Parkinson's Disease in a population of patients in Lagos, Nigeria (8). These results were extracted from a data base collected over 10 years. Of the 124 patients with parkinsonism, 98 (79%) had Idiopathic Parkinson's Disease, while 26 (21%) had secondary PD. Results showed a similar disease profile to European counterparts, although there were fewer patients with early onset disease (<50 years old) (16.3%) and family history (1,.02%). In terms of clinical presentation, 31.6% were tremor- predominant, 55.1% were mixed, and 14.3% had an akinetic-rigid presentation. These different clinical presentations were not compared for gender. An important observation was that, compared to European studies, there was a greater delay in diagnosis. One of the negative aspects of this study was that patients with secondary Parkinson's disease were not excluded from the study.

The first study on IPD in the Black South African population was published in 1988 (2). These results were derived from monitoring the prevalence of levodopa usage. The study concluded that IPD occurred less frequently in Black Africans. In terms of recent data, a study from Tygerberg Hospital in the Western Cape, South Africa, investigated the factors influencing the development of early onset Parkinson's disease (EOPD) or late onset Parkinson's Disease (LOPD), (13). This data was extracted from a 5-year genetic study. Of the 397 patients, 62.5% (248) were male, and 34,8% (138) were female. Gender was found to have no effect on age of onset. EOPD was also found more frequently in Black, mixed-ancestry and White Afrikaner participants compare to White English speaking patients. This conflicts with the Lagos study's findings. A family history was associated with younger onset. However, one third of cases with LOPD had a significant family history.

No studies have looked specifically at whether there are different clinical phenotypes of IPD among different ethnic groups.

Our study was conducted in a highly specialized clinic in a tertiary hospital, which serves a largely indigent population. As a result, we cannot draw conclusions on the prevalence of IPD, or differences in cognitive impairment. When comparing the different ethnic and gender groups, our study showed clear trends with regards to differences in phenotypes. The main differences seen were in age of onset, pattern of rigidity, posture and tremor.

The majority of patients in our study population had the classic presentation of IPD. This is a syndrome of late onset, resting tremor, stooped posture, appendicular rigidity, and bradykinesia. This included ninety-one percent of White and seventy-one percent of Black patients. However, a subset of patients, particularly Black patients, showed some deviations from the classic phenotype.

IPD is typically a disease of the elderly but modern literature describes an earlier disease onset in patients of African origin (1;6). This was replicated in our study. One third of Black patients had early onset Parkinson's disease (EOPD) compared to eighteen percent of White patients.

Of note, Black patients were more likely to have axial (80%) rather than appendicular rigidity (54.3%) compared to White patients (45.5% and 90.1% respectively.) They were also more likely to have an erect posture (68.6%). These two findings were statistically significant (p-values= 0,033 and 0,039 respectively). Furthermore, almost a third of Black patients had an akinetic-rigid presentation. This was particularly prevalent in Black males (54%).

There was a higher incidence of cognitive impairment in Black patients. It is important to note that, although all participants had a sufficient level of education to complete the MMSE, there may have been some bias because of differences in the quality of education, a legacy of the country's history of racial inequality. It is important to note that the MMSE has a culture bias and is not specific for features of a subcortical dementia, which is found in IPD. However, it is a good screening tool and is easily reproducible.

There were also several differences in presentation between the two gender groups. There was a slight female preponderance of 56%, unlike the male preponderance described in literature. The clinical phenotype was similar

between the two groups except for two marked differences. Firstly, the prevalence of axial rigidity was greater in males (95,5%) compared to females (64,3%). Secondly, the prevalence of a resting tremor was much higher in females (93,9%), compared to males (59,1%). This was statistically significant (p value= 0,01). The mean age of onset (AOO) was similar in male and female participants in both racial groups.

CONCLUSION

The phenotype of IPD in the majority of our study population is of the classic type. A third of our Black patients had EOPD. We identified a subset of Black patients (one third) who presented with an akinetic-rigid syndrome.

Although the results showed clear trends in the differences between ethnic and gender groups, they were not all statistically significant. This is possibly due to the small sample size and hospital complex bias. A larger sample size and community study is needed to confirm these findings.

Limitations:

Our sample size was small and limited to one geographical area. Although the recruitment time was sufficient, our sample size was biased by the fact that many patients at the movement disorder clinics had secondary Parkinson's disease. Several were too cognitively impaired to provide consent, and there were also many with insufficient schooling to perform cognitive testing.

The Hospitals in which the study was conducted serve more Black than White patients. As a result, more Black patients were recruited into the study.

The MMSE is a good screening tool but isn't designed for subcortical dementia which is found in IPD. It has a culture bias as well. MMSE scores have been shown to be lower in Black and other ethnic groups due to differences in English proficiency and socioeconomic factors14.

Declaration:

There are no financial or material contributions to declare.

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