

Epidemiology of Parkinson's Disease in Africa

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Abstract - Parkinson's disease is the second most common neurodegenerative disorder in the world and yet Africa remains a dark continent when it comes to studies related to it. This paper aims to review the available literature on the topic with emphasis on the epidemiologic studies conducted in the region. The studies originated from 13 African countries. Overall, the prevalence and incidence rates of African regions are lower than those reported of American and European populations. No significant difference can be seen in the prevalence rates between men and women. A general lack of proper management can also be observed in most regions in terms of diagnosis, treatment, medication and supervision.

Key Words: Parkinson's disease; Africa; Epidemiology, neurodegenerative, ethnicity, gender, World Health Organization.

1. INTRODUCTION

Parkinson's disease is one of the most prevalent neurodegenerative disease. It typically occurs in the elderly and leads to degeneration of neurons in affected parts of the brain. The cause of the disease is still unknown but it is believed to involve an interplay of genetic and environmental factors. A study on available literature on the subject indicates that there have only been few research projects pertaining to Parkinson's disease in the African continent. However, the region is experiencing a demographic shift characterized by an increasing mean life expectancy. It has been predicted that by the year 2050, there will be about 139 million people aged 60 years and older in sub-Saharan Africa¹. Prevalence of age-related diseases such as Parkinson's disease is thus expected to increase. Hence, a study of epidemiologic data is necessary to identify risk factors and ensure complete understanding of the disease spread situation. Figure 1 shows the 13 countries where the studies took place.

In this study, we review the existing publications on the topic with a focus on the epidemiological aspects of Parkinson's disease in Africa. We also highlight any significant differences in prevalence according to gender or race. This paper also reviews the current disease management scenario in the region and ways to improve on it.

2. METHOD DEPLOYED

The literature search for publications on Parkinson's disease in Africa took place electronically on the World Wide Web. The key tool used to search articles and research papers on the topic was Google Scholar. The search terms used were "Parkinson's disease and Africa", "Parkinson's disease epidemiology in Africa", "Movement disorders in Africa", etc. Furthermore, specific country names and "Parkinson's disease" were searched. Articles and papers on worldwide epidemiology of Parkinson's disease were reviewed for citations of African publications. In total, 30 publications have been directly or indirectly referred in this review.

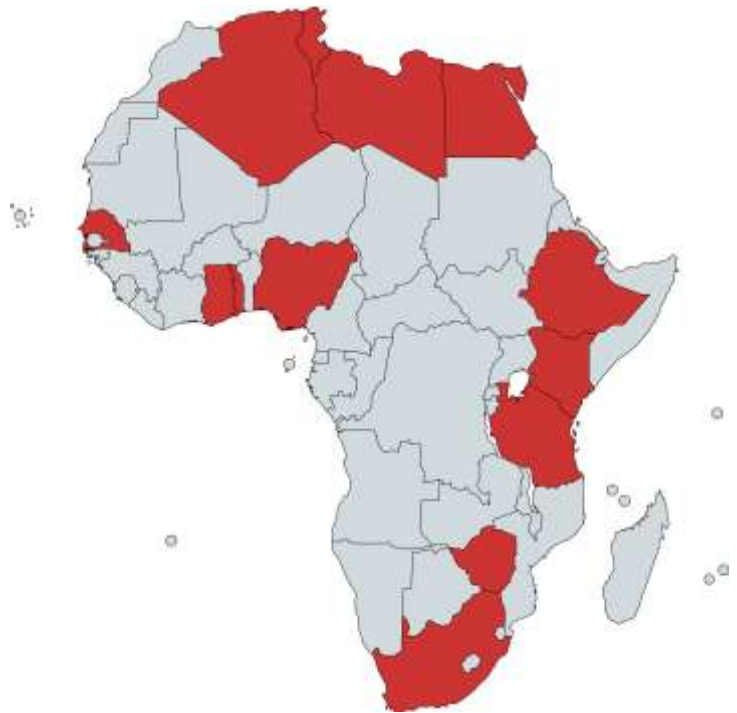


Fig -1: African countries covered in the review paper

3. PREVALENCE AND INCIDENCE

There are a limited number of prevalence studies conducted in Africa for Parkinson's disease. Several studies used the World Health Organization (WHO) screening instrument and protocol for neurological disorders. Most studies used a two-stage approach to identify individuals with Parkinson's disease. In stage 1, screening questionnaires were administered to elicit disease symptoms. In stage 2, individuals who screened positive in stage 1 were examined

by a healthcare professional (usually a neurologist) to confirm or refute a diagnosis. UK Parkinson’s Disease Society Brain Bank Research criteria was also popular for diagnosis.

The crude prevalence of PD in Africa is lowest in western and eastern African countries. This finding is in contrast to the prevalence rates from North Africa that are similar to European populations. Most studies published in the region have focused on the prevalence and not the incidence rates. There have only been two incidence studies on Parkinson’s disease in African nations. These studies were conducted in

Benghazi, North East Libya (1982-1984) and Assiut Governorate, Egypt (2010).

In the first study, the crude incidence rate was found to be 4.5/100,000 per year. However, no sex or age-specific data was recorded. The second study in Egypt recorded a crude incidence rate of 84/100,000. Gender specific data was also provided.

Table 1: Prevalence studies of Parkinson’s disease in Africa with respect to age

Country	Crude prevalence (per 100,000)	Prevalence in specified age-range (per 100,000)
Libya ⁶	31.4	285.1 (> 50 yr)
Nigeria ^{5,11}	10	59 (> 39 yr)
Tunisia ¹⁰	43	216 (> 40 yr) 296 (> 50 yr)
Egypt ⁹	557	2748 (> 50 yr)

DISEASE SPREAD WITH AGE

Parkinson’s disease predominantly affects people of old age. The general trend seen worldwide is that the disease prevalence increases with age. Due to the lack of adequate studies on the matter in Africa, little can be told about overall disease spread with age. Table 1 shows some of the studies that compared prevalence rates with respect to age.

Based on the age at onset, Parkinson’s disease can be sub-categorised as: early-onset (Age at onset: < 50 yrs) and late-onset (Age at onset > 50 yrs). An early onset of the disease can be caused by additional factors such as positive family history and environmental elements such as drinking well-water, living in a rural area, farming and pesticide exposure. The studies performed in the same country differed in population characteristics. Table 4 is illustrated by figure 2. It is evident that most studies found the average age of onset to lie between the range of 50-60 years.

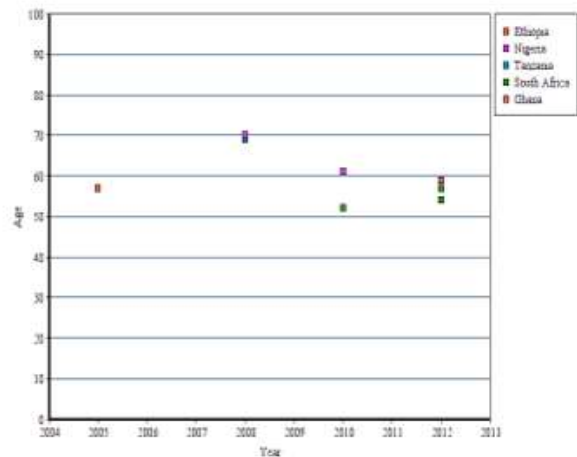


Fig 2: Average onset age of recent studies

DISEASE VARIATION WITH GENDER

Some studies compared prevalence rates in African populations with respect to gender. Few community-based studies have been conducted in the continent which are summarized in table 2. As can be seen, males are slightly more affected than females

but the difference is not statistically significant. The same trend can be seen in hospital-based studies shown in table 6. The number of male cases are higher than that of female cases. Although there is a significant difference, it isn’t conclusive.

Table 2: Disease variation with sex in community-based studies

Country	Population sex ratio (male - female)	Number of cases	
		Male	Female
Ethiopia ⁷	1:1.014	4	0
Libya ⁶	1.065:1	87	76
Tanzania ⁴	1:1.065	23	9
Egypt ⁹	1.51:1	21	12

DISEASE VARIATION WITH RACE/ETHNICITY

Numerous studies have reported a lower prevalence of Parkinson’s disease in populations of African origin in comparison to European or North American regions.

In their 1993 study, Zhang and Roman reported that black African populations have one of the lowest prevalence rates recorded in any region of the world.

Table 3: Comparative studies for Parkinson’s disease in Black(B) and White(W) populations

Publications	Sample source	Study period		Sample size	Cases
Paddison and Griffith	Medical clinics in Baltimore, USA.	1959 – 1969	W	112,878	165
			B	446,158	74
Kessler	Charity Hospital at New Orleans, USA.	1967 – 1969	W	-	1,183
			B	-	87
Lombard and Gelfand	Andrew Fleming Hospital and Harare Hospital in Harare, Zimbabwe.	1973 – 1976	W	34,952	33
			B	82,453	17
Schoenberg et al. ¹⁹	Household enumeration in Copiah County, USA.	1978	W	11,931	19
			B	11,666	12

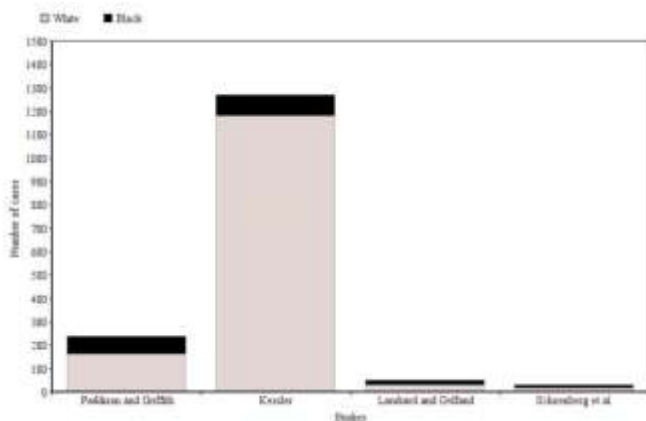


Fig. 3: Disease variation with race

DISEASE MANAGEMENT

Africa has few organizations that help in financial aid and research for Parkinson’s disease. These include Parkinson’s Disease Foundation centered in Kenya, Association Tunisie Parkinson in Tunisia, Parkinson Patients Support Organization in Ethiopia, Parkinson’s Disease & Related Disorders Association of South Africa and International Parkinson and Movement Disorder Society. The latter has published many insightful research papers on the topic of the review.

The majority of population suffering from Parkinson’s disease in Africa are undiagnosed and untreated which leads to poor quality of life and increased mortality rates. There exists a perpetual need for medical resources and health workers. There is a vast shortage in the number of medical doctors, let alone skilled neurologists. On an average, there are only 0.03 neurologists per 100,000 inhabitants in the continent^{20,21}. Furthermore, most neurologists are located in

the cities while the majority of the population lives in rural areas.

For the diagnosed minority, drug treatment may be unavailable, or if available, unaffordable. Medications for Parkinson’s disease are available on average to only 12.5% of individuals who actually need them, compared with 79.1% in Europe²¹. It has been estimated that the current local cost of treatment for one patient is approximately US\$400/year. Since approximately 60% of the population lives with less than US\$2/day, the patients cannot afford to buy them²². The poverty is notable, with the choice patients have to make between medication and food. There has also been significant discrepancy between rural and urban areas. The populations in rural areas are less likely to have access to treatment.

Hospitals in most part of Africa often stock only medication that is mentioned on the WHO Essential Drugs List. For Parkinson’s disease, the list is rather outdated. It contains anticholinergic medications (biperiden) and a levodopa and carbidopa formulation that contains a lower proportion of dopa-decarboxylase inhibitor than would be commonly used in a developed country setting (100/10 mg rather than 100/25 mg)²³. More modern treatments are usually not accepted in the region.

Non-drug treatments are also practised in Africa but at limited locations. These treatments include physiotherapy, speech and language therapy and occupational therapy²³. Despite of showing good results, these treatments are not being applied at the required scale. Neurosurgery is also a beneficial option for a particular subgroup of patients, but it is unaffordable and the region does not have the necessary infrastructure and other resources to put it into practice.

DISCUSSION:

The review provides a summary of Parkinson's disease research in Africa. It is evident that the scale of research done on the topic is not at the scale that it needs to be. In this study, several methodological issues need to be addressed.

As clear from figure 1, most of these studies were covered in Northern and sub-Saharan Africa differing in geographic locations. Studies that took place in the same country were years apart or had different population characteristics. The populations covered in these research projects had differences in size (see table 1), age structure, sex ratios (see table 5), racial features and other socio-economic factors. There are discrepancies in the year as well as duration of the studies. Looking at tables 2 and 3 most of these studies took place before 2000s and few recent studies were recorded.

The duration of these projects lie between the range of 1 and 10 years. Thus evaluating the disease epidemiology over time proves to be difficult. Many of the studies were typically small and hospital-based. These studies were derived from admission records. The frequencies based on hospital attendance are not likely to be representative of the frequencies observed in general population. Only door-to-door studies are able to reduce the bias associated with socioeconomic and cultural factors.

The diagnostic criteria applied in studies were also not uniform. The two most used methods were UK Parkinson's Disease Society (UKPDS) Brain Bank Criteria and the WHO protocol. The UKPDS criteria is based on questionnaires and require the presence of bradykinesia and at least one other feature of parkinsonism (rigidity, tremors or impaired balance). The problem with WHO screening instrument and protocol is that it is not specific for Parkinson's disease. The diagnostic criteria for Parkinson's disease have now become better standardized, and when properly applied, they increase diagnostic accuracy²⁴. Using internationally accepted diagnostic criteria will ensure comparability of findings from future studies.

The crude prevalence in sub-Saharan Africa varies from 7 to 20 per 100,000 which is considerably less than that in the developed world²⁵. Despite of these findings, it is difficult to compare crude prevalence rates between developing and developed countries due to population structures not being similar. Furthermore, comparison of hospital admission rates for Parkinson's disease in whites and blacks even in the same country does not provide an accurate description of different rates of disease occurrence because of differences in access to health care (related to socioeconomic status, education, religion, and language).

The observation about the disease spread with age is consistent with other surveys and studies around the world. Thus, age is an important risk factor and more studies should include records of the disease in different age groups.

Although most cases come under late-onset category, it is important to look at the factors contributing to an early onset of the disease. Early-onset category shows a slower disease progression and a good response to levodopa therapy.

The difference in prevalence between the two genders cannot be fully explained. A true increased susceptibility in men could be due to a protective effect of estrogen in women or higher exposure of men to environmental toxins, for example pesticides through farm work.

Amid the focus on malaria, HIV/AIDS and tuberculosis, neurological diseases in Africa go largely unnoticed. There is a general lack of awareness, both within the general population and also among healthcare professionals. Building up a network of interested parties to improve education, training and access for those wishing to develop their skills and service in movement disorders is key to improving care for patients. In order to improve access to drugs for the disease, development of policies at a national level for dealing with chronic diseases as a whole is important. Along with this, ensuring access to pensions for older population will allow more fair access to medication and medical help.

These discrepancies provide an opportunity for further epidemiologic surveys. Studies addressing these issues would benefit African populations by allowing them to plan for future healthcare needs and would also benefit the world population by providing more insights on the disease etiology. Such studies would be made easier through collaboration with international researchers and agencies.

CONCLUSION:

The review aimed at covering the Parkinson's disease spread in Africa across multiple factors and gaining insights. It was observed that the prevalence rate of the disease increases with age and has no significant difference in males and females. It was also seen that African populations have less prevalence rates as compared to European or North American populations. The scale of diagnosis and treatment of the disease is very small and there is a lot of room for improvement. Overall the number and scope of such studies has been very limited. Collaboration across various African countries and organizations is needed in order to pool resources to conduct more studies and subsequently generate awareness on the topic.

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BIOGRAPHIES



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B Tech Computer Science at PES University, Bangalore, India. He worked as an Associate Data Scientist at MinionLabs. As a Machine learning and NLP enthusiast, he loves coding and firmly believes that Deep Learning and Computer Vision will change the way "We live our life" and revolutionize it for the betterment of humans



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