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Parkinson's Disease in Sudan: Where are we now?

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Abstract

Aim: To review the Parkinson's disease (PD) literature in Sudan.

Methods: A narrative review of the literature was conducted in October 2022, using PubMed, Science Direct, and African Journals Online (AJOL) databases. Peer-reviewed published papers regarding Parkinson's disease were retrieved from Sudan between 1957 and 2022. This review did not include animal studies, articles from South Sudan, or unpublished data. Brief communications and commentaries that do not generate new data were also excluded. The following keywords were used to search the literature: Parkinson's disease, "Parkinsonian," "parkinsonism," "tremor," "movement disorders," and " Sudan," "Sudanese."

Results: 146 articles were identified; seven of those met the inclusion criteria, including three case reports, one Cohort, and three cross-sectional studies. These articles contained information related to genetics (n = 5), clinical presentation of Parkinson's disease (n = 1), and medication availability (n = 1).

Conclusion: The local literature on Parkinson's disease is scarce and mainly focuses on the genetic aspects of the condition. There is a need for epidemiological studies and articles highlighting responses to therapy and surgical interventions in the late stages.

Keywords: *Parkinsonism; Parkinson's Disease; Tremor; Movement Disorders; Sudan*

Introduction

Parkinson's disease (PD) is the second most common neurodegenerative disease affecting the elderly population [1]. It causes a significant burden on patients and caregivers and the health-care systems, especially in the late stages. The lifetime risk of PD is 2% in males and 1.3% in females [2]. The literature extensively investigates PD; however, scarce data on the topic is available from Sudan. This review summarizes what was done on the subject in Sudan to guide areas of future research on PD.

Materials and Methods

This narrative review examined Parkinson's disease literature from Sudan between 1957 and September 2022.

Inclusion criteria: human studies from Sudan, either full research articles or conference abstracts. In addition, reports were included on Sudanese participants outside Sudan.

Exclusion criteria: Animal studies, articles from South Sudan, and unpublished data.

The following databases were used to obtain research articles: PubMed, ScienceDirect, and African Journals Online.

Articles were identified using MeSH terms and Boolean operators (or/and). Examples of the keywords used in the search were "Parkinson's disease," "Parkinsonism," "Parkinsonian," "movement disorders," "tremor," and "Sudan," "Sudanese." Duplicate studies were removed. After the initial recruitment of the articles. Moreover, all references were screened for additional studies and included when appropriate.

Results and Discussion

Out of 146 articles initially screened, seven papers were included in this review. Two abstracts were identified titled "Clinical characteristics of Parkinson's disease in Sudanese patients attending Daoud Charity Clinic" and "Prevalence of depression among Sudanese patients with Parkinson's Disease attending Daoud Charity Clinic in 2020-2021," but only the objectives of the abstracts were found [3,4]. The search process is illustrated in figure 1.

The seven articles identified were classified and described in this review as following: clinical presentation and etiology (n = 1), available therapy for Parkinson's disease (n = 1), and genetics and case reports (n = 5).

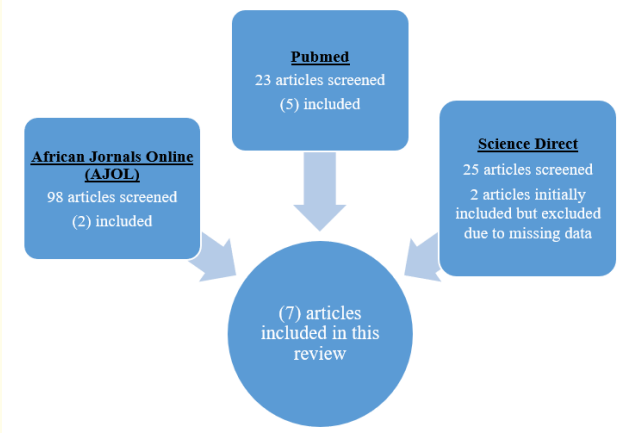

Figure 1: *Articles recruitment process.*

Authors	Year	Study design	Title
Bakhit Y., *et al*.	2022	Cohort	Methylation of alpha-synuclein in a Sudanese cohort
Hamid E., *et al*.	2021	Continent web based survey	Availability of Therapies and Services for Parkinson's Disease in Africa: A Continent-Wide Survey
Ibrahim EA, Albasher SA	2019	Cross-sectional	PINK1 type of Early Onset Parkinson's Disease (EOPD) in Sudanese patients
Elsayed LE., *et al*.	2016	Case report	A novel nonsense mutation in DNAJC6 expands the phenotype of autosomal-recessive juvenile-onset Parkinson's disease

Cazeneuve C, *et al*.	2009	Case report	A new complex homozygous large rearrangement of the PINK1 gene in a Sudanese family with early onset Parkinson's disease
Khalid K., *et al*.	2009	Cross-sectional	Clinical presentation of Parkinson's disease among Sudanese patients
Leutenegger AL., *et al*.	2006	Case report	Juvenile-onset Parkinsonism as a result of the first mutation in the adenosine triphosphate orientation domain of PINK1

Table 1: *Study design and year of the articles in the review.*

Clinical presentation and etiology

A study was conducted in a tertiary neurology center in Khartoum state to describe the clinical presentation and etiology of parkinsonian features in 94 Sudanese patients. The male-to-female ratio was found to be 1.5:1. The most common presenting symptoms were bradykinesia, tremor, excessive salivation, sweating, constipation, and difficulty swallowing. Clinical examination revealed rigidity, gait abnormalities, and primitive reflexes [5]. Regarding the etiology of the Parkinsonian features, most patients had idiopathic Parkinson's disease, followed by Wilson disease, vascular, and supranuclear palsy. One patient had multi-system atrophy, and another patient had drug-induced parkinsonism [5].

Available therapy for Parkinson's disease

In Sudan, there are three tertiary neurology centers in Khartoum State, the capital of Sudan, where neurological services are provided. Patients from all over Sudan travel to the capital to receive specialist evaluation and care. There is an approximate 0.80 neurologists per 1 million population. Moreover, there are three specialized movement disorder clinics with 15 experts [6]. Fortunately, Levodopa preparation is primarily available in Sudan. Other medications for Parkinson's disease are available at variable frequencies [6].

Genetics

A study reported a novel mutation in the adenosine triphosphate orientation site of the PINK1 kinase domain in eight patients from Sudan with a spectrum of clinical presentations ranging from dopa-responsive dystonia to early onset parkinsonism [7]. Another article conducted in the National Center for Neurological Sciences (NCNS) to examine PINK1 gene expression in Sudanese patients with early-onset Parkinson's disease; the study concluded that the PINK1 gene was expressed in 90% of the participants, however statistically significant association was found between PINK1 gene expression and age, gender and family history of PD [8]. Additionally, one Cohort study was conducted on DNA methylation in 172 Sudanese patients with PD confirming what was mentioned in the literature on the role of alpha-synuclein methylation in the pathogenicity of Parkinson's disease [9].

Case reports

One case report identified a juvenile form of Parkinson's disease in a ten years old Sudanese patient who presented with visual hallucination, rigidity, and associated epilepsy. Genetic testing detected a novel nonsense mutation in DNAJC6 [10]. Another case report highlighted three siblings (two males and one female) from a consanguineous family who presented with early-onset parkinsonism. "Multiplex ligation-dependent probe amplification" was performed and revealed that the patients were homozygous for a deletion mutation of PINK1 exons 4 to 8 [11].

Conclusion

Parkinson's disease in Sudan is under-researched with the present data being relatively new, as the earliest article conducted on human subjects was in 2006. Parkinson's disease articles from Sudan mainly described the genetic aspects related to the condition and the clinical presentation. Further studies could focus on addressing the epidemiology, risk factors, response to medications, and quality of life of Parkinson's disease patients.

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