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Multiple Sclerosis in sub-Saharan Africa: Review of current trends and available literature

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ABSTRACT

Background: From the middle of the last century, hospital-based data have often suggested the MS was not found among blacks living in sub-Saharan Africa. Earliest studies from South Africa were focused white South Africans. The objective of this review is to provide an overview on the current status of the epidemiology of multiple sclerosis and management in sub-Saharan Africa. It aims to bring to the fore the growing prevalence and challenges of people living with multiple sclerosis in the face of increasing incidence.

Methods: We conducted a literature review of articles on multiple sclerosis in sub-Saharan Africa. Papers on the subject were summarised and conclusion established.

Results: Cases of multiple sclerosis has been reported from all regions of sub-Saharan Africa, although not from all countries. Most available studies were case reports or case series. The largest case series was from Kenya. Epidemiological studies were only from South Africa. Data on multiple sclerosis were also collected from papers on the pattern of neurological disease seen in big urban hospitals. No study has explored the incidence and quality of life of people living with multiple sclerosis. There is some evidence that facilities for the management of multiple sclerosis have generally improved as many of the patients had brain MRI.

Conclusion: Robust studies on MS is lacking in SSA. Targeted measures aimed at improving the management and treatment of MS in SSA should include national and international studies in SSA

Keywords: Multiple sclerosis, Sub-Saharan Africa, Prevalence, Case reports.

Introduction

Multiple sclerosis (MS) is a chronic inflammatory disease of the central nervous system and a cause of disability in young adults between the ages of 20 and 40 years. [1,2]The peak age of diagnosis of MS corresponds to the peak age of productivity, thus leading to huge economic loss on those affected. Globally, there has been an increase in the prevalence rates of MS; rising from 29 in 2013 to 44 per 100,000 people in 2020.[3] According on World Atlas of MS, the prevalence of MS in Canada is as high as 290/100,000.[3] In the European region, countries such as Finland and Sweden have prevalence rates of 219/100,00 and 215/100,000 people respectively. In the United States of America, the prevalence rate is as high as 288 in 100,000.[3]

Established risk factors for MS include air pollution, consumption of fast foods, cigarette smoking, exposure to human endogenous retroviruses, measles and Epstein Barr virus infections[4,5] and possibly diet.[6] Studies have suggested that the consumption of fruits, coffee, and high levels of sun exposure in primary school children and university students were protective [7–9]. With increasing population movements and exposure to environmental toxins, more and more people in areas with otherwise low prevalence rates of MS such as sub-Saharan Africa (SSA) are reporting rising cases of MS in the last few decades. From the middle of the last century, hospital-based data have often suggested the MS was not found among blacks living in sub-Saharan Africa. Earliest studies from South Africa were focused white South Africans[10,11]. Lack of data from Africa in the past might be attributed to several factors such as the prevailing socioeconomic state of blacks at that time. Others include lack of access to good and well-equipped hospitals, preference for non-orthodox care and lack of manpower and expertise in the field. Since the 1940s papers on disseminated neurological diseases resembling MS started appearing in the literature[12] and since then several case reports and reviews have been published.

The aim of this review is to summarise the available reports on MS and give an updated view on the current state of MS among Africans living in sub-Saharan Africa.

Methods.

Methods:

We reviewed all available papers online on MS in sub-Saharan Africa with particular emphasis on blacks living in the region using the standard approach for conducting a scoping review[13]. We first set out to identify research questions, secondly, we selected relevant databases, thirdly study selection and data extraction and lastly result interpretation, summarization and dissemination. We looked at all available data on the internet on MS from SSA up until early 2024. This timespan was considered considering the paucity of data on MS in literature.

Three research questions were formulated namely: What is the epidemiology of MS in SSA? Are there case reports of MS in SSA? Are there review articles on MS in SSA? Is MS captured in any hospital-based study that described the pattern of neurological diseases in SSA. Are there laboratory, neurophysiological and radiological studies that were focused on MS in sub-Saharan Africa.

A computerized search was conducted in EMBASE, MEDLINE, AJOL (African Journals Online) and Google scholar. The search strategy included the following keywords: multiple sclerosis, inflammatory diseases on the central nervous system, epidemiology of multiple sclerosis, laboratory investigations in multiple scleorsis, profile of neurological diseases, Africa. These key words were associated with Africa, sub-Saharan Africa, specific country names (such as Kenya) and regions (for example, southern Africa). We included all available studies in English Language or with English language translations. The reference list of review studies was examined to identify if other studies were not captured through the electronic search. Suitable titles were subsequently added if they met the criteria for review.

Study selection

The authors screened papers by abstract and identified those for full text review. Duplicates were removed. We included peer–reviewed original journal articles as well as case reports and case series. Publications with only abstracts were included if the title of the article was explicit enough. Publications from Northern Africa were excluded. All studies included in this review were summarized and relevant points summarized.

Ethics approval. Ethical approval was not required as no primary data was collected.

Statistics. No statistical tests were conducted.

Results:

A total of 43 publications were identified through the database search. Most of the papers were case reports 19)42.2%) and studies on the pattern of neurological cases seen in tertiary hospitals across the sub continent 6(13.3%). Only four papers (8.9%) dealt on the epidemiology of MS. Table 1One article each reported on health seeking behaviour, neuro imaging and vitamin D deficiency in MS patients. Table 1.

Publication Characteristics of MS sub-Saharan Africa.

The number of articles per country is shown in Figure 1. Most of the publications were from Nigeria and South Africa. All epidemiological studies were based in South Africa.

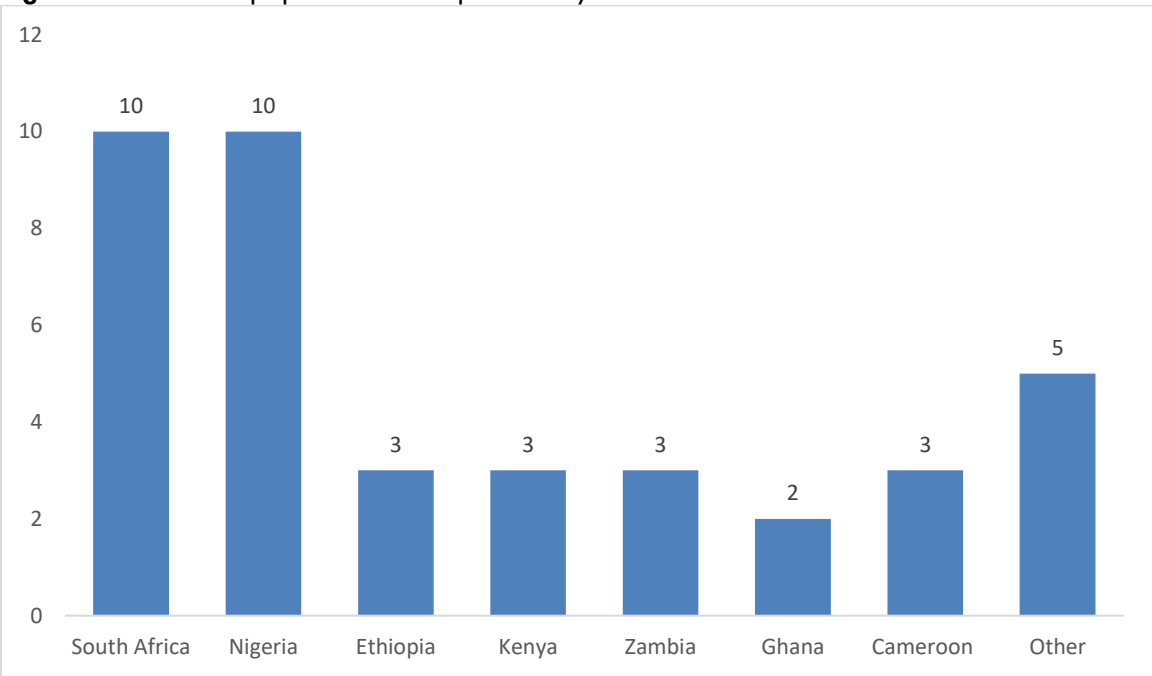
Table 1. Summary of available studies on Multiple Sclerosis in sub-Saharan Africa.

Authors	Year	Country	Comments
Goldstein B[12]	1946	Not stated	Case report
Dean G[10]	1967	South Africa	Epidemiology
Ames FR[11]	1977	South Africa	Epidemiology
Kanyerezi BR et al.33	1980	Uganda	Case report
Rosman KD[17]	1985	South Africa	Epidemiology
Tekel-Haimanot R.[24]	1985	Ethiopia	Case report
Bhigjee AI.[18]	1987	South Africa and Zimbabwe	Case series
Adam AM. [18]	1989	Kenya	Case report
Mbonda E et al.[23]	1990	Cameroon	Case report
Dean G[20]	1994	South Africa	Case report
Kioy PG[45]	2001	Kenya	Neurophysiology
Bhigjee AI[16]	2007	South Africa	Epidemiology
Modi G[15]	2008	South Africa	Review
Keme-Ebi [26]	2008	Nigeria	Case report
Onwuekwe et al. [27]	2011	Nigeria	Case report
Giampaolo D L[54]	2013	South Africa	Guideline
Okubadejo et al31	2014	Nigeria	Case report
Pretorius C[53]	2014	South Africa	Experiences of Patients with MS
Kuate-Tegueu[37]	2015	Cameroon	Case report
Miskin D P[52]	2016	Zambia	Challenges in diagnosis of MS
Dabilgou et al.[19]	2017	Burkina Faso	Case Report
Joseph J P[25]	2017	Malaysia	Case Report
Komolafe M A41	2018	Nigeria	Pattern of neurologic cases
Camara et al. [20]	2019	Gabon	Case report
Anyiam et al.[30]	2019	Nigeria	Case report
Adefemi DA42	2019	Nigeria	Pattern of neurologic cases
Heine M[46]	2020	Africa	Scoping review
Eze C O[39]	2021	Nigeria	Pattern of neurologic cases
Jamal et al. [21]	2021	Kenya	Case report
Ayele B A[43]	2021	Ethiopia	Neuroimaging
Ayele B A[44]	2021	Ethiopia	Vitamin D deficiency
Bonomi S[47]	2021	Africa, Latin America, Asia, Middle East	Disability progression.
Kruger H[51]	2021	South Africa	Workplace experience
Akpalu A[36]	2021	Ghana	Pattern of neurologic cases
Campbell F C[28]	2022	Nigeria	Case Report
Howlett W P[38]	2022	Tanzania	Pattern of neurologic cases
Usman JS[40]	2022	Nigeria	Pattern of neurologic cases
Aderinto N[48]	2023	Africa	Challenges in management.
Ephoevei-Ga[32]	2023	Togo	Case Report
Chomba M[55]	2023	Zambia	Impact of Delayed diagnosis
Campbell F C[29]	2022	Nigeria	Case Report
Tremlett H[56]	2024	Zambia	Complications of MS
Oduro B D[58]	2024	Ghana	Health seeking Behaviour

Discussion.

The estimated incidence per 100,000 people in the African region increased from 6 in the year 2013 to 9 in 2020.[3] Global burden of MS and its attributable risk factors, 1990–2019 reported a total of 23 509 cases of MS in west African region and 13 071, 3665, and 5667 in the east African, central African and south African regions. The corresponding age standardized rates per 100 000 population were west African region 7.8, east African region 4.7, central African region 4.1 and south African region 7.8.[14] Although these figures are likely to be underestimated due to absence of robust studies, nevertheless, possible reasons for an increasing prevalence include increased westernization of many communities in SSA, increasing pollution and changing lifestyles. Other factors may include increased number of neurologists, higher index of suspicion and increased availability of diagnostic facilities all which may lead to higher reporting. [14] Epidemiological studies are still lacking in most parts of Africa but there are epidemiological studies from South Africa.[15,16,17]

Figure 1. Number of papers reviewed per country



The first epidemiology study on MS in African was carried out in South African whites by Dean.[10] He reported 281 cases of probable MS with an overall prevalence rate for White South Africans of 9.1/100,000 (males 5.4, females 12.8). In 1985 Rosman et al.[17] reported an increasing incidence of 0.2/100 000 in white south Africans per year. These studies were not representative of the whole country as blacks South Africans were not included. Bhigjee and colleagues[16] carried in an epidemiological and clinical study in KwaZulu Natal, South Africa in 1985 and reported a crude period prevalence per 100 000 for whites was 25.63, for Indians 7.59, people of mixed ancestry 1.94 and for blacks 0.22 with corresponding age standardized prevalence per 100 000 of 25.64, 7.15, 1.72 and 0.23, respectively.

The first well documented and confirmed case of MS in a black African was reported in South Africa in 1987.[18] Since then, there have been more case reports, case series and reviews from different African countries although earlier reports were not well investigated.
Dabilgou *et al*[19] reported a case of MS in a 25-year-old male student in Burkina Faso and another case was reported in a 21-years old female in Gabon[20] and both cases were confirmed by MRI. A study that described the demographic and clinical characteristics of patients with MS in Nairobi Kenya reported 99 cases with a male to female ratio of 1:4.[21] Dean *et al* [22] reported seven cases in black south Africans and 5 from Zimbabwe. Mbonda et also reported a case of MS in a black Cameroonian woman[23] and Tekle-Haimanot in an Ethiopian woman.[24] MS was also been reported in a Somali woman outside the continent.[25]

In Nigeria, we are aware of five reported cases of MS; the first was in a 41-year-old man with probable primary progressive MS with locked in syndrome,[26] the diagnosis was majorly clinical because neuroimaging and laboratory investigations were not done. Subsequently, one case report from southeast Nigeria by Onwukwe *et al*[27] and two by Campbell *et al*.[28,29] All cases were fully investigated. Anyiam *et al*[30] in Zaria, northern Nigeria reported a case of MS in a 10-year-old boy who presented with 2-year history of inability to neither walk nor use the left upper limb and a year's history of progressive loss of vision. The diagnosis was also MRI confirmed. Okubadejo *et al*[31] in a case series described definite and fully investigated cases of MS reported frequency as 1.26 per 1000 and with a female to male ratio of 3:1. In Togo two MS cases were reported in one case series.[32] The first patient was 54 years old patient who was first diagnosed as stroke. The second was a 17-year-old adolescent male. The abstract by Kanyerezi et al[33] on their observation in Mulogo Hospital in Uganda was not available.

Historical lack of data on MS in SSA may in fact be similar to other non-communicable diseases because there were no reports coming from the continent. Rarity of non-communicable diseases in the past could have been due to dearth of manpower and the population distribution in a continent where most people were living in rural settings with few or no specialized hospitals. However, with improvements in the doctor to population ratio in the continent, the prevalence of other non-communicable disease has risen. For example, the prevalence of hypertension has tremendously risen from the level it was in the 1970s such that some communities currently have more than 30-50% of their population living with hypertension.[34,35]

There are some studies that included MS as part of the reasons for attending neurology clinics or admission in big urban hospitals. In Ghana, Akpalu reported 150 (2.1%) cases of MS out of 7076 neurological cases seen in the hospital.[36] In Cameroon Kuate et al,[37] using ICD-10 classification reported probable MS in 2(0.2%). Howlett WP et al[38] reported a 0.7% (5 out of 2037 patients) rate in Tanzania. In this series MS was included together with other demyelinating diseases of the central nervous system. Several reports from Nigeria have also reported MS as one albeit rare reason for neurology clinic visits or admissions.[39-42]

Laboratory studies that focused on MS were few but the mere fact that such studies exist is a surrogate to increasing prevalence of MS in the continent. Ayele et al[43] in a cross-sectional study of radiological features of people living wit MS in Ethiopia reported finding similar to what is already known in the literature. He also with other colleagues reported high rates of Vit D deficiency in 25 MS patients.[44] In Kenya, out of 2831 patients who were seen in an electrophysiology laboratory in Nairobi Kenya, nine (0.3%) were diagnosed of MS.[45]

A survey by Modi *et al*[15] found improved diagnostic techniques with most of the subjects having brain MRI. Studies from Nigeria, Ethiopia and Kenya suggest that MRI and laboratory services are available in these countries.[21,39-42] Ayele et al[41] demonstrated that most MS patients have relapsing and remitting variant of MS (66.7%) and classical radiological features of MS. They suggested that that typical neuroimaging features of MS in sub-Saharan Africans is like that of Caucasians. Most recent case reports show that MS patients in other parts of sub-Saharan Africa have access to laboratory services

Some cases from Nigeria[26-28] and Togo[32] were males but that from Gabon[20] was a female. The descriptive study by Okubadejo *et al*[30] from Lagos showed a female to male ratio of 3:1. The cases reported by Tekle-Haimanot[24] in Ethiopia and Joseph et al[25] in Malaysia were women. The sex ratio of the 99 cases reported from Kenya showed a male-female ratio of 1:4.[21] Case series from eastern African and southern African were dominated by females. The age distribution of known cases of MS in Africa-resembles what is already known.[4] It was earlier postulated that the phenotypic expression of MS in black Africans may be different from that of whites/Caucasians[10,46,47], and this possibly explained the lack of case ascertainment.[48] It is possible that MS in Africans may be different from the phenotype described in African Americans where studies have demonstrated greater inflammatory activity within the cerebrospinal fluid and more exacerbations compared to Caucasian Americans.[49] The possibility of generational changes in MS phenotype over time[50] have been suggested. Currently there is little epidemiological evidence to support this assertion, on the contrary trends based on available reports suggest that the clinical presentation of MS may be similar to that seen among Caucasians.[43,46] Clinically most cases reported in among black Africans presented as relapsing remitting MS and primary progressive MS.[21,46,47] Campbell *et al*[28,29] reported rare forms of MS. Most of these case reports were probably published because of the pattern of presentation. There are evidences across the sub-continent to show that MS in many centers. Definite diagnosis and treatment of MS often require—high level expertise and expensive investigative tools which may be lacking in most centres in SSA. Thus, the reasons for paucity of cases may be multifaceted.

MS patient from SSA face numerous challenges in accessing care and treatment. Kruger et al found out that people living with MS manage the disclosure of their diagnosis of MS in order to maintain a favourable relationship in the workplace although most were able to adapt to their workplace.[51] A report from Zambia looked the challenges in diagnosing and treatment of demyelinating diseases (including MS) in the country[52]. The author found that diagnosis was based predominantly on compatible clinical history and neurologic exam findings, and in some cases, more definitely established by cerebrospinal fluid exam and imaging findings. When available, laboratory studies were useful in excluding other known causes of CNS demyelination. Several factors were reported to affect treatment choices and outcome. These include socio-economic status, availability of drugs, and employment status. Other papers have documented improving care, case ascertainment, improved diagnostic tools and increasing manpower although the continent still lags behind many parts of the word.[46,53]

Major challenges in the treatment of MS in sub-Saharan Africa may be divided into inadequate manpower (including neurologists, radiologists, specialist nurses and physiotherapists), cost of investigations, cost of medications (poverty), lack of newer disease modifying agents, poor knowledge of the disease, socio-cultural beliefs and lack of diagnostic tools. These limitations should be similar to what is obtainable across SSA.

MS in principle may be treated in any of the tertiary hospitals excluding the specialized hospitals (such as orthopedic and psychiatric hospitals) and few private hospitals. However, facilities for investigating MS especially with regards to radiological imaging are not available in all tertiary institutions. Some specialized centers may have a visiting neurologist who takes care of neurological cases including multiple sclerosis. Current data however suggests that more people in SSA may have access to brain MRI than before hence the possible reason for rising prevalence.

Although proficiency for the diagnosis of MS has grown in the last few decades, the overall number of neurologist and other specialists in the continent remain very low. There is no record of specialist nurses or physiotherapists in most countries in SSA. Oligoclonal band, for example, can be done in few laboratories even in the large cities. The role of these other specialists in the management MS becomes evident if we consider the chronic sequalae of MS and the associated impact on the quality of life. There are no data on service availability and readiness of different healthcare centres with regard to the treatment of MS in the continent. It can be assumed that MS can be treated in most tertiary and secondary care centres with qualified neurologists and paediatric neurologists, but personal experiences vary widely. Unlike many other neurological diseases cases of MS are few and far in between, hence it may be misdiagnosed as stroke, brain tumors pending the availability of brain MRI. In Nigeria for example, most centres use standard protocols or guidelines from the United States of America or United Kingdom. Data on MS management in private and secondary health centres depends largely on the expertise of the clinician working in those centres. There is a guideline for the management of MS in South Africa.[54]

Treatment of MS in most SSA nations remains basic. Use of intravenous and oral steroids seems to be universal. Immunoglobulins and most recommended cytotoxic drugs are available although still expensive for most people.

Ocrelizumab is also readily available in Nigeria, but this cannot be said of other SSA countries. Access to care and availability of modifying medications are higher in South Africa than in many other countries. In the continent, most people with MS pay directly for the cost of medical care. Though MS and epilepsy do not share similar risk factors but taking a clue from studies that stratified people living with epilepsy into social classes, most of the patients are often in the lower socioeconomic group. This may also be true with MS hence the overbearing impact of poverty in MS may be enormous. The cost of disease modifying agents poses a lot of financial challenge for the patients and has been reported as one of the major causes of non-adherence. Okubadejo et al[31] noted that the annual cost of disease modifying therapy was $21000. There is no data on adherence to medications and hospital visits in patients with MS, however non-adherence to medications will be presumably very high, not only because of cost of treatment but also because of the side effects of medications. In Kenya, 27.3% of the subjects studied were non-adherent.[21] Apart from the economic status of the subjects, other factors that may affect adherence will include religious beliefs, use of herbal and complimentary medicine. People living with chronic neurological diseases have been reported to combine both orthodox and non-orthodox medications; and this may also be true for people living with MS.

Chomba et al[55] studied the impact of delayed diagnosis of MS on Zambians and found out that delayed diagnosis of MS led to increased rates of disability at diagnosis; depression and frustration from living with undiagnosed symptoms; loss of employment or income; increased cost of treatment; loss of confidence in health workers in the country; lack of clarity in understanding MS disease severity and the role of neurologists post-diagnosis; poor treatment adherence; and significant strain on patients' families and loved ones.

No study has addressed the treatment gap of MS in SSA. Based on individual case reports and studies on other neurological diseases, the treatment gap in neurological diseases including MS is unacceptably wide and patients report to the hospital after many years. Factors leading to wide treatment gap will include wrong diagnosis from onset, delays in investigations and lack of expertise.[55] Others would include cost of drugs, access to drugs, superstitious and cultural beliefs, long distances to health facilities and traditional care preferences. These factors are more likely to be more acute in rural than urban centres and may also have geographical variations within the continent and individual countries. Major contributors to the overall treatment gap included those who were never diagnosed (diagnostic gap). Diagnostic gap for MS remains very wide. Limitations in treatment of MS has been reviewed by Heine et al[42] and Aderinto et al. [49]

There is no data on the outcome of MS in most parts of SSA, but it is not expected to differ significantly from region to region.[46,49] Many cases of MS may eventually be diagnosed after the patients have become blind, wheelchair bound or have developed contractures and bed sores. The rate of development of disabilities is directly related to the frequency of relapses. In the African region, with poor access to care and medications relapses are likely to be very frequent and subsequently the rate of physical disability. In Zambia one study compared the comorbidities in MS and neuromyelitis optica spectrum of disorders.[56] Out of 17 cases of MS, 11(64.7%) has at least one disability; ten of the eleven (91%) had physical comorbidities and 5 (45.5%) had psychiatric comorbidities. The odds of any physical comorbidity was higher in MS was 6.9;95 %CI:1.4–34.7, p=0.02. Comorbidities associated with MS include neuropsychiatric, cardiovascular, metabolic and other autoimmune disorders.[57] These comorbidities increase the burden of the disease and eventual outcome. Psychiatric comorbidities such as depressive and anxiety disorders which may contribute to non-adherence to disease modifying therapy, thus resulting in worse outcomes. Access to psychiatrics by people with MS may be limited by the experience of the managing physicians and their ability to elicit early signs of psychiatric disorders in these patients. Neuropsychiatric care as well as access to physiotherapy increases the cost of care for the disease. Epilepsy in people living with MS may add to the already high burden of epilepsy in sub-Saharan Africa.

Quality of life studies have shown that MS affects quality of life in several domains. In South Africa Kruger et al[51] reported that people living with MS manage the disclosure of their diagnosis of MS to maintain a favourable relationship with the workplace; and despite various physical and psychological limitations, participants were mostly able to adapt to their work environment. With limited treatment options, poor socio-economic status and lack of medications the quality of life of people living with MS remains very poor in SSA. Currently there are no studies on the quality of life in SSA.

The knowledge of MS in Africa is lacking even among physicians and limited among neurologists.[48] There is almost a universal lack of knowledge among the populace thus most new onset cases are first considered as stroke or brain tumors. This chiasm is further entrenched by cultural and religious beliefs which often regard chronic and unexplained medical cases as the consequences of spiritual problems. Such beliefs are often reinforced by both Christian and Islamic interpretation of sickness. Studies have shown that such beliefs are the same irrespective of the level of education, age or the place where the respondents live. Oduro in a qualitative study carried out in Ghana, explored the health-seeking behaviour of five purposively selected patients with MS in Ghana through in-depth interviews. The study showed a lack of awareness about MS, and the high cost of treatment causing patients to seek non-biomedical forms of care, such as herbal remedies and divine healing.[59]

Some MS organizations exist in SSA. There is online evidence of MS organizations in many countries within the region. In Nigeria for example, the Nigerian Society of Neurological Sciences and several other private organizations are involved in increasing awareness of MS. Some private organizations offer some level of rehabilitation or socialization programmes for persons living with MS. These include advice, counselling, referrals, and social support. Several training and update programs have been conducted by the Nigerian Society of Neurological Sciences. There is some evidence that medical school curriculum has been revised to place more emphasis on neurology including multiple sclerosis.

Conclusion.

There is some evidence to suggest an increasing prevalence of MS in sub-Saharan Africa, however the overall prevalence remains low. Care of MS is wrought with late diagnosis and unavailability of drugs and more patients are likely to have brain MRI. Robust studies on MS is lacking in SSA. Targeted measures aimed at improving the management and treatment of MS in SSA should include national and international studies in SSA

Conflicts of Interest. The authors have no conflicts of interest.

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