Review

Prevalence, impact and solutions to Buruli ulcer disease in Nigeria: a review

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Abstract

Background: Buruli ulcer (BU) is an infectious disease caused by Mycobacterium ulcerans. This review brought to the fore the prevalence, burden and solutions to BU disease in Nigeria.

Methodology: A systematic search of literature was conducted using the following search engines, Google, PubMed, Google Scholar, Infolep, WHO website, Web of Science, African Journal Online, Biomed central and BASE Search. A total of 74 articles were found and 30 were included in the review. The searches were done between September and November 2022.

Results: In communities in Nigeria where BU is endemic, myths and cultural values and traditions constitute barriers to the management and control of the disease. BU patients have very long delays before diagnosis and long hospitalization during treatment. This delay in diagnosis is responsible for the high healthcare costs with accompanying deformities and disabilities. Even though the mortality rate from BU is low, the burden has both economic and social dimensions. The patients are stigmatized mainly due to the poor community knowledge of the disease, hence experience social isolation and suffer job losses and high school drop-out rates.

Conclusion: The burden of BU in Nigeria is high. The patients present late which worsens the socio-economic impact of the disease. Increasing awareness of BU among the populace is very essential. Involvement and orientation of traditional healers could facilitate early referral of cases. There is need to decentralize BU treatment services. The mental health needs of BU patients during and after treatment should be given utmost priority.

Keywords: Buruli Ulcer, Prevalence, Nigeria.

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Introduction

Buruli ulcer is an infectious disease caused by an environmental mycobacterium called Mycobacterium ulcerans. The organism requires a low (2.5%) oxygen concentration and grows at temperatures of 29-33^{o}C. It causes tissue damage and same time inhibits the immune response because of its production of a unique lipid toxin referred to as mycolactone. The disease affects mostly the skin and sometimes the bone thus causing permanent disfigurement and long-term disability.[1] It is the third most common mycobacterium disease worldwide.

Most cases occur in tropical and subtropical regions except in Australia, China and Japan. The disease is reported in 33 countries in Africa, the Americans, Asia and the Western Pacific.[1] Buruli ulcer infection begins as a painless nodule or plaque most times associated with edema. These features will ulcerate within four weeks even with antibiotic treatment and could lead to deformities if it affects the bones. According to the World Health Organization (WHO), the disease is classified into three categories of severity. Category 1 are single small lesions which account for 32% of cases. Category 11, non-ulcerative and ulcerative plaque and oedematous forms, 35% and Category 111, the disseminated and mixed forms such as osteitis, osteomyelitis and joint involvement, (33%). The lesions occur mostly on the limbs; (35% on upper and 55% on lower limbs) and 10% on other parts of the body.[1] The course of the disease reveals a two-stage process: a pre-ulcer and ulcer stages. In communities where the disease in endemic in Nigeria, myths and cultural values and traditions constitute barriers to the management and control of the disease. [2] Thus, BU patients in Nigeria have very long-time delays to diagnosis (50.6±101.9 weeks) and long hospitalization during treatment, (108±60 days) [3]. The delay in diagnosis creates a high health care cost with accompanying deformities and disabilities.[2] The aim of the review is to ascertain the prevalence, impact and solutions to Buruli ulcer disease in Nigeria.

Methods

A search of the literature was conducted using the following search engines, Google, PubMed, Google Scholar, Infolep, Web of Science, Biomed central, African Journal Online, WHO website and BASE Search. Search was done using the keywords which included Buruli ulcer, Mycobacterium ulcerans disease, burden, impact and solutions. A total of 74 articles were found of which 30 were used in the preparation of the manuscript. The literature searches were done by all the authors between September and November 2022. They worked independently after which the selection process was harmonized by two of the authors who reconciled differences where they existed. All articles relevant to the objectives of the study were included and grouped accordingly in the review. Only articles written in English language were included in the review.

Prevalence of Buruli ulcer disease in Nigeria

Between the years 2011 and 2016, a total of 549 cases of Buruli ulcer were reported by the National Control Program for Tuberculosis, Leprosy and BU. Thus, the annual case detection rate was 0.06 per 100,000. [4] The states in Nigeria with the highest number of cases included Ogun, (167 cases over the six years included in the review) and Anambra with more than 50 cases over the same period. BU was reported from 46 local government areas in 10 states. Majority of the cases were found in the southern part of Nigeria. [4] In all, over 37% of new cases were diagnosed with category 3 lesions while 29% had limitation of movement at diagnosis. These figures are above the WHO targets for BU control by the end of 2014 and demonstrate the need for early BU case detection in the country. [4]

Burden/Impact of Buruli ulcer disease

Buruli ulcer is regarded as one of the most neglected tropical infectious diseases. There is evidence that in communities in Nigeria where the disease is endemic, myths and cultural values and traditions constitute barriers to the management and control of the disease [2] This is because the people perceive the disease as being caused by witchcraft hence, they do not seek treatment in a health facility.[5] The effect is that BU patients in Nigeria have very long delays to diagnosis (50.6±101.9 weeks) and long hospitalization during treatment. (108±60 days) [3] This delay in diagnosis is responsible for the high healthcare cost with accompanying deformities and disabilities [2]. For example, among a group of 82 BU cases that presented in three treatment centers in Benin Republic within a ten-year period, 82.9% were diagnosed as WHO category 111 lesions.[6] The delay in diagnosis makes it possible that pre-diagnosis costs account for as high as 94.8% of total costs.[7] Thus, the direct costs of BU diagnosis and treatment are

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catastrophic to majority of the patients and their families.[7]

Even though the mortality rate from BU is low, the burden of the disease has both economic and social dimensions. [8] The economic burden includes the direct cost of illness and indirect costs, and income lost due to illness [8]. In Nigeria, although the treatment services for BU are free, other related costs exist including cost of feeding and transportation which because of prolonged hospital stay do constitute an economic burden [7,9] The patients are stigmatized mainly due to the poor community knowledge of the disease,[10] hence experience social isolation and suffer job losses [11] and drop out from school.[12]

Stigma attached to a health condition adversely affects the psychosocial aspects of life [13] including the participation in society [14] The psychological problems associated with the disease impedes their participation in economic activities further worsening the poor economic status of their households.[15] A study in Ghana revealed that caregivers of BU patients as a result of their caregiving role incur financial, psychological and health problems [16] BU also impacts on household costs. For example, household costs for those involved in the care of BU patients were 8.6 times higher than those of households who socially isolated the patients.[12]

Solutions to the problems of Buruli ulcer

There are no primary preventive measures for BU since its mode of transmission is unknown. There is no vaccine against Buruli ulcer at present. The vaccine Bacillus Calmette-Guerin provides only a very limited protection against the disease. Thus, the objective of BU control is to minimize suffering, disabilities and socioeconomic burden.[1] Consequently, it has been postulated that increasing health education and active search for the disease will raise the awareness of the disease among the people and enable the people to seek care early [17] Early case finding will necessitate improved access to BU treatment services in Nigeria and this demand building the capacity of health workers to identify the disease especially in endemic communities.[3] Furthermore, there is the need to improve patient education about BU and engage informal health providers as way of reducing pre-diagnostic delays and costs.[7]

A study in Benin Republic revealed that providing access to protected water like wells was a practical way of reducing the incidence of BU [18]. Thus, efforts at urbanization could be protective to the development of BU [19] and this could be achieved by improving access to protected water supply. Also, prevention of the disease could be realized by encouraging water sanitation and hygiene (WASH) services and practices which is important for all diseases transmitted by lack of hygiene.[20]

Due to the burden of care on caregivers of BU patients, a study in Ghana concluded on the need for the provision of financial assistance such as waivers on cost of hospital services and provision of incentives to caregivers.[16] However, studies in Nigeria went a step further and recommended the decentralization of BU treatment services.[3,7] In another context, a decentralized treatment service was viewed as socially more compatible due to the adverse effect of treatment on income of households of people affected by the disease.[21] Also, when BU patients are treated at home, the women who are responsible for the welfare of the households remain in their homes instead of accompanying the patients to the health facilities designated for treatment. There is evidence that such displacements of women for the purpose of caregiving affect the well-being of their households [22]

Moreover, the decentralization of treatment services may also require that laboratory centers for the diagnosis of BU are located in the rural areas where the burden of the disease is more.[20] There may be the need to include psychosocial interventions for both the BU patients and their caregivers.[16] While emphasis is being placed on early case detection for BU, those who presented late should participate in self-care interventions during the period of treatment. A study in Anambra state, Nigeria revealed that being part of such groups is associated with decreased health care costs, improved quality of life and reduced disability status.[23] Attention should also be given to physiotherapies so as to promote physical and psychological well-being.[15] Eventually at the end of treatment, BU patients should be empowered economically by providing them with small scale welfare grants.[15] This is to cushion the high economic burden of the disease on the patient and members of their households.

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Status on knowledge of BU

Currently, there is the possibility of all oral antibiotic treatment for BU.[24] This will necessitate a change from use of injectable rifampicin and streptomycin to oral rifampicin and clarithromycin. Concerning its pathogenesis, it has been found that the major cellular target of its major toxin mycolactone is the Sec61 translocon.[25] This molecular machine is located at the interface between the cytosol and the endoplasmic reticulum. Even though considered controversial, some measures of prevention for BU have been observed with the use of Baccillus Calmette-Guerin (BCG) vaccine.[26] Presently, vaccines specific to Mycobacterium ulcerans which targets a mycolyl transferase (antigen 85A) of the bacteria are being tested.[27] Suffice it to say that there is currently no ascertained measure for preventing the disease. There is a postulation that the exact disease burden of BU in underestimated.[28] This is attributed to the limited awareness of the disease. Consequently, it is expected that increasing the awareness and understanding of BU will ensure a more defining fight against the disease.[28]

Strengths and limitations of the review

This could be said to be the first review article on BU disease in Nigeria thus revealing the burden and socio-economic impact of the disease. This is expected to engender more attention on the disease including that of policy makers and encourage more research. A limitation of this study is that only articles written in English language were included in the review.

Policy Implications

There is the need to increase the awareness of the disease among the populace and provide access to protected water sources. Involvement of traditional healers in the management of BU is essential so as to ensure early referral of cases. Locating BU treatment centers in rural areas where the disease is more prevalent will help to reduce the cost of hospitalization and the economic losses on the part of caregivers who are mostly women. Attention should be paid to the mental health needs of BU patients and their caregivers.

Conclusion

The burden of BU in Nigeria is very high. Moreover, the patients present late which worsens the socio-economic impact of the disease. Increasing the awareness of BU among the populace is very important. Involvement and orientation of traditional healers will facilitate early referral of cases. There is need to decentralize BU treatment services. Furthermore, attending to the mental health needs of BU patients during and after treatment should be of utmost priority,

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