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CLINICAL CASE STUDY

`Window on the World': Buruli ulcer in the Ga West Municipality, Ghana

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Buruli ulcer is an endemic condition in Ghana, and is second only to leprosy in terms of societal economic impact and the devastating disfigurement its pathological progression inflicts. However, it receives little attention in the Western world.

This article raises awareness of Buruli ulcer in the worst affected region of the Ga West municipality in Ghana, as well as a broad overview of its profile in practice from the perspective of those living with the condition.

History and Global Distribution of Buruli ulcer

Buruli ulcer is a neglected yet common sub-tropical disease caused by the *Mycobacterium ulcerans* bacterium.¹ It was first formally identified in the late 1890s by Sir Albert Cook, a missionary doctor, in the Ugandan district of Buruli.² Despite its origins, there have been no reported incidences of Buruli ulcer in Uganda since the 1980s.³ In Australia, the condition became known as both Bairnsdale ulcer and Daintree ulcer in the 1930s due to its prevalence in these regions.⁴

Inconsistency in its clinical presentation, recognition and the limited clinical diagnosis by health workers makes accurate prevalence rates a challenge to establish in several other countries.⁵ Cases of Buruli ulceration have been formally diagnosed and recorded in over 30 countries but central and western Africa still record the highest endemic rates.¹⁶ Twelve of the 15 endemic countries that provide the World Health Organization with clinical updates on the epidemiology of the disease reported almost 2200 newly detected cases in 2013.¹⁵

In Cameroon, there is a prevalence rate of almost 0.5% involving both active and inactive cases, and 930 cases are detected annually.⁶ Since 2015, Côte d'Ivoire had recorded more than 5000 cases of Buruli ulcer.⁷ Togo, Benin, Burkina Faso and Guinea have also reported increasingly high incidence rates.⁹ Buruli ulcer is rarely diagnosed in countries such as the USA, Europe and Canada, and cases that are detected are usually attributable to contraction of infection by travellers who have visited endemic regions of West Africa.¹⁰

Ghana is the most highly endemic country, with increasing prevalence rates of 87 per 10,000 recorded in the Ga West Municipality alone.¹¹ The major endemic feature of *Mycobacterium ulcerans* inhabitation is the presence of swampy and subtropical landscape.¹⁷ Several studies regarding transmission of Buruli ulcer in Ghana have verified a link between inhabitants who use the Densu River as their major water supply and the likelihood of being infected with the disease.¹² Around 70% of the cases detected annually are inhabitants who live close to the Densu river, which has been identified as a centre of transmission.¹³

Distribution of Buruli ulceration globally is indicated in Figure 1, illustrating endemic areas and those with a high incidence of the condition.

Figure 1: Distribution of Buruli ulcer Globally

INSERT FIGURE 1.

Aetiological Factors and Clinical Manifestation of Buruli ulcer

Buruli ulcer affects people of all ages, but children aged 1-15 years account for the highest incidence rates.¹⁸ In West Africa, Buruli ulcer is strongly associated with poverty and its association with little or no access to formal education.¹⁹ The disease commonly affects residents living or working in poor rural communities with restricted access to physical healthcare resources.²² In Ghana, although hospital treatment is free, the vast majority of Buruli ulcer patients and their families and carers cannot sustain the financial constraints that the condition imposes, such as paying for basic dressings, due to their poor socio-economic circumstances. Recent research conducted in Ghana reveals that more than 60% of families cannot afford to support a relative with Buruli ulcer, which consequently leads to patient isolation during care.²¹

Localised Endemic Regions in Ghana

In endemic areas, trained healthcare professionals detect and diagnose Buruli ulcer before sufferers are referred for formal diagnosis and management. The main confirmation tests for Buruli ulcer are IS2404 Polymerase Chain Reaction (PCR), direct microscopy, microbial culture, histopathology and the Ziel Nelson (ZN) stain. PCR is the most commonly used method because of its sensitivity and the speed with which results are provided (within 48 hours).²⁹

The Ga West Municipality forms one of ten districts in the Greater Accra region of West Accra; Ghana's capital. It has an estimated population of 550,000, and has a land area of about 692km². The majority of the inhabitants are subsistence farmers, ³⁰ so sand weaning is a common practice. This has led to the development of numerous surface bodies of water, which are commonly used for activities such as farming and minor fishing; they are also a haven for water-borne diseases such as Buruli ulcer, malaria and schistosomiasis.³¹ Less than 40% of the inhabitants have a sanitised water supply, with the majority depending on ponds, streams and the River Densu for their direct water supply in both agricultural and domestic contexts. As a direct consequence, diseases such as respiratory infection and diarrhoea are commonplace.³²

Poor road networking has led to decreased access to health provision and other significant socioeconomic activities such as educational provision, markets and churches, so many of the inhabitants often seek herbal remedies as first aid to the onset of their ailments.³³

Mode of Transmission

The *Mycobacterium ulcerans* organism has been positively identified in swampy and waterlogged areas, and areas adjacent to rivers.²³ The disease can actively thrive in these ideal conditions that ensure its survival and reproduction.²⁴ Environmental changes such as deforestation, dam construction and agricultural activities have also been reported to increase numbers of the organism significantly. ²⁵ Its mode of transmission is unclear, but several studies have suggested the involvement of certain aquatic insects, especially *Naucoris dymplonychus*, however this has yet to be

proven. Most recent evidence indicates transmission via breaches in epithelial tissue.²⁶ There is not yet any evidence of transmission from person to person.²⁷

Clinical Pathology

Buruli ulcer can appear on any anatomical region of the body, with greatest incidence of infection in the lower limb. This is predominantly due to more frequent lower limb exposure to areas of soil and vegetation.

The development of the condition is characterised by two stages; pre-ulcerative and ulcerative stage. The pre-ulcerative stage is characterised by a painless, anatomically fixed nodule, papule, oedema and the plaque. The frequent appearance of these lesions on the lower limb is attributed to contact of the legs with stagnant water. The World Health Organisation estimates that 35% and 55% of cases recorded appear on the upper and lower limbs respectively, while the remaining 10% appears on other anatomical sites.³⁴

Lesions are classified according to their size, characteristic appearance and anatomical location in three broad categories:

1. Category I: a single lesion measuring less than 5cm in diameter.
2. Category II: a lesion measuring between 5 and 15cm.
3. Category III: a single lesion measuring more than 15cm that appear at critical sites such as the breast, eye and genitalia.

A single Buruli ulcerative lesion large numbers of the *Mycobacterium ulcerans* organism, usually in clusters or in smaller units at the centre of the lesion (Thangarag et al, 1999 –**AUTHOR: THIS DOES NOT APPEAR IN REF LIST**). *Mycobacterium ulcerans* produces mycolactone, a toxin with cytotoxic and analgesic properties, which make the established lesion painless.³⁶ As the disease progresses, surrounding structures such as nerves and blood vessels become progressively infected.³⁷ The appearance of these granulomas (which contain epithelial and Langhan's Giant cells) is a clear indication that the immune response of the patient has a significant role in the elimination of the organism from the body.³⁸

All phases of disease progression predispose the patient to the risk of developing the secondary ulcerative stage if they are not detected and treated early. Due to the painless nature of the pre-ulcerative stage, most affected patients ignore its presence but become more alarmed at the secondary ulcerative stage. Painful ulceration develops as a direct result of the underlying infection; it may spread to destroy extensive areas of the dermis and, in the most severe instances, affect bone tissue. This, in turn, leads to the formation of permanent limb contractures. These contractures lead to permanent disability in the majority of cases. Some ulcers do heal without intervention but only if the surrounding anatomical and physiological structures remain unaffected by the infective organism.⁴⁰

Figure 2: Clinical Manifestations of Buruli ulcer

INSERT FIGURE

Source: (World Health Organisation, 2000).

Local Healthcare Infrastructure and Buruli ulcer

Ga West Municipal Hospital (GWMH) which is located in the municipality's capital (Amasaman), is the major surgical and referral centre for Buruli ulcer. Though this hospital is in an area ranked the fifth most endemic Buruli ulcer district in Ghana, it records the highest case-loads in terms of active and healed lesions.^{41,42} The Buruli ulcer unit was established by World Vision Ghana, and each year up to 90 patients are admitted for long-term treatment.⁴² One of the major pre conditions for admission to the unit is the identification of a carer who will take responsibility for the patient until discharge. The unit is made up of a team of doctors, lab technicians, nurses, researchers, care assistants and physiotherapists. Wound dressing is undertaken twice weekly for both inpatients and outpatients, although daily dressings are often advocated depending on the condition of the wound.⁴³

Socio-cultural Overview of Buruli ulcer

The literature around the socio-cultural impact of Buruli ulcer highlights an array of experiences in relation to physical symptoms, emotional coping mechanisms and the wider psychological and social impacts of the condition.⁴⁴ Poor recognition of the initial symptomology of the illness, coupled with a delay in the identification of the illness and delay in seeking treatment, culminates in poor compliance with recommended treatment regimens.⁴⁵

Culturally women suffer less social isolation in relation to Buruli ulcer infection than men, who are less likely to seek treatment at any stage of the disease, despite being most likely to be the main wage earner in Ghanaian culture.⁴⁶ Social life in Ghana often revolves around leisure activities centred in swimming, gardening or travelling (Brown, 2005). Stigmatisation due to wound appearance and the resultant disabilities that can occur as a direct result of the condition means that sufferers become increasingly socially isolated.⁴⁷

Culturally in the Ga West municipality, Buruli ulcer is believed to have supernatural origins, although a small sector of the local population do acknowledge swimming in rivers or ponds as a risk factor.⁴⁸ Since knowledge of the condition's origins has a significant impact on whether people seek medical intervention or use witchcraft to oust it, significant delays in patients receiving orthodox medical diagnosis and intervention are common.⁴⁹ It has been locally reported that 51% of their respondents attribute the cause to witchcraft, sorcery and curses. Social stigmatisation in relation to perceived supernatural punishment or negatively deserved karma surrounding people with the condition also provides an insight into why sufferers or their families and carers do not seek help.⁵⁰

Significant delays in seeking medical aid are also associated with perceptions of the disease's prognosis, in particular the belief that diagnosis will automatically lead to a referral for amputation of affected limbs.⁵¹ Lack of pain on a pragmatic level also means that, since sufferers are not in any significant discomfort, their everyday activities can continue largely unhindered until the more pronounced ulcerative phase of the disease.⁵²

Carer Designation

Carers can be defined as those who provide support and assistance to Buruli ulcer patients, ranging from practical help with dressings to the provision of psychological support and spiritual aid. Carers are predominantly 50 years of age or older, female, and usually are immediate relatives of the sufferer. Carers are often involved in health promotion and are a valuable resource to the local community in reducing recurrence of tropical disease. The burden of being a carer in such circumstances can be stressful, and often attributed to poor communication with healthcare providers and the practicalities of providing care in an inpatient setting.⁵⁴ Prognostic outcomes of Buruli ulceration are positively impacted upon by the presence of carers. The average time spent as an inpatient for Buruli ulcer patients and their carers is 91 days, and nearly all treatments centres regard carer accompaniment as a mandatory requirement as part of the admissions protocol.⁵⁵

Fiscal Implications of Buruli ulcer

In addition to the cost to the national economy in Ghana, Buruli ulcer has a much greater impact at a micro-level for affected patients. Their carers and families suffer increasing poverty in relation to the socio-economic impact of the disease.⁵⁶ Recent cost analysis study reveals that, despite the availability of free medical care, Buruli ulcer households are still faced with unmanageable costs due to the need to provide regular dressing packs for their relatives. Most households with a low income react to this by withdrawing from care and returning to traditional herbalists for treatment. This is not surprising when the average expense of Buruli ulcer hospital treatment is estimated to be 25% of the average family's household annual income.⁵⁷

Control Programmes

The World Health Organisation in collaboration with the Global Buruli ulcer Initiative has outlined several control measures to be implemented at a local community level, alongside the established operational treatment pathways already available.⁵⁸ Education lies at the heart of these interventions, which include:

- Implementation of an early clinical case detection protocol
- Empowering community health workers through education and training in Buruli ulcer care
- Proactive management of confirmed cases via medical and surgical intervention as required and
- The prevention of long term disability via ongoing processes of rehabilitation
- Improved standards of diagnosis in the confirmation of cases via an efficient laboratories infrastructure
- The use of standard Buruli ulcer record forms to accurately report all cases detected
- Strengthening healthcare infrastructure
- Establishing an effective monitoring and evaluation of control actions (World Health Organisation, 2001)

Fig 3: Creating Buruli ulcer Awareness with Community Members in an Endemic Village in the Ga West Municipality, Ghana.

INSERT FIGURE 3

Source: National Buruli ulcer Control Programme

The National Buruli ulcer Control Programme (NBUCP) was established in Ghana in 2002 as a consequence of the Yamoussoukro Declaration, which enforced control programmes in all countries where Buruli ulceration was endemic.⁵⁹ In Ghana, the NBUCP continues to raise awareness of Buruli ulcer for all health workers and the general public. It also seeks to collaborate with health service providers and trains community volunteers who help in the detection and screening of cases early enough to prevent complications or disability. As part of its aim, NBUCP intend to train health personnel to improve case management skill and collaborate with research institutions to conduct detailed studies on Buruli ulcer.

Conclusion

Buruli ulcer remains an endemic condition in Ghana, yet the impact of the disease receives little attention in the Western world. It is second only to leprosy in terms of societal economic impact and the devastating disfigurement its pathological progression inflicts. The fact that, socioculturally, Buruli ulcer is also entrenched in supernatural belief remains a challenge.

In a country where podiatric medicine is not a recognised allied health profession, raising awareness is one of the first steps the podiatry profession can make to challenging and addressing this inertia in international support for the eradication of Buruli ulcer through tailored and affordable treatment interventions. Whether this happens as a direct result of financial aid or practical support is most certainly a debate for the global healthcare community and the politicians whose intervention can mediate this change.

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