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Short Communication

Clinical and Social Aspects of Leprosy (Hansen's Disease) and Contemporary Challenges to Elimination

Cassandra White*

Department of Anthropology, Georgia State University, USA

***Corresponding author**

Cassandra White, Department of Anthropology, Georgia State University, 33 Gilmer St, 343 Sparks Hall, GA 30303, USA, Tel: 1-404-413-5150; Fax: 1-404-413-5159; Email: cwhite@gsu.edu

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Abstract

Although there is an effective treatment for Hansen's Disease (leprosy), there are still 200,000 or more cases reported each year around the world. This paper explores some of the future challenges to controlling Hansen's Disease transmission and preventing disability. These barriers include the long incubation period of the disease; the development of disabilities post-"cure"; problems with case detection and coverage in remote areas; the existence of an animal host for the disease in the Americas; and underreporting of cases due to problems in healthcare coverage in some endemic areas as well as possible pressure to underreport that result from global elimination campaigns.

ABBREVIATIONS

WHO: World Health Organization; MDT: Multidrug Therapy; M Leprae: Mycobacterium Leprae; GIS: Geographic Information Systems

INTRODUCTION

Hansen's Disease (leprosy), caused by infection with Mycobacterium leprae or the more recently discovered bacillus, Mycobacterium lepromatosis [1,2], is one of the oldest diseases known to affect human populations. Although a multidrug therapy treatment (MDT) is widely available and free for people affected by the disease, eradication and even elimination (reduction of new cases to 1 per 10,000 in a population) in certain endemic regions of the world remain elusive. The number of new cases reported each year has been declining globally over the past decade, but there are still over 200,000 cases detected each year [3]. The World Health Organization has shifted its goals slightly from a "Final Push" strategy of leprosy elimination to focus on early detection of disease to reduce severe Hansen's Disease-related disabilities and to prevent all disabilities in young children by the year 2020; in their latest report, WHO still suggests a "leprosy-free world" as a goal. [4] Lockwood, et al., have observed that Hansen's Disease does not meet the conditions of a disease for which an elimination target should be set. [5] The clinical characteristics of the bacilli, the nature of its interaction with human hosts, and a variety of social, economic, and political factors suggest that WHO's vision that includes zero transmission and disease, zero disability, and zero stigma may not make sense for Hansen's Disease in the same way that it might for other diseases.

Signs and symptoms

The most common early symptoms of Hansen's Disease are depigmented spots on the skin; often these spots are insensitive due to associated nerve damage. The nature of these lesions as not generally painful and similar in appearance to many minor dermatological conditions (such as dermatitis, spots from sun damage, and vitiligo) is one factor that results in delays in treatment seeking and misdiagnosis, which in turn can lead to disability. Though Hansen's Disease is often treated or identified by dermatologists because of its manifestations on the skin, it is also a neurological disease that attacks the peripheral nerves. [6] Some people with the disease exhibit neuropathy without any dermatological manifestations, [7] which can also lead to misdiagnosis of Hansen's Disease as diabetes or rheumatoid arthritis.

MDT, a combination of rifampin, clofazimine, and dapsone, is an effective treatment for Hansen's Disease in that people are rendered non contagious shortly after beginning treatment and are considered cured in terms of having no live bacilli in the body after the 6 month-1 year treatment regimen recommended by WHO. However, many people are affected by neurological "reactions" that can continue for many years after MDT is complete. [8] Complications related to these reactions associated with Hansen's Disease can thus occur after affected individuals are "cured" and no longer registered as official cases, but some people who suffer from reactions require follow-up care for many years to prevent severe disabilities from developing.

Transmission and susceptibility

M. leprae and M. lepromatosis are rod-shaped, acid-fast bacilli that are most commonly spread via person-to-person contact through droplets emitted during breathing or coughing. Armadillos are now known to carry and most likely are able to transmit Hansen's Disease to humans as well in the Americas, particularly in the Southeast US, Mexico, and South America. [9] Recently, red squirrels in the United Kingdom were found to carry M. lepromatosis. [10] A recent survey of studies on Hansen's Disease transmission demonstrate that other vectors and reservoirs (including insects, soil, and water)for these bacilli have been considered and have been neither confirmed nor completely ruled out in terms of risk for transmission to humans [11].

Several human genes have been identified to be associated with Hansen's Disease susceptibility in humans [12], while most individuals worldwide are genetically immune. A number of factors related to substandard living conditions have been associated with Hansen's Disease and may contribute to reduced immunity or may be responsible for the spread of the disease itself [13]. In endemic areas, often family members from the same household are found to have Hansen's Disease after one individual is diagnosed; this is in part because of the genetic factors associated with susceptibility as well as the prolonged contact often suggested as necessary for Hansen's Disease transmission [14].

The incubation period in the human body varies, depending on the person's individual immune system, but the WHO acknowledges that this can be up to 20 years [15]. Though it is typically fewer years than this, the incubation period suggests that there are many people in endemic regions who are still harboring the bacillus but who have not developed symptoms. The presence of animal and possibly other environmental reservoirs for the bacilli and the long incubation period for the disease justify an approach to Hansen's Disease control that considers that services for will be needed indefinitely and that the idea of a future with "zero disease" may not be feasible [16].

Case detection and reporting

The World Health Organization has emphasized the importance of early case detection as a key component both for transmission control and disability reduction. However, pressure on local and national governments to achieve elimination goals may result in underreporting of cases. Pressure to meet WHO goals resulted in shifts in how cases are registered and reported, which also effectively resulted in underreporting of cases [5]. In certain regions of the world, as in Northern Brazil, where case detection efforts are ongoing and active, healthcare workers are finding alarming numbers of new cases and high rates of disability among schoolchildren and their household contacts, particularly in interior towns with high levels of poverty. In a sample by Barreto et al., in a high risk area of Pará state in 2015, 11 of 134 schoolchildren (8.3%) tested were found to have Hansen's Disease. Their study suggests that based on their survey and mapping, there could be 80,000 undiagnosed children in the state of Pará alone. [17] Sample survey data from 2013 in Uttar Pradesh and Haryana, in India, also indicates the "presence of a large number of undiagnosed and unreported cases" of Hansen's Disease, which they attribute to limitations of regional healthcare services. [18] Salgado et al., have noted that the "absence of diagnosis of leprosy is not the same as the absence of leprosy" and suggest that reported incidence of Hansen's Disease and related disabilities in Brazil (and possibly in other countries) is much lower than actual numbers, since many regions, particularly the Amazon region, are still difficult to access for researchers and healthcare workers. [16] The use of new medical technologies for identifying potential cases as well as Geographical Information Systems (GIS) mapping and spatial analysis technologies [19] are already being used in Brazil and are promising for future case detection efforts, but as Tiwari and Richardus [20] have recently suggested, "advanced microbiological and operational research is necessary to understand transmission better" before a comprehensive plan for elimination based on the interruption of transmission can be successful.

Stigma and its relationship to hansen's disease control efforts

Stigma is often discussed as a problem that impacts the quality of life and self-esteem of people affected by Hansen's Disease, but it should also be understood as a possible factor in Hansen's Disease control. The relationship among stigma, transmission, and disability is a complicated one. Existing stigma related to Hansen's Disease might result in people avoiding treatment-seeking, which can in turn result in the further spread of the disease and the development of disability. [21] Stigmatizing attitudes may have to do with long-standing beliefs that exist in a society but may also be related to other issues, such as anti-immigration/xenophobic sentiment, on the rise currently throughout the global North, that prevent people from seeking treatment because of fear of deportation or segregation [22,23].

CONCLUSION

Future challenges

A number of global changes may affect efforts to control Hansen's Disease transmission. In 2015, there were over 244 million international migrants [24], many of whom come from nations where there are still population clusters where Hansen's Disease is a public health problem. They often move to nations where the disease is not endemic and where they might not know where and how to access treatment, so this could be a challenge in the future in terms of case detection and monitoring to prevent disabilities. Global warming is also resulting in increased migration (for example, from areas where rising sea levels are leaving them without homes, as in Western Pacific region where many people are affected by Hansen's Disease); climate change may result in increased poverty and a deterioration in living conditions in already impoverished areas. At the same time, there is ongoing research on techniques for earlier disease detection, increased data collection using GIS and other mapping technologies, and there is an expansion of work in some communities with healthcare workers and community health agents attempting to reach more people in previously underserved areas. The best approach moving forward should involve a long-term view both in terms of working with people affected by the disease whose experience with Hansen's

Disease extends beyond the completion of MDT and for creating sustainable strategies for Hansen's Disease control on a global scale.

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