Evidence of hidden leprosy diagnosed by active case finding in a highly endemic setting in Colombo district, Sri Lanka

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Abstract

Background: To achieve the elimination of leprosy by 2030, improving case detection, contact tracing and early treatment is essential. However, the extent of hidden leprosy in pockets of endemic areas remains unexplored.

Objective: To determine the prevalence of hidden leprosy and its associated factors.

Methods: A household survey was conducted in the Divisional Secretariat (DS) area, Moratuwa over two months from 1st September 2023 using an interviewer-administered questionnaire. The data collection and screened were done by the public health staff attached to the Medical Officer of Health office after obtaining the written informed consent.

Results: The socio-demographic data were presented as frequency distributions. The prevalence was calculated and presented as proportion with its 95% confidence interval (CI). The factors associated with leprosy were calculated using bivariate and multivariate logistic regression and p<0.05 was considered statistically significant. A total of 6486 people were screened in 2059 premises. Thirteen cases were confirmed as leprosy; thus, the prevalence of hidden leprosy was 20.1 (95% CI 11-34) per 10000 population. The majority (n=10, 77.0%) were multi-bacillary type, and two patients were under 15 years of age, while three were presented with grade II disability. Age above 15 years (p=0.001) and presence of another leprosy patient in the house (p=0.001) were statistically significant with the disease.

Conclusion: High number of leprosy cases were hidden in pockets in DS area Moratuwa, therefore active case findings targeting populations of age 15 years or above and contact screening of the household/d members play a substantial role.

Keywords: Hidden Leprosy, Active case, Sri Lanka

Introduction

Leprosy is a chronic infectious disease caused by the bacterium Mycobacterium leprae, which affects the skin and peripheral nerves and can be progressive to cause permanent damage if left untreated. It is typically characterized by lesions on the skin, as well as disfigurement of the facial features, hands and feet. The disease is spread through droplets of the infected person via the respiratory route [1].

Leprosy has been around for centuries and documented in many ancient texts. While the exact origin of leprosy is unknown, it is believed to have originated in East Africa in the prehistoric era and spread to other parts of the world following migration paths. Sri Lanka has a long history of leprosy, with records of the disease dating back to the 17th century [2]. Although

leprosy was eliminated from the world as a public health concern in 2000, it is noted that 200,000 new cases are detected worldwide yearly [3]. Leprosy was a major public health concern in Sri Lanka until the mid-20th century [4], but the country achieved the leprosy elimination target in 1995, when public health measures such as early detection, treatment, and prevention were introduced. Despite this, leprosy is still detected in Sri Lanka, particularly in certain high-risk communities. The disease is more prevalent in some areas, mainly due to a lack of awareness and overcrowding. The prevalence is estimated to be 0.7 per 10,000 people [5], however, it is much higher in certain high-risk communities as high as 5 per 10,000 people [6], therefore, targeting these areas in leprosy prevention and treatment is crucial.

Active case finding is the systematic screening for the disease, normally outside of health facilities. Its objectives are targeted case-finding and prompt initiation of treatment to rapidly render the patient non-infectious. It is an important strategy to detect leprosy at an early stage to reduce the risk of disability and transmission [7].

People living in high-risk communities are often unaware of the risks associated with leprosy, which means that the disease often goes undetected and untreated [7]. Approximately 2000 cases are reported annually in Sri Lanka [5]. Accordingly, 1550 patients were diagnosed in 2023 and among those 173 were aged below 15 years. Out of the total, the case detection was highest in Colombo, Gampaha and Batticaloa districts where 315, 168 and 151 cases were reported respectively. Usually, one-third of patients from the district of Colombo were detected in the Moratuwa Divisional Secretariat (DS) area [8]. Although mapping of index cases from 2001 to 2022 showed pockets of endemic areas, the extent of hidden leprosy in such pockets remains unexplored. Therefore, a household survey was planned in DS Moratuwa which is identified as the timely needed activity to reduce leprosy in this selected high-risk area.

In a study conducted in a high-burden country, being a male, performing manual labour, suffering from food shortage in the past, being in contact with undetected household members and living in a crowded household are known risk factors for leprosy [9]. Therefore, it is important to identify the associated factors with leprosy in this high-risk community. The objective of this study was to describe the prevalence of leprosy through active case finding and identify the factors associated with the disease in the DS area, Moratuwa.

Methods

The leprosy cases confirmed from 2001 were mapped (Figure 1) and identified the hotspot areas where the highest number of leprosy cases were being reported in DS area Moratuwa. Nine Grama Niladari (GN) divisions: Molpe, Angulana north, Uyana, Koralawella north, Koralawella south, Idibedda west, Moratuwella west, Moratuwella south and Willorawatta were included.
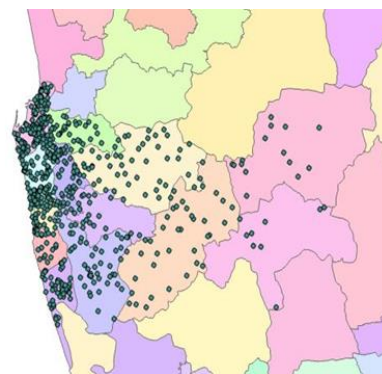

Figure 1: Leprosy cases from 2001 to 2022 in Regional Director of Health Services (RDHS), Colombo

Initial discussions were made with the officials of the Anti-Leprosy campaign, RDHS office-Colombo, community members and religious leaders. The survey was conducted on three consecutive Fridays and Saturdays from 1st September 2023. Permanent or temporary houses, religious institutes (e.g. temples, churches), homes for the elders, homes for children or homes for the disabled, collective living quarters (police and military barrack: school, university and similar hostels) and households as part of business premises such as shops and offices were included. An updated voter's list was taken from the DS office. All houses were divided into blocks of 20 to 40 households. One Public Health Inspector (PHI) and Public Health Midwife (PHM) were allocated to each block and the block was named as "Family team". A total of nine teams were allocated and an additional two teams including one PHI and one PHM were created to visit only unvisited households which were identified as closed by the Family team while their visits or to visit unseen household members by the "Family team" and they were called as "Mopping team". The "Office team" consisted of a Management Assistant and a Development Assistant involved in data management. The suspected patients of having leprosy were referred to a special skin clinic at the community centre every Saturday during the survey period headed by the Medical Officer of Health (MOH) and suspected patients were referred to the Dermatology Clinic at the Base Hospital, Panadura or Colombo South Teaching Hospital. Principal Investigator conducted a half-day training on guiding all team members, on signs and symptoms of leprosy, examination, completion of the data collection tool and referral to the hospital. A pilot survey was conducted in five households on the rest of the day of the training to gain experience in the examination of the people, fill out the data collection tool and estimate the time required to assess a single household. The community was informed of the survey by religious leaders, government officials, and public health officers. All individuals were screened on the presence of skin lesions (patches or nodules), and loss of sensation over the skin lesions (patches) using a "wisp of cotton wool", and the number of skin lesions was counted, if any. Palpation of the nerves was checked. The data were obtained from each eligible household while they were visited by the field officers at their houses after obtaining informed written consent once information regarding the study was provided by an information sheet. All information gathered through this survey was considered strictly confidential.

Frequency distribution was used to describe the socio-demographic characteristics and the magnitude of hidden leprosy cases. The prevalence was presented as a proportion with a 95% confidence interval (CI). Odds ratio was calculated, and multiple logistic regression were carried out to identify significant factors adjusted for covariates and a p-value <0.05 was considered statistically significant.

Results

Of the 2059 households included in the study, 1625 (78.9%) households with 6486 people were screened.

Table 1: Details of the household screening

Total number of people screened for leprosy	Number of patients referred to the Dermatology clinic	No. confirmed as leprosy
6486	72	13

Table 2: Socio-demographic and clinical details of the patients

Characteristics	Non-leprosy people (n=6473)	Leprosy patients (n=13)	Adjusted OR	p-value
Age (years)				
15 or above	6409	11	18.2 (3.9-83.8)	**0.001**
Less than 15	64	2	1.0	
Gender				
Female	4037	6	1.9 (0.6-5.9)	0.236
Male	2436	7	1.0	
No. of household				
More than three	2905	9	0.3 (0.1-1.2)	0.091
Less than three	3568	4	1.0	
Household contacts with leprosy				
Yes	10	6	553.9 (157.9-1942.3))	**0.001**
No	6463	7	1.0	

The positivity rate for leprosy was 20.1 (95% CI 11-34) per 10000 population (13/6486). Of the 72 suspects, 13 leprosy cases were confirmed, giving a detection rate of 18.1% (95%, CI = 9.9%, 28.9%). The child prevalence (leprosy cases among less than 15 years of age) was 3.08 per 10000 population. The socio-demographic and clinical details of the patients are described in Table 2.

A total of 13 new patients were diagnosed either clinically (n = 10) or by biopsy (n = 3). Age above 15 years or more (p=0.001) and history of household contact with leprosy (p=0.001) were significantly associated with the diagnosis of leprosy in both bivariable and multivariable analysis. Among diagnosed patients 10 (77.0%) categorized to multibacillary leprosy and 3 (23.0%) as paucibacillary leprosy (Figure 1) and two of them presented with grade II disability.

The majority (n=11, 84.6%) of patients had initially experienced pale or reddish patches over the skin with loss of sensation as an initial symptom of leprosy.

Discussion

The positivity rate of 20.1 per 10,000 in the targeted GN divisions in DS area Moratuwa which is alarmingly high and well above the 'Elimination' target. The overall prevalence of leprosy in Sri Lanka was 0.7 per 10,000 population in 2012 [6]. The much higher figure we observed in our study could be due to the active case detection strategy, compared to the above-mentioned lower estimates, which used passive case detection. Due to the COVID-19 pandemic from 2020 onwards, active case-finding activities and passive self-reporting of the cases were severely impacted which led to leprosy cases undetected [10]. Further, a study done in Ethiopia reported the prevalence of hidden leprosy as 9.3 per 10,000 of the population (15/16107) [11]. However, a survey done in India reported a prevalence of 37·5 per 10,000 [12], thus, it denoted that though leprosy is eliminated, it is highly prevalent in some pockets. Therefore, active case findings are recommended frequently in these hotspots to explore the hidden leprosy.

The proportion of childhood leprosy was 15.4% (2/13) in this study, which is higher than the national prevalence (10.0%) [8]. The presence of childhood leprosy among new cases denoted the existence of an active source of infection and high ongoing transmission of the disease in the community [13]. It also indicates the lack of disease control by the health system. Household contacts are the main source of infection in our study, with a large OR of 553.9, therefore, PHII were instructed to regular visits in six months to screen the contacts. We found that 15.4% (n=2) of patients presented with grade II disability on diagnosis, showing a prolonged delay in health-seeking. This figure is lower than the findings of Ethiopia (20.0%) and a study conducted in Addis Ababa (23.7%) [14]. This finding is higher than the national figure of 6-8% [15]. The higher proportion of grade II disability in our study indicates the late case presentation and ongoing transmission of leprosy [16]. In addition, it reflects inadequate awareness of leprosy among the community [17]. Stigma and discrimination toward leprosy in the community could be one of the major factors leading to late presentation, thus regular awareness of leprosy to interrupt the barriers is essential.

Our study exposed that hidden leprosy is significantly associated with age and contact history with leprosy but did not show significant differences with gender and number of households. The findings were different to other countries [12, 18]. All study participants resided in a coastal belt in Sri Lanka and most of them shared semi-permanent small houses, where ventilation is poor and overcrowded, thus, it could be one reason for the high endemicity of leprosy in this area, which should be explored further.

Strengths and limitations of the study

This community-based active study shows the hidden leprosy cases which were missed by passive case detection which led to a risk of disease transmission to others. We employed public health staff as data collectors to discover hidden leprosy. All persons were examined during house-to-house visits, thus, the study benefited the individuals who could not recognize painless patches or were not aware of the symptoms of leprosy.

Conclusions

The overall prevalence of hidden leprosy is higher than the national figures. The prevalence of hidden leprosy was significantly high among patients above 15 years of age and houses with a positive patient with leprosy.

Recommendations

An active case-finding targeting above 15 years of age groups in houses with a positive patient with leprosy in pocket areas is crucial to stopping leprosy transmission and its complications. Further studies with larger sample sizes are recommended to identify potential factors associated with hidden leprosy.

Acknowledgements

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