Leprosy-Info

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Leprosy-Info aims to sensitize the members of the International Order to issues pertaining to Hansen's Disease. Until 1975, it as believed that the microorganism *Mycobacterium leprae* responsible for Hansen's Disease was restricted only to humans. In 1975, nine-banded armadillos with leprosy-like features were described from different locations in Louisiana. There has since been evidence confirming the susceptibility to the *mycobacterium* of other armadillo species. Armadillos are mostly found in Central America and South America, thus providing a source of infection to the human community if there is close contact with an infected animal. Armadillos are kept as pets and also serve as a food source (their meat is said to taste like fine-grained, high-quality pork). Since then, other animal species including wild squirrels and non-human primates, have been identified as possibly serving as potential vectors for the *mycobacterium*. To complicate matters, other *mycobacterium species* have been identified as affecting other animal species, though the relationship of these *mycobacterium* organisms to *Mycobacterium leprae* (and the more recently identified *Mycobacterium lepromatosis*) are still not clear. In this issue, a review of the potential animal and environmental reservoirs are reviewed. This facet serves to illustrate the problems of eradicating the disease completely in regions where host animal reservoirs are naturally present especially when these animals have a close relationship to humans.

Animal reservoirs

There remains no doubt that the mycobacteria causing Hansen's disease in humans (*Mycobacterium leprae* and *Mycobacterium lepromatosis*) also affects a number of animal hosts, particularly armadillos, squirrels and non-human primates. These can serve as a potential infection source to humans. The scientific evidence relating to animal hosts of the disease was extensively reviewed in 2020 (Reference: Ploemacher T, Faber WR, Menke H, Rutten V, Pieters T (2020) *Reservoirs and transmission routes of leprosy; A systematic review*. PLoS Negl Trop Dis 14(4): e0008276. Download article).

Recently, archaeological genome studies have shown an association between *Mycobacterium leprae* infections the English red squirrel and medieval strains isolated from archaeological human remains in England. This relationship may not be too surprising considering that English human communities had a close relationship with the English red squirrel during Medieval times. The squirrel was captured for its meat and fur; it was also kept as a pet, possibly before ending up in the pot. The following two illustrations confirm the role of red squirrels as pets during the Medieval and the Tudor ages. The first shows a *Medieval Maiden with a pet squirrel wearing a collar with a bell* (from a 14th century illuminated page); the second shows an oil-on-panel painting by Hans Holbein the Younger dated circa 1526 depicting *A Lady with a Squirrel and a Starling* held by the National Gallery in London.

The realization that animals can serve as host reservoirs for the *Mycobacterium leprae* and *Mycobacterium lepromatosis* has opened up a new vista of research in potential environmental sources of infection. Besides armadillos, red and ground squirrels and various non-human primate species, evidence of infection has been identified also in the Lowland tapirs (*Tapirus terrestris*), and the Margay (*Leopardus weidii*). The potential of animal host reservoirs serving as human sources of infection is made more likely considering the evidence showing that the *Mycobacterium* can survive in contaminated soil and water sources.

These animal and environmental studies have brought about a realisation that complete eradication of Hansen's disease may not be a straightforward program. It has always been assumed that human-to-human transmission was the primary source of infection. These studies emphasise the need to integrate environmental health aspects in any leprosy 'eradication' project.

ABSTRACTS

Spatial–temporal trends in leprosy burden and its associations with socioeconomic and physical geographic factors: results from the Global Burden of Disease Study 2019

Shen L, Ding J, Wang Y, Fan W, Feng X, Liu K, Qin X, Shao Z, Li R. Public Health. 2024 May;230:172-182.

Access

Abstract

Objectives: The purpose of our study was to assess the multiscalar changes in leprosy burden and its associated risk factors over the last three decades.

Study design: We conducted an in-depth examination of leprosy's spatial–temporal trends at multiple geographical scale (global, regional, and national), utilizing information from Global Burden of Disease, Injuries, and Risk Factors Study (GBD 2019).

Methods: Incidence and the estimated annual percentage change (EAPC) in age-standardized incidence rate (ASIR) of leprosy were determined, with countries categorized based on leprosy incidence changes. We examined socioeconomic and physical geography influences on leprosy incidence via Spearman correlation analysis, using ternary phase diagrams to reveal the synergetic effects on leprosy occurrence.

Results: Globally, incident cases of leprosy decreased by 27.86% from 1990 to 2019, with a reduction in ASIR (EAPC = −2.53), yet trends were not homogeneous across regions. ASIR and EAPC correlated positively with sociodemographic index (SDI), and an ASIR growth appeared in high SDI region (EAPC = 3.07). Leprosy burden was chiefly distributed in Tropical Latin America, Oceania, Central Sub-Saharan Africa, and South Asia. Negative correlations were detected between the incidence of leprosy and factors of SDI, GDP per capita, urban population to total population, and precipitation, whereas the number of refugee population, temperature, and elevation showed opposite positive results.

Conclusions: Despite a global decline in leprosy over the past three decades, the disparities of disease occurrence at regional and national scales still persisted. Socioeconomic and physical geographic factors posed an obvious influence on the transmission risk of leprosy. The persistence and regional fluctuations of leprosy incidence necessitate the ongoing dynamic and multilayered control strategies worldwide in combating this ancient disease.

Leprosy in England and Wales 1953–2012: surveillance and challenges in low incidence countries.

Fulton N, Anderson LF, Watson JM, et al. BMJ Open 2016;6:e010608.

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Abstract

Objective: To review all notified cases of leprosy in England and Wales between 1953 and 2012.

Design: National surveillance study of all reported cases. Setting: England and Wales.

Outcome: Number and characteristics of reported cases.

Results: During this period, a total of 1449 leprosy cases were notified. The incidence fell from 356 new cases notified between 1953 and 1962 to 139 new cases between 2003 and 2012. Where data were available, leprosy was more common in men, 15–45 year olds and those from the Indian subcontinent. There was considerable undernotification in 2001–2012.

Conclusions: The high level of under-reporting indicates a need for improved surveillance in the UK. Public Health England, in collaboration with the UK Panel of Leprosy opinion, has revised the

UK Memorandum on Leprosy in order to provide updated guidance on diagnostic procedures, treatment, case management, contact tracing and notification.

Spatiotemporal pattern of leprosy in southwest China from 2010 to 2020: an ecological study.

Zhang M, Qiao L, Sun P, et al. BMC public health. 2024; 24 (1) : 1-14.
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Abstract
Background: Despite many efforts to control leprosy worldwide, it is still a significant public health problem in low and middle-income regions. It has been endemic in China for thousands of years, and southwest China has the highest leprosy burden in the country.
Methods: This observational study was conducted with all newly detected leprosy cases in southwest China from 2010 to 2020. Data were extracted from the Leprosy Management Information System (LEPMIS) database in China. The Joinpoint model was used to determine the time trends in the study area. Spatial autocorrelation statistics was performed to understand spatial distribution of leprosy cases. Spatial scan statistics was applied to identify significant clusters with high rate.
Results: A total of 4801 newly detected leprosy cases were reported in southwest China over 11 years. The temporal trends declined stably. The new case detection rate (NCDR) dropped from 4.38/1,000,000 population in 2010 to 1.25/1,000,000 population in 2020, with an average decrease of 12.24% (95% CI: −14.0 to −10.5; P<0.001). Results of global spatial autocorrelation showed that leprosy cases presented clustering distribution in the study area. Most likely clusters were identified during the study period and were frequently located at Yunnan or the border areas between Yunnan and Guizhou Provinces. Secondary clusters were always located in the western counties, the border areas between Yunnan and Sichuan Provinces.
Conclusions: Geographic regions characterized by clusters with high rates were considered as leprosy high-risk areas. The findings of this study could be used to design leprosy control measures and provide indications to strengthen the surveillance of high-risk areas. These areas should be prioritized in the allocation of resources.

Leprosy: treatment, prevention, immune response and gene function

Li X, Ma Y, Li G, et al. Frontiers in Immunology. Frontiers Media SA. 2024; 15:1298749.
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Abstract
Since the leprosy cases have fallen dramatically, the incidence of leprosy has remained stable over the past years, indicating that multidrug therapy seems unable to eradicate leprosy. More seriously, the emergence of rifampicin-resistant strains also affects the effectiveness of treatment. Immunoprophylaxis was mainly carried out through vaccination with the BCG but also included vaccines such as LepVax and MiP. Meanwhile, it is well known that the infection and pathogenesis largely depend on the host's genetic background and immunity, with the onset of the disease being genetically regulated. The immune process heavily influences the clinical course of the disease. However, the impact of immune processes and genetic regulation of leprosy on pathogenesis and immunological levels is largely unknown. Therefore, we summarize the latest research progress in leprosy treatment, prevention, immunity and gene function. The

comprehensive research in these areas will help elucidate the pathogenesis of leprosy and provide a basis for developing leprosy elimination strategies.

Reactions in leprosy

Grijsen M. L, Naafs B. Community Skin Health. IFD. 2023; 19 (2) : 20-25.
Download PDF of whole Community Skin Health vol.19 issue

Abstract
Here we discuss, in more depth, leprosy reactions, which are a major clinical challenge in treatment. Leprosy reactions are episodes of exacerbated inflammation and may cause nerve damage leading to permanent disability. Reactions may occur before, during or after antimycobacterial treatment. Although reactions belong to the normal course of untreated leprosy, treatment can prevent or precipitate reactions.

USEFUL LINKS

The World Health Organization provides a number of useful resources to help understand the problems associated with Hansen's Disease. It has also designed a strategy aiming to achieve 'zero leprosy' by the year 2030. The W.H.O. Global targets for 2030 include:

- 120 countries reporting zero new autochthonous cases
- 70% reduction from 2020 baseline in annual number of new cases detected
- 90% reduction from 2020 baseline in rate per million population of new cases with G2D
- 90% reduction from 2020 baseline in rate per million children of new child cases with leprosy

These resources can be freely accessed.

- *Towards zero leprosy. Global leprosy (Hansen's Disease) strategy 2021–2030*, W.H.O., Geneva, 2021 Download
- *Leprosy/Hansen Disease: Management of reactions and prevention of disabilities*, W.H.O., Geneva, 2020 Download
- *Leprosy: training of health workers on skin-NTDs*. (W.H.O. sponsored course) Access
- *Global leprosy (Hansen disease) update, 2021: moving towards interruption of transmission*. W.H.O. Weekly epidemiological record, September 2022 Download
- *Global leprosy (Hansen disease) update, 2022: new paradigm – control to elimination*. W.H.O. Weekly epidemiological record, September 2023 Download