



## A MULTIDISCIPLINARY APPROACH TO EARLY DIAGNOSIS AND PREVENTION OF LEPROSY – RECENT REVIEW OF LITERATURE

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### ABSTARCT

**Objective:** of current review of literature is for early diagnosis and thereby effective prevention and control of Leprosy at national as well as primary level through multidisciplinary approach consisting of community medicine, microbiology, pathology departments. **Design:** consists of review of literature related to role of laboratory for

diagnosis of leprosy and recent development in leprosy eradication programme. Inclusion criteria includes relevant publications related to early laboratory diagnosis and prevention of leprosy from mentioned departments. Exclusion criteria includes publications related to multi drug therapy, side effects, treatment compliance etc. **Result:** The search has identified 15 publications consisting of recent advances in both histopathology and microbiology diagnostic techniques and recent updates of Leprosy eradication programme. **Conclusion:** Leprosy is though one of the ancient scourges of mankind even after modernization in all fields it is posing us as one of the unsolved problem. Rapid and early detection of leprosy by applying recent diagnostic methods and apt planning and implementation of national policies is essentially needed for eradication of leprosy.

**KEYWORDS:** community medicine, microbiology, pathology departments.

### INTRODUCTION

The prevalence of leprosy has declined over past 20 years, attributable to WHO free multi-drug therapy (MDT) campaign to leprosy diagnosed cases as a part of LEP. However according to recent statistics, 2010 highest burden of cases in world detected to be in 6 countries and in India being maximum number accounts for 55% of new cases.<sup>[1]</sup> According to March 2012 NLEP report, 0.13 million cases detected in India children 9.7%, the high

proportion of incidence in children signifies as a potent epidemiological indicator to reevaluate all our Leprosy control programmes.<sup>[2]</sup> Therefore there is need to reduce deformities at least if not eradication by early diagnosis, physiotherapy, reconstructive surgery, essentially self care, potential surveillance systems.<sup>[3]</sup>

Encouraging parameters like easily ascertainable clinical signs including macular hypopigmented anaesthetic lesions, practical and simple microbiological (Ziehl – Neelson's staining) and histopathological evidence of early nerve involvement, NCS (Nerve conduction studies) for nerve impairment, effective MDT for interrupting transmission, only possible reservoir of infection (Armadillos) are even though sustainable for possible elimination of Leprosy current scenario i.e., as new cases continue to occur, makes it remote possibility.

It is quite unfortunate that medical, clinical laboratory specialists<sup>[3]</sup> and epidemiologists are alienated from general public health practices. This disunity has its impact on Leprosy eradication. Through multidisciplinary committed approach there is possibility of leprosy eradication in near future.

By using advanced information technologies i.e., GIS Geographical information system to identify risk factors, to plan, evaluate control interventions and to establish burden of the disease one can reduce the problem to certain extent.<sup>[4]</sup>

Clinical diagnosis of leprosy in early stages of the disease also appears to be associated with several factors such as social stigma, appropriate strategies for contact tracing and in indeterminate stage needs thorough histopathological as well as clinical identification that often presents with one or few hypopigmented lesions with no clear sensory loss.<sup>[3]</sup> The role of clinical microbiologists depends on proper selection of diagnostic test. Recently the application of telemedicine resulted in passive case detection<sup>[5]</sup>

## **MATERIALS AND METHODS**

Review of literature consisted of careful methodological search to include all the four medical departments including community medicine, diagnostic microbiology, Pathology in order to obtain relevant latest information about early detection and prevention of leprosy. For which keywords were chosen and a formal search procedure was made. This had resulted in thorough research on problem based study with proper orientation. Relevant search

included about latest prevalence of leprosy, reduce transmission of leprosy, field friendly diagnostic tests.

The electronic databases included were EMBASE, ASSIA. SCOPE MED, BNI, AMED, EMSCO, PMID. PUBMED/MEDLINE

**Inclusion criteria**

1. Estimation of the problem in order to know extent of intervention needed.
2. recent updates of leprosy eradication programmes
3. the selection of biomarkers with best predictive value for development of leprosy for eg PGL – 1 status (given increased risk to develop leprosy in positive patients) and selecting PGL – 1 positives for direct PEP without sensory loss correlating and asymptomatic cases .
4. Relevant search of recent advances in histopathological diagnosis of Leprosy.

**Key words for selected publications**

Included were Publication years 2000- 2014 inclusive

Leprosy, Hansen's disease or Mycobacterium leprae. Prevalence , incidence, age group, WHO, Early case detection by contact tracing, biomarkers, PGL – 1 , NLEP, CMI & HMI responses , epidemiology, clinical features, indeterminate cases, asymptomatic , histopathology, serological tests, GIS (geographical information system), POD (Prevention of disability), NCS, NFI (nerve function impairment). community based rehabilitation. CBR

**Exclusion criteria**

1. The publications that were not meeting inclusion criteria
2. Treatment aspects multi-drug therapy, drug resistance
3. publications prior to 2004
4. detailed histopathological as well as clinical criteria for advanced cases of leprosy
5. dermatological classification of leprosy
6. Acid fast staining and collection of specimens by skin clipping

**DISCUSSION**

National leprosy eradication program was continuously incorporating new strategies for control and eradication of leprosy. In 2005 (April – May) second leprosy elimination project was carried out through independent agency, Indian Institute of Health Management and Research, Jaipur. In 2005 leprosy is eliminated as public health problem at national level and a strategic plan for leprosy elimination was introduced. In 2006-2010 WHO introduced

Global Strategy for further Reducing the Leprosy Burden and Sustaining Leprosy Control Activities. The government has taken major step towards integrating NLEP into the general health system. This enforced that all hospitals, dispensaries and PHCs had to treat Leprosy patients.<sup>[3]</sup> This has resulted in renewed focus on quality of services, effective partnerships reaching underserved communities that resulted in reduced disease burden.<sup>[6]</sup> In 2011 – 2015, The Enhanced Global Strategy for Further Reducing the Disease Burden due to Leprosy: ..Operational guidelines were introduced for Leprosy eradication.<sup>[7]</sup> According to this operational guidelines Leprosy cases with grade – 2 disability has to be reduced to 35percent of 2010's by the end of 2015.<sup>[6]</sup>

Eradication is defined as “permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts,” .After eradication there is no need for interventional measures. In the case of Leprosy as it is one of the few chronic illnesses that has satisfying criteria for eradication, such as diagnosis of leprosy by simple diagnostic microbiology tests, clear clinical signs and symptoms, single possible reservoir of infection ,created scope for leprosy eradication. Even then the current scenario shows that this is remote possibility.<sup>[8],[9]</sup>

Close contact transmission, the speed of transmission, extent of contagiousness are considered as grey areas in leprosy control.<sup>[3]</sup> In a study from Ethiopia, it was said that the average detection delay exceeded 2 years<sup>66</sup>. Close contacts of a leprosy patient can become infected rapidly.<sup>[10]</sup> This is one area that needs thorough research.

By integrating of leprosy treatment into the general health service ,so that they have access to the services of ophthalmologists, surgeons, physiotherapists, and general physicians, there was reduction in leprosy stigma. However alienation of clinical laboratory, epidemiological specialists from public health practioners has resulted in retarded progress in leprosy eradication.<sup>[3]</sup> This disunity also has to be considered for successful eradication.

Even though there are operational guidelines suggested by WHO in 2015, its sustainability is a challenge. The progress in Leprosy eradication program should not be considered to lessen the benefit of continuing to spend resources when it comes to compete with other priorities like HIV/MALARIA/Tuberculosis as in Leprosy apart from treating the bacterial infection minimizing permanent nerve damage and impairment is essentially required.<sup>[11]</sup>

Early diagnosis and treatment with MDT is mainstay for preventing the disability in case of Leprosy still today .However epidemiological and biological evidences show that treating with MDT alone is not sufficient for Leprosy eradication. Leprosy relapse due to per sisters is another unsolved problem( dormant bacilli )<sup>[12]</sup>

Therefore there is apparent need for thorough research on molecular based studies related to pseudo genes and rapid diagnostic methods including histo pathological as well as microbiological tests to achieve living with leprosy but making it harmless.<sup>[13,14]</sup>

Histo pathologically examinations of nasal mucosa and FNAC from hypesthetic regions in the absence of skin lesions is useful to know early characteristic changes in Leprosy. Usually abnormalities are seen in deep dermal nerves and the neurovascular complexes.In nasal mucosa macrophage granuloma ,epitheloid granuloma along with nerve inflammation are seen.<sup>[15-18]</sup>

Apart from nerve conduction studies provide valuable information for assessing nerve impairment. Various studies suggest that the nerve damage is more pronounced than clinically estimated.<sup>[19]</sup>



IDRI (Infectious Disease Research Institute) has introduced a rapid diagnostic test using card format using a single drop of blood for detecting specific leprosy antigen. The test has ability to detect the leprosy infection before clinical symptoms appear.<sup>[20]</sup>

Serological detection of soluble cytokine by ELISA /CYTOKINE producing T- cell by ELI Spot is yet another diagnostic test. Even though PCR is effective molecular tool for rapid and confirmative detection of leprosy as well as its drug resistance its high expense precludes for routine usage and is limited to research work on mutations and detecting new strains. High levels of anti-PGL-1 Ig M by ELISA could facilitate the characterization of those contacts who are at risk of developing.

Prevention of leprosy is by BCG vaccine so far being more than 50% efficient, but needs further supplementation with chemoprophylaxis.<sup>[21]</sup> IDRI supported by American missions is preparing candidate vaccine using leprosy antigens that are potent stimulators of IFN  $\gamma$  secretion.<sup>[22,23,24,25]</sup>

## CONCLUSION

Early detection is the keystone for appropriate management of leprosy in order to limit disability, disfigurement, and social stigma in advanced disease..Leprosy can be eliminated by providing access to expert health care and providing free treatment,. Currently as per WHO, innovative and practical strategies involving mainly operational solutions is indeed needed to attain leprosy free society in near by future.

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