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Recent Review of Literature on Early Diagnosis and Prevention of Leprosy

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Abstract

Objective of current review of literature is to promote 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, General medicine, dermatology departments

Design consists of review of literature related to knowledge and attitudes of patients towards leprosy, inclusion criteria includes relevant publications related to early 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 identified 15 publications consisting of delay in patient reporting, health education interventions at community level as well as family and individual level, clinical manifestations and case detection during early phase of infection, review about past and present, improved early diagnostic rapid and inexpensive techniques in microbiology.*

Conclusion: *There is evidence based information that interventions to promote early diagnosis of leprosy at national as well as local level are limited. Therefore there is invariable need to develop and implement range of success oriented interventions to promote case detection as well as early diagnosis and health education about leprosy. This can be possible through dedicated approach to research on fundamental biology to improvise diagnostic techniques as well as health policies to prevent and control leprosy.*

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 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 .[(1)] . According to March 2012 NLEP report, 0.13 million cases detected in India out of which children 9.7%.The high proportion of incidence in children signifies as a potent epidemiological indicator to reevaluate all our Leprosy control programmes. [(2)]

According to recent study by *MD Anderson News Release 02/20/2014*, correlating several known facts and published articles by genomists, led to a hypothesis that ancient leprosy ancestor 20 millions ago had undergone 40% inactivation of genes from all its genome.[(3)] All these genes had given rise to either pseudogenes (characterized by polymorphism) [(4)] or some even may be lost. This

reductive evolution is unique among all pathogenic bacteria that has resulted in minimal genes sufficient for survival inside a macrophage, Schwann cell or keratinocyte i.e.,[5] strict human parasitic life style of leprosy. As a result there is neither independent existence nor any extra human reservoir except for Armadillos. MD Anderson pathologist Xiang-Yang Han, M.D., Ph.D., a professor in laboratory medicine have discovered in 2008 yet another new leprosy causing species called Mycobacterium lepromatosis. Usually pseudo genes are to be lost during chromososmal deletion. One exaplanation for highest level of pseudo genes (1133 when compared to TB 6) responsible for highest mutation & strain variation in leprosy was detrimental horizontally transferred DNA (eg. Bacteriophages and transposons). The characterization of mini and micro satellites (pseudo genes) of VNTR,SNP and new markers are useful to differentiate strains from large population and to trace chains of transmission on a small scale, to understand real disease causing loci in bacteria thereby early detection & effective epidemiological control of leprosy.[6]

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 indeterminant stage needs thorough histopathological as well as clinical identification that often presents with one or few hypo pigmented lesions with no clear sensory loss .[7]

The role of clinical microbiologists depends on proper selection of diagnostic test. Recently the application of telemedicine [8] has been applied for early passive detection of cases

Materials & Methods

Review of literature consisted of careful methodological search to include all the four medical departments including community medicine, diagnostic microbiology, medicine and dermatology 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 by appropriate contact tracing (hot spots) 6 pilot projects, then treating hot spots (high case prevalent) through blanket approach, methods to reduce social stigma, recent molecular developments in order to formulate field friendly molecular diagnostic techniques as well as serological, tele leprosy or telemedicine for early case detection to assist national programmes.

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

Inclusion criteria

1. Estimation of the problem in order to know extent of intervention needed.
2. To get acquainted with methods to reduce transmission of leprosy such as implementing PEP with SDR covering hot spots through blanket approach pilots projects giving priority to contact tracing.
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
4. Applicability of telemedicine or telemedicine for early case detection
5. Clinical diagnosis for indeterminant cases with one or two hypopigment patches without sensory loss correlating and asymptomatic cases based on histopathological report in selected early contact tracing groups

Key words for selected publications

Included were Publication years 2004- 2014 inclusive

Leprosy, Hansen's disease or Mycobacterium leprae. Prevalence ,incidence, age group, WHO, Early case detection by contact tracing, biomarkers, PGL – 1,social stigma, self stigma ,knowledge, attitude, health education, NLEP, pseudo genes, CMI &HMI responses, epidemiology, clinical features, in determinant cases, asymptomatic, histopathology, serological tests, pilot projects, blanket approach, SDR, direct PEP, hot spots, telemedine/ teleleprosy.

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

The best keyword in present review of literature was early detection /contact tracing. Then the review needs its definition at outset of discussion.

Detecting leprosy cases before nerve impairment is defined as early detection,[9] however it is difficult to set appropriate definition as some cases present with early signs of disease [10], some present with symptoms related to skin conditions, some indeterminant/asymptomatic.[11]Yet another important factor for consideration is social stigma/personel stigma [12] associated with the consequences of disease such as disfigurement, disability sensory loss that forms a major impending factor for contact tracing. Religious stigma [13] is overcome by interpreting Biblical writings as skin diseases, socio-cultural, economic and service factors found to female participation and delay can be overcome by personel/ community education. Contact tracing/sub clinical cases can be done by identifying sensitive biomarkers in early phases of leprosy. One such is by PGL-1 response to disease. [14]

Tele medicine/teleleprosy includes strategies for early case detection a Greek word Tele means distance mederi to heal "a range of options for effective communication and transferring information. "especially those located at distant, this has enhanced the passive case finding and treatment [8] This includes using information and technology for diagnosis, treatment and prevention of disease and still is under research. Contact-tracing programmes should be feasible and cost effective integrated to local health care services to sustain long term. Funding and support should be maintained after each pilot project.[15,16].

Pilot projects are international projects that include health authorities, healthcare workers, communities and patients for appropriate language and definition of cases. All asymptomatic cases /high risk groups are treated with are by blanket approach [17]

After contact tracing mass prophylaxis by SDR and PEP especially for hot spots i.e., high-incidence pockets or hot pops remote or confined high-incidence population.

Clinical examination also useful for early detection of cases. The case may present with macular/papular/nodular/infiltrative hypopigmented patch/erythematous/reddish or copper coloured well defined / ill defind margins, reduced/loss of sensation for touch, heat, pain and appear shiny, thickened, dry to touch, slightly reddish skin over face. Proper history taking ensures early case identification. Indeterminate leprosy presents with one/few hypo pigmented patches with no clear sensory loss. Histopathological finding of nerve infiltration is sure sign for early diagnosis of leprosy.[18]

fig 1

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 [(19)]. IDRI has recently introduced early diagnosis of leprosy by smart phone and recombinant proteins such as LID-1 and PADL [(20)]

Other recent diagnostic techniques include serological detection of soluble cytokine by ELISA /CYTOKINE producing T- cell by ELISpot. Even though PCR is an 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 IgM by ELISA could facilitate the characterisation of those contacts who are at risk of developing . [(21)]

Prevention of leprosy is by BCG vaccine so far being more than 50% efficient but needs further supplemention with chemoprophylaxis. [(22)] IDRI supported by American missions is preparing candidate vaccine using leprosy antigens that are potent stimulators of IFNγ secretion.[(23,24,25,).]

Conclusion: Early detection is the keystone for appropriate management of leprosy in order to limit disability, disfigurement, and social stigma in advanced disease. Health education about leprosy that people with leprosy are not very contagious, can be treated with special antibiotics live normally in a family, can socialize and be employed. Leprosy can be eliminated by providing access to expert health care and providing free treatment, displaying posters, enlisting support of others eg community leaders, teachers, religious authorities and traditional practitioners at public places. Currently as per WHO, innovative and practical strategies involving mainly operational solutions is indeed needed to attain leprosy free society in nearby future.

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