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## Recent Developments in Leprosy



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### ABSTRACT

Leprosy continues to be a great health hazardous is caused by *Mycobacterium leprae*, previously it was treated as the mark of disgrace but the stigma was reduced later by educational awareness and training. By the use of multidrug therapy diagnosis and the treatment at primary stage, it might be possible to avoid disabilities and deformities. It is also important to have the basic understanding of the disease by all the physicians and the patients to avoid complications in the diagnosis and the treatment. Here in this review article, we have discussed the recent development in the field of leprosy which covers the description, symptoms, diagnosis, treatment, complications, conditions, neuropathy and correlations etc. which can be used as platform for further research and development in Leprosy.

## INTRODUCTION

Leprosy or Hansen's disease is caused by a gram-positive bacterium "*Mycobacterium leprae*" was discovered in 1873 by Gerhard Henrik Armauer Hansen [1]. Historically leprosy has been targeted as the mark of disgrace and prevents people for medical treatment, due to this lot of efforts has been done to reduce stigma by educational awareness program and training of local health officials. According to the World Health Organization, 180,000 peoples are infected with leprosy mostly lying in Africa and Asia [2]. It is an inherited primary immunodeficiency disease (PIDD) of the peripheral nerves and mucosa of the upper respiratory tract with main symptom of leprosy as disfiguring skin sores, lumps, or bumps [3]. It affects skin, peripheral nerves, eyes, thin tissues inside the nose and limbs [4]. It has various types such as Indeterminate leprosy, Tuberculoid leprosy, Borderline tuberculoid leprosy, Mid-borderline leprosy, Borderline lepromatous leprosy and Lepromatous leprosy [3]. Variety of the chemotherapeutic agents are present for the treatment of leprosy such as dapsone (diaphenylsulfone), rifampicin, clofazimine, ofloxacin, minocycline, Levofloxacin sparfloxacin and clarithromycin [3, 5]. Due to the unavailability of a method to demonstrate the presence of an asymptomatic infection the length of the incubation period of leprosy following *Mycobacterium leprae* infection has never been conclusively determined but some reports exhibited that it has an incubation period of about 3-5 years [6]. Then permanent damage may result in many parts of the body including the eyes and outer extremities if initial symptoms are left untreated. Leprosy results in not only physical problems but also mental, social and economic consequences [2,3]. In women, these problems are magnified by the gender disadvantage that prevails in many countries [4-6]. Health services are responsible for educating and motivating patients to report promptly, adhere to treatment schedules and to provide holistic health care and quality services. Variety of research has been done to spread knowledge of leprosy for developing awareness between both physicians and general people. This article will also provide a good understanding, awareness and knowledge which will help researchers for further developments.

### Review of literature:

K. Eichelmann et al [7] presented a review on recent updates in leprosy and concluded that to prevent disability and/or contagion by leprosy it is must for all physicians to have the basic understanding of the disease and immunopathologic mechanisms. Cecília Maria Passos

Vázquez, et al [8] reported immune response in leprosy influenced by micronutrients. They discussed how a decreased level of antioxidants may contribute to an increased oxidative stress and complications of infectious diseases and leprosy. W. Cairns S. Smith & Ann Aerts [9] described the role of contact tracing and prevention strategies for the disease. Avninder Singh et al [10] studied that Skin biopsy is integral for the understanding of leprosy, its causative organism and for monitoring its relapse and drug resistance. Bikash Ranjan Kar et al [11] presented a ten year study on the Visible deformity in childhood leprosy and observed that there is requirement to motivate parents to bring their children to the hospital at the earliest sign of leprosy is of utmost importance in the present situation. Jan H. Richardus et al [12] studied the comparison of close contacts with leprosy in newly diagnosed leprosy patients in a high and low endemic area between Bangladesh and Thailand. Tom A Mendum et al [13] carried out the study of bioarchaeology and specifically ancient DNA to understand the medieval European leprosy epidemic. The results revealed that during the 11<sup>th</sup> century, leprosy strains were typically part of a closely related group of type 2F strains, not the type 3 strains that predominate in later European samples. Anuja Sharma et al [14] presented the Clinico-Histopathological correlation in leprosy and found the minor disagreement in polar leprosy (TT+LL) and major discordance in borderline group (BT+BB+BL). Wim H. Van Brakel et al [15] studied the assessment of sensory and motor neuropathy in leprosy at baseline the results revealed that monofilaments and other sensory function test results were good and were found in agreement with validity. On the other hand, the VMT results and motor nerve conduction was good for the ulnar nerve, but very few median and peroneal nerves with abnormal conduction had an abnormal VMT. Osvaldo J M Nascimento [16] reported the clinical presentations of leprosy neuropathy and finds that it continues to be a health problem in poor developing countries of tropical and subtropical areas also reported in developing countries. He also stated that prophylactic measures can be applied to eradicate this infectious neuropathy that requires the epidemiological history, precise clinical and neurological examination are needed and help to avoid disabilities and deformities. Farooq Rehman Soomro et al [17] presented an article for the awareness of leprosy and find that Leprosy awareness should be created not only in medical practitioners but also in public and patients. Made Sutjita et al [18] studied the case report on Lepromatous leprosy in a patient with B-Cell lymphoma and tubulointerstitial nephritis the author found that the combination

in leprosy and lymphoma is rare. Aejaz Ali Wani et al [19] performed a clinical study of the cranial nerve involvement in leprosy and observed that all leprosy patients with increased risk must be monitored from the outset of the disease in order to detect nerve damage for avoiding permanent loss. Evangeline B. Handog et al [20] reviewed leprosy in the Philippines and observed there should be broadening of effective and operational strategies for management of chronic diseases and primary prevention. Sujoy Ghosh et al [21] presented review report targeting two cases of oro-facial aspects of leprosy. Vithiya Ganesan et al [22] performed a case report on the diagnostic dilemma between primary oral tuberculosis in a patient with lepromatous leprosy and observed that the relation between these two diseases continues to be enigmatic despite decades of research. Luciana Neder et al [23] reported health-related quality of life evaluated by paediatric quality of life Inventory 4.0 in paediatric leprosy patients with musculoskeletal manifestations. The results revealed the reduction in the physical activity and the school activity paediatric leprosy patients. D. Mandal et al [24] studied the receptor expression levels of vitamin D for evaluating the severity and complexity of disease progression. Chuan Wang et al [25] performed studies on tuberculosis risk-associated single nucleotide polymorphisms and found that leprosy and TB have many similarities so there may not be shared susceptibility loci between these in the Chinese han population according to the present association study. Renate A. Richardus et al [26] carried out an observational study in Bangladesh targeting clinical manifestations of leprosy after BCG vaccination. Balachandra S. Ankad et al [27] described the bone involvement in leprosy at early stage and suggested that the clinicians must know about this and there should be involvement of radiological techniques in the investigating protocol of the disease. Jamile Leão Rêgo et al [28] discussed the role of ERBB2 gene polymorphisms in leprosy susceptibility. Mallika Lavania et al [29] detected first time the presence of *Mycobacterium gilvum* in the bathing water of leprosy patient. Tinara Leila de Souza Aarão et al. [29] studied the relationship between growth factors and its implication in the pathogenesis of leprosy, the author stated that new cytokines profiles may be involved in the inflammatory response to *M. leprae.*, pro-inflammatory cytokines and regeneration factors., IL-17 stimulating an inflammatory response and negatively regulates the action of NGF and NGFR. P. Prem Anand et al [31] reported a review on Another face of Hansen's disease. Paulo Renato Yamasaki et al [32] reported the synthesis and evaluation of novel dapsone–thalidomide hybrids for the treatment of type 2

leprosy. E.M. Reis et al [33] et al described the role of *Mycobacterium leprae* DNA in peripheral blood and stated that it can be used to hint a bacilli migration route. Clarissa Iris Rocha-Leite et al. [34] provided the idea for the mental disorders in untreated and undiagnosed leprosy patients. G.A.V. Silva et al [35] investigated a possible association of +874T IFNG to leprosy, the author also described that IFN- $\gamma$  polymorphisms may be related to a higher cellular immune response in leprosy. Won Kim et al [36] presented the report regarding the effect of age on the state of leprosy considering the elderly leprosy survivors and general population. The study was carried out by R.P. Turankar et al. [37] to understand the transmission of therapy considering the single nucleotide polymorphism-based molecular typing of *M. leprae* from multicase families of leprosy patients. M.A.M. Morgado de Abreu et al [38] identified the presence of *Mycobacterium leprae* in the oral mucosa from paucibacillary and multibacillary leprosy patients. Kelly Emi Hirai et al [39] reported the presence of large number of dendritic cells in tuberculoid leprosy and found that these cells play an important role in the activation of the innate and adaptive immune system and favouring an efficient immune response to *M. Leprae*. Alessandra Pontillo et al [40] studied the contribution of *NLRP1* haplotypes to the leprosy susceptibility and provided the idea of a common pathogenic mechanism which states *NLRP1* association with leprosy and Crohn disease. A brief report on leprosy was provided by K. Eichelmann et al [41] which states that two main regimens are used depending on whether the patient has paucibacillary or multibacillary disease. M. Lavania et al [42] discussed the development of primary drug resistance to rifampicin in *Mycobacterium leprae* strains from leprosy patients in India. J. Wim Brandsma [43] presented an overview targeting the pathogenesis of ‘deformity’ and to present a discourse on how deformities can, to a very large extent, be prevented and corrected. N. Hohmann et al [44] reported the epidemiological consequences of leprosy-tuberculosis co-infection the authors concluded that the consequences are assessed for realistically confined parameter values and demonstrated that Robustness of long-time behaviour with respect to spatial effects are demonstrated. Victor Santana Santos et al [45] evaluated the importance of agreement between clinical and histopathological data to classify leprosy and concluded that both are necessary for control as well as the treatment of leprosy.

## CONCLUSION

Leprosy has been considered as a great health hazardous in poor developing as well as in developing countries. A lot of efforts have been done and should be done to reduce stigma by educational awareness program and training of local health officials. To avoid the disabilities and deformities, early diagnosis and the treatment is compulsory. It is also important to have the basic understanding of the disease, immunopathologic mechanisms, clinical forms of neuropathy of leprosy for quick and accurate diagnosis. The review provides the complete understanding of the disease, complications, conditions, diagnosis, treatment, neuropathy, and correlation and the recent developments in the field of leprosy which will provide a platform to the researcher for further development in this field.

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## Conflict of Interest:

The authors have no conflict of interests.

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