

Recent Advancement in the Diagnosis and Treatment of Leprosy

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BACKGROUND:

The importance of awareness and treatment of leprosy has been recognized globally due to the impact of the disease on individuals, communities, and public health. Extensive research and studies have shed light on various aspects of leprosy, highlighting the significance of addressing the disease effectively. Here is a brief background study on the importance of awareness and treatment of leprosy (Cerqueira et al., 2020)³

- **Historical Context:** Leprosy has been known since ancient times, and it has been associated with social stigma and discrimination for centuries. In many societies, leprosy was considered a curse or punishment, leading to the isolation and abandonment of affected individuals. Over the years, efforts have been made to understand the disease, dispel misconceptions, and improve the lives of those affected.
- **Disease Burden:** Leprosy continues to be a public health concern in several parts of the world. According to the **World Health Organization (WHO)**¹⁷, in 2020, there were 200,178 new cases reported globally. Although the number of cases has significantly decreased over the years, leprosy remains endemic in certain countries, and pockets of transmission persist. The burden of the disease affects individuals physically, emotionally, and socially, making awareness and treatment crucial (Lazo-Porras et al., 2020)¹¹.
- **Research and Innovation:** Ongoing research is essential for improving diagnostic tools, treatment regimens, and understanding the transmission dynamics of leprosy. Research studies help identify risk factors, optimize interventions, and develop strategies for targeted interventions in high-burden areas. Innovations such as Smartphone apps for early detection, telemedicine for remote consultations, and community-based initiatives contribute to enhanced awareness and treatment outcomes.

The importance of awareness and treatment of leprosy lies in the prevention of disabilities, reduction of transmission, elimination of social stigma, and integration of leprosy services into existing healthcare systems. Continued efforts to raise awareness, improve access to treatment, and address the social and economic aspects of leprosy are essential to ensure a world free from the burden of this ancient disease.

Many of the tropical diseases are neglected by the researchers and medicinal companies due to lack of profit and other interests. The Drugs for Neglected Diseases initiative (DNDi) is established to overcome the problems associated with these neglected diseases. According to

a report published by the WHO, leprosy (Hansen's disease) is also a neglected infectious disease.

Christian Ewhrudjakpor (2008) conducted study on Health Care Providers Knowledge as Correlates of their Attitudes towards Leprosy Sufferers in Nigeria. This study was aimed at relating health workers knowledge and consequent attitude towards leprosy patients. The study results shown that Pearson product moment correlation confirmed that health workers' above average knowledge of leprosy relates positively with attitudes towards leprosy patients. The researcher suggested that knowledge of health worker to be further improved in order to sustain positive attitudes of health workers towards sufferers of leprosy.²¹

Ruth et al (2015)²² conducted a cluster-randomized controlled intervention study in Cirebon District, Indonesia. Testimonies, participatory videos and comics given or made by people affected by leprosy were used as methods to facilitate a dialogue during so-called 'contact events'. The contact intervention was effective in increasing knowledge and improving public attitudes regarding leprosy.⁹⁵

Leprosy, also known as Hansen's disease, is a chronic infectious disease that has plagued humanity for centuries. Despite significant progress in its control, leprosy continues to affect individuals in various parts of the world, causing physical, emotional, and social burdens. The disease affects the skin, the peripheral nerves, mucosal surfaces of the upper respiratory tract and the eyes. Leprosy is known to occur at all ages ranging from early childhood to old age. Leprosy is curable and treatment during early stages can prevent disability. In this introduction, we will explore the importance of awareness and treatment of leprosy, highlighting the reasons why addressing this disease is of utmost significance. Leprosy is transmitted via droplets, from the nose and mouth, during close and frequent contact with untreated cases.

Firstly, early detection and treatment play a vital role in managing leprosy. With timely intervention, the progression of the disease can be halted, preventing severe disabilities and deformities that often accompany advanced stages of leprosy. This underscores the importance of raising awareness about the signs and symptoms of the disease, enabling individuals to seek medical help promptly and initiate treatment that can lead to a better prognosis. **(HABIBALLA AHMED et al., 2021)⁸**

(Kar & Gupta, 2015) Leprosy is a curable disease, having been eliminated from many countries, including India. This has been possible due to the wide availability of effective and safe drugs. Treatment of leprosy has undergone considerable changes over decades, from chaulmoogra oil in 1915 to dapsone monotherapy in 1946, then eventually to multidrug therapy (MDT) in 1982. In the last two decades, reports of resistance to all first-line drugs have appeared in the literature, with the need to conduct clinical trials using newer but highly bactericidal drugs and their combinations against *Mycobacterium leprae*.

Its reported the role of Vitamin D and Vitamin D receptor in leprosy patients and stated that most of the patients of leprosy have low level of Vitamin D and Vitamin D receptor. Also in various research studies showed the relationship of leprosy with three Vitamin D receptors.

(Naafs, 2006) Objective: To review the history of the treatment of leprosy and leprosy reactions after World War II. Methods: Treatments based on experience and clinical evidence

are compared with those advised by the WHO in their quest to eliminate leprosy by the year 2000, later extended to 2005. Results: Leprosy is not eliminated. Analyses of data on reaction treatment suggest that the treatment regimens for leprosy reactions as advised by the WHO may lead to more impairment among leprosy patients than the 'old' established regimes. Conclusion: WHO policies to eliminate leprosy may have jeopardized the proper treatment of leprosy for years to come.

The treatment for leprosy was suggested and prescribed by a WHO study group in 1981 as a chemotherapy for the disease. The treatment is a multi-drug therapy which relies on combination of 3 drugs – rifampicin, dapsone, and clofazimine **Chemotherapy of leprosy** [4]. Multi-drug therapy was successful for the treatment of leprosy instead of mono-drug therapy that was based on dapsone only. The multi-drug therapy helps to inhibit the development of any disabilities and acts as an early remedy; it also suppresses the development of drug resistance [20]. When left unattended and untreated, leprosy leads to persistent damage to skin, nerves, eyes and complete deterioration of limbs in extreme cases. Kamath *et al.* investigated the cases of leprosy in the U.S. in 2014. They observed 3 types of leprosy reactions in their study. Type 1 (reversal reaction), type 2 (erythema nodosum leprosum) and type 3 (Lucio phenomenon) were found responsible for long life disability. At present, there are no treatments to reduce long lasting disability due to leprosy [15].

Meima *et al.* explored the relation between occurrence and future frequency of WHO grade-2 damage caused by leprosy. The study revealed that in future there will be significant number of people with impairment caused by leprosy and will need care, treatment, and training for self-care and prevention of leprosy [1]. Reis *et al.* observed the epidemiological studies of leprosy in Brazil and concluded that it can be detected through DNA of MP patients under quantitative PCR (qPCR). The qPCR targets the ML0024 genomic area giving positive results, thus helping in identification of bacillus DNA in leprosy patients [5].

Statement: “A study to assess the Recent Advancement in the Diagnosis and Treatment of Leprosy at early stage in adopted areas of Prayagraj (UP).

METHODS:

A negligible amount of advancements has been made in last few decades which includes the tools of diagnosis, causes, treatment, and genetic studies of the bacterium (*Mycobacterium leprae*) that causes leprosy. The diagnosis of leprosy at earlier stages is important for its effective treatment. Recent studies on vitamin D and its receptors make leprosy diagnosis easier at earlier stages. Skin biopsies and qPCR are the other tools to identify the disease at its initial stages.

RESULTS:

Until now a specific drug for the treatment of leprosy is not available, therefore, Multi-Drug Therapy (MDT) is used, which is hazardous to health. Besides *Mycobacterium leprae*, recently a new bacterium *Mycobacterium lepromatosis* was also identified as a cause of leprosy. During the last few years the genetic studies of *Mycobacterium leprae*, the role of

vitamin D and vitamin D receptors (VDR), and the skin biopsies made the treatment and diagnosis of leprosy easier at early stages. The studies of micro RNAs (miRNAs) made it easy to differentiate leprosy from other diseases especially from tuberculosis.

CONCLUSION:

Leprosy can be distinguished from sarcoidosis by quantitative study of reticulin fibers present in skin. The treatment used until now for leprosy is multi-drug treatment. The complete genome identification of *Mycobacterium leprae* makes the research easy to develop target specified drugs for leprosy. Rifampicin, identified as a potent drug, along with other drugs in uniform multi-drug treatment, has a significant effect when given to leprosy patients at initial stages. These are effective treatments but a specific drug for leprosy is still needed to be identified. The current review highlights the use of modern methods for the identification of leprosy at its earlier stages and the effective use of drugs alone as well as in combination.

REFERENCES:

- i. Abraham Meima; Natasja HJ Van Veen; Jan H Richardus. Future prevalence of WHO grade 2 impairment in relation to incidence trends in leprosy: an exploration. *Trop. Med. Int. Health*, **2008**, *13*(2), 241-246.
- ii. Axel Kroger; V Pannikar; MT Htoon; A Jamesh; K Katoch; P Krishnamurthy; K Ramalingam; Shen Jianping; Vitthal Jadhav; MD Gupte. International open trial of uniform multi-drug therapy regimen for 6 months for all types of leprosy patients: rationale, de- sign and preliminary results. *Trop. Med. Int. Health*, **2008**, *13*(5), 594-602.
- iii. Cerqueira, S. R. P. S., Dos Santos, L. S., Morelo, E. F., Dos Santos Júnior, A. de C. M., de Sousa, C. A. F., Gonçalves, R. T., Neto, G. H., Marques, D. da S., Sampaio, R. N. R., Kurizky, P. S., & Gomes, C. M. (2020). The interference of polypharmacy and the importance of clinical pharmacy advice in the treatment of leprosy: A case control study. *Revista Da Sociedade Brasileira de Medicina Tropical*. <https://doi.org/10.1590/0037-8682-0114-2020>
- iv. Chemotherapy of leprosy for control programmes: report of a WHO study group [meeting held in Geneva from 12 to 16 October 1981], *World Health Organization*, **1982**.
- v. EM Reis; S Araujo; J Lobato; AF Neves; AV Costa; MA Gonçalves; LR Goulart; IMB Goulart. *Mycobacterium leprae* DNA in peripheral blood may indicate a bacilli migration route and high- risk for leprosy onset. *Clin. Microbiol. Infect.*, **2014**, *20*(5), 447- 452.
- vi. Elena Conde-Montero; Celia Horcajada-Reales; Petunia Clavo; Irene Delgado-Sillero; Ricardo Suárez-Fernández. Neuropathic ulcers in leprosy treated with intralesional platelet-rich plasma. *Int. Wound J.*, **2016**, *13*(5), 726-728.=

- vii. F Johannes Moet; David Pahan; Linda Oskam; Jan H Richardus. Effectiveness of single dose rifampicin in preventing leprosy in close contacts of patients with newly diagnosed leprosy: cluster randomised controlled trial. *Br. Med. J.*, **2008**, 336(7647), 761-764.
- viii. GAV Silva; FG Naveca; R Ramasawmy; AL Boechat. Association between the IFNG+ 874A/T gene polymorphism and leprosy resistance: a meta-analysis. *Cytokine*, **2014**, 65(2), 130-133.
- ix. HABIBALLA AHMED, M. M., ANURADHA, & WADHWA, P. (2021). A REVIEW ON AGENTS FOR THE TREATMENT OF LEPROSY INFECTION. *Asian Journal of Pharmaceutical and Clinical Research*. <https://doi.org/10.22159/ajpcr.2021.v14i3.40373>
- x. Kar, H. K., & Gupta, R. (2015). Treatment of leprosy. In *Clinics in Dermatology*. <https://doi.org/10.1016/j.clindermatol.2014.07.007>
- xi. Katoch, V. M. (2002). Advances in the diagnosis and treatment of leprosy. In *Expert reviews in molecular medicine*. <https://doi.org/10.1017/s1462399402004763>
- xii. Lazo-Porras, M., Prutsky, G. J., Barrionuevo, P., Tapia, J. C., Ugarte-Gil, C., Ponce, O. J., Acuña-Villaorduña, A., Domecq, J. P., De La Cruz-Luque, C., Prokop, L. J., & Málaga, G. (2020).
- xiii. Ron P Schuring; Jan Hendrik Richardus; David Pahan; Linda Oskam. Protective effect of the combination BCG vaccination and rifampicin prophylaxis in leprosy prevention. *Vaccine*, **2009**, 27(50), 7125-7128.
- xiv. R Kamal; V Pathak; A Kumari; M Natrajan; K Katoch; HK Kar. Addition of Mycobacterium indicus pranii vaccine as an immunotherapeutic to standard chemotherapy in borderline leprosy: a double-blind study to assess clinical improvement (preliminary report). *Br. J. Dermatol.*, **2017**, 176(5), 1388-1389.
- xv. Sonia Kamath; Seth A Vaccaro; Thomas H Rea; Maria T Ochoa. Recognizing and managing the immunologic reactions in leprosy. *J. Am. Acad. Dermatol.*, **2014**, 71(4), 795-803.
- xvi. Sudhir Kumar; Raza Ali Naqvi; Riyasat Ali; Richa Rani; Neena Khanna; DN Rao. FoxP3 provides competitive fitness to CD4+ CD25+ T cells in leprosy patients via transcriptional regulation. *Eur. J. Immunol.*, **2014**, 44(2), 431-439.
- xvii. Suman Jain; Leo H Visser; Muralidhar Reddy Yerasu; Renuka Raju; AK Meena; B Lokesh; Sujai Suneetha. Use of high resolution ultrasonography as an additional tool in the diagnosis of primary neuritic leprosy: a case report. *Lepr. Rev.*, **2013**, 84(2), 161-165.
- xviii. World Health Organization (WHO) antibiotic regimen against other regimens for the treatment of leprosy: A systematic review and meta-analysis. In *BMC Infectious Diseases*. <https://doi.org/10.1186/s12879-019-4665-0>
- xix. Xiang Y Han; Jose Jessurun. Severe leprosy reactions due to Mycobacterium lepromatosis. *Am. J. Med. Sci.*, **2013**, 345(1), 65-69.

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- xx. Working to overcome the global impact of neglected tropical diseases: first WHO report on neglected tropical diseases, *World Health Organization*, **2010**
- xxi. **NET** - Christian Ewhrudjakpor. Health Care Providers Knowledge as Correlates of their Attitudes towards Leprosy Sufferers in Nigeria. *Ethno-Med.* 2008;2(2): 115-20
- xxii. Ruth M. H. Peters,^{1,*} Dadun,² Marjolein B. M. Zweekhorst,³ Joske F. G. Bunders,⁴ Irwanto,⁵ and Wim H. van Brakel ;A Cluster-Randomized Controlled Intervention Study to Assess the Effect of a Contact Intervention in Reducing Leprosy-Related Stigma in Indonesia: *PLoS Negl Trop Dis.* 2015 Oct; 9(10): e0004003