

Oral Health in Leprosy as a Public Health Issue in India: Review of Literature

D P Singh*

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Oral health is vital for the well-being of any person as it is related to many health problems. There is an impression that the oral manifestations of leprosy and oral health in leprosy have not received adequate attention although oral and nasal lesions of leprosy are probable sources of spread of bacilli and transmission of the disease. This review focuses on analysing the information about oral health in leprosy and oral manifestations of leprosy from literature documented in the PubMed database. A comprehensive review was carried out to assess leprosy's oral health, including both leprosy-specific and non-specific lesions, like erythematous/hypochromic macula, fissure, edema, periodontitis, bone involvement, caries and other dental problems. A search of the literature was done in the electronic database of PubMed for all indexed articles. The search strategy used oral leprosy, leprosy, non-specific, oral involvement, oral health in leprosy, India specific keywords. It was observed that of more than 5800 articles available on leprosy from India, less than 0.5% are on oral health in leprosy. The major oral problems associated in leprosy are gingival recession, attrition, mobility and tooth loss. Overall, among the major issues pertaining to oral health, periodontal disease and gingival recession are the predominant findings, followed by tooth loss, mobility, and attrition. 29 studies were eligible based on the inclusion criteria and selected for the review; of these 6 were institutional studies while others were outpatient studies. None of these studies deals with the epidemiology of these oral health issues at the community level. It has been observed that the majority (more than 60%) of leprosy-affected persons (LAPs) have manageable oral health problems. This analysis shows a lack of adequate and representative data on oral health problems in leprosy patients. Low access to public health dental services and poor self-perceived oral health reinforce the need to achieve comprehensive health care in this population. There is a clear need to undertake well-designed studies to understand the current status of oral health problems in leprosy to develop information material and strategies relevant for affected people, dental professionals and health personnel treating leprosy.

Keywords : Oral Leprosy, MDT, Leprosy, Oral Health in Leprosy.

Introduction

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae* and now *Mycobacterium lepromatosis* in some areas. *M. leprae* as the cause of leprosy was discovered by G. H. Armauer

Hansen in Norway in 1873 (Lorentz & Irgens 1973), making it the first bacterium to be identified as causing disease in humans. It remains one of the leading causes of disability despite the wide use of multidrug therapy (MDT)

* Dr Dushyant Pal Singh, MDS, Office of NASI-ICMR Chair on Public Health Research, Rajasthan University of Health Sciences, Jaipur – 302033, Rajasthan, India.

Corresponding Author : Dr Dushyant Pal Singh, **Email :** dushyantsinghjadoun@gmail.com

consisting of rifampicin, clofazimine and dapsone, which came into world wide use from 1982 onwards following the recommendations of WHO (van Brakel et al 2012, WHO 2021). With the success of MDT, there is a major reduction in numbers, and clinical profile has changed drastically. Since then, the services for leprosy patients gradually changed from institutional to outpatient care through health centres and field clinics. Leprosy causes disability in a small proportion of cases which may be cause for social stigma and discrimination. There are standard guidelines to diagnose and manage leprosy patients (NLEP Training Manual for Medical Officers 2009). the pathogen has an affinity to cooler areas for its multiplication; about 75% of intraoral involvement is the hard palate as the mean surface temperature is estimated to be around 27.4°C. This decrease in the intraoral temperature is due to the initial invasion of the bacilli into the nasal cavity leading to nasal blockage and initiation of mouth breathing activity by the individual, thus allowing the inspired air to lower down the temperature, especially in the anterior part of the hard palate (Sushma et al 2018, Rendall et al 1976, Scheepers 1998, Shepard 1965).

Historically, leprosy has been reported to cause oral manifestations leading to bone resorption (Prejean 1930, Prejean 1936, Prejean 1943, Nunez Murti et al 2004). Oral and nasal lesions of leprosy have been considered as probable sources of discharge of lepra bacilli and transmission of the disease. The oral manifestations of leprosy include involvement of the trigeminal nerve in the face, lips, gingival, palate, tongue, cheeks and salivary glands (Pallagatti et al 2012).

It is widely recognized that oral health is vital for the well-being of any person. However, the oral manifestations of leprosy and oral health in leprosy have not received much attention. This

information is relevant to people, health care professionals like dentists as well as leprologists. The aim of the study was to analyze the information about oral health in leprosy from Indian literature documented in the PubMed database.

Materials and Methods

A comprehensive review was carried out to analyze the publications from India available in PubMed on oral health in leprosy as well as specific and non-specific lesions of leprosy like erythematous macula hypochromic macula, fissure. The search strategy used key words such as oral leprosy, leprosy, non-specific, oral involvement, oral health in leprosy, India specific. All relevant articles from India published and indexed on these aspects in this database were included.

Results

Out of 5825 articles available on leprosy in this database (accessed on 20th July 2021, 1600 hrs onwards) from India, only 29 (less than 0.5%) articles were on oral health aspects, either lesions specific to leprosy or other diseases conditions in leprosy cases or leprosy-affected persons who might have been already treated for leprosy.

Twenty-nine studies were selected for this review based on the aim and objective of the research and the inclusion criteria focused on oral health of leprosy affected people, it included oral health problems as well as involvement due to leprosy. There were 8 case reports, 2 review articles, one having images in a gallery and 18 are studies on leprosy-affected persons (LAPs), with 6 studies on institutionalized patients and 23 studies on LAPs treated as outdoor patients. None of these studies dealt with the epidemiology of these oral health issues at the community level. Besides the case reports, the number of subjects studied ranged from 8 to 750 and their profile varied (Table 1).

Table 1 : Studies from India on oral health and oral manifestations of leprosy

Authors	Number of subjects studied
Girdhar & Desikan 1979	40
Hubscher et al 1979	50
Mukherjee et al 1979	08
Sharma et al 1993	10
Rawlani et al 2008	160
Rawlani et al 2011	160
Pooja et al 2014	30
Jacob et al 2016	16
Jain et al 2016	350*
Dinatius et al 2018	750
Kunsi et al 2018	225
Vohra et al 2019	100
Gupta et al 2020 (a)	140
Gupta et al 2020 (b)	200

*Dental Students, subjects included in various studies varied from active disease to old treated leprosy affected persons living in institutions.

There are fewer (3/29) Indian studies on oral health in leprosy in this database prior to the MDT era. After MDT (1982 onwards), 26 studies were published from India on oral health-related issues. Dental caries (76.25%), periodontal disease (78.25%) (Rawlani et al 2011) and gingival recession (54.8%), were predominant findings along with tooth loss (69.5%), mobility (60.86%), attrition (56%) were other problems identified (Jacob et al 2016).

Leprosy was identified as a cause of about 10% of cases of Chronic Macrocheilia (Handa et al 2003). Lesions of palate and tongue have been reported in several studies before MDT and in the MDT era (Girdhar & Desikan 1979, Rawlani et al 2008, Rawlani et al 2011, Pallaghati et al 2012, Bommanavar et al 2018).

In a recent study by Vohra et al (2019), 70% of leprosy patients showed oral manifestations, of which 25% had chronic generalized periodontitis,

2.8% cases of oral melanosis, 10% atrophy of papillae and loss of taste sensation each, 8.5% had aphthous ulcers and candidiasis 7.14% had depigmentation, and 5.71% smokers' palate, oral submucous fibrosis, and fissured tongue.

The oral lesions in leprosy have been broadly classified as leprosy specific and non-specific. summarized by Pallagatti et al 2012 (Table 2).

Changes in bony architecture of oral cavity

An increase in the alveolar bone loss has been reported in leprosy (Jeffcoat 1992, Subramaniam et al 1983, Rawlani et al 2011, Jacob Raja et al 2016), this loss was generalized. This bone loss was linked with advanced disease, possibly because of late diagnosis. These patients also had peripheral neuropathy leading to hand and feet deformity in the form of claw hand or ulcer on hand, making maintenance of oral hygiene difficult.

Table 2 : Non-specific and specific oral lesions seen in leprosy (Pallagatti et al 2012)

1. Leprosy-non-specific lesions	Enanthem of palate or uvula	
2. Leprosy-specific lesions	Lips	Flat-topped nodules
		Macrocheilia
		Microstomia
	Tongue	Multiple superficial ulcers
		Mild glossitis
		Loss of papillae
		Fissured tongue
		Nodules on anterior tongue
		Atrophy
		Pavement-like appearance
	Buccal mucosa	Diffuse infiltration
		Papulonodules and ulceration
		Pale mucosa
	Hard and soft palate	Loss of shininess of mucosa
		Erythematous papules
		Nodular sub-mucosal infiltrate
		Palatal ulceration
		Palatal perforation
	Uvula and fauces	Miliary papules and nodules
		Triangular deformity of fauces
Dental	Gingivitis	
	Periodontitis	
	Periodontoclasia	
	Specific pulpitis	
	Periapical granulomas	

Discussion

Understanding the nature of oral manifestations present in leprosy affected persons (LAPs) will help the health professionals to understand the disease better and provide effective comprehensive care. In this review, oral manifestations in leprosy patients (due to leprosy or other aetiologies) have been focused for increasing awareness about these aspects among dermatologists/leprologists and dental surgeons.

Appropriate treatment of oral health conditions may also help reduce the frequency/ recurrence in leprosy reactions by eliminating the source of infection and improving the general oral hygiene of the patient (Pallagatti et al 2012). Oral and nasal lesions of leprosy could be important sources of bacilli spread and the transmission of the disease (Girdhar & Desikan 1979, Hubscher et al 1979). Early detection and treatment of oral lesions may prevent the spread of disease (Rawlani et al 2011, Subramaniam et al 1983).

It would be essential to carry out prospective studies to understand this aspect, especially in the context of current MDT.

In recent studies a lack of proper oral hygiene measures has been seen among leprosy patients, which contributed to their poor oral health (Dinatus et al 2018, Kungsi et al 2018). There is clear need to create mass awareness among leprosy affected persons, leprosy workers and doctors so that oral hygiene gets its due attention (Kungsi et al 2018). Our observations are in concurrence with the findings of Reichert (1976), Jeffcoat (1992), Aufderheide & Rodriguez-Martin (1998), Laskaris (2005), Nunez-Marti et al (2004).

Among various oral health problems (Pallagatti et al 2012), chronic macrocheilia deserves special attention as in more than 10% of the cases of chronic macrocheilia leprosy was the etiology (Handa et al 2003, Gogri et al 2015).

Lesions (ulcerative, infiltrative or nodular) of tongue and palate in leprosy also appear to be important (Girdhar & Desikan 1979, Mukherjee et al 1979, Nigam & Singh 1990, Sharma et al 1993, Pavithran 1994, Rawlani et al 2008, Rawlani et al 2011, Dhawan et al 2012, Ghosh et al 2015, Dabas et al 2015). Though leprosy is considered mainly a disease involving peripheral nerves and skin, cranial nerve specially facial and trigeminal nerves involvement has been observed as significant problem by Kumar et al (2006). In case of trigeminal nerve, usually maxillary division is involved which can be a diagnostic sign for leprosy by dental clinicians (Reichert et al 1982). Palatal palsy has been seen which can cause regurgitation and it requires appropriate management. Pavithran (1994) has also emphasized that palatal palsy requires appropriate management.

Besides leprosy specific lesions with varying presentations (Pallagatti et al 2012), leprosy patients may suffer from other diseases like oral

TB (Candamourty et al 2013), myiasis (Ganesan & Mandal 2016) and oral candidiasis (Gupta et al 2020a). These manifestations may occur at any age, including children (Jain 2017), indicating the need to keep paediatricians in the knowledge dissemination loop in diagnosis and management of these lesions. The involvement of the dermatologists and dentists in the leprosy diagnosis programmes can be an advantage translating into early diagnosis and thus achieving the goals of "leprosy eradication".

India has achieved major success in controlling leprosy at a public health level. From a caseload of more than six million, after MDT, these numbers decreased to about 2 lakhs in 2005 (more than 98% decline), leading to the declaration of its elimination at public health problem (less than 1 per 10,000 population) in 2005 (Dhillon 2006). Elimination and eradication after that have been challenging tasks. Though the number of highly bacillated cases may be lower than pre MDT era (Girdhar & Desikan 1979, Hubscher et al 1979), as MDT is also known to reduce the discharge of bacilli from oral/nasal surfaces faster than before, the problem persists. Advanced lepromatous leprosy with rhino-oro-laryngological involvement continues to be reported in the post-elimination era (Thomas & Emmanuel 2009, Dabas et al 2018). Thus this route of transmission should not be ignored.

Equally important is the issue of oral health issues of leprosy patients who are cured of leprosy, but their oral health needs are not met (Pallagatti et al 2012, Dinatus et al 2018, Kungsi et al 2018, Pooja et al 2014). It is appropriate time to revisit dental aspects of leprosy (Bommanavar et al 2020).

Studies on the knowledge and attitude of dentists and dental students on oral manifestations and management of leprosy are few (Jain et al 2016). In their study, 32.29% had poor knowledge and

57.42% had fair knowledge while only 10.29% had good knowledge about leprosy. Univariate analysis showed a year of training to be a significant predictor for knowledge level ($t=7.12$; $p<0.001$).

Conclusions

To conclude, this review shows that there is a dearth of representative data on oral health problems in leprosy patients. Even among this limited number of studies available, none shows the situation at the community health level. However, the magnitude of oral health problems appears to be substantial. Firm conclusions can be drawn only after undertaking proper studies with a careful selection of subjects using appropriate sampling methods. Well-designed studies need to be undertaken to understand the oral health problems in leprosy to develop information material and strategies relevant to affected people, dental professionals, and health personnel treating leprosy. Dentists have continued to be committed to dealing with these issues over the last 80 years (Prejean 1943, Bommanavar et al 2020). It will be appropriate if dentists and leprologists jointly decide these priorities.

The poor standards of oral health in leprosy patients may increase the risk for leprosy reactions and overall ill health, consequently affecting the quality of life. Low access to public health dental services and poor self-perceived oral health indicates the need to focus on this aspect to achieve comprehensive health care in this population. Early detection and treatment of oral lesions may help to some extent in preventing the spread of disease. All these studies thus documented conclude that oral health status is totally compromised in leprosy cases and need immediate attention from dentists in most of the developing countries. The affording factors contributing to periodontal disease and caries activity, thus need to be emphasized and the

question need to be answered is how serious are periodontal diseases and caries prevalence in leprosy patients and what are the possible reasons for the increase in their prevalence? One reason can be attributed to hand claw deformity often seen in such cases, which further impair the maintenance of oral hygiene in leprosy patients. It been postulated that leprosy patients are usually affected with claw hands, stiff joints, thumb paralysis, anesthesia and contractures leading to severe deformity due to which the oral hygiene maintenance is compromised (Guo et al 2017, Long 1964).

Future Perspective

With all the remarkable achievements in the fight against leprosy, the stage is now set for the final assault (Dogra et al 2013). An integrated health approach will be the most cost-effective approach in this scenario. One may learn lessons from other developing countries still having problems of leprosy (Taheri et al 2012). The attitude and competence of health workers may be a problem in some areas (Aggnur et al 2014). Their empowerment will be in their interest and important for the success of programmes like leprosy and oral health.

Examination of the oral mucosa should form an integral part of examining patients with leprosy as early detection and treatment of oral lesions may also contribute to reducing the risk of spread of disease in some cases and slower reaction rates. Oral health should be an integral part of the general health for the overall health of leprosy patients. Dentists may have inadequate information of oral manifestations of leprosy; likewise, professionals who work at Leprosy Control Programmes may not be adequately concerned with their patient's oral health – appropriate training of dentists and leprologists will be thus extremely useful. It would be desirable to develop evidence-based strategies to achieve the goals of optimum

good oral health in leprosy-affected persons' as well early diagnosis and effective treatment of oral manifestations of leprosy.

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