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Original Research Article

A study of ENT symptoms in leprosy patients at a leprosy rehabilitation centre in Hyderabad, Telangana, India

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ABSTRACT

Background: Hansen's disease (leprosy) remains endemic in India. Otorhinolaryngologic (ENT) involvement, particularly of the nasal mucosa, may occur early but is often overlooked. Early recognition is vital for timely treatment and prevention of irreversible deformities. The objective was to describe the spectrum and frequency of ENT manifestations among multibacillary leprosy patients at a rehabilitation center in Hyderabad, India.
Methods: A cross-sectional observational study was conducted at Sivananda Rehabilitation Home from September 6-25, 2025. Forty-nine confirmed multibacillary patients (ages 12-70) underwent structured ENT evaluation, including anterior rhinoscopy, otoscopy, and oropharyngeal examination. For disease-type and bacteriological index (BI) correlations, an analytic cohort of 42 patients was used.
Results: In the analytic cohort (n=42), disease distribution was lepromatous (47.6%), borderline lepromatous (40.5%), and mid-borderline (11.9%). Overall, 16/49 (32.7%) reported nasal symptoms, with epistaxis being most common (62.5%). Clinical examination revealed nasal abnormalities in 28/49 (57.1%); turbinate atrophy was most frequent (36.7%), followed by hypertrophy (12.2%) and septal perforation (8.2%). Notably, 75% of patients with septal perforation had a BI>4. No participant reported ear or throat symptoms, though incidental otoscopic findings occurred in 12.2%.
Conclusions: ENT involvement is common in multibacillary leprosy, predominantly affecting the nose. Objective nasal findings significantly outpace reported symptoms. Routine ENT evaluation, specifically focused nasal examination, should be incorporated into standard leprosy assessments to support early recognition and reduce complications.

Keywords: Hansen's disease, Leprosy, Otorhinolaryngology, Nasal manifestations, Epistaxis, Turbinate atrophy, Septal perforation, Multibacillary

INTRODUCTION

Hansen's disease, more commonly known as Leprosy, is a chronic bacterial infection caused by Mycobacterium leprae.[1] The bacilli invade the cooler regions of the body and proliferate, causing a relentless immune response. The power of the immune response will eventually depend on the patient's cell-mediated immunity. In a significant number of patients, the disease persists as a chronic inflammatory condition that severely deforms the skin and damages the nerves, leading to long-standing complications.

As a major public health problem, leprosy has been the target of many government -led eradication initiatives in India. which have been more or less successful. In India, the National Leprosy Eradication Program is the Health Program related to leprosy, which successfully curbed the prevalence to less than one case per 10,000 population, thereby India announced the official declaration of leprosy elimination in 2005.

Despite India achieving elimination in 2005, the fact persists that more than 60% of global leprosy cases arise reported from India. In 2020, over 1.14 lakh new leprosy cases were reported from India, making India responsible for 55% of international cases. This high percentage also indicates active transmission and hyperendemicity.[2] Leprosy has a long incubation period. The documented modes of transmission of leprosy range from household contact to contact with a nine-banded armadillo.[3]

As per the Ridley-Jopling classification, Leprosy can be classified as tuberculoid (TT), borderline tuberculoid (BT), mid-borderline (BB), borderline lepromatous (BL), and lepromatous leprosy (LL).[4] The classic presenting features of leprosy include loss of sensation on the skin and hypoaesthetic and hyperaesthetic lesions of the skin.[5] Since it is a debilitating disease, an early and quick diagnosis is warranted, and this can be achieved by taking note of clinical signs and symptoms that herald the disease. Since the main transmission mode is through nasal droplets, the portal of entry, i.e., the nose and nasal mucosa, plays an important role in the pathogenesis of the disease.[6]

It has also been shown that ENT manifestations, while initially benign, can progress into severity, leading to a pernicious loss of normal otorhinolaryngological function. On top of this, all the ENT manifestations are so protean that they can easily be missed and misattributed to another disease. Consequently, failure to consider Leprosy as an early diagnosis might delay therapy and lead to considerable loss of time. Through our study, we aim evaluation in both diagnosis and management in patients suffering from leprosy.

This study underscores the importance of comprehensive ENT evaluation both in diagnosis and management of patients with Hansen's disease.

METHODS

Study design and setting

This was a cross-sectional observational study conducted at Sivananda Rehabilitation Home (SRH), Hyderabad, India, a tertiary care centre dedicated to the management and rehabilitation of patients with Hansen disease. Data collection occurred from September 6 to 25, 2025, during which all eligible patients attending the facility were evaluated.

Study population

Sample size was specified by convenience sampling based on all eligible patients attending the facility during the study period (September 6-25, 2025). Given the specialized nature of the rehabilitation center and the limited study duration, we enrolled all consenting multibacillary leprosy patients attending outpatient services during this timeframe

The study included 49 patients with clinically and bacteriologically confirmed Hansen disease patients, each belonging to the multibacillary spectrum leprosy patients as per the Ridley–Jopling classification. For the primary analyses that required both disease type and BI, exclusion was done for patients with missing BI or missing disease type. After exclusion, the analytic COHORT for BI-linked and type-linked analyses comprised 42 patients for whom both BI and type were available (female=19, male=23).

The exclusion comprised patients lacking BI documentation in the dataset.

Patients diagnosed with multibacillary leprosy, specifically BB, BL and LL, were included in the study based on clinical and bacteriological grounds. Patients aged 12-70 years, who were willing to undergo a detailed ENT examination and provided informed consent, were enrolled.

Patients with a history of pre-existing ENT disorders not attributable to leprosy, those who had undergone previous nasal, aural, or pharyngeal surgery, and patients who were uncooperative or unable to complete the ENT assessment were excluded. Patients with purely paucibacillary forms of leprosy were also excluded from the study.

Sample size and demographic profile

The final study sample consisted of 49 patients, of whom 22 females (44.9%), and 27 males (55.1%).

Data collection

All 49 patients underwent a systematic ENT evaluation. Nasal examination was performed using anterior rhinoscopy in all patients, with endoscopic assessment carried out where indicated. Otological examination included otoscopy to assess the external auditory canal and tympanic membrane. Examination of the oral cavity and oropharynx was conducted to identify mucosal changes, fissuring, coating, or other lesions. Pharyngeal and laryngeal assessment was performed using indirect laryngoscopy when clinically indicated. Sensory evaluation included bedside assessment for olfactory disturbances (anosmia or hyposmia) and gustatory changes (hypogeusia). Patient-reported symptoms were

documented separately from clinical findings observed on examination.

Bacteriological and clinical assessment

The variables analysed included demographic parameters such as age group (12-25, 27-40, 44-55, and 56-70 years) and sex. Disease-related variables included the type of leprosy (BL or LL) and BI category. ENT-related variables encompassed nasal, ear, throat, and oral cavity symptoms and findings, as well as sensory disturbances involving smell and taste. The extent of ENT involvement was also assessed by categorising patients into single-site or multiple-site involvement groups.

Ethical considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee of Sivananda Rehabilitation Home (SRH). Written informed consent was obtained from all participants. Patient confidentiality was maintained throughout the study.

RESULTS

Among the 49 patients with leprosy included in this study, the distribution according to the Ridley-Jopling classification revealed that LL represented the largest proportion with 20 patients (47.6%), followed by BL with 17 patients (40.5%), and BB with 5 patients (11.9%).

Table 1: Type of leprosy (Ridley-Jopling Classification).

Type of leprosy	N	%
BB	5	12
BL	17	40
LL	20	48
Total	42	100

Table 2. Nasal Symptoms in Leprosy.

Symptom status	N	%
Symptoms present	16	32.7
No symptoms	33	67.3
Total	49	100.0

Table 3: Nasal symptoms vs. type of leprosy.

Nasal symptoms	BB	BL	LL	Total
Epistaxis	2	4	4	10
Crusting	1	0	0	1
Loss of smell	0	1	2	2
Nasal stuffiness	0	0	3	3

The gender distribution showed 23 male patients (54.8%) and 19 female patients (45.2%), yielding a male-to-female ratio of approximately 1.2:1 (Figure 1).

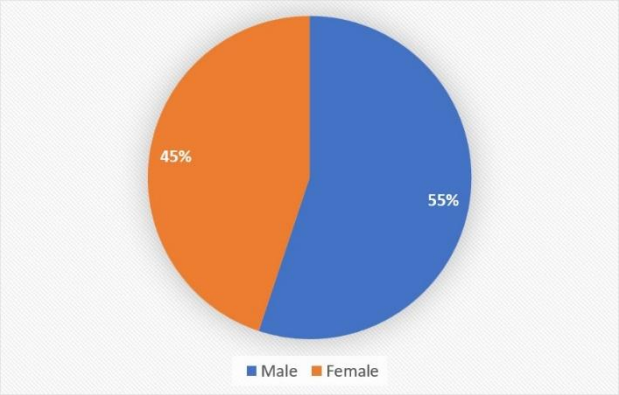

Figure 1: Gender distribution of the total study population.

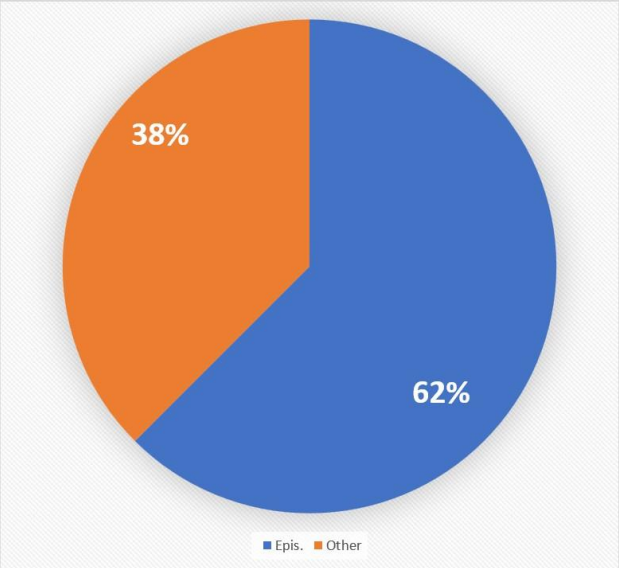

Figure 2: Prevalence of epistaxis among symptomatic patients.

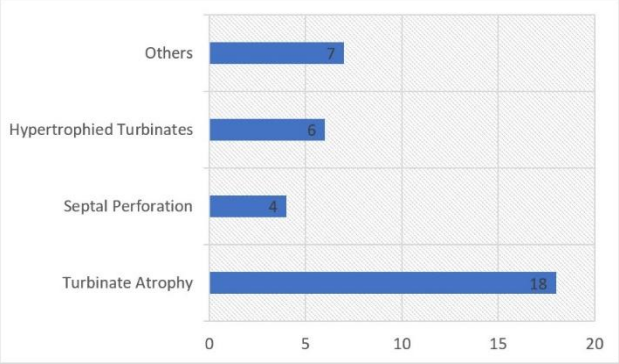

Figure 3: Distribution of rhinological examination findings among multibacillary leprosy patients.

Nasal symptoms

Of the total 49 patients evaluated, 16 patients (32.7%) presented with nasal symptoms, while 33 patients (67.3%) were asymptomatic regarding nasal complaints.

When analysed according to disease type, symptoms were observed in 2 patients (40.0%) with BB leprosy, 6 patients (35.3%) with BL leprosy, and 7 patients (35.0%) with LL leprosy. Symptoms appeared to be distributed relatively evenly across the disease spectrum, with a slight predominance in the more severe multibacillary forms.

Among the 16 symptomatic patients, epistaxis was the most frequently reported complaint, occurring in 10 patients (62.5% of the symptomatic population). Nasal stuffiness was reported by 3 patients (18.8%), pain by 3 patients (18.8%), loss of smell by 2 patients (12.5%), and crusting by 1 patient (6.3%) (Figure 2).

Distribution of nasal symptoms according to type of leprosy

In patients with BB leprosy, epistaxis was reported in 2 patients (40.0% of BB patients) and crusting in 1 patient (20.0%).

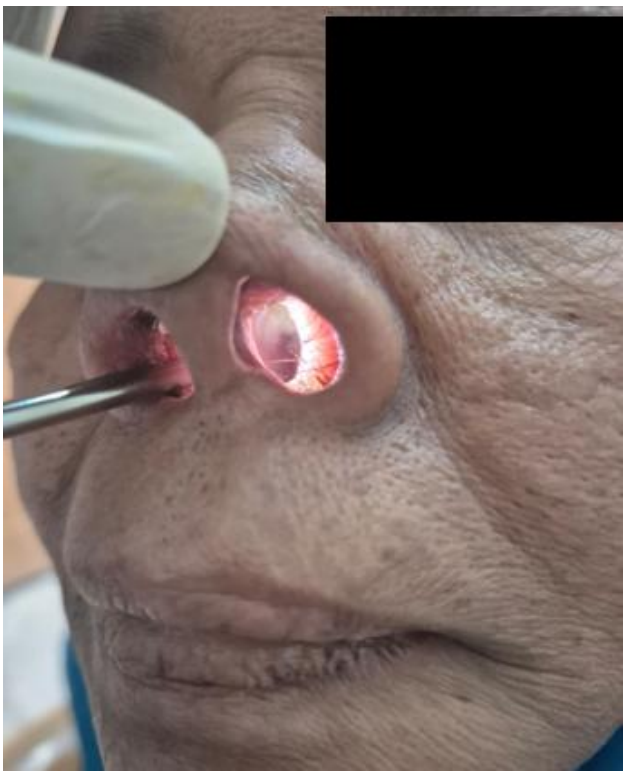

Figure 4: Anterior rhinoscopic view showing a large septal perforation in a patient with lepromatous leprosy.

Among BL leprosy patients, epistaxis was the predominant symptom occurring in 4 patients (23.5% of BL patients), followed by pain in 1 patient (5.9%) and loss of smell in 1 patient (5.9%).

In the LL category, epistaxis was noted in 4 patients (20.0% of LL patients), nasal stuffiness in 3 patients (15.0%), and loss of smell in 2 patients (10.0%).

Relationship between symptoms and bacteriological index

The distribution of epistaxis across different BI values demonstrated a relatively even pattern across the spectrum of disease severity. Epistaxis cases were documented at BI values ranging from 0 to 5.0, with occurrences noted at BI values of 0, 2, 2.25, 3.25, 3.5, 3.66, 4.0, 4.5 (2 patients), and 5.0.

Otological and pharyngeal symptoms

No patient in the study cohort presented with ear-related complaints. Similarly, no throat-related symptoms were reported by any of the study participants.

Rhinological examination findings

Anterior rhinoscopy revealed abnormal nasal findings in 28 of 49 patients (57.1%). Turbinate atrophy was the most common finding, present in 18 patients (36.7% of the total cohort; 64.3% of those with abnormal findings). Hypertrophied turbinates were observed in 6 patients (12.2% of the total; 21.4% of those with findings), and septal perforation in 4 patients (8.2% of the total; 14.3% of those with findings). Other less frequent findings were noted in 7 patients (14.3% of the total; 25.0% of those with findings) (Figure 3).

Nasal findings and disease severity

The distribution of nasal examination findings across different BI ranges showed the following pattern: 3 findings were noted in patients with BI 0-1, 6 findings in those with BI 1-2, 1 finding in the BI 2-3 range, 6 findings in the BI 3-4 category, and 5 findings in patients with BI 4-5. This distribution suggests a relatively even occurrence of nasal findings across both lower (BI 0-2) and higher (BI 3-5) bacteriological indices.

Septal perforation and bacteriological index

In 4 patients septal perforation was observed, it is a marker of advanced disease.

A notable clinical trend was that the 3 patients (75%) with the perforation demonstrated a BI greater than 4.

Otological examination

Otoscopic examination revealed incidental otological findings in 6 patients (12.2%).

Retracted tympanic membrane was the most common finding, observed in 4 patients (8.2%): 3 patients showed unilateral retraction, and 1 patient demonstrated bilateral retraction. In addition, tympanic membrane perforation was noted in 1 patient (2.0%), and cerumen impaction in the right external auditory canal was observed in 1 patient (2.0%). The distribution of these otological findings

across disease types showed: 1 patient with BB leprosy (cerumen impaction), 1 patient with BL leprosy (retracted tympanic membrane), and 4 patients with LL leprosy (1 with bilateral retracted tympanic membrane, 2 with unilateral retracted tympanic membrane, and 1 with tympanic membrane perforation).

No pharyngeal or laryngeal abnormalities were identified in the study population, either symptomatically or on clinical examination.

DISCUSSION

This descriptive observational study evaluated ENT manifestations in 49 patients with leprosy, focusing on nasal, otological, and pharyngeal involvement. The findings contribute to the growing body of evidence highlighting the importance of otorhinolaryngologic examination in the comprehensive evaluation of leprosy patients.

The predominance of LL (47.6%) and BL (40.5%) types in our cohort is consistent with observations from other studies examining ENT manifestations in leprosy. Silva et al similarly reported higher rates of nasal alterations in lepromatous leprosy compared to other forms.[7] The male-to-female ratio of 1.2:1 observed in our study aligns with the global epidemiological pattern of leprosy, though it differs from the classical 2:1 ratio reported in India.[8] This variation may reflect changing demographic patterns in leprosy or regional differences in disease presentation.

Nasal symptoms were present in 32.7% of our study population, with epistaxis being the most common complaint among symptomatic patients (62.5%). This finding is particularly significant as epistaxis has been well-documented as an early manifestation of nasal involvement in leprosy. Lalwani et al emphasised that nasal symptoms, including obstruction, crusting, bleeding, and hyposmia, occur early in the course of lepromatous leprosy.[9] The mechanism for epistaxis is purported to be the affliction of the arteriovenous complex of the septum. In the initial stages, bacillary infiltration of the nasal mucosa leads to blood-tinged mucoid discharge. Gradually, in the chronic stages, mucosal nodules develop and ulcerate, leading to frank epistaxis.

The relatively high proportion of epistaxis in our study (62.5% of symptomatic patients) exceeds the 14.66% reported in the reference study by Vora et al suggesting possible differences in disease severity or duration at presentation. A recent US-based COHORT study by Khetani et al reported epistaxis in only 11.1% of patients with nasal manifestations, though this difference may reflect variations in healthcare access and early detection between different settings.[10]

The distribution of symptoms across disease types showed relative uniformity, with symptoms observed in 40.0% of BB patients, 35.3% of BL patients, and 35.0% of LL patients. This finding contrasts with traditional understanding that nasal involvement is predominantly a feature of lepromatous disease. However, this may reflect the multibacillary nature of all three types in our COHORT, as even BB and BL represent significant bacterial loads.

The observation that epistaxis occurred across a wide range of BI values (0 to 5.0) with relatively even distribution suggests that nasal symptoms may not correlate linearly with bacillary load. This finding warrants further investigation with appropriate statistical analysis to determine whether BI is a significant predictor of symptom severity.

Turbinate atrophy was the most frequently observed finding in our study (64.3% of those with nasal findings), followed by hypertrophied turbinate (21.4%) and septal perforation (14.3%). Barton described the progressive nature of nasal involvement in leprosy, noting that atrophy of the inferior turbinate is a common late finding in untreated lepromatous leprosy.[12] The coexistence of both atrophic and hypertrophic changes in our cohort suggests patients were at different stages of disease evolution.

Turbinate atrophy in leprosy results from granulomatous infiltration leading to destruction of the erectile tissue and subsequent atrophy. The process is analogous to secondary atrophic rhinitis seen in other chronic granulomatous diseases such as sarcoidosis and Wegener's granulomatosis. The relatively even distribution of nasal findings across different BI ranges (0-1 through 4-5) suggests that structural changes may persist or occur independently of current bacterial load, possibly representing chronic sequelae of past disease activity.

The observation that 75% of patients with septal perforation had a BI greater than 4 is clinically significant. Septal perforation represents advanced nasal involvement and occurs through mechanisms involving chronic inflammation, vascular compromise, and direct bacillary infiltration of the cartilaginous septum. The trend with high BI suggests that septal perforation may serve as a clinical marker for severe disease requiring intensive monitoring and management.

The otoscopic findings in our study present an interpretive challenge. While 6 patients (12.2%) demonstrated otological findings on examination, none reported ear-related symptoms. The findings included retracted tympanic membrane in 4 patients, tympanic membrane perforation in 1 patient, and cerumen impaction in 1 patient.

The literature on otological involvement in leprosy is notably sparse. While leprosy can affect the external ear (pinna and ear lobule), causing infiltrative lesions, direct

involvement of the middle ear and tympanic membrane is not well-documented as a primary manifestation of leprosy. Retracted tympanic membranes and perforations are commonly encountered in general ENT practice and can result from various etiologies, including chronic Eustachian tube dysfunction, previous infections, or trauma.

Given the absence of ear symptoms and the common occurrence of these findings in the general population, we cannot confidently attribute these otological observations to leprosy itself. The findings may represent incidental otological pathology unrelated to the primary disease.

The absence of pharyngeal and laryngeal symptoms or findings in our cohort is consistent with the literature, indicating that while leprosy can affect the larynx, such involvement is relatively uncommon and typically occurs in advanced, untreated lepromatous disease. The systematic examination of these structures nevertheless remains important in comprehensive ENT evaluation of leprosy patients.

The finding that 8.2% of our patients demonstrated septal perforation highlights the ongoing occurrence of advanced nasal complications despite the availability of effective multi-drug therapy. Timely diagnosis and treatment with MDT renders patients non-infectious within 72 hours and can prevent progression to deformities such as septal perforation and saddle nose deformity. Regular ENT evaluation during the course of treatment, with particular attention to nasal structures, may help identify early changes amenable to intervention.

Limitations

As a descriptive observational study, our findings are limited by the absence of a control group and statistical analysis to establish definitive associations between variables. Another factor which precluded significant statistical analysis was the convenience sampling undertaken in a definite time window (3 weeks). Additionally, the cross-sectional nature of the study does not permit assessment of temporal relationships or disease progression patterns. The absence of data on disease duration at presentation limits our ability to understand the natural history of ENT manifestations. Prospective longitudinal studies with standardised ENT examination protocols would provide valuable information about the evolution of nasal findings over time and in response to treatment. Audiological testing was not performed in this study, which would have provided objective assessment of hearing function and helped characterise any subclinical auditory involvement. Future studies incorporating audiometry, tympanometry, and acoustic reflex testing would enhance our understanding of otological involvement in leprosy.

CONCLUSION

This study shows that ENT manifestations, especially nasal involvement, are common among patients with leprosy, with nasal symptoms observed in one-third of cases and abnormal nasal findings detected in more than half. Epistaxis emerged as the most common nasal symptom, while turbinate atrophy was the most frequent examination finding. The association between septal perforation and high bacteriological index suggests this finding may serve as a marker of severe disease. Although otological findings were noted in a few patients, their clinical significance remains uncertain in the absence of symptoms and common occurrence of similar findings in the general population. Further research with appropriate controls is needed to establish any potential relationship between leprosy and otological pathology. The findings reinforce the importance of comprehensive ENT evaluation in leprosy patients and highlight the need for increased awareness among healthcare providers regarding nasal manifestations as potential early indicators of the disease. Early recognition and treatment of nasal involvement can prevent irreversible deformities and reduce disease transmission, contributing to ongoing efforts toward leprosy elimination.

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