IADVL SIG LEPROSY

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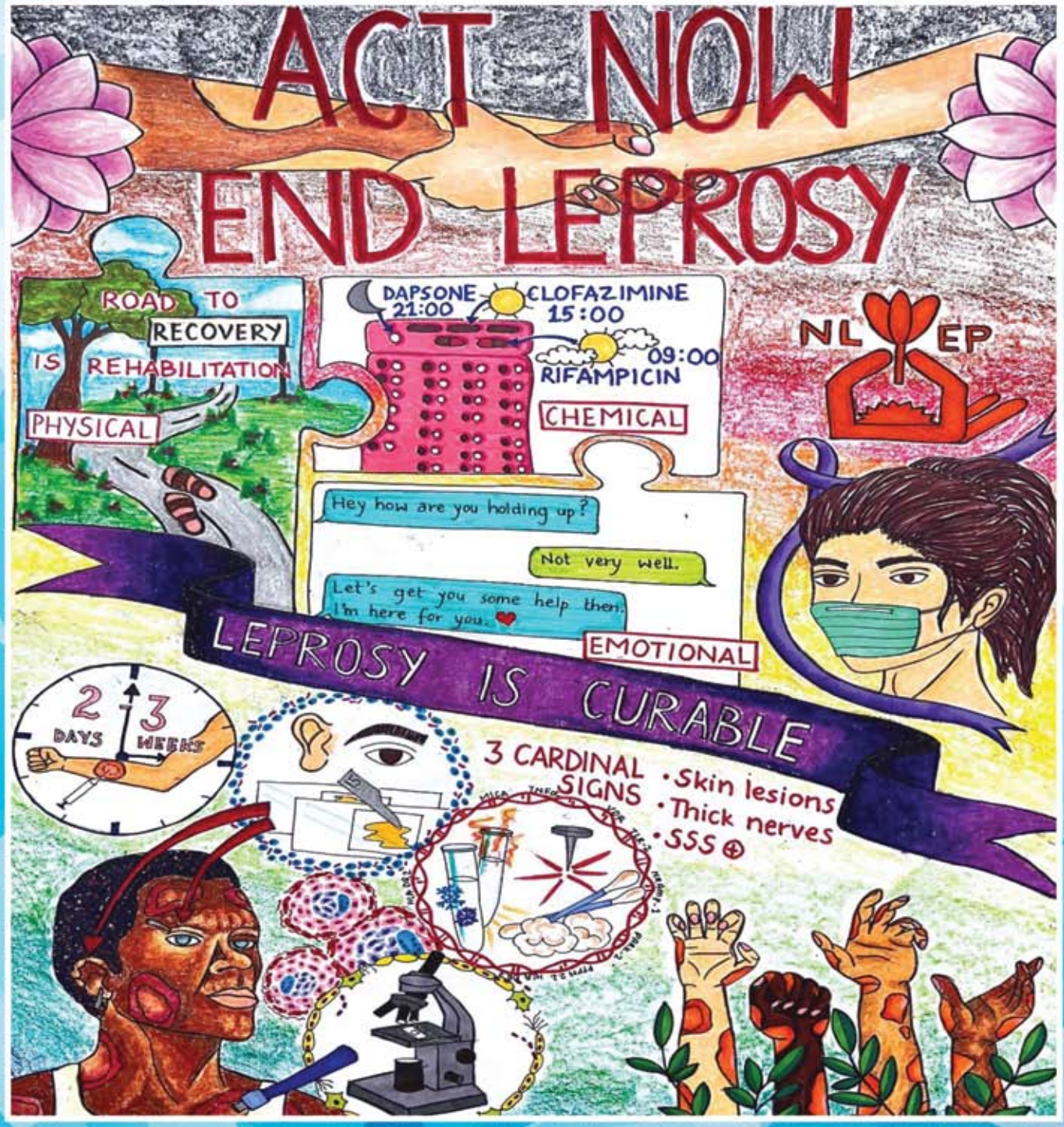
LEPROSY FREE HUMANITY



The winner of the 2023 National Leprosy Day poster competition

Editorial Board

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Dr. Sunil Kumar Gupta
Coordinator
SIG Leprosy 2023-24

Welcome Note

Dear Readers,

We are delighted to present the second volume, first issue of the IADVL SIG Leprosy Newsletter. This academic platform aims to foster knowledge exchange, facilitate collaborations, and promote advancements in the field of leprosy research and clinical practice.

Leprosy, also known as Hansen's disease, remains a significant public health challenge in many regions of the world, including India. The IADVL, with its strong commitment to excellence in dermatology, venereology, and leprology, has established the SIG for Leprosy to address the unique needs and challenges faced by healthcare professionals and researchers working in this domain.

In this issue, we have curated a diverse range of articles, expert perspectives, and updates to keep our readers abreast of the latest developments in leprosy research and clinical practice. Our dedicated members have meticulously crafted content that encompasses various aspects of leprosy, ranging from epidemiology and diagnostics to treatment and rehabilitation.

To begin with, we have an insightful editorial that reflects upon the current status of leprosy and the challenges that lie ahead. The editorial highlights the need for collaborative efforts, multidisciplinary approaches, and innovative strategies to achieve the ambitious goal of eliminating leprosy as a public health problem. Our newsletter features several articles that delve into crucial topics such as leprosy global trends in epidemiology, transmission dynamics, emerging drug resistance, and the role of immunotherapy in leprosy management. These research findings shed light on important aspects of leprosy pathogenesis, host-pathogen interactions, and treatment outcomes, offering valuable insights for clinicians, researchers, and policymakers alike.

In addition to research articles, this issue includes clinical case studies that present intriguing diagnostic dilemmas and management challenges encountered in the day-to-day practice of leprosy. These

case studies not only contribute to our understanding of the disease but also provide valuable learning opportunities for healthcare professionals involved in leprosy care.

We have also dedicated a section to review articles. These reviews serve as a comprehensive resource for healthcare professionals, enabling them to stay updated with the evolving landscape of leprosy management.

We sincerely hope that this newsletter serves as a valuable resource for our readers, enabling them to expand their knowledge, enhance their clinical practice, and contribute to the collective efforts aimed at eliminating leprosy as a public health problem. We welcome your feedback, suggestions, and contributions for future issues, as we strive to make this newsletter a vibrant platform for leprosy research and education.

Finally, we would like to express our gratitude to the contributors, reviewers, and the editorial team for their dedicated efforts in bringing this newsletter to fruition. We extend our heartfelt appreciation to the IADVL Academy and its leadership for their unwavering support and encouragement.

Wishing you an enriching reading experience!

Dr. Sunil Kumar Gupta
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"The more we learn about leprosy, the more we can do to eradicate it and alleviate the suffering it causes."

- Yohei Sasakawa

Leprosy has been one of the most feared and stigmatized diseases in history, with a social and cultural impact that extended far beyond its medical consequences. Despite the pervasive stigma and discrimination, some ancient societies had more enlightened attitudes towards leprosy. In India, for example, leprosy was recognized as a distinct disease and was mentioned in the Hindu epic Ramayana, which describes the God Rama curing a leprosy patient with the help of a divine herb. In ancient China, leprosy patients were allowed to live in their own communities and were treated with respect and compassion.

During the Middle Ages, leprosy became a major health problem in Europe, where it was known as "the scourge of God." The disease was associated with religious and moral decay, and leprosy patients were often forced to wear distinctive clothing and carry bells to warn others of their approach. Leprosy hospitals, known as leprosaria, were established throughout Europe to care for the patients, abandoned by their families.

In the 19th century, discovery of Mycobacterium leprae in 1873 by the Norwegian physician Gerhard Armauer Hansen paved the way for the development of specific diagnostic tests and the use of sulfone drugs to treat leprosy. The establishment of the Leprosy Mission in 1874 by the British missionary Wellesley Bailey marked a new era in the care and treatment of leprosy patients, emphasizing the importance of social and spiritual support in addition to medical care.

In the 20th century, the World Health Organization (WHO) launched a global campaign to eradicate leprosy as a public health problem, with a goal of reducing the prevalence of the disease to less than

one case per 10,000 population. The introduction of multi-drug therapy (MDT) in the 1980s, which combined three antibiotics (rifampicin, clofazimine, and dapsone) into a single treatment regimen, revolutionized the treatment of leprosy and greatly reduced the risk of drug resistance. We have come a long way since then.

Knowledge and research are critical in developing more effective treatments and strategies for combating leprosy. By educating healthcare professionals, communities, and policymakers about the true nature of leprosy, dispelling myths and misconceptions, and promoting social and economic integration, we can reduce the stigma and discrimination associated with the disease and ensure that those affected by leprosy are able to live a full and dignified life. Despite being curable, it still poses a significant challenge due to drug resistance and co-infection with other diseases. By investing in research and innovation, we can continue to develop new and more effective treatments and strategies for combating leprosy, and ultimately achieve our goal of a world free from the burden of this disease.

All the authors have strived assiduously to prepare a plethora of fundamental topics on the subject and presented them in succinct format. We as editorial team would like to take this opportunity to thank our Coordinator and convener for being the guiding light, As well as SIG members and guest authors for invaluable contribution.

We firmly believe that this SIG Leprosy newsletter will be able to present valuable insight and information to our esteem readers.

“Leprosy is a disease that is surrounded by fear and ignorance. It is our duty to dispel that fear and ignorance and replace it with compassion and understanding.” - Baba Amte

Wishing happy learning!!

Reetu Agarwal
Nagendra Singh Beniwal

Emerging Trends in Leprosy Epidemiology and Control : Challenges and Opportunities for Global Elimination

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Leprosy is a disease known from ancient times with different names in different regions. This is strongly associated with the social stigma. In 1873 when G H Armauer Hansen discovered Mycobacterium leprae as the causative agent of leprosy, it was tough to accept by everyone due to the strong social belief that this disease was a curse of God. But after passes of 150 years, we now know more about Hansen's disease at the molecular level.

Throughout history, affected patients have suffered from this debilitating condition, often surrounded by distress, and stigmas, and shunned as castaways. There have been leprosy epidemics on all continents, and they have terrified the entire population. Historically, Chinese, Egyptian, and Indian cultures feared leprosy because it was considered a disfiguring, contagious, and irrepressible disease.

There are still many developing countries like India where more than 60% of new cases of leprosy are detected despite sustained efforts and robust labour. There is a need for extensive research to understand better several aspects of the disease, including its epidemiology.

Global Trends of Leprosy

There is a high prevalence of leprosy in tropical countries, particularly in underdeveloped and developing nations worldwide. Since the advent of multi-drug therapy in the early 1980s, its prevalence has decreased dramatically. It still prevails in Southeast Asian, American, African, Eastern Pacific and Western Mediterranean countries. The duration of treatment and the rate at which new cases are detected drive the global trend in the recorded prevalence of the disease.

There is a gradual decrease in the number of new cases from 299036 (2005) to 202189 (2019) [Figure-1]. While the new case with Grade 2 disability decreased from 14248 (2015) to 10814 (2019) [Figure-2]. The new child cases also decreased from 18907 (2015) to 14981 (2019) [Figure-3].

Several countries are reporting cases of Hansen's disease through the web-based reporting system. Still, 95% of the new caseload is from twenty-three countries. While forty-five countries reported zero cases, still thirty-three countries reported less than 10 cases yearly. Suboptimal treatment completion rate was reported by forty-six countries and 19630 cases were retreatment cases with 3897 cases being relapses. Worldwide total of 13602 Type 1 lepra reactions and 5727 Type 2 lepra reactions has been recorded till the year 2019.

India contributed 57% of the whole new cases detected worldwide within the year 2019-20, comprising 26% of G2D cases and 43% of the latest child cases.

Figure-1: Trend showing detection of new cases

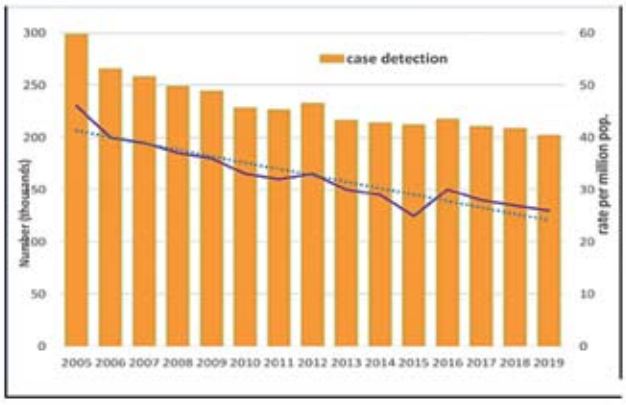


Figure-2: Trend showing grade-2 disability

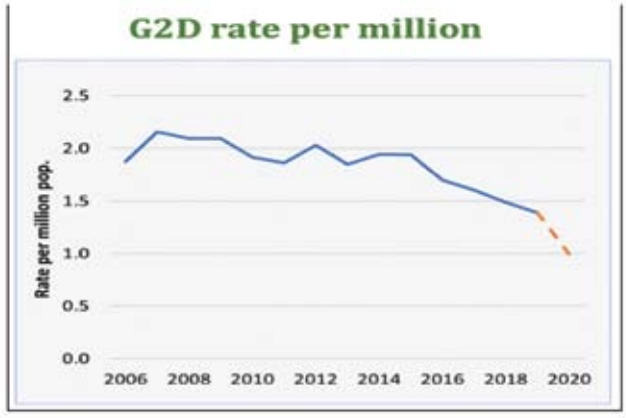
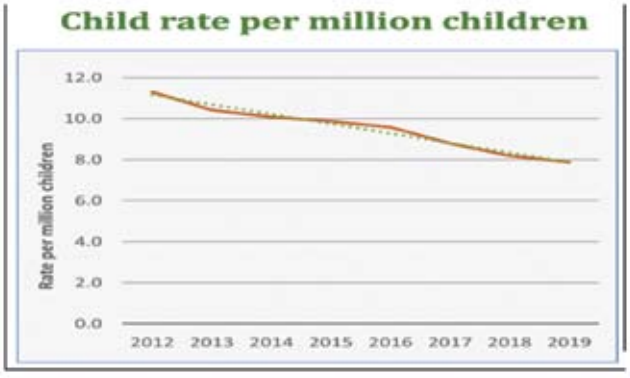


Figure-3: Trend showing new child cases



The Global Leprosy Strategy 2021-2030 and the WHO Roadmap for Neglected Tropical Diseases 2021-2030 aim to achieve interruption of transmission of leprosy by 2030. The Strategy focuses on interruption of transmission and achieving zero indigenous cases by accelerating case detection activities in high-endemic districts and sustaining a strong surveillance system in low-endemic districts [Figure-4].

Figure-4: Milestones & Target 2030

WHO 2030 Target, Sub-Targets and Milestones

INDICATOR	2020	2023	2025	2030
Number of countries with zero new autochthonous leprosy cases	50 (26%)	75 (39%)	95 (49%)	120 (62%)
Annual number of new leprosy cases detected	184,000	148,000	123,500	62,500
Rate (per million population) of new cases with grade 2 disability	1.3	0.92	0.68	0.12
Rate (per million children) of new pediatric cases with leprosy	7.81	5.66	4.24	0.77
Source: the NTD roadmap: WHO				

Major challenges in global elimination

(a) Delay in detection due to low awareness, pandemic, and other health emergencies.

(b) Increasing Human Resources under new programmes requiring training.

(c) Generating more interest in and funding for research on leprosy is an important challenge for the future.

(d) Limited laboratory services and diagnostic tools.

(e) Coordination with partners and stakeholders is still limited.

(f) Need for strengthening resistance to first-line drugs and expansion of antimicrobial resistance surveillance especially as post-exposure prophylaxis is scaled up.

(g) Paper-based reporting system

(h) Migration and Urbanization

(i) Stigma and discrimination are deeply embedded in many communities.

Point of Care & Future Opportunities

(a) Acceleration of new case detection by a targeted approach

(b) Strengthening of the surveillance system, geotagging of leprosy affected, contact tracing and data management.

(c) Development of advanced tools and techniques for early diagnosis of leprosy and nerve function impairment.

(d) Providing recommended drugs for Hansen's disease and its reaction at the subcentre level free of cost.

(e) Introduction of surveillance of anti-microbial resistance and adverse drug reactions and provision of alternative drugs at leprosy centres free of cost.

(f) Provision of free supply of second and third-line drugs for the management of lepra reaction.

(g) Providing the most effective chemoprophylaxis to all contacts of cases

(h) Development and promotion of safe and effective vaccinations as immunoprophylaxis in endemic areas and in contacts.

(i) Funding support for the development of new drug delivery systems and research for new treatment regimens to increase treatment compliance.

(j) Making and implementing laws for the complete treatment of Hansen's disease and prevention of discrimination.

(k) Introduction of post-treatment surveillance of treated cases and providing them care after cure.

(l) Inclusion of leprosy-affected persons in the leprosy program.

(m) Strengthening existing partnerships, adding more partners, and repealing the existing discriminatory laws against leprosy are also required.

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EXPERIENCE OF ESTABLISHING AN INHOUSE PHYSIOTHERAPY REHABILITATION FACILITY FOR LEPROSY PATIENTS

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Leprosy is a feared illness since antiquity, due to the havoc it wreaks upon the mind and the body. More than its treatment, the disease is plagued by its perceptions in society. Stigma and discrimination associated with leprosy continues to challenge early detection and successful completion of treatment. The factors associated with higher perceived stigma include illiteracy, financial inadequacy, need for change of occupation due to restrictions posed by disease, lack of knowledge about leprosy, visible deformities etc. There is also tangible public apathy over leprosy which struggles to stay high on the political agenda of developing countries.

With the advent of multidrug therapy and decline in leprosy burden of the country, the dedicated rehabilitation in leprosaria has dwindled. It was assumed that leprosy as a disease could be treated in hospitals and primary health care levels. It is probably the most crucial aspect and a 'missing link' in most rehabilitation programmes where emphasis is laid down on grading of deformity and not on its overall treatment which would involve all the three aspects viz medical management, surgical interventions, and rehabilitation. This disease during the course of illness may produce changes in the structure and functioning of certain parts of the body called Impairment. Visible impairment or a visible consequence of an impairment inside the body, is termed as Deformity. Specific and paralytic deformity is primary impairment and anaesthetic deformity is secondary impairment. Functional consequence of deformity constitutes what is called Disability. The disease may become a Handicap with persistent disability and the patient experiences limitation in fulfilling a normal role in the society.

An important aim of any leprosy programme is to focus on the early detection of deformity and prevention of its progression to disability. A special focus is on children as a way to reduce disabilities especially G2D and reduce transmission.

Rehabilitation is a process intended to enable people with disabilities to reach and maintain optimal physical, sensory, intellectual, psychological, and social functions. It includes all measures aimed at reducing the impact of disability on an individual, enabling him or her to achieve independence, social integration, better quality of life and self-actualization.

In spite of the National Leprosy Eradication Programme (NLEP) and its achievements by government, new cases are still being diagnosed amongst the healthy population of the Armed Forces.

Management of leprosy in the Armed Forces has a different set of challenges and requirements. The patients acquiring leprosy are

highly trained and skilled manpower requiring more vigilance and care as far as deformities are concerned. Their treatment is supervised and monitored very closely as employability restrictions cannot be carried on for longer duration in view of loss of man hours.

Following are the benefits of physiotherapy in leprosy

i. Protects tissue during healing.

ii. Prevent and reduce swelling by active and passive exercises.

iii. Muscle re-education after tendon transfer and improve strength of transferred tendons.

iv. Increasing and regaining range of movement.

v. Clean supple skin by oiling, massaging, and protecting the part from reinfection and trauma, thus preventing resulting complication and deformity.

While physiotherapy facilities do exist in the hospital, the department of physiotherapy stays committed to the large clientele having diverse diseases requiring physiotherapy. Further, leprosy patients are neglected on the basis of discrimination and stigma involved and are often not able to avail physiotherapy rehabilitation facilities for best desired results in the treatment and management.

Therefore, it is desirable to have in-house physiotherapy facilities dedicated to leprosy patients in the dermatology department. Equipment for the Centre were sourced both from the conventional and modern field. Few of them are enumerated below:

SL.No.	Equipment	Effects and benefits
1	Multi exercise chair (Fig1)	Increase joint movement and muscle power of limbs
2	Shoulder wheel (Fig 2)	Increase range of movement and muscle power of shoulder and upper limb
3	Treadle Sewing machine	Innovative and very effective for strengthening of small muscles of feet especially for foot drop.
4	T pulley (Fig 3)	Strengthening of muscles of upper limb and gentle passive exercise for increasing range of movement of shoulder
5	Rotary wrist machine (Fig 4)	Strengthening forearm muscles involved in pronation and supination, especially after surgery
6	Static cycle	Strengthening muscle of lower limb
7	Cross trainer	Strengthening muscle of lower limb
8	Quadriceps table	Enables exercise in sitting position for knee flexion and progressive resistance group especially after surgery
9	Finger exerciser and soft ball	For strengthening small muscle of hands especially in ulnar or median claw hand
10	Incline reciprocal unit (Fig 5)	For reciprocal hand shoulder exercise

The results were very gratifying both physically and on mental wellbeing. The patients with tendon transfer surgery for mobile and fixed claw hand (Fig 6-8), wrist drop, and foot drop benefited tremendously in muscle re - education and strengthening. The patients were discharged very early in the course of disease period with less residual deformity. It is to be understood that physiotherapy rehabilitation is an adjunct to the main arsenal of multidrug therapy and a comprehensive approach towards battling the disease with collaboration between both medical and social agencies, is mandatory. The effects of physiotherapy are already well established, however a structured study on the prolonged effects of physiotherapy is need of the hour.

Fig1: Multi exercise chair

Fig 2: Shoulder wheel

Fig 3: T pulley

Fig 4: Rotary wrist

Fig 5: Incline reciprocal unit

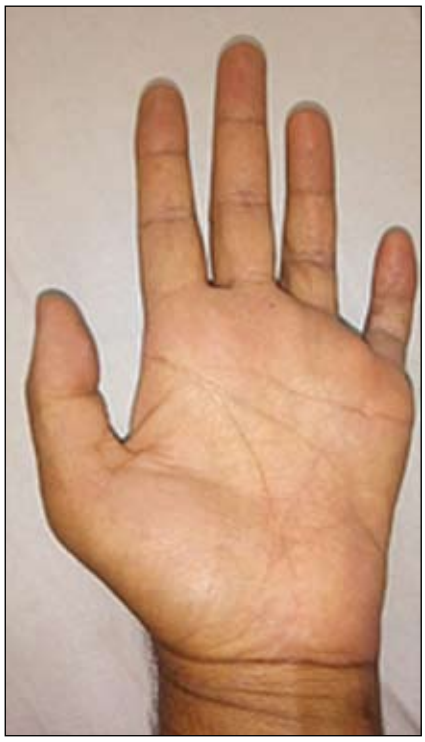

Fig 6: Complete claw hand

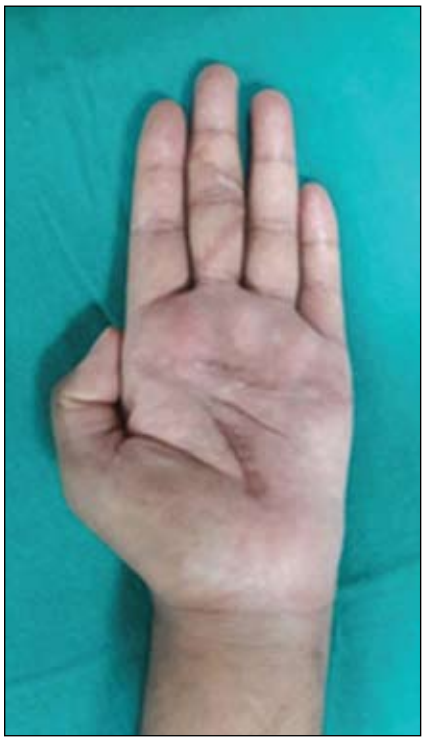

Fig7: Tendon transfer surgery

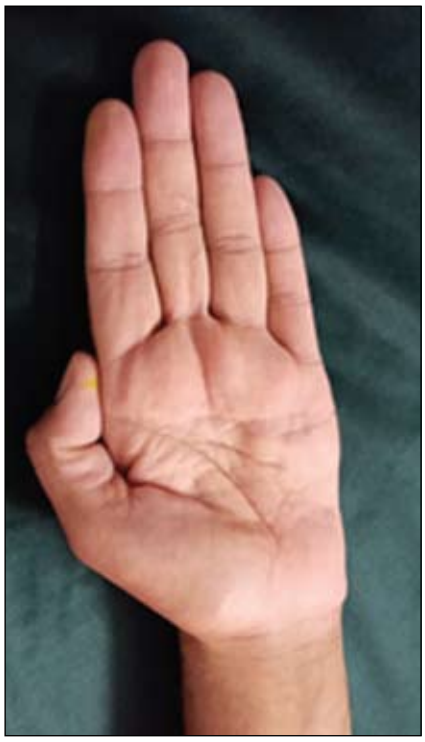

Fig 8: Post surgery

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Ultrasound In Leprosy

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Introduction

World health organization has given cardinal points to diagnose leprosy. A person should have one amongst the three criteria hypopigmented, hypaesthesic/ anaesthetic skin lesions, enlarged/tender peripheral nerves, and positive slit skin smear. However, hypopigmented skin lesions are not found in pure neuritic leprosy and diffuse infiltrative form of lepromatous leprosy. Palpation of nerve has subjective variation among clinicians. Slit skin smear may not come positive in tuberculoid pole of leprosy and pure neuritic leprosy. In such scenarios there is always a need for objective way to diagnose leprosy. Nerve examination findings can be made accurate to avoid most of the problems. Recently there is a growing interest in high resolution ultrasonography (HRUS) as a diagnostic tool for diseases of the peripheral nervous system - mononeuropathies, polyneuropathies and peripheral nerve tumors.1

HRUS of nerve: HRUS is a non-invasive technique to see study structural changes in nerve. It can avoid invasive procedures like nerve histopathology and is more cost effective than magnetic resonance imaging. Furthermore, inter-observer agreement between sonographic measurements is excellent. Imaging peripheral nerves can be done with reasonable precision with USG with broadband frequency of 10-14 MHz; CD frequency of 6-13 MHz and linear array transducer. 2,3 Following information can be obtained by HRUS: -

(a) location and degree of nerve enlargement

(b) nerve morphological alterations

(c) echo texture

(d) fascicular pattern

Axial image of a normal nerve in HRUS shows small hypoechoic areas separated by hyperechoic septae, giving a “honeycomb-like” appearance (Figure 1).4 Axial scan can measure the cross-sectional area of nerve (CSA) and thereby degree of enlargement from baseline value along with echo-reflectivity of the nerve. The longitudinal scan of nerve in HRUS reveals the fascicular architecture, which gives “bundle of straws” appearance in healthy condition (Figure 2).4 Hence longitudinal scan helps to know the length of nerve thickened, presence of any nodularity in nerve and nerve abscess.

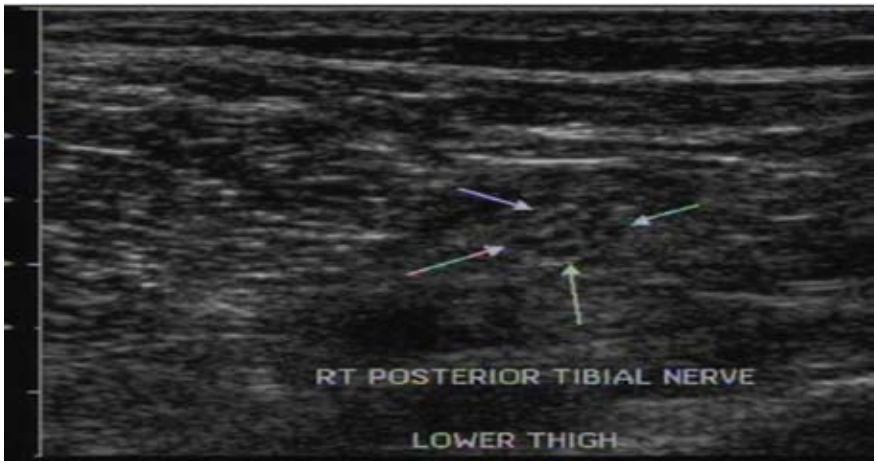

Figure 1: Axial scan of healthy nerve honeycomb like appearance

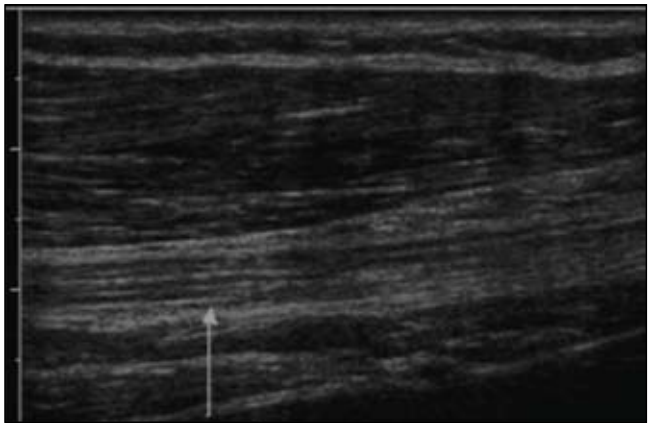

Figure 2: Longitudinal scan of healthy nerve giving bundle of straw appearance

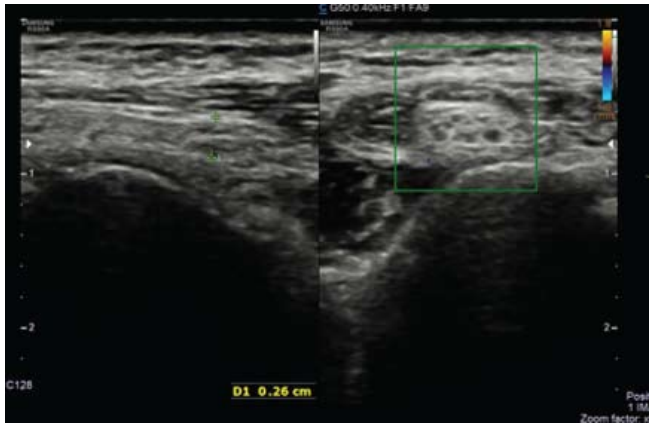

Figure 3: Color Doppler USG of healthy nerve showing avascularity

Color Doppler USG Nerve

Color Doppler (CD) is indicated to look for absence or presence of blood flow signals in the perineural plexus and interfascicular vessels of nerve trunks. In healthy nerves, neither the fascicles nor the epineurium shows CD signals indicating normal (hypo) vascularity of nerve trunks (figure 3). The presence of blood flow signal denotes hypervascularity suggestive of ongoing neural inflammation and nerve damage(neuritis) (figure 4).5 Hence color doppler USG can be helpful in diagnosing neuritis in leprosy. Increased neural vascularity with interfascicular edema will suggest ongoing neural inflammation (neuritis) in leprosy reactions. CD is helpful in differentiating acute and chronic neuritis. Because of edema CSA will be increased along with change in echotexture (hypoechoic) along with increased vascularity in acute neuritis associated with leprosy reactions whereas in chronic neuritis CSA will not be increased but vascularity will be there. Color doppler USG can help in monitoring the treatment of neuritis and hence avoid early stoppage of anti-reaction treatment which leads to recurrence of neuritis. Color Doppler imaging may assist in judging the return to normalcy following neuritis and the time of stoppage of anti-reaction treatment.

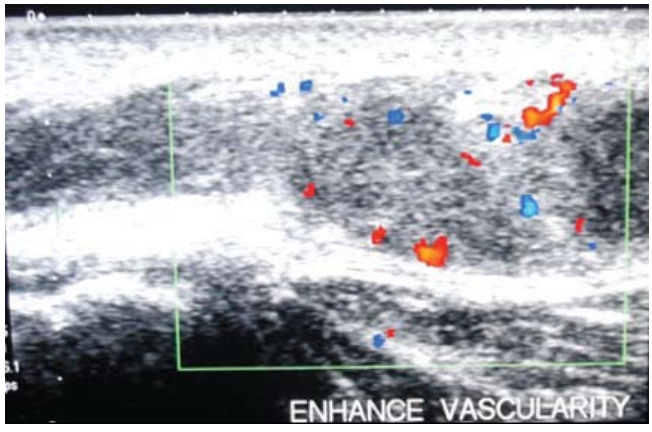

Figure 4: Color doppler USG of left common peroneal nerve of Leprosy patient showing blood flow signals suggestive of neuritis

Jain et all compared the CSA of major peripheral nerve trunks of upper limb and lower limb of leprosy patients with healthy controls. They graded the structural changes in nerve in terms of change in echo-reflectivity. Mild =some hypo-reflectivity, Moderate = obvious hypo-reflectivity, Severe= absence of any fascicular pattern. They suggested follow up USG can detect changes in the CSA and structural integrity which can be correlated directly to treatment efficacy and clinical improvement.5

Afsal M et al, compared HRUS findings of diabetic peripheral neuropathy with leprosy

neuropathy. They found both type patients showed diffuse thickening of the peripheral nerves. Nerve thickening was significantly more behind the medial epicondyle in the patients having leprosy compared to patients with DPN. Abnormal echo-patterns, focal lesions with thickening, and increased vascularity were seen in leprosy patients not in DPN.6

Summary of usefulness of HRUS in Leprosy

1. Diagnosis of Pure neuritic leprosy: Due to absence of skin lesion the diagnosis of PNL is purely based on nerve enlargement. HRUS can objectically measure the CSA of nerve and detect nerve enlargement.
2. Classifying mono-neuritic and polyneuritic PNL
3. Early diagnosis of lepra reaction by detecting neuritis, avoiding early stoppage of neuritis treatment, monitoring neuritis treatment.

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Neuroimaging in Leprosy

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In India, National Leprosy eradication Programme (NLEP) has been successful in achieving a prevalence rate of this disease to less than 1 case per 10,000 population 1, yet India continues to be amongst the top three countries reporting more than 10000 cases per year. Still leprosy continues to baffle us with presentation at atypical sites and unusual morphological types.

Peripheral nerves affliction by Mycobacterium leprae causing neuropathy is well established, but reports of central nervous system (CNS) involvement are scarce in literature.2,3 This could partly be attributed to lack of dedicated cross-sectional investigations of the CNS in leprosy patients. With newer advancements in imaging with magnetic resonance imaging (MRI), it is imperative to study these rare presentations of leprosy for better understanding of disease process and the extent of involvement to pave way for better treatment modalities and care to these patients.

With widespread availability of Magnetic resonance imaging (MRI) the evaluation of patients with peripheral neuropathy (PN) has got renewed attention. Being non-invasive in nature, offering high contrast resolution and multiplanar imaging, it facilitates imaging of peripheral nerves all along its tract. MRI can potentially document early changes in morphology, internal characteristics of afflicted nerves and can also detect early denervation changes in the corresponding muscle.4 It also enables us to visualize deep seated nerves like sciatic nerve and simultaneous evaluation of adjacent bones and soft tissues as well. It is possible to look for any loss in fascicular architecture or formation of micro-abscesses. Micro-abscess appears as T2 hyperintense and T1 hypointense lesions. The T2 hyperintensity is attributable to loss of myelin sheath, increase in free water, increased vascularity, and oedema. This provides an edge over and above conventional imaging modalities like high resolution ultrasonography (HRUSG) in facilitating early diagnosis, treatment, and prevention of disability.

Dorsal root ganglion and plexus are part of the peripheral nervous system but their involvement in leprosy is rarely reported. Khadilkar et al had reported a case of multibacillary leprosy with hyperintensity in spinal cord at C5-6 level and enlargement of unilateral dorsal root ganglion.5

In a case series, Polavarapu et al described MRI abnormalities of the brain, spinal cord, proximal nerves, and plexus for eight leprosy patients.2 Two patients had intracranial lesions in form of enhancing facial nuclei & nerves and one patient had a lesion in the nucleus ambiguus. Two patients also had enhancing spinal cord lesions. A follow up imaging in these patients after multidrug

therapy (MDT) revealed resolution in intracranial and spinal cord MR abnormalities. Brachial and lumbosacral plexitis were evident in six and two patients respectively.

In a retrospective study by Jabeen et al the MRI of thirty-two patients of leprosy were evaluated in detail in whom dedicated plexus and craniospinal imaging was performed. 3 Out of thirty-two patients, twenty-two patients showed MR abnormalities. In brain, enhancement of facial colliculus and nucleus ambiguus were appreciated in two patients. Four patients showed hyperintense discrete T2 lesions on spinal cord imaging with contrast enhancement. On the other hand, brachial plexus thickening and hyperintensity was appreciated in ten patients and six showed involvements of peripheral nerves manifesting as thickening and formation of micro or macroabscesses.

In a prospective observational study by Verma et al involving dedicated neuroimaging in multibacillary leprosy patients.6 Five out of twenty-nine patients demonstrated abnormalities on MRI. One had T2 hyperintensity involving both middle cerebral peduncles, one brachial plexitis and three had features of ganglionitis/myelitis. This study differed from earlier studies in that imaging abnormalities were reported in absence of abnormal neurological examination.

All these MR abnormalities have been attributed to various causes like retrograde extension of infection through peripheral nerves, immunological reaction mediated by autoreactive T cells against bacterial antigens, though exact pathogenesis remains to be identified.

Neuroimaging in leprosy has revealed involvement of the hitherto considered relatively spared areas such as plexus, spinal cord and brain at a much higher frequency then realised before. This type of imaging further gets its importance in cases of pure neuritic leprosy, whose diagnosis remains challenging till date.

It is thus evident that cases of leprosy be offered a detailed neurological examination and MR of craniospinal axis and plexus be considered accordingly. In future appropriately designed prospective studies with larger sample size can further shed light on the exact nature and reason for these CNS imaging abnormalities.

Future of neuroimaging lies in Diffusion tensor magnetic resonance imaging (DTI). DTI is an advanced, non-invasive MRI technique based on diffusion of water molecules. The water molecules diffuse or move randomly due to thermal energy (Brownian motion). The movement is of greater magnitude along the intact white matter tracts in comparison to across the tracts. This anisotropic or direction dependent movement of water is measured by DTI technique and can be displayed as fibre-tracking following specific algorithms called tractography. DTI can potentially provide more information in leprosy which tends to involve nerve fibres.7

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Drug Resistance in Leprosy: Learning from the Past & way ahead

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Introduction

The advent of multidrug therapy (MDT) in 1982 was a significant step in leprosy treatment which paved the way to reduce the burden of leprosy. On the contrary drug resistance in leprosy is also on the rise posing a dreadful public health problem. Various reasons for drug resistance are inadequate or irregular treatment and monotherapy.

Types of drug resistance

An untreated case is infected with a drug-resistant Mycobacterium leprae strain in primary resistance.[1] In secondary resistance, drug resistance develops in a patient on MDT, initially responding to therapy but later showing no response or relapse after treatment completion.[1]

Drug resistance in the pre-MDT era

Before MDT, dapsone monotherapy was used in leprosy treatment. Dapsone resistance was first demonstrated in mouse foot pad by Petit and Rees in 1964.[2] After dapsone monotherapy in the 1960s and 1970s, many resistance cases were reported.[3] Introducing other drugs or combined therapy was the answer to this emerging dapsone resistance. In 1970 bactericidal role of rifampicin against M. leprae was demonstrated.[4] Shephard, in 1972, suggested that rifampicin should be used with acedapsone to reduce drug resistance.[5] Rifampicin alone or with dapsone was used for leprosy. The first case of rifampicin-resistant was detected in 1976.[6] Since then, more cases of rifampicin resistance have been detected. In 1982, WHO recommended MDT for leprosy treatment to overcome this problem.

Clofazimine resistance, one of the components of WHO-MDT, is rare. Diepen, in 1982 reported the first case of clofazimine resistance in a patient who was on clofazimine monotherapy.[7] Subsequently, a few more cases of clofazimine resistance have been reported.[8,9]

Drug resistance in the post-MDT era

Some newer drugs were also found effective after MDT was introduced. Ofloxacin bactericidal activity against M. leprae was first demonstrated in 1986.[10] The first case of ofloxacin resistance was detected in 1994.[11] According to the data between 2009-2015 from 19 countries, rifampicin resistance was found in 5.1% of relapse cases and 2 % of new cases.[12] In India, data between 2011-2015 showed rifampicin resistance in 3.5%, dapsone resistance in 2.3%, and ofloxacin resistance in 2.3% of new cases.[12] In relapse cases, rifampicin resistance, was found in 8.2%, dapsone resistance in 4.8 %, and ofloxacin resistance in 2.3% of cases. This

data seems to be the tip of the iceberg. More cases of drug resistance can be detected by doing a resistance study in every new or relapse case.

Role of drug resistance in lepra reactions

Drug resistance is a well-known cause of relapse. Recently drug resistance has been speculated to be responsible for chronic erythema nodosum leprosum and steroid non-responsive type 1 lepra reaction.[13] There are reports of rifampicin-resistant in leprosy cases with lepra reactions. These reaction cases have not been included in the drug resistance surveillance program.[14] The resistant strains released from these reaction cases might spread the infection in the endemic area.[14]

Guidelines for drug resistance surveillance in leprosy

To tackle the problem of drug resistance, WHO and NLEP have formulated guidelines for drug resistance surveillance.

WHO guidelines for surveillance

The main aim of surveillance is to detect secondary dapsone, rifampicin, and ofloxacin resistance in leprosy patients, who relapsed after completion of WHO recommended MB-MDT regime.[15] WHO recommendation for resistance testing in leprosy is mentioned in Table [1].

Table 1: WHO recommendations for drug resistance testing in leprosy

New cases	New cases who are smear positive (BI more than 2 +) are to be tested
Retreatment cases	All retreatment cases must be tested for secondary resistance except transferred in cases unless they are considered at risk for resistance due to irregular treatment
Testing for drugs	PCR plus sequencing for folP1, rpoB, and gyrA gene mutations
Sample for testing	Two SSS samples from the site having BI 2+ or more should be taken. Ear lobe being the preferred site, together with the most prominent skin lesion. Or One skin biopsy from a prominent lesion having BI 2+ or more

NLEP guidelines for surveillance

Under NLEP, for drug resistance surveillance, the health facilities are divided into 3 levels.[12]

Level 1: Health facility where leprosy patients are diagnosed and treated,

Level 2: Health facility where facility of sample collection for AMR by slit skin smear method is available,

Level 3: Health facility where facility for skin biopsy is available.

Recommendations by NLEP

All relapse cases and 20% of new MB cases will be referred to Level 2 facility for sample collection for drug resistance by slit skin smear method. Samples with BI ≥ 2 shall be sent to one of the apex laboratories for drug resistance testing. Patients with a negative PCR report shall be referred to Level 3 facility for a skin biopsy. The skin biopsy sample shall be sent to apex laboratory for drug resistance testing. Under the drug resistance surveillance system, six apex laboratories have been identified and all states and union territories are linked to these labs (Table 2).

Table 2: Apex laboratories for drug resistance testing and allotted states and UTs		
	Laboratory	**Allotted states and UTs**
1.	Central Leprosy Training Research Institute, Chengalpattu, Tamil Nadu	Kerala, Andaman & Nicobar, Lakshadweep, Puducherry
2.	National JALMA institute for leprosy and other Mycobacterial diseases, Agra, UP	Uttar Pradesh, West Bengal, Assam, Tripura, Nagaland, Meghalaya, Gujarat, Rajasthan, Bihar
3.	Schieffelin Institute for Health Research and Leprosy Centre, Karigiri, Tamil Nadu	Tamil Nadu, Goa, Karnataka
4.	LEPRA- Blue Peter Public Health Research Centre, Telangana	Andhra Pradesh, Telangana, Maharashtra, Odisha, Madhya Pradesh
5.	Regional Leprosy Training and Research Institute, Raipur, Chhattisgarh	Chhattisgarh, Manipur, Mizoram, Sikkim, Arunachal Pradesh, Jharkhand, Dadra & Nagar Haveli, Daman & Diu
5.	Regional Leprosy Training and Research Institute, Raipur, Chhattisgarh	Chhattisgarh, Manipur, Mizoram, Sikkim, Arunachal Pradesh, Jharkhand, Dadra & Nagar Haveli, Daman & Diu

Investigations for drug resistance

There are standard and newer molecular methods for detecting drug resistance. Various methods are mouse foot pad assay, PCR-DNA sequencing DNA microarray, and real-time PCR-based high-resolution melting analysis. The major drawbacks of these tests are non-availability, high cost, and time-consuming tests.

Management

Treatment of drug-resistant cases16 is mentioned in Table 3.

Table 3: Recommended regimes for resistance cases in leprosy		
Name of resistant drug	**Treatment**	**Allotted states and UTs**
	First 6 months	**Following 18 months**
Rifampicin or rifampicin plus dapsone	Clofazimine 50 mg/day plus minocycline 100 mg/day plus ofloxacin 400 mg/day	Clofazimine 50 mg/day plus minocycline 100 mg/day or ofloxacin 400 mg/day
	Clofazimine 50 mg/day plus ofloxacin 400 mg/day plus clarithromycin 500 mg/day	Clofazimine 50 mg/day plus ofloxacin 400 mg/day
Rifampicin and ofloxacin	Clofazimine 50 mg/day plus minocycline 100 mg/day plus clarithromycin 500 mg/day	Clofazimine 50 mg/day plus minocycline 100 mg/day or clarithromycin 500 mg/day
Dapsone	Standard WHO- MB-MDT, with follow-up at the end of treatment and should be examined regularly for possible relapse.	

Lesson learned from the past: In pre-MDT era, irregular treatment and monotherapy were the main cause of secondary resistance. To tackle this problem, MDT was introduced. In recent years both primary and secondary resistance cases have been detected. Alternate drug regimens have been developed for these resistant cases. The main drawback of this alternate regime is the cost and long duration of therapy.

Moreover, resistance to ofloxacin has also been detected. In the surveillance program, mainly new and relapse cases are tested. Rifampicin-resistant has been detected in leprosy cases with lepra reactions. The resistant strains released from these reaction cases might spread the infection in the endemic area.

Drug resistance testing is also not very easy. Only a few laboratories for drug resistance testing for leprosy in India exist. There is a lack of skill in sample collection for resistance. To overcome the emerging drug resistance following suggestions are made:

1. All new, relapse, and patients with reactions should be tested for drug resistance.
2. The facility for drug resistance should be established at every tertiary care center, especially in endemic areas.
3. Like WHO-MDT, alternate drugs should be provided free of cost.

Conclusion

Drug resistance in leprosy is rising and is a public health concern. Drug resistance is responsible for relapse, chronic erythema nodosum leprosum, and steroid non-responsive type 1 lepra reaction. A robust surveillance system and a free drug supply of alternate drugs are required to deal with the problem.

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Managing Leprosy in Special Situation

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Introduction

Leprosy can affect people from all age groups, especially in areas of high endemicity. The management of leprosy in such situations can be challenging, because of changes in immunity, need for dose modifications or polypharmacy. We have reviewed and discussed the prevalence, clinical spectrum, and special considerations in the management of leprosy among special population groups, such as children, pregnancy and lactating women, elderly and people living with HIV.

Childhood leprosy

Leprosy in children is an indicator of active community transmission and is a marker of failure of disease control programs.[1] Incidence of childhood leprosy cases with disability is also an indicator of the operational efficiency of national programs, as this reflects the delayed diagnosis.[2] As per National Leprosy Elimination Program update, child cases percentage has reduced from 7.67% as on 31st March 2019 to 6.86 % as on 31st March 2020.[3]

The most common age group to be affected among children is between 10-14 years, which might be due to the long incubation period of the disease. Yet many cases have been reported among younger children and infants. This shows the importance of keeping leprosy as a differential diagnosis for clinically suspicious lesions.

Paucibacillary forms have been reported more commonly among children, with the most common clinical type being borderline tuberculoid leprosy. Indeterminate leprosy has been most commonly described among young children. Whole body examination is of prime importance as in many cases lesions are present in covered areas such as buttocks. Leprosy reactions are reported less frequently among children, with a wide variation in the reported frequency ranging from 1-30%. Type 1 reaction is more common, as the most common disease form is borderline tuberculoid leprosy.

Deformities among children should be prevented as they add to the morbidity and result in prolonged impairment of quality of life. The various risk factors for development of deformities are like those of adult patients.

One of the most challenging aspects of leprosy in children is the confirmation of diagnosis, especially in case of disease presenting with subtle signs, as tests for fine touch and/or temperature sensitivity can be extremely difficult for children. So, in case of doubt, it is often rational to perform slit skin smear and histopathological examination. But, slit skin smear positivity is low as most children present in the paucibacillary spectrum. Similarly, sensitivity of histopathological examination also depends on several factors, such as appropriateness of choice of site for biopsy, depth and amount of tissue sample obtained, and expertise of the pathologist in leprosy.

ML-FLOW test, a simple and rapid immunochromatographic flow test which detects immunoglobulin M to phenolic glycolipid 1,

has been proven to correlate with multibacillary disease and clustering of the disease.[4]

For children between 10-14 years of age, rifampicin 450 mg once monthly, clofazimine 150 mg once a month and 50 mg on alternate days and dapsone 50 mg daily has been recommended for 6 and 12 months for paucibacillary and multibacillary cases respectively. Treatment of children <10 years of age or <40 kg is more complex, requiring use of single formulation medications, with doses such as 10mg/kg rifampicin once a month, 100mg clofazimine once a month and 50 mg twice weekly and dapsone 2 mg/kg daily, for 6 and 12 months for paucibacillary and multibacillary cases respectively.

As per recommendation by WHO in operational guidelines, Global Leprosy Strategy, 2016-2020, for children weighing 20-40 kg, MDT blister packs can be used with adaptations: half of dapsone 50mg tablet (thus 25mg); clofazimine twice weekly instead of every other day; single formulation rifampicin 300 mg instead of 450 mg pill included into blister pack. For children weighing less than 20 kg, clofazimine 1 mg per kg body weight daily and 6 mg/kg once per month must be used along with rifampicin 10mg/kg once a month and dapsone 2 mg/kg daily. This can pose a difficulty due to the non-availability of oral solutions.

There have been uncommon reports of hematological and hepatic impairments with dapsone and rare incidence of hematemesis with clofazimine among children. In such situations, use of alternative regimens can also pose a problem, as use of ofloxacin and minocycline is contraindicated among children below 10 years of age, due to risk of early closure of epiphysis and dental and bone alterations. Corticosteroids are the mainstay of treatment for reactional states in childhood leprosy, although use of thalidomide for type 2 lepra reaction has been reported.[5]

Chemoprophylaxis with single dose rifampicin (600mg for weight > 35 kg, 450 mg for >9 years age, and 300 mg for 5-9 years age group) has been recommended. Immuno-prophylaxis with BCG vaccine two doses six months apart to all household contacts has been recommended in some countries, due to its reported beneficial protective effect.

Leprosy in pregnant/lactating women

Leprosy has been rarely reported in pregnancy, although the exact incidence in the recent years is unknown. A detection rate of 4.3-9.7 has been reported from Brazil during the years 2007-2009.[6] As leprosy is a disease with complex interplay of host immunity and pregnancy is a state of decreased immunity, there is chance of increased predisposition to disease development and reactivation. There is a change in the levels of various hormones during pregnancy (especially during the last trimester and during the first three months post-partum) such as increased levels of steroids, thyroid hormones and estrogen which result in decreased cellular immunity.[7] There is a down-regulation in T helper 1 cell response with reduced interleukin 2 production. These changes increase the chance of downgrading reaction and relapse.[8] Borderline tuberculoid form has been reported most, with multibacillary form of disease and smear negativity.

Monitoring of anaemia and uterine height has been recommended as physiological anaemia of pregnancy can be aggravated due to possible hemolytic anaemia caused by dapsone therapy, which can result in direct and indirect consequences for the mother and the child respectively. There are reports of increased risk of low birth weight, premature birth, increased chance of childhood infection and exfoliative dermatitis changes in

the newborn; and progression of disease towards lepromatous pole, onset, and aggravation of lepra reactions, and possibility of disease relapse for the mother.

WHO recommends use of multidrug therapy in pregnant and lactating women, which significantly reduces the chance of disease transmission to the newborn.[9]

Rifampicin is known to cross placenta, however, there appears no increased risk of birth defects from the data of more than 300 case reports.[10] Use of rifampicin in lactating women results in minimal transfer (around 5% of the therapeutic dose) of the drug to breast milk, and no adverse effects have been reported among breastfed infants.[11]

Dapsone is also considered compatible to be administered during pregnancy and lactation, with few reports of haemolytic anaemia in women and their babies, which resolved after discontinuation of the drug, thus necessitating close monitoring.

There are only very few publications with a small number of cases regarding clofazimine during pregnancy and breastfeeding. Clofazimine can cross the placenta and can pass into breast milk (around 22% of maternal dose) and cause skin discoloration in the baby. There have been no reports of congenital anomalies, only rarely unexplained neonatal deaths due to prematurity, gastroenteritis and unknown reasons have been reported in the past.[12-14]

Corticosteroids are the mainstay of treatment for lepra reactions during pregnancy and lactation.

Leprosy among elderly

With a better life expectancy, there is an expected increase in cases of leprosy among the elderly. One of the retrospective chart review studies from India reported 7.4% of all patients of leprosy being elderly (more than 60 years of age).[15] Whereas in studies from Brazil and Malaysia, proportion of patients being more than 60 years of age ranged between 12-19.4%.[16-19] Borderline tuberculoid type was the most common clinical type of leprosy among such cases, with predominance of multibacillary type of disease state. Type 2 lepra reaction was found to be more common as compared to type 1 lepra reaction. Grade 2 deformity ranged from 8.3-13.8% in various studies which is very high.[15,20]

The presence of deformity adds to the burden of comorbidities among such elderly patients. Management can often be challenging and needs close monitoring owing to the fact that most patients are on polypharmacy.

Leprosy with HIV

It is speculated that human immunodeficiency virus and leprosy co-infection may increase the susceptibility to leprosy infection and result in aggravation or worsening of the disease. However, HIV infection does not appear to increase the susceptibility to leprosy.[21] In contrast, initiation of antiretroviral therapy has been reported to be associated with activation of leprosy infection and exacerbation of existing lesions, as a manifestation of immune reconstitution.[22] In one of the studies, 10.5% of the patients of leprosy had HIV co-infection.[23] There is no significant differences in prevalence of HIV among leprosy patients.[24,25]

There have been documentations of shift from lepromatous to borderline tuberculoid disease after starting treatment with both antiretroviral and multidrug therapy, possibly due to altered granuloma formation.[26]

In HIV-leprosy coinfected patients with low CD4+ T cell count, there is presence of granuloma formation in histopathology, indicating preservation of ability to form granuloma (thus contrasts with patients with tuberculosis-HIV

coinfection). This interesting phenomenon has been termed as granuloma paradox.[25] As HIV is also neuropathic, there is a theoretical possibility of synergistic nerve impairment.[27]

In a cohort study, oral as well as intravenous steroid (1-2mg/kg body weight and 2 patients receiving methylprednisolone pulse) was safely used among HIV-leprosy co-infected patients, with only one patient (out of 11) developing sepsis.[28] Concomitant use of antiretroviral therapy did not result in any adverse event.

Conclusion

The clinical manifestation of leprosy can be altered among various special physiological and concomitant immunological situations, due to change in immunity, associated comorbidities, or concomitant drug therapy. Such cases need special consideration. Multidrug treatment must be continued in all such special cases. Treatment of reactional states with steroid might be challenging.

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LEP : An Overview

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Background

Since time immemorial Leprosy has affected humans, and it has been stigmatized and associated with social exclusion throughout history. Despite the availability of effective treatment, leprosy still affects people worldwide, particularly in developing countries. To address this issue, several countries have implemented national leprosy eradication programs. This article provides an overview of the National Leprosy Eradication Programme in India, one of the most successful programs of its kind in the world.

Leprosy has been a major health problem in India for centuries. In the 1940s and 1950s, India had the highest number of leprosy cases in the world, accounting for more than 70% of the global burden of the disease. Despite the availability of effective drugs for the treatment of leprosy, the disease continued to spread, and the number of cases continued to increase. In response to this situation, the Indian government launched the National Leprosy Control Programme (NLCP) in 1955, with the aim of providing diagnosis, treatment, and rehabilitation services to leprosy patients. However, the program failed to achieve its objectives, and the number of leprosy cases continued to rise. In the 1980s, India had the highest burden of leprosy in the world, with more than 100,000 new cases being reported every year. It is needless to say that the disease was highly stigmatized, and people affected by leprosy were often isolated and discriminated against by society.

In response to this precarious situation, the Indian government launched the National Leprosy Eradication Programme (NLEP) in 1983 with much ambitious goal of eliminating leprosy as a public health problem in India by the year 2000. The NLEP was based on the World Health Organization's (WHO) strategy of multidrug therapy (MDT), which is a combination of three drugs (rifampicin, clofazimine, and dapsone) that came into use from 1982 being highly effective in curing leprosy.

The NLEP's Objectives

Vision of NLEP is “Leprosy-free India”.

The primary objective of the NLEP is to eliminate leprosy as a public health problem in India. This means reducing the number of new cases to less than one case per 10,000 population at the district level, which was the goal set by National Health Policy,2002. India was able to achieve this goal at national level in December 2005 through NLEP.

NLEP’s other objectives include early detection and treatment of leprosy cases, prevention of disabilities due to leprosy-related nerve damage,

rehabilitation of people affected by leprosy, and reduction of stigma and discrimination against people affected by leprosy as mentioned below: -

(a) Prevalence rate: Aim to reduce Prevalence rate less than 1/10,000 population at sub national and district level.

(b) Disability limitation:

(i) To reduce Grade II disability % < 1 among new cases at National level.

(ii) To reduce Grade II disability cases < 1 case per million population at National level.

(iii) Zero disabilities among new Child cases.

(c) Zero stigma and discrimination against persons affected by leprosy.

Implementation

The NLEP adopts a multipronged strategy through a decentralized approach, with the involvement of state governments, district health authorities, and non-governmental organizations (NGOs). The program focused on early detection and treatment of leprosy cases, disability prevention and management, and community awareness and participation. The key components of the NLEP included:

(a) Early case detection : The program aimed to detect all new cases of leprosy and start them on MDT treatment as soon as possible. Case detection comprised of active and passive surveillance. Active surveillance involved screening of high-risk groups such as family members of leprosy patients, contacts of leprosy patients, and people living in leprosy endemic areas. Passive surveillance involved the reporting of leprosy cases by health workers, private practitioners, and NGOs.

(b) Prompt treatment : The NLEP provides free of cost services for diagnosis and management including surgical /non-surgical interventions to all leprosy patients. The treatment is provided through government health facilities such as primary health centres, govt. dispensaries, CHC, District Hospitals (DH) and medical colleges throughout the country and accredited NGOs. Difficult to diagnose, complicated cases, reaction cases and cases requiring reconstructive surgery are referred to district hospital for further management. The duration of treatment varies depending on the type and severity of the disease, but most patients were cured within 6-12 months.

(c) Disability Prevention and Medical Rehabilitation: The NLEP also aims to prevent disabilities caused by leprosy through early detection and appropriate management. It also renders rehabilitation services to leprosy patients with disabilities, such as micro-cellular rubber (MCR) footwear, physiotherapy, and occupational therapy. Hansen's disease patients are also empowered with trainings in self-care procedure for preventing aggravating disability to the insensitive hands/feet. Emphasis is also being placed on correction of permanent disability through reconstructive surgeries (RCS). To strengthen RCS services, GOI has identified 112 institutions for conducting RCS based on the recommendations of the state governments. Out of these institutions, 60 are Govt. Institutions and 52 are NGO institutions. The program also provided disability certificates to eligible patients, which entitles them to social welfare benefits.

(d) Capacity building : Training of general health staff like Medical Officer, health workers,

health supervisors, laboratory technicians and ASHAs are conducted every year to develop adequate skills for diagnosis and management of leprosy cases. To enhance research & Training, four Institutes have been stablished under the aegis of DGHS as mentioned below: -

(i) Central Leprosy Training and Research Institute Institutes (CLTRI)

(ii) Chengalpattu, Regional Leprosy Training and Research Institute (RLTRI) at Raipur, Gauripur and Aska.

(iii) An additional training centre was established at Agra under ICMR.

(e) IEC and counselling : The NLEP has been striving to mitigate the stigma and prejudice associated with leprosy through community awareness and participation. It involves Intensive IEC (Information, education, and communication) activities to generate awareness which will help in reduction of stigma and discrimination associated with persons affected with leprosy. These activities are conducted through mass media, outdoor media, rural media, advocacy meetings and formation of self-help groups of leprosy patients and their families. The program also involves participation of religious and community leaders in awareness campaigns.

(f) Supervision and Monitoring : To ensure implementation in the letter and spirit, NLEP is monitored at all the health echelons through analysis of monthly progress reports, through field visits by the supervisory officers and programme review meetings held at central, state and district level. For better epidemiological analysis of the disease situation, emphasis is put on assessment of New Case Detection and Treatment Completion Rate and proportion of grade II disability among new cases. Visits by Joint monitoring Teams with members from GOI, ILEP and WHO have been as integral part of NLEP.

(g) NGO services under SET (Survey, Education and Treatment) scheme : Govt. of India has been providing grant to NGOs under Survey, Education and Treatment (SET) scheme. These NGOs have been contributing to the programme through IEC, Prevention of Impairments and Deformities, Case Detection and MDT Delivery. From Financial year 2006 onwards, Grant-in-aid is being disbursed to NGOs through State Health Societies.

Impact

The NLEP has been one of the most successful public health programs in India. Since its inception, the program has detected and treated millions of leprosy cases, resulting in a significant reduction in the burden of the disease.

(a) The program achieved its target of eliminating leprosy as a public health problem in India in December 2005.

(b) Percentage of Grade II Disability (G2D)/visible deformity among new cases decreased from 3.05% in 2018-19 to 2.39% (2019-20).

(c) The G2D amongst new cases/ million population decreased from 2.65/million population as on 31st March 2019 to 1.94/ million population as on 31st March 2020.

(d) Child cases percentage has reduced from 7.67% as on 31st March 2019 to 6.86 % as on 31st March 2020.

NLEP: The Road Travelled:

Significant milestones in the history of the National Leprosy Eradication Programme (NLEP) which highlight the progress and challenges of the NLEP/NLERP in the fight against leprosy in India are as follows: -

Year	Event
1955	The National Leprosy Control Programme (NLCP) is launched in India.
1983	The NLEP is launched with the aim of eliminating leprosy as a public health problem.
1984	Multi-drug therapy (MDT) is introduced as the standard treatment for leprosy.
1991	The World Health Organization (WHO) declares that leprosy has been eliminated as a public health problem in India (prevalence rate less than 1 case per 10,000 population).
2005	The NLEP achieves its target of reducing the prevalence rate of leprosy to less than 1 case per 10,000 population in all states and union territories of India.
2010	The NLEP is renamed as the National Leprosy Eradication and Rehabilitation Programme (NLERP) with a renewed focus on rehabilitation services for leprosy patients.
2018	The NLERP launches a new five-year plan (2018-2022) with the aim of achieving zero leprosy transmission and reducing the number of new cases with Grade 2 disability to less than one case per million population.
2020	The COVID-19 pandemic poses challenges to leprosy control activities, leading to disruptions in diagnosis, treatment, and rehabilitation services for leprosy patients.

New Initiatives

(a) Enhanced active & early case detection strategy has been introduced through ACD&RS (Active Case Detection and Regular Surveillance strategy throughout the year).

(b) Convergence of leprosy screening for targeting different age groups like under RBSK (for 0-18 yrs), RKSK (13-19 yrs), and CPHC – Ayushman Bharat (above 30+ yrs population).

(c) Timely referral and follow up for treatment completion on time through Multi Drug Therapy (MDT) available free of cost in all public health facilities

(d) For prevention of leprosy amongst contacts: Post Exposure chemoprophylaxis administration (PEP).

(e) **Awareness Activities :** Routine IEC activities as mentioned in preceding paragraphs are being carried out to mitigate stigma of the Leprosy. On Anti Leprosy Day 2017 (30th January 2017), NLEP has envisioned Special Annual Mass Awareness campaigns named Sparsh Leprosy Awareness Campaigns (SLAC) to reduce stigma and discrimination against persons suffering from leprosy. SLAC is being organized by Gram Sabhas in villages across the country in cooperation and coordination with allied sectors of the health department. Appropriate messages from District Magistrates and

appeals from Gram Sabha Pramukh (Heads of Village councils) to reduce discrimination against persons affected with leprosy are read out; pledge is taken by all Gram Sabha members to reduce the burden of disease in the community, and felicitation of persons affected with leprosy is done. Village community is encouraged to participate in these meetings, and school children are encouraged to spread awareness about the disease through plays, posters etc.

Conclusion

The National Leprosy Eradication Programme (NLEP) in India has made significant strides in combatting leprosy and improving the lives of affected individuals. Through early detection, timely treatment, and social integration, NLEP has reduced the prevalence of leprosy and prevented disabilities associated with the disease. However, challenges remain in terms of early detection, reducing stigma, and ensuring post-treatment follow-up. The future roadmap of NLEP should focus on strengthening case detection, integrating leprosy services into general healthcare, and empowering affected individuals and communities. Continued research, collaboration, and monitoring are essential to achieve the goal of eradicating leprosy and creating a society that is inclusive and free from discrimination.

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Tickle Your Grey Matter

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1. Leprosy can be distinguished from sarcoidosis by quantitative study of

- Reticulin fibres
- Nerve fibres
- Collagen fibres
- Elastic fibres

2. LID-1/NDO-LID antibody levels with MDT

- reduces
- increases
- remains stagnant
- disappears

3. Most sensitive ML specific gene-based PCR is

- RLEP
- 18kDa
- 36kDa
- 16SrRNA

4. Mutations responsible for dapsone drug resistance

- folP1
- GyrA
- rpoB
- cloA

5. Techniques that are available to examine histopathological changes in leprosy affected nerves except:

- Job-Chacko modification of Fite-Faraco stain
- Gomori's-Grocott methanamine silver stain
- Luxol fast blue stain
- Ziehl-Neelsen stain

6. Nerve conduction studies detect the abnormalities in nerves

- Before MFT
- After MFT
- Same as MFT
- Not useful

7. Hirayama disease mimics

- LL
- TL
- PNL
- BL

8. Correction of ulnar nerve claw hand in manual labourers

- extensor carpi radialis longus (ECRL)
- flexor digitorum superficialis (FDS)
- lumbricals
- interosseous muscles

9. 4+ in Bacteriological Index is

- 10-100 bacilli in one microscopic field
- 1-10 bacilli in one microscopic field
- 100-1000 bacilli in one microscopic field
- >1000 bacilli in one microscopic field

10. Atypical types of Lepromatous Leprosy except

- Histoid leprosy
- Lucio leprosy
- Lazarine leprosy
- Pure neural leprosy

Answers

Ans.1. Reticulin fibres

Ans. 2. Reduces

Ans.3. RLEP

Ans.4. folP1

Ans.5. Ziehl- Neelsen stain

Ans.6. Before MFT

Ans.7. PNL

Ans.8. flexor digitorum superficialis

Ans.9. 10-100 bacilli in one microscopic field

Ans.10. Lazarine leprosy

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