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Ocular Manifestations of Lepromatous Leprosy

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ABSTRACT

This study was done during the study period November 2020 to September 2022, during which 47 patients of leprosy were examined of whom 36 were Lepromatous leprosy in Ophthalmology department if Rajah Muthiah Medical College and Hospital. In our study 80.06% of Lepromatous leprosy patients had ocular manifestations, of whom maximum prevalence was present in 61-75 age group. The major ocular manifestations present were Madarosis (61.11%), Iridocyclitis (50%), Lagophthalmos (11.11%), corneal anesthesia (22.22%), corneal Hypoesthesia (16.67%), exposure keratitis (8.33%) and corneal opacity (8.33).
BCVA- 3/60 to PL (U/L) – 18.06%
BCVA- 3/60 to PL (B/L)- 2.8%
Most of the patients of Lepromatous leprosy had Bilateral Polyneuropathy. The most common nerve affected in Lepromatous leprosy was found to be ulnar nerve and Radial cutaneous nerve. The ocular symptoms occurred more in patients of WHO grade 2 Disability than grade 2 or grade 1. Ocular symptoms occurred mostly in patients who completed Leprosy treatment.

Keywords: Lepromatous leprosy, ocular manifestations, leprosy

INTRODUCTION

Leprosy is a chronic granulomatous disease caused by *Mycobacterium Leprae*. It affects the skin and nerves manifesting as hypopigmented patches with sensory loss.

Leprosy is endemic in several states and union territories of India, with the annual case detection rate of 4.58 per 10,000 population.[1] The prevalence rate of leprosy is 0.4 per 10,000 population in the country.[1] Despite India being declared "leprosy-free" in 2005, the country still accounts for over half (almost 60 per cent) of the world's new leprosy patients. [1]
According to Ridley and Jopling Classification of Leprosy there are five categories. 1) Lepromatous 2) Borderline Lepromatous 3) Borderline 4) Borderline Tuberculoid 5) Tuberculoid. In the Lepromatous spectrum there is a weak cell mediated response to the bacillus and more severe clinical picture. According to Daniel E et al (2002) ocular complication is more common in lepromatous leprosy.
The eye can be affected in four ways. (i) by direct invasion of lepra bacilli which reach the ciliary body and other structures through the ciliary body, (ii) secondary to involvement of facial nerve and ophthalmic division of trigeminal nerve, (iii) hypersensitivity reaction released in blood stream by the breakdown of lepra bacilli present in the circulating blood, (iv) secondary to changes in the skin and supporting tissue of lids tear drainage system.
Eye involvement is common in Hansen's disease and its complications, particularly potentially sight threatening lesions if

neglected can lead to blindness. Sight threatening complications of leprosy include lagophthalmos, decreased corneal sensation and iridocyclitis.

This study was done to know the ocular complications of leprosy in patients attending skin OPD in RMMCH.

MATERIALS AND METHODS

This study was conducted in the Department of Ophthalmology, Rajah Muthiah Medical College, Chidambaram during the period of November 2020 to September 2022.

Inclusion criteria

1) All leprosy patients who attending Department of Ophthalmology, RMMCH.
2) All leprosy patients who attending Department of DVL, RMMCH.

Exclusion criteria

1) Patients with co-morbid condition like HIV were excluded from the study.
2) Patients not willing to participate in the study.

Study Methodology

The patients were explained the purpose of the study and consent is taken for the conduct of the study. They were examined in Ophthalmology OPD. Information regarding the name, age and gender of the patient, type of disease, Erythema Nodosum Leprosum (ENL) reactions and treatment are noted. A detailed examination was done on the patient. After taking history of eye problems, visual acuity was recorded with a Snellen's chart. The patients who had visual impairment with visual acuity less than 6/6 were again tested with pin hole and retinoscopy examination and were given best corrected glasses.

A detailed examination of the ocular adnexa (eyebrows, eyelids, lacrimal sac) anterior segment of the eye (conjunctiva, cornea, anterior chamber, iris, pupil, lens) was done with slit lamp.

Lagophthalmos was tested by asking the patient to close eyes gently and any exposure of cornea/sclera is noted. The presence of Bell's phenomenon is noted for consideration of treatment. Corneal sensation was tested with a sterile fine cotton wisp. Intraocular pressure is measured by non-contact tonometer, both the eyes are dilated with tropicamide eye drops and fundus examination is done with indirect ophthalmoscope. All the findings are noted down in a proforma for analysis. A provisional clinical diagnosis is noted down. The patients requiring treatment and vision correction were treated in the hospital.

Potentially sight threatening lesions like lagophthalmos, exposure keratitis, corneal anesthesia, corneal opacity, iridocyclitis which can cause loss of vision and blindness are treated carefully.

STATISTICAL ANALYSIS

The collected data is entered in Microsoft excel and Statistical analysis was done using IBM Statistical Package of Social Sciences (SPSS) version 21.0. Quantitative variables were expressed using Frequency and percentage and quantitative variables using mean and standard deviation. Bar charts and pie diagrams were used for representing the data.

RESULTS

In our study out of 47 leprosy cases, 36 were of Lepromatous spectrum. In our study we found the prevalence of ocular disease in 29 lepromatous leprosy patients (80.06%).

Table 1: Age and Gender Distribution of Lepromatous Leprosy Patients

Variable	Male	Female	Total
Mean Age ± Standard Deviation	57.33±18.34	55±16.73	56.56±17.61
Median age in years	60.50	59.50	60.50
Minimum age in years	6	19	6
Maximum age in years	87	75	87
Age Category			
0-15	1	0	1
16-30	1	1	2

Table 1 To Be Continued….			
31-45	4	3	7
45-60	6	2	8
61-75	9	6	15
>75	3	0	3
Total Study Participants	24 (66.67%)	12 (33.33%)	36

In our study among lepromatous leprosy patients for males the mean age was 57.33±18.34 and median age was 60.50. For females, the mean age was 55±16.73 and median age was 59.50. The overall mean age was 56.56±17.61 and median age was 60.50. It was found most of the patients were in the age group of 61-75 and the patients came from 6 to 87 years of age.

It was found in our study most of the Leprosy patients were males. Out of total 36 cases we had 24 males (66.67%) and 12 females (33.33%).

Figure 1: Gender Distribution among Study Population of Leprosy cases

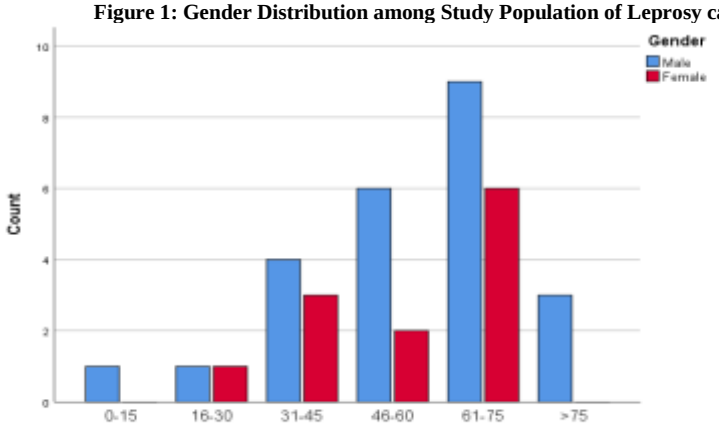

Table 2: Ocular complication in Lepromatous Leprosy Patients

	Lepromatous	Percentage
Eyebrow		
Total Madarosis	5	13.89
Partial Madarosis	9	25
Eyelids		
Total Madarosis	4	11.11
Partial Madarosis	4	11.11
Trichiasis	1	2.78
Ptosis	1	2.78
Ectropion	1	2.78
Lagophthalmos	4	11.11
U/L	2	5.56
B/L	2	5.56
Conjunctiva		
Chronic Conjunctivitis	2	5.56
Pterygium	1	2.78
Sclera		
Episcleritis	1	2.78
Cornea		
Corneal Anesthesia	8	22.22
Corneal Hypoesthesia	6	16.67
Exposure Keratitis	3	8.33
Corneal opacity	3	8.33
Superficial Keratitis	1	2.78
Interstitial Keratitis	2	5.56
Healed Pannus	1	2.78
Iris and Pupil		
Acute Iridocyclitis	1	2.78
Chronic Iridocyclitis	17	47.22
Sluggish Reacting Pupil	12	33.33
Duct		
Chronic Dacryocystis	3	8.33
Cataract		
PSCC	1	2.78

In our study among lepromatous leprosy, we found the most common ocular manifestation was madarosis (61.11%) followed by chronic iridocyclitis (47.22%). It is found of the 17 chronic iridocyclitis cases we had 12 cases (33.33%) had sluggish reacting pupil. Lagophthalmos was present if 4 cases (2 unilateral and 2 bilateral). In our study 66.67% of the patients had corneal involvement.

Table 3: Visual Status of Leprosy Study Population

Visual Acuity	Number of Eyes (n=72)	Percentage
Normal vision(6/6-6/18)	31	43.06
Low vision((6/18-6/60)	18	25
Severe Visual impairment(6/60-3/60)	10	13.89
Blindness(3/60 – PL)	13	18.06
Blindness in both eyes (n=36)	1	2.8
Total	72	100

In Table 3, Visual Status of the Leprosy population was seen based on the number of eyes. According to WHO classification of Blindness it is noted out of a total 72 eyes, 31 eyes (43.06%) had normal vision, 18 eyes (25%) had Low vision, 10 eyes (13.89%) had severe visual impairment, and 13 eyes (18.06%) had Blindness. In our study 1 case of leprosy (2.8%) had blindness in both eyes.

Table 4: Causes of Blindness in Leprosy

Lesions Related to leprosy (n=13)				
	Unilateral	**Bilateral**	**Total**	**Percentage**
Corneal Diseases	1	3	4	30.77
Lagophthalmos		1	1	7.69
Chronic Iridocyclitis	1	5	6	46.15
Lesions not related to Leprosy				
Cataract	3	6	9	69.23
Age related Macular Degeneration		1	1	7.69

In our study we have noted major causes of Blindness in leprosy study population in Table 11. It is observed that 9 cases were due to cataract (69.23%) and one case due to ARMD (7.69%) which are not specific to Leprosy. There were a few causes which was specific to leprosy. It is observed that 6 cases (46.15%) were due to chronic Iridocyclitis, 4 cases were due to corneal causes (30.77%) and one case due to Lagophthalmos (7.69%).

Table 5: Grading of WHO disability

Grading of WHO disability	**Ocular Symptoms**			
	Present		**Absent**	**Total**
	Unilateral	**Bilateral**		
Grade 0	1	4	4	9
Grade I	1	6	1	8
Grade II	2	14	2	16
Total	4	24	7	36

In Table 5, it was observed that there are greater chances of ocular manifestation in patients with Grade II disability of hands and feet and most of the cases were found to be bilateral. It was observed that 24 cases had bilateral ocular disease, of which 14 cases, 6 cases and 4 cases had Grade II, Grade I and Grade 0 disability of hands and feet respectively. It was observed 4 cases had unilateral disease of which 2 cases, 1 case and 1 case had Grade II, Grade I and Grade 0 disability of hands and feet respectively.

Table 6: Nerve involvement seen

Nerve	Lepromatous (n=36)
Supraclavicular nerve	2
Supraorbital nerve	4
Infraorbital nerve	1
Greater auricular nerve	3
Radial Nerve	5
Radial cutaneous nerve	18
Common peroneal nerve	8
Ulnar nerve	22
Posterior Tibial Nerve	7
Sural Nerve	0
Median Nerve	0
Fibular Nerve	0
Lateral popliteal nerve	3

In Table 6, in Lepromatous Leprosy peripheral neuropathy was most seen in ulnar nerve followed by Radial Cutaneous Nerve. It was also found most of the Lepromatous Leprosy cases had Polyneuropathy with bilateral involvement.

DISCUSSION

Leprosy is a disease that is found to be endemic in many developing countries like India and a significant cause of blindness. Most of the Blindness can be prevented by early diagnosis of ocular leprosy, appropriate systemic anti-leprosy treatment, early and prompt treatment of immune reactions and ocular complications of leprosy.[3]

Most of the patients were in the age group of 61-75. The mean age was found to be 57.33±18.34 in males and 55±16.73 in females. In our study out of 47 participants 36 had Lepromatous Leprosy, 24 (66.67 %) were males and 12 (33.33%) were females. Hence males were predominantly affected in our study. This male predominance was seen even in people with history of leprosy patients affected by lepra reaction.[32]

In our study of 36 Lepromatous leprosy cases, 29 had ocular manifestations, 23 (48.94%) of the leprosy cases developed ocular manifestations after completion of anti- leprosy treatment. Several studies have shown that patients continue to develop new eye complications after successful treatment completion and are believed to be related to on-going immune reactions and the slow evolution of pre-existing nerve damage. Hence the completion of anti-leprosy treatment could not ensure that the eyes are protected. Daniel et al found that, each year, approximately 5.6% of MB patients who completed treatment with MDT can develop treatable vision threatening ocular complications.[10] This is consistent with the study of Lewallen S et al[14] and Kusagur S R et al.[31]

It was found that the ocular disease increases with duration of leprosy. This was consistent with the study of Reddy G N et al.[4]

In our study majority of the patients belonged to Lepromatous Hansen's disease (LHD). It was also found that most of the ocular manifestations occurred in Lepromatous Leprosy. Ocular complications appear to be more common among lepromatous patients than Tuberculoid as anterior segment of the eye provides a favorable environment for the *M. Leprae* which is more numerous in the lepromatous patients. This was consistent with the study of Premanandam M et al (2012)[29] and Kulkarni P et al (2013).[30]

In our study it was found that the ocular lesions (at least one pathology in one eye) related to Lepromatous Leprosy was found in 80.06%. This was consistent with other studies. A study by Reddy S C et al[36] showed a similar finding with ocular manifestation of 60.03%. Madarosis (50.11%) was the most common manifestation in study population and most of the patients with madarosis were found to be Lepromatous. The second most common ocular manifestation was observed to be chronic iridocyclitis. This is consistent with the study of MALLA O K et al.[28]

The commonest form of uveitis in leprosy was chronic uveitis. In our study there were one case of acute uveitis (2.78%) and 17 cases of chronic uveitis (47.22%). The case of acute uveitis with Posterior Synechiae was seen to occur in a patient undergoing lepra reaction. They were treated with topical steroids and cycloplegics.

Iris atrophy was the most common finding in chronic iridocyclitis. It is characterized by atrophic patches and sluggish reacting pupil.[37,14] Iris atrophy was seen in 33.33% of patients in our study.

Episcleritis was found to occur in one patient (2.78%) who was also observed to undergo lepra reaction. There were three cases of chronic dacryocystitis (8.33%) in our study, all of whom were having Lepromatous Leprosy. This was consistent with previous studies which showed increased Dacryocystitis in Lepromatous Leprosy.

There were six patients who were observed to have lepra reaction in Lepromatous Leprosy. In cases with Lepra reaction most common manifestation was found to be Madarosis in our study.

In our study the most common ocular lesion not related to Leprosy was observed to be Cataract, followed by Refractive error. The cataract may be due to senile cataract. In our study we observed one case of Posterior subcapsular Cataract (PSCC). Studies by Dana M R et al have shown the likelihood of PSCC in patients on chronic steroid therapy.[24] Three patients were found to have glaucoma in our study who were given anti glaucoma medication. It has been suggested through literature that there was generalized decrease in intraocular pressure in Leprosy. It has been suggested this was due to loss of autonomic function of anterior segment of eye, suggested cause being infiltration of ciliary nerve by *M. Lepra.*[22]

It was seen in our study superficial lesions like (Madarosis of eyelid/ eyebrow/ superficial keratitis) was seen in 61.22% of cases. In our study Potentially Sight Threatening Lesions (PSTL) like Lagophthalmos (11.12%), Corneal Anesthesia (38.89%) and Iridocyclitis (50%) was seen. This is consistent with the study by Reddy S C et al.[44] A study by Kusagur S R[31] was found to have PSTL in 72.4% of cases, which was consistent with our study.

It is been observed most of the cases of Lepromatous type had WHO grade II disability. This is consistent with the finding that deformity is more common in Lepromatous Leprosy. The most common ocular manifestation in this grading was found to be Chronic Iridocyclitis and madarosis. It was also observed that ocular symptoms are more common in patients of grade II disability of arm and hands.[9]

Peripheral Neuropathy was seen in a number of cases, ulnar nerve involvement was most common followed by radial cutaneous Nerve. It was also found nerve involvement was most common in Lepromatous Leprosy. It was found that neuropathy was present in 31 cases of 36 leprosy cases (85.42%) and majority of the cases had Bilateral polyneuropathy which was consistent with the study of Khadilkar S V et al.[35] But in my study, it was found most of the cases of tuberculosis spectrum also had polyneuropathy, this may be due to long duration of disease.

In our study if we see the BCVA (Best Corrected Visual Acuity) of both eyes together, 2, 8% of cases had Blindness according to WHO classification of visual impairment.[9]

Visual acuity was recorded in individual eyes, of which 13.89% had severe visual impairment and 18.06% had blindness.[3]

It was observed in leprosy patients that there was significance increase in the occurrence of ocular symptoms with risk factors of leprosy like age, spectrum of leprosy and presence of significant limb deformities. This may be due to increased ocular manifestation with duration of disease.[32]

There was some significance in the occurrence of ocular symptoms with spectrum of leprosy and the presence of significant limb deformities which was consistent with the study of Daniel E et al

(2002). They found that patients with one or more grade of limb disability have greater occurrence of leprosy related ocular complications and general ocular complication than people with no deformity in any limb.[9]

CONCLUSION

This study was conducted in Rajah Muthiah Medical College and Hospital during the period of two years during which 36 cases of Lepromatous Leprosy was evaluated for ocular Manifestations. Among the 36 patients six had lepra reaction.

Majority of Patients in our study developed ocular manifestations after the completion of treatment despite having good compliance. Thus it emphasizes the importance of regular follow up after treatment. Majority of patients who were treated for ocular inflammation had a good visual prognosis after treatment.

Thus, there is a need to have a regular follow up and treatment of all Leprosy cases. In the present study Ocular Leprosy was related with age of patient, spectrum of disease and gender of patient. In Leprosy patients with deformity, the occurrence of ocular findings was found to be significantly high.

To conclude ocular complications are more prevalent among leprosy patients, Lepromatous leprosy is the common spectrum to have severe complication. Among the various causes of blindness cataract is the most common. Early suspicion, assessment of spectrum along with long term corticosteroid with antileprosy drugs can prevent major complication. Large scale studies needed to be done. Anterior segment changes are manageable whereas posterior segment complication needs careful monitoring.

Declaration by Authors

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