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Association of Childhood Hansen's Disease with Clinicopathologic Parameters

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KEYWORDS
Childhood Hansen's disease, Leprosy in children and Paediatric.

ABSTRACT

Introduction: Leprosy, also known as Hansen's disease (HD), is a long-term infection by the bacteria Mycobacterium leprae or Mycobacterium lepromatosis. Infection can lead to damage of the nerves, respiratory tract, skin, and eyes. This nerve damage may result in a lack of ability to feel pain, which can lead to the loss of parts of a person's extremities from repeated injuries or infection through unnoticed wounds.

Aims: This study aims to provide a comprehensive analysis of childhood Hansen's Disease, focusing on clinicopathologic aspects.

Materials and methods: The present study was a Comparative study. This Study was conducted from 1year (June, 2021 – May, 2022) at School of Tropical Medicine, Kolkata. Total 100 patients were included in this study.

Result: In Male, 11(22.00%) patients had 1 Skin Lesion, 26 (52.00%) patients had 2-5 Skin Lesion and 13(26.00%) patients had >5 Skin Lesion. In Female, 17(34.00%) patients had 1 Skin Lesion, 10 (20.00%) patients had 2-5 Skin Lesion and 23 (46.00%) patients had >5 Skin Lesion. Association of gender with No. of Skin Lesion was statistically significant (p=0.0037).

Conclusion: In conclusion, this clinic pathologic study provides valuable insights into the distinctive features of childhood Hansen's disease, emphasizing the need for heightened clinical suspicion, early diagnosis, and comprehensive management strategies to mitigate the disease burden and improve long-term outcomes among affected children.

INTRODUCTION

One of the oldest illnesses to affect humans is leprosy. Following an extensive search for the cause,When Sir Gerhard Armature Hansen identified it as a Mycobacterium leprae in 1873, he said wryly: "Almost everything on Earth, or anywhere in between, has been thought to be the cause of leprosy; this is understandable given that the less one knows, the more one's imagination is active. "Leprosy is a disease that can affect practically every organ in the body and has a wide range of clinical manifestations.

The primary reason the disease is significant is that it can result in physical deformities that are progressive and permanent. Several centuries of intense battle have resulted in the disease's containment. The development of MDT therapy, which was implemented in 1982, is credited. The majority of leprosy-endemic nations have eradicated the disease. India was successfully eliminated in December of 2005.Even though leprosy prevalence has drastically decreased in endemic countries, the rate of new case detection has remained stable or is trending upward.A total of 1.27 lakh new cases were detected in 2011–2012, with 9.7 of those cases being in children. Leprosy can affect children, just like too many other illnesses do. Not every leprosy-related hypopigmented skin lesion exists. Typically, children exhibit a single hypopigmented patch,

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particularly on the face, along with intact or compromised sensation. Leprosy in children presents with perplexing clinical features and challenging sensation testing.If the diagnosis is not made specifically, it might be overlooked, and the person will become disabled in their early adulthood. If the disease is discovered in its early stages in children, it can be effectively treated, and the deformities can be avoided. Above all, leprosy in children serves as a marker for determining the disease's endemicity. The high percentage of child cases suggests that the illness is still spreading throughout the community. It also serves as a gauge for the control program's effectiveness. The clinical and histopathologic profiles of children diagnosed with leprosy at Tirunelveli Medical College Hospital were analyzed in this study, with implications discussed in light of the significance of early detection of leprosy in children.

MATERIALS AND METHODS

Study design: Comparative study.
Study setting: School of Tropical Medicine, Kolkata.
Study period: 1year (June, 2021 – May, 2022)
Study population: Patients attending dermatology OPD at School of Tropical Medicine, Kolkata.
Sample size: 100
Inclusion criteria: --

- Age: Children within a defined age range, typically under 18 years old.
- Confirmed Diagnosis: Patients with a confirmed diagnosis of Hansen's disease based on clinical and laboratory criteria, such as skin lesions consistent with leprosy and positive skin smear or biopsy results.
- Consent: Informed consent obtained from the child's legal guardian or parent.
- Willingness to Participate: Willingness of the child and their guardian to participate in the study, including providing necessary medical history and undergoing clinical examinations.
- Availability: Patients who are accessible for follow-up visits and data collection.

Exclusion criteria: --

- Age: Children above the specified age limit for inclusion.
- Other Medical Conditions: Children with comorbid conditions that might interfere with the evaluation or management of Hansen's disease or its complications.
- Unconfirmed Diagnosis: Patients with suspected but unconfirmed cases of Hansen's disease.
- Previous Treatment: Children who have received treatment for Hansen's disease prior to enrollment in the study.
- Inability to Participate: Children and guardians unwilling or unable to comply with study procedures or follow-up visits.
- Severe Illness: Children with severe illness or complications that may affect their ability to participate or confound study outcomes.
- Pregnancy/Breastfeeding: Excluding pregnant or breastfeeding individuals due to potential effects of the disease or treatments on the pregnancy or infant.
- Language or Communication Barriers: Patients who cannot effectively communicate or understand the study requirements due to language barriers or cognitive impairments.

Study variables:

1. Demographic Variables:
   - Age
   - Gender
   - Ethnicity
   - Socioeconomic status
2. Clinical Variables:
   - Duration of symptoms
   - Clinical subtype of Hansen's disease (e.g., tuberculoid, lepromatous)
   - Clinical manifestations (e.g., skin lesions, nerve involvement, eye complications)
   - Severity of symptoms (e.g., number and size of skin lesions, degree of nerve damage)
   - Presence of deformities or disabilities
   - History of previous treatments or reactions to medications
3. Pathological Variables:
   - Histopathological findings from skin biopsies
   - Presence and distribution of acid-fast bacilli (AFB) in skin smears or biopsy specimens
   - Nerve biopsy findings (if applicable)
4. Laboratory Variables:
   - Results of laboratory tests (e.g., complete blood count, erythrocyte sedimentation rate, C-reactive protein)
   - Serological tests for antibodies to Mycobacterium leprae (e.g., ELISA, ML Flow)
5. Treatment Variables:

Journal of Chemical Health Risks
www.jchr.org
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- Type of treatment received (e.g., multidrug therapy, corticosteroids)
- Duration of treatment
- Compliance with treatment regimen
- Treatment outcomes (e.g., resolution of skin lesions, improvement in nerve function)

6. Complications and Outcomes:

- Development of complications (e.g., ulceration, neuritis, eye involvement)
- Disability grading (e.g., using the WHO Disability Grading System)
- Long-term sequelae (e.g., permanent nerve damage, deformities)

7. Risk Factors and Predictors:

- Factors associated with disease progression or severity (e.g., delayed diagnosis, leprosy reactions)
- Immunological markers (e.g., cytokine levels, T-cell responses)
- Environmental or social factors influencing disease transmission or outcomes

8. Follow-up Variables:

- Time to resolution of symptoms or lesions
- Recurrence of symptoms or relapse after completion of treatment
- Functional outcomes (e.g., nerve function, activities of daily living)

RESULT

Table 1: Comparison of the study population's complaints according to gender

Presenting Complaints	Male		Female		Total		P-value
	N	%	N	%	N	%	
Deformity	11	22.00	15	30.00	26	26.00	0.4082
Patches	19	38.00	13	26.00	32	32.00	
Screening	14	28.00	12	24.00	26	26.00	
Trophic Ulcer	6	12.00	10	20.00	16	16.00	
Total	50	100.00	50	100	100	100	

Table 2: Children's contact status in relation to gender distribution

Nature of Contact	Male		Female		Total		P-value
	N	%	N	%	N	%	
No	17	34.00	21	42.00	38	38.00	0.4443
Household contact	20	40.00	14	28.00	34	34.00	
Neighbourhood contact	13	26.00	15	30.00	28	28.00	
Total	50	100.00	50	100	100	100	

Table 3: Analyzing the quantity of skin lesions at the time of presentation

No. of Skin Lesion	Male		Female		Total		P-value
	N	%	N	%	N	%	
1	11	22.00	17	34.00	28	28.00	0.0037
2-5	26	52.00	10	20.00	36	36.00	
>5	13	26.00	23	46.00	36	36.00	
Total	50	100.00	50	100	100	100	

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Table 4: Examination of the appearance of skin lesions at presentation

Morphology	Male		Female		Total		P-value
	N	%	N	%	N	%	
Single Patch	9	18.00	23	46.00	32	32.00	0.0011
Multiple patches	11	22.00	16	32.00	27	27.00	
Only Plaques	21	42.00	7	14.00	28	28.00	
Patches & Plaques	9	18.00	4	8.00	13	13.00	
Total	50	100	50	100	100	100	

In Male, 11(22.00%) patients had Deformity, 19(38.00%) patients had Patches, 14 (28.00%) patients had Screening, and 6 (12.00%) patients had Trophic Ulcer. In Female, 15(30.00%) patients had Deformity, 13(26.00%) patients had Patches, 12(24.00%) patients had Screening, and 10(20.00%) patients had Trophic Ulcer. Association of gender with Presenting Complaints was not statistically significant (p=0.4082). In Male, 20(40.00%) patients had Household contact and 13(26.00%) patients had Neighbourhood contact. In Female, 14(28.00%) patients had Household contact and 15(30.00%) patients had Neighbourhood contact.Association of gender with Nature of Contact was not statistically significant (p=0.4443).

In Male, 11(22.00%) patients had 1 Skin Lesion, 26 (52.00%) patients had 2-5 Skin Lesion and 13(26.00%) patients had >5 Skin Lesion. In Female, 17(34.00%) patients had 1 Skin Lesion, 10 (20.00%) patients had 2-5 Skin Lesion and 23(46.00%) patients had >5 Skin Lesion. Association of gender with No. of Skin Lesion was statistically significant (p=0.0037). In Male, 9(18.00%) patients had Single Patch, 11(22.00%) patients had multiple patches, 21 (42.00%) patients had Only Plaques, and 9(18.00%) patients had Patches & Plaques.In Female, 23(46.00%) patients had Single Patch, 16(32.00%) patients had multiple patches, 7(14.00%) patients had Only Plaques, and 7 (14.00%) patients had Patches & Plaques. Association of gender with Morphology was statistically significant (p=0.0011).

DISCUSSION

This study was a comparative investigation. This study was carried out at Kolkata's School of Tropical Medicine for duration of one year, from June 2021 to May 2022. In all, 100 patients were involved in this investigation.

- Patients in Group I-50 who are male
- 50 patients in Group II who were female

According to the study, the age range of 6 to 10 years old in our study had the highest rate of childhood leprosy. of **Keelar et al, 1985 [1]**. In a study, children with leprosy were primarily observed between the ages of 5 and 14. by **Dayal et al, 1990** [**2**].

Our study's child cases revealed a slight male preponderance, with a male to female ratio of 1.6 to 1. Studies revealed a notable male preponderance. by **Singal et al** [**3**], **2011** in Delhi's GTB Hospital. According to the literature, adults with the disease are more likely to be male, but in children, the gender difference is minimal.

This study supports the information above. In the study, there was no gender difference in the age group of 6 to 10 years, but there was a male preponderance in the 11 to 14 year age group.

The study conducted at Eastern Nepal revealed that the youngest case reported was a 7-year-old male child, which is similar to the reports of 6 years in those studies. by **Deb Burman et al** [**4**], **2003** and a peripheral hospital in Andhra Pradesh by **AG Rao et al** [**5**], **2009**. Before MDT was developed, infant disease rates were extremely high.

It has been demonstrated that the incidence rate of leprosy is higher in individuals living under one roof than in the overall population. **Jesudasan K et al 1984 [6]**. Seven (36.8%) of the children in this study had previously interacted with leprosy patients. Out of them, 2 had contact in their immediate neighborhood, and 5 had contact with their family in the past.

In our study, the family contacts were all on the higher end of the spectrum; they were fathers with LLHD on an MB regimen.

Journal of Chemical Health Risks
www.jchr.org
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While numerous researchers have documented the critical role that close contacts play, some comparable studies have demonstrated that clinical leprosy only develops in susceptible individuals following a contact with the patient.

They contend that a person's susceptibility is inherited and can be passed down through generations even in the absence of clinical leprosy. **SandeepSachdevaet al 2010 [7]**. But They were unclear about their inherited relationship. The likelihood of contracting the illness is directly correlated with the degree of close contact and genetic relatedness between the parties. The incidence within families could be caused by persistent skin-to-skin contact that results in droplet infection.

Disease incidence is also influenced by familial HLA predisposition. Regardless of the cause, the high incidence of Hansen's disease in these kids raises the need for a strategy of child screening in homes where leprosy is present. In this study, there were no mother contacts.

Out of 100 patients in our study, the majority had patches in the male group [19 (38.00%)] as opposed to the female group [13 (26.0%)]. however (p=0.4082), this was not statistically significant. Similar to the study, the most prevalent type of lesions in our patients (78.9%) were hypopigmented hypoanaesthetic patches. by **AG Rao et al, 2009** (68.8%) [**5**].

Jesudasan et al 1984 [6] observed in According to this study, the incidence rate of leprosy among family members living under one roof is higher than it is in the general population. However, our research revealed that fewer patients in the female group [13 (26.0%)] than in the male group [15 (30.0%)] had neighborhood contact. However, this did not show statistical significance (p=0.4443).

We found that the male group [26 (52.0%)] had more patients with Skin Lesion No. 2–5 than the female group [10 (20.0%)]. which (p=0.0037) was statistically significant. In our study, there were more skin lesions on the face, limbs, and exposed body areas.

Such observations were in concurrence with those noted by **AG Rao et al [5] (2009)** and **Sehgal and Chaudhary (1989)** [**8**]. This makes sense given that children in warm climates wear little clothing and that bacilli may enter through microtrauma or insect bites.

In the current study, we demonstrated that more patients in the female group [23 (46.00%)] than in the male group [9 (18.0%)] had single patches. that (p=0.0011) was statistically significant.

CONCLUSION

Leprosy remains a significant health issue for children. Despite the fact that childhood leprosy is no longer as common, a sizable percentage of children are still presenting to medical facilities at a later age with deformities, which may be due to their ignorance or their reluctance to come forward or to have an insufficient diagnosis made. Children who are born with deformities experience greater social and psychological distress because they must live with this stigma for the rest of their lives. It is essential that the earliest possible treatment be started for any child who has been diagnosed with leprosy. Leprosy in children is a reflection of the effectiveness of the control program as well as the state of disease control in the community. All available channels, including the media and the health services, should be used to increase public awareness. An essential component of early detection and treatment to attain the goal of leprosy eradication is school surveys, parental education, counseling, and screening of household contacts of leprosy patients.

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