

Clinico-epidemiological profile of childhood cutaneous tuberculosis

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Abstract

Introduction: Although cutaneous tuberculosis constitutes a small percentage of extra pulmonary tuberculosis, it has not been fully documented in Nepal and more so in the pediatric population.

Objectives: The aim of the study was to assess the epidemiology and clinical profile of childhood cutaneous tuberculosis at Kathmandu Medical College and Teaching Hospital, Nepal.

Material and Methods: Children (below 15 years of age) with cutaneous tuberculosis who attended the teaching hospital between April 2008 and March 2014 were studied.

Results: A total of 17 children with skin tuberculosis were identified during the study period, which constituted 34% of all patients with skin tuberculosis. There were 11 boys and 6 girls with a mean age of 8.8 years. The duration of the lesions ranged from 1 month to 4 years and 13 (76.5%) were brought for medical help after six months of onset of the disease. Lower limb was the most common site of involvement. Of the various patterns of cutaneous tuberculosis; scrofuloderma was the most common 7 (41.2%) followed by lupus vulgaris 6 (35.3%), erythema nodosum 2 (11.7%) and gumma 1 (5.8%). Combination of lupus vulgaris and scrofuloderma was noted in one patient. Three patients (17.6%) had internal organ involvement as pulmonary tuberculosis.

Conclusion: The pattern of skin tuberculosis had wide variation with a few of them having systemic involvement. Therefore, these patients need a thorough evaluation or an uniform standard therapeutic regimen to cover both internal organ and cutaneous tuberculosis.

Keywords: *Clinical profile, Skin tuberculosis, Nepalese children*

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Original Article**Introduction**

Tuberculosis continues to be a major public health problem worldwide, because of adverse social conditions, development of multi-drug resistant strains of *Mycobacterium tuberculosis*, ineffective public health surveillance programmes and the emergence of HIV infection.¹ Extrapulmonary tuberculosis constitutes around 10% of all cases of tuberculosis and cutaneous tuberculosis represents only 1.5 % of all cases of extrapulmonary tuberculosis.² Cutaneous tuberculosis has a varied clinical presentation, determined by the pathogenicity, route of infection as well as status of cellular immunity of the host.³ In children, drug compliance is usually poor and the immune system is not well developed which are compounded in the above mentioned problems.

The paucity of studies from this part of the world prompted us to undertake the study with the aim to assess the epidemiology and clinical profile of childhood cutaneous tuberculosis in a tertiary care hospital of Kathmandu, Nepal.

Material and Methods

This is a descriptive study where all newly diagnosed patients of cutaneous tuberculosis (<15 years age) who attended the department of Dermatology and STI in Kathmandu Medical College and Teaching Hospital (KMCTH), Kathmandu between April 2008 and March 2014 were included. Statistical analysis was conducted by means of SPSS statistical software for Windows (version 10.0, SPSS Inc, Chicago, IL, USA). Descriptive statistics were reported through number and percentage for categorical responses and mean and standard deviation for continuous variable. A detailed history was taken with particular reference to BCG vaccination and tuberculosis in the family. Clinical features including the cutaneous and systemic examination were recorded in a preset proforma. BCG vaccination was confirmed by the presence of a small circular scar in the left deltoid region. The skin biopsy from the advancing edge of the lesion or the edge of the sinus tract lesion was performed and was divided into two portions, one part

processed for histopathological evaluation after staining with hematoxylin and eosin and the other portion used for culture of mycobacteria in Lowenstein–Jensen medium. The Mantoux test was performed by intradermal injection of 0.1 ml of purified tuberculin on the volar surface of the forearm; induration was measured after 72 hours in all patients. Induration of more than 10mm was taken as suggestive of infection with *M. tuberculosis*. Fine needle aspiration of the lymph nodes was undertaken whenever indicated. To rule out tuberculosis in other organs, chest X-ray and sputum-smear examination for acid-fast bacilli (AFB) on 3-consecutive days were done for all patients. Patients were classified according to the morphology of the lesions described in standard texts. Whenever any systemic organ was involved or if there was a presence of generalized lymphadenopathy, the disease was classified as disseminated. Haemogram, liver, and renal function tests were done before starting therapy. Later the patients were given three or four anti-tubercular drugs regimen for 6-8 months as per Nepal national tuberculosis treatment guideline.

Results

A total of 17 children with skin tuberculosis were identified during the study period, which constituted 34% (17 out of 50) of all patients with skin tuberculosis. There were 11 boys and 6 girls with a mean age of 8.8 years ($1.5-14 \pm 3.57$ years). The duration of the lesions ranged from 1 month to 4 years and 13 (76.5%) were brought for medical help after six months of onset of the disease. Lower limb was the most common site of involvement seen in 47% cases, followed by neck, face, and trunk. Fifteen children were BCG vaccinated however it was doubtful in 2 patients because neither a definite scar nor a record of receiving a BCG vaccination was available. Only one child had family history of pulmonary tuberculosis. The mantoux test was positive in 12 (70.5%) patients. Histopathology revealed tuberculoid granuloma in eight children, caseation necrosis was found in four cases. In two cases, histopathology showed erythema nodosum and one case showed nonspecific features in the form

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of chronic inflammatory infiltrate. Table 1 profiles of these patients. summarizes the main clinico-epidemiological

Table 1: Clinical and epidemiological profile of children with cutaneous tuberculosis

Case No.	Age (Years)/ Sex	Duration (months)	Site	Family history of TB	BCG Vaccine	Lymph Adenopathy	Mantoux test (mm)	Histopathology/ Fine needle aspiration cytology	ESR	X-Ray Chest	Clinical Diagnosis
1	7/Male	24	Rt axilla	Yes	Yes	Axillary, Inguinal cervical	20	Caseation necrosis + epitheloid granuloma	22	NAD	Scrofuloderma
2	5/Male	24	Rt. ankle	No	Yes	NO	>30	Tuberculoid granuloma	28	NAD	Lupus vulgaris
3	10/Male	3	Neck	No	Doubtful	Cervical, axillary	>20	Epitheloid granuloma	35	NAD	Scrofuloderma
4	7/ Male	18	Rt. Axilla	No	Yes	Rt. Axillary	20	Epitheloid granuloma	30	NAD	Scrofuloderma
5	10/Male	48	Rt. Ankle	No	Yes	Axillary	15	Caseation necrosis + epitheloid granuloma	40	NAD	Scrofuloderma Lupus vulgaris
6	9/ Male	12	Buttock	No	Doubtful	NO	<5	Tuberculoid granuloma	20	NAD	Lupus vulgaris
7	10/ Female	24	Rt thigh	No	Yes	NO	5	Tuberculoid granuloma	55	NAD	Lupus vulgaris
8	14/ Female	5	Face	No	Yes	Cervical	17	Chronic inflammatory infiltrate	38	NAD	Scrofuloderma
9	11/ Female	36	Face	No	Yes	NO	10	Tuberculoid granuloma	20	NAD	Lupus vulgaris
10	14/ Female	5	Lt. leg	No	Yes	NO	22	Erythema nodosum	45	NAD	Erythema nodosum Scrofuloderma
11	5/ Male	6	Back	No	Yes	Axillary (both)	15	Caseation necrosis + epitheloid granuloma	30	NAD	Lupus vulgaris+ Pulmoanary-
12	6/ Male	8	Rt. Knee	No	Yes	NO	<5	Tuberculoid granuloma	29	Opacity	tuberculosis
13	12/ Female	6	Neck	No	Yes	Cervical	20	Epitheloid granuloma	52	Fibrosis	Scrofuloderma
14	12/ Male	18	Rt. Leg	No	Yes	Inguinal (both)	5	Tuberculoid granuloma	32	NAD	Lupus vulgaris
15	1.5/ Male	1	Neck	No	Yes	Cervical Axillary	>10	Epitheloid granuloma	80	Hilar lymphadenitis	Scrofuloderma
16	5/ Female	1	Rt. Leg	No	Yes	NO	20	Erythema nodosum		NAD	Erythema nodosum
17	12/ Male	6	Chest	No	Yes	NO	30	Ill-define granuloma		NAD	Gumma

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Age (in years)	Lupus Vulgaris (LV)		Scrofuloderma (SFD)		Erythema Nodosum		Gumma		Total
	M	F	M	F	M	F	M	F	
0-4	–	–	2	–	–	–	–	–	2 (11.76%)
5-9	3	–	2	–	–	1	–	–	6 (35.29%)
10-14	1	2	2	2	–	1	1	–	9 (52.94%)
Total (%)	6 (35.29%)		8 (47.06%)		2 (11.76%)		1 (5.88%)		17 (100%)

M- Male, F-Female

Of the various patterns of cutaneous tuberculosis seen, 8 (47.06%) had scrofuloderma, 6 (35.3%) had lupus vulgaris, 2 (11.7%) had erythema nodosum, and 1 child had a gummatous ulcer on the chest. Combination of lupus vulgaris and scrofuloderma was noted in one patient. **Figure 1-3** depicted the various pattern of cutaneous tuberculosis. Three patients had internal organ involvement as pulmonary tuberculosis. All patients were treated with three or four anti-tubercular drug regimen for 8 months as per Nepal national tuberculosis treatment guideline.



Figure 2: Lupus vulgaris over right index finger and right foot



Figure 1: Lupus vulgaris over Left thumb



Figure 3: Scrofuloderma in the neck and axilla region

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Discussion

The incidence of childhood cutaneous tuberculosis varied worldwide from 12.8% to 31.7% in India^{3,4} and 36.3% in Hong Kong.⁵ In the present series, 34% of the total numbers of patients with skin tuberculosis were children. In contrast to the previous studies^{4,6}, boys outnumbered girls in our study.

Thirteen (76.5%) children brought for medical help after six months of onset of the disease in our study. Delay in diagnosis may occur because of scarce attentions paid by parents during the early stages of the disease and when they seek advice it is often from practitioners who are little exposed to this uncommon condition. Therefore, sometimes misdiagnosis,⁷ neglect, or late diagnosis⁸ in children may result in extensive disease. The definitive diagnosis of skin tuberculosis employ smear and culture examination for demonstration of acid fast bacilli but are tedious and unrewarding.^{4,9,10} Mantoux test positivity was noted in 70.5% in our series. This was probably because, in children with localized disease, sensitization occurred due to the presence of the disease, or was induced by BCG, exposure to related environmental mycobacteria, or *M. tuberculosis* from infected close contacts. Mantoux negativity was probably due to the extent of the disease, malnutrition, and other related factors.⁶ In our study, although a good clinico-histopathological correlation was observed and was supported by a positive Mantoux test, yet smear examination with Ziehl-Neelsen as well as culture on Lowenstein-Jensen media were unsuccessful.

In the last couple of decades newer techniques have emerged for the rapid detection, isolation and identification of mycobacteria. These include fluorescent microscopy¹¹, DNA probe identification,¹¹ high performance liquid chromatography,¹² polymerase chain reaction,¹³ serological diagnosis¹⁴ and DNA finger printing.¹⁵ Newer methods are gradually being incorporated into the testing schedules which will revolutionize the early and /or definitive diagnosis of tuberculosis in future. However, these tests, apart

from being expensive, need well equipped laboratories and are not available in our hospital.

It is difficult to define the role of BCG. Some have found no significant difference between vaccinated and unvaccinated groups,² others have hinted at a modification in the severity,¹⁶ and a recent report indicated moderate protection against skin tuberculosis.¹⁷ Eighty eight percent of the children in this study had BCG vaccinations. Two had doubtful BCG vaccination however both of them had localized disease; scrofuloderma and LV. Occasionally LV occurring at the site of BCG vaccination has been seen,¹⁰ suggesting exogenous inoculation of the infection similarly in one of our patient had lupus vulgaris on the buttock following intramuscular injection.

Lower limb was the most common site of involvement in our study. The reason stated for the predominance in the lower parts of the body is the lack of clothing in a large number of children who acquire the infection while playing.⁹

Cutaneous manifestations of tuberculosis are polymorphous in both children and adults. Scrofuloderma (SFD) was the commonest type of cutaneous tuberculosis in our series similar to the other studies^{6,18} reported from India. This is probably due to consumption of unboiled/unpasteurized milk which is a common phenomenon in India and which may subsequently lead to infection of cervical lymph-nodes by *M. bovis* via the tonsils with development of SFD. In India, in general, SFD is more frequent in children, unlike in Europe where adults are more often affected with this type of presentation.¹⁹ This may be due to differences in the source of infection, endogenous reactivation being more common in Europeans.¹⁹ Lupus vulgaris (LV) the second most common forms in our study, demonstrating a finding probably related to the improvement in health conditions and general availability of vaccination programs countrywide and increases the immunity against *M. tuberculosis*. The keratotic form of Lupus vulgaris was the most common followed by the hypertrophic and ulcerative varieties.

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Mycobacterial infection in LV can be acquired through both exogenous and endogenous routes, and may assume warty forms.^{2,18}

Wong et al from Hong Kong reported TVC in as high as 65.5% of their children and SFD in only 16.3% of their children,⁵ however in contrast, 41.2% of children in our series had SFD and none had TVC. Similarly Kumar et al reported SFD in 51.2% and TVC in only 4.4%.²

Regional lymphadenopathy is seen more often in children with disseminated disease and thus appeared to be a soft indicator of disease dissemination. In the present study the cervical lymph nodes were most commonly affected in SFD. A larger number of children were seen in the younger age groups, as in another hospital-based study.²⁰ In one report, SFD was the most common form seen in children, especially girls.²¹ Children are not only prone to develop SFD but the lesions, even when localized appear severe when compared to those of adults.²² More than one form of skin tuberculosis can affect a patient.^{10, 23} This presentation seems to be comparatively uncommon in children, as single child with LV and SFD was seen in this study. Scrofuloderma of the chest wall was associated with pulmonary tuberculosis. Erythema nodosum was noted in 11.7% in our study in contrast to 1.3% tuberculides reported by Kumar et al from India. Tuberculous gumma was present in only 1 patient, compared to the incidence reported in the literature. Primary skin tuberculosis and acute miliary skin

tuberculosis were also not seen in this series. The former may present as a chancre due to exogenous infection in children exposed to tubercle bacilli for the first time or as noduloulcerative lesions secondary to BCG inoculation in infants.²⁴ Acute miliary skin tuberculosis is seen rarely in children following exanthems²⁵ or in disorders that predispose to poor immune status.²⁶

One child had evidence of active foci of tuberculous infection in the lungs. The incidence of tubercular lymphadenitis in children with LV was much greater when compared to that in adults.¹⁰ We have noted lupus vulgaris with scrofuloderma in one patient. Three patients had internal organ involvement as pulmonary tuberculosis. In the spectrum of cutaneous tuberculosis there are a proportion of patients with dissemination (systemic involvement) who are of great epidemiological significance as they require a change in the standard therapeutic regimens recommended for cutaneous tuberculosis.

In conclusion, scrofuloderma and lupus vulgaris were the most frequent form of cutaneous tuberculosis and are important causes of morbidity. There is a high likelihood of internal involvement, especially in patients with scrofuloderma. Therefore, all cutaneous tuberculosis patients need a thorough evaluation for internal organ involvement and need a uniform standard therapeutic regimen to cover both internal and cutaneous tuberculosis.

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