

Prevalence and patterns of dermatological disorders among school children in Kurunegala MOH area

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Abstract

There are limited prevalence studies of skin diseases on school children in Sri Lanka. An analytical cross sectional study was done to identify the prevalence and pattern of dermatological disorders among early and middle adolescent children in junior grades (grade 6-10) in ten schools of Kurunegala MOH division. Data was collected through self-administered and interviewer administered questionnaires from 1500 children. Exposed parts of the body of each child were clinically examined. 66.8% of children had one or more skin diseases of which 583 children had transmissible skin diseases with higher incidence of Pediculosis capitis (31.9%), Pityriasis versicolor (5.9%), Viral Warts (3%) and 5 cases of leprosy (0.3%). Among 868 children with non-transmissible diseases Acne (10.7%), Seborrheic dermatitis (10.1%), Eczema and other dermatitis (10.1%) and xerosis (6.3%) seen commonly. The results proved to be quite impressive for managers of health services in resource allocation as well as orientating health interventions.

Introduction

Although skin diseases are very common among the population in many developing countries, they have not been regarded as a significant health problem that could benefit from health interventions. This attitude is due to the assumption that skin diseases are benign, not life-threatening, only a minor nuisance, and they do not merit measures that may appear out of proportion to their low priority¹.

Children are more vulnerable to many skin diseases. The pattern of skin diseases in children is very much influenced by climate, external environment, dietary habits and socioeconomic status¹. The school environment makes children vulnerable to cross transmission of communicable skin diseases among themselves and among their family members.

The effect of skin diseases is considerable and underappreciated². This is now known to be comparable to "many" more serious medical disorders³. Chronic skin disorders will have much more serious effects on children's lives than acute skin disorders.

Determination of prevalence and pattern of dermatological disorders is important to plan preventive and curative health programs in children. Hospital based studies are influenced by factors such as social class, accessibility to medical services, educational and cultural background⁴. They do not show the actual burden of the skin diseases among children in the community. Therefore we need to have community based studies to determine prevalence and pattern of dermatological disorders. To best of our knowledge, no community based study regarding prevalence and pattern of dermatological diseases of school children in Sri Lanka has been published. In Sri Lanka with a good school enrolment rate, prevalence and pattern of skin diseases among school children represent that of the same age group in the community.

As benefits, on account of early detection of skin diseases and referral to relevant units help cure and prevent further complications.

The study area including urban and suburban areas mainly has a tropical climate and belongs to intermediate zone of Sri Lanka. Low humidity and high temperature is reported in most periods of the year.

Aim and objectives

To identify the prevalence and pattern of skin diseases and related factors among early and middle adolescent school children studying in junior grades (grade 6 to grade 10) in Kurunegala MOH division (which includes sub MOH divisions of Mallawapitiya, Maspotha, Kurunegala municipal area).

Methodology

Study design: Analytical cross sectional study.

Study population: Early and middle adolescent school children of age between 11 years to 16 years (students in grade 6, 7, 8, 9 and 10) selected from 10 schools in the Kurunegala MOH division.

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Sample size calculation⁵

The results of the pilot study suggested that the prevalence of some dermatological conditions were with a prevalence as low as 2.5%. This fact was also evident in most other studies conducted on comparable populations.

In such rare disease conditions to satisfy the normal assumptions ie. np and $n(1-p)$ to be >5 it was required to increase the precision enabling it to capture rare but important diseases. This situation has been discussed at length by some authors. Therefore based on observed results expected proportion 0.02 was considered with desired width of the confidence interval as 0.01⁶. Since observed sampling fraction was about 8% ($>5\%$) finite population correction was finally applied to the sample size calculated above. Therefore the sample size determined for the study was 1500.

3.8 Sampling technique

A cluster sampling method was used to identify a sample that represented the early and middle adolescent population of 11 to 16 years of age studying in grade 6, 7, 8, 9 and 10 in the public schools of the Kurunegala MOH area.

The target population composed of 18151 in 41 public schools.

The number of clusters for each age stratum from the randomly selected 10 schools were determined by PPS method. Since target population more or less consisted of equal numbers in all age strata equal weights were allocated at each stratum. Accordingly 12 clusters of size 25 were selected from each stratum.

Method and data collection

Students whose parents or guardians have not given written consents, students who do not give verbal consent, uncooperative students, mentally subnormal children, children with psychiatric disorders and residents outside the study area were excluded from the study.

Data collection was done through pre tested self-administered questionnaire and interviewer administered questionnaire.

The students for each cluster were selected by systematic sampling.

Dermatological examination on exposed parts of the body and feet was carried out under day light. Students who complained of skin lesions in unexposed areas except breast and genitalia) were

examined with the consent of the student. A teacher or a hospital chaperon was present at the examination room. Breasts and genitalia were skipped from examination to keep up with the privacy. However in some cases where it is quite indicative of thorough examination to arrive at a decision such students were referred to Dermatology clinic for subsequent examination and investigation in order to ascertain the presence of disease.

Dermatological examination was carried out by a team of doctors with at least 3 year continuous experience in dermatology unit of Teaching Hospital Kurunegala under the direct supervision of the Consultant Dermatologist. Diagnosis was made mainly clinically adhering to the ICD 10 classification. Data was analysed by appropriate variables using statistical package of social sciences 14.

Ethical clearance: Was obtained from the Ethical Review Committee of Faculty of Medicine, University of Kelaniya.

Results

Out of 1500 study population 817 (54.5%) were females while 683 (45.5%) were males from 11-16 yrs of age.

Table 1.

<i>Disease Category</i>	<i>No</i>	<i>% by Total Diseases</i>	<i>Prevalence (per 100)</i>
Bacterial infections	49	3.3	3.3
Viral infections	50	3.4	3.3
Fungal infections	100	6.7	6.7
Parasitic infestations	479	32.1	31.9
Eczeema and dermatitis	399	26.7	26.6
Papulosquamous disorders	4	0.3	0.3
Urticaria and erythema	22	1.5	1.5
Photodermatitis	52	3.5	3.5
Disorders of skin appendages	189	12.7	12.6
Other disorders of skin	148	9.9	9.9
Disease free	498		
Total with disease	1492	100	
Total students screened	1500		

Table 2. Prevalence of Dermatological diseases among children in the Sample

<i>Disease/Condition(D)</i>	<i>No</i>	<i>Prevalence %</i>	<i>Disease/Condition(D)</i>	<i>No</i>	<i>Prevalence %</i>
Impetigo	3	0.2	Other bacterial infections	37	2.5
Molluscum contagiosum	5	0.3	Nail dystrophy	8	0.5
Viral warts	45	3.0	Alopecia areata	1	0.1
Dermatophytoses	11	0.7	Androgenetic alopecia	2	0.1
Pityriasis versicolor	88	5.9	Hair colour and hair shaft abnorm.	3	0.2
Candidiasis of skin/nail	1	0.1	Leprosy	5	0.3
Pediculosis capitis	478	31.9	Acne	161	10.7
Dry skin	95	6.3	Localized hyperhidrosis	12	0.8
Cellulitis	2	0.1	Vitiligo	6	0.4
Seborrheic dermatitis	151	10.1	Freckles	5	0.3
Atopic dermatitis	2	0.1	Other Leukoderma	2	0.1
Contact dermatitis	6	0.4	Seborrhoeic keratosis	19	1.3
Other dermatitis	1	0.1	Acanthosis nigricans	30	2.0
Infective dermatitis	4	0.3	Corns and callosities	3	0.2
Cutaneous and Mucocut.			Keloid scar, Hypertrophic scar	17	1.1
Leishmaniasis	1	0.1	Amyloidosis of skin	7	0.5
Pityriasis alba	22	1.5	Café au lait spots	1	0.1
Other specified dermatitis	118	7.9	Haemangioma	3	0.2
Erysepelas	2	0.1	Lichen nitidus	1	0.1
Psoriasis	1	0.1	Hirsutism	2	0.1
Lichen planus	1	0.1	Other malignant neoplasm of skin	1	0.1
Lichen striatus	1	0.1	Melanocytic naevi	41	2.7
Urticaria	22	1.5	Other skin conditions	13	0.9
Photodermatitis	52	3.5	Dermatological disease free	498	33.2
Total cases screened	1500		Total diseases diagnosed	1492	
No of Children with at least one disease	1002				

Overall prevalence of skin diseases: It was noted that 66.8% of the total studied population had one or more skin diseases. Similarly 41.4%, 19.3%, 4.9% and 1.2% of the study population had had 1, 2, 3 & 4 diseases respectively.

Among the children with skin diseases, 42.7% were females which was significantly higher than observed 24.1% in males ($P < 0.001$).

1. Age: No significant difference in the prevalence of at least one skin disease among the age groups considered in the study.
2. Income: By level of income 31.4% (315) children from the disease group were from low income (<10,000SLR) group while 54.5% (546) in middle income and 14.1% (141) in high income (>30000 SLR) group.

3. Father's education - Highest prevalence of both transmissible and non-transmissible diseases were seen in the category with paternal education level of grade 5 - O/L while the lowest incidences were seen in the category with highest paternal education (educational level of A/L<including graduates).
4. Children with pediculosis capitis were more frequently found in low and middle income group than upper income group (15.4%).
5. Number of skin diseases among studied population: Number of disease free was 33.2%. Those with one disease comprised of 41.4% while 19.3% with two skin diseases, 4.9% had three skin diseases and 1.2% had 4 diseases.

Table 3. Disease Transmissibility by Level of Education of father (X)

Disease	Grade<5	5≤X<O/L	O/L≤X<A/L	A/L≤X≤Grad.	Total
Transmissible	89	362	154	19	624
%	14.3	58.0	24.7	3.0	100.0
Non-Transmissible	139	490	205	34	868
%	16.0	56.5	23.6	3.9	100.0
Total	228	852	359	53	1492
Dis.free	62	278	127	31	498

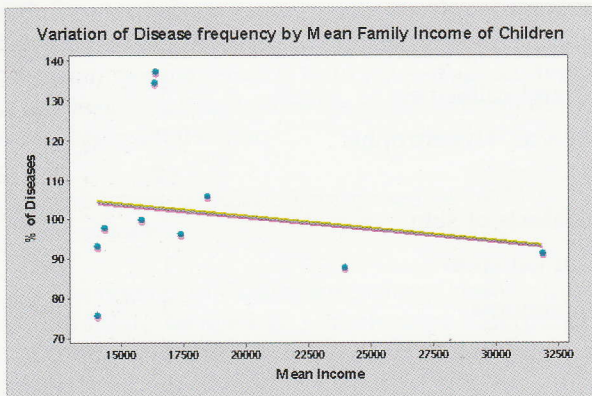


Figure 1.

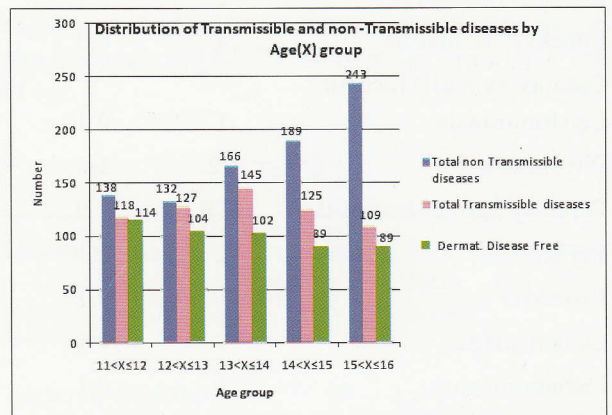


Figure 2.

Table 4. Variables in the suggested model

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender (1)	-1.244	.117	112.275	1	.000	.288
Age_yrs	.120	.040	8.965	1	.003	1.127
Income			10.457	2	.005	
Income (1)	-.159	.132	1.448	1	.229	.853
Income (2)	-.581	.181	10.303	1	.001	.559
Constant	-.167	.563	.088	1	.767	.846

Table 5. Classification table

	Predicted (the cut value 0.5)		
	Presence of any Dermatological disease		Percentage Correct
	No Disease	Presence of any Dermatological condition/Disease	
No Disease	111	391	22.1
Presence of any Dermatological condition/Disease	113	885	88.7
Total	224	1276	66.4

Discussion

The spectrum of dermatological disorders varies greatly among children. In a review of prevalence studies in children by WHO, the prevalence of skin disorders ranging from 21% to 87% have been reported¹.

Studies done on children in Hong Kong, Ibadan-Nigeria, Bagdad governorate-Iraq, rural Tanzania, Chandigarh-India, showed the prevalence rate of 31.3% 35%, 40.9%, 51.9%, 55%^{7,4,8,9,10} whilst studies in Turkey, rural Ethiopia, Eastern Saudi Arabia reported rates as high as 77%, 80.4%, 98.6% respectively^{11,12,13}.

A community based study done in Piliyandala area and in a slum area on Siddhartha road, Colombo including all age groups showed overall prevalence of at least one skin disease of 47.6% and 32.9%. Same study showed 55.1% and 38.7% of prevalence among 11-20 year age group^{14,15}. Considering different age groups of these two studies most prevalent two skin diseases were seen in 11-20 year age group.

Present study revealed 66.8% (CI 64%-69%) prevalence of at least one skin disease.

Different studies done in various parts of the world show a significant difference in the disease pattern^{8,12,16}. Transmissible diseases are the main cause of visit to primary health care facility in developing countries. There is a significant variation in disease pattern among different communities and in different parts of the same country^{13,16,17,18,19}.

Present study showed 624 transmissible and 868 non-transmissible skin diseases among 1500 study population (Table 3). This is different to the pattern seen in other developing countries with higher incidence of transmissible diseases.

Parasitic infestations (31.9%) and fungal infections (6.7%) were commoner transmissible skin diseases seen among the study population. Pediculosis capitis has the highest prevalence of 31.9% (with adjusted CI 29.5%-34.3%) in this study. Similar result was seen in a school survey in Varanasi city India almost touching upper limit of CI with 35% prevalence¹⁹. Relatively low prevalence (6.8%) was seen in a similar study done in Mersin, Turkey²⁰. Review on worldwide prevalence on head lice shows that Pediculosis capitis is widespread throughout and does not discriminate socioeconomic status grounds. In Asia prevalence varied from 0.7% to 59%²¹. Lower prevalence of 6.7% and 0.22% was seen in two local studies indicating a lower prevalence in adults^{15,14}. In the present study 64% of girls were affected in contrast to 36% of boys. Therefore observed results proved to be comparable to many of the above studies¹⁹. Long hair in girls may at least be partly attributed to this. Pityriasis versicolor was the commonest fungal infection with a prevalence of 5.9% (CI 4.6% - 7.1%). Prevalence of 1.8% and 4.7% was seen on similar studies done in rural Ethiopia and Ibadan Nigeria^{12,4}. Prevalence of 6.3% and 10.5% was seen in two local studies^{15,14}. Pityriasis versicolor was the commonest fungal infection seen in one of them¹⁴. It appears to considerably vary in different studies in the country. However among the affected 40 (85%) boys and 31 (75%) girls had not sought any treatment probably due to trivial discomfort caused.

Relatively lower prevalence of dermatophytoses (0.7%) was seen in the present study in contrast to two local studies which showed 4.6% and 3.6% prevalence^{14,15}. Lower incidence in the present study could be due to examination of only exposed areas of the body and lower incidence of dermatophytoses in the age range on focus.

Viral warts were found to be 3.4% (CI 2.4% - 4.4%) in the present study. Similar studies done in rural Ethiopia and Turkey showed the prevalence of 6.25% and 2.67%^{12,11}. Lower prevalence of 0.6% and 1.88% observed in two local studies^{14,15}. This difference implies with lower incidence among adult population. Low prevalence of bacterial infections of 3.3% (CI 2.4% - 4.2%) was seen in the present study. Lower prevalence of 1.44% and 0.7% was seen in two local studies representing a lower prevalence in adults^{14,15}. Similar studies showed prevalence of 3% in Varanasi city and 16.07% in Wardha district, India^{19,10}. Prevalence of leprosy was 0.3% (1 Multibacillary, 4 Paucibacillary) in the present study which is well close to the national figure of 0.7% reported by Sri Lankan leprosy campaign.

Absence of scabies in the present study may be due to absence of an epidemic at the time of the study, improved living conditions, satisfactory access to health care facilities and absence from school of those with active scabies. Results of two local studies show the prevalence of 0.17% and 1%^{14,15}.

Commoner non transmissible dermatoses were acne (10.7%), seborrhoeic dermatitis (10.1%), eczema and dermatitis (except seborrhoeic dermatitis) (10.1%), xerosis (6.3%), photodermatitis (3.5%).

Acne was the most prevalent 10.7% (CI 9.1% - 12.3%) non transmissible disease seen in the study. Similar results were seen in a student health centre in Hong Kong (9.8%) and among Varanasi school children in India (8%)^{7,19}. Relatively lower prevalence was seen in Brazil and rural Ethiopia (2.7%)^{22,12}. Significant gender difference in the prevalence of acne was not seen in the present study. Variations in the results could be explained by racial differences, hormonal profiles, other environmental factors and dietary habits, differences in definition of acne and access to treatment.

Seborrhoeic dermatitis showed a prevalence of 10.1% (CI 8.5%-11.7%) with a much higher prevalence in females (62.9%) in comparison to 31.9% in males. This could be due to having long hair in females. High temperature in the study area, infrequent baths resulted from attendance to after school classes and inclusion of scalp dandruff to seborrhoeic dermatitis category would have probably contributed for a relatively higher prevalence of seborrhoeic dermatitis among the study population. Higher prevalence of 12% in a local study denotes a higher incidence in adults¹⁴.

Eczema and dermatitis other than seborrhoeic dermatitis showed prevalence of 10.1%. Two local

studies showed the prevalence of 9.5% and 7.5%^{14,15}. 6.8% prevalence was seen in a study done in Hong Kong⁷. Incidence of atopic dermatitis was low (0.1%) in the present study.

Xerosis showed the prevalence of 6.3% (CI 5.0% - 7.6%). Relatively higher prevalence of dry skin of 11.85% has been reported in a study done in Turkey¹¹. Although dry skin can develop secondary to malnutrition, in the absence of other cutaneous features of malnutrition among the present study population, favours causes other than malnutrition. Hot low humid environment, lack of proper skin care and underlying atopy may be contributing to this.

Relatively higher value of 3.5% prevalence of photo-dermatitis was seen in the present study in comparison to two local studies (1.1% and 0.6%)^{14,15}. Increased incidence of prolonged exposure to sun, helping parents in farming, reluctance to use umbrellas to protect from sun would have contributed to this.

The decline in the prevalence of transmissible skin diseases with age shown in Figure 1 may be attributable to the ability of older children to have good personal hygiene and health care even under different circumstances. Increased prevalence of non-transmissible skin diseases with age may be due to higher incidence of acne with age and increased exposure to environmental, pollutants, chemicals and allergens. Similar findings have been reported in other countries^{11,23}.

Table 3 shows a decline in the prevalence of skin diseases (both transmissible and non-transmissible) with higher paternal education. But surprisingly low prevalence of both types was seen in the group with paternal education less than grade 5. High level of immunity with more frequent exposure to infections may be contributing to reduction in transmissible diseases, but for the non-transmissible diseases, factors other than what we considered in the study may be contributing to that.

Assessment of the socioeconomic status is a demanding task for any investigator. The information collected on family income and parental education were relied upon to impart some reflection on socioeconomic situation.

Despite few outliers, regression of percentage of disease on mean family income of children in different schools revealed a slight decline of disease frequency as it moves from low to high.

(Figure 1). However the true effect could have been masked by the other associated factors. Therefore it is highly indicated that the effect of income be studied with the help of multivariate analysis techniques against fixed levels of other influencing factors.

Statistically significant association of pediculosis capitis and very low income was shown in the present study ($p < 0.05$).

The logistic regression was run to ascertain the effects of age, gender and level of family income on the possibility that an individual student would have the disease. The suggested model was statistically significant with $X^2(4) = 130$ (< 0.001) and the model correctly classified 89% of cases (Table 5).

All three parameters included in the model gender, age and income level (lower and upper) were significant (Table 5). Accordingly likelihood that a female student would have some disease is approximately 3.5 times higher than male student. However increase of age was not found to have a striking influence on disease occurrence. It showed only 1.12 times increase of chance for one to have the disease as the age increases by one year. It was also evident that one in the upper income group is less likely to have the disease than that in the lower group. However as pointed out before (Figure 1) this decline was not very marked.

In the present study 90.6% of study population had not sought any treatment for skin diseases previously. 5.2% attended Western treatment from government hospitals while 3.3% for same treatment from private sector. Small minority of 0.9% seek native/Ayurvedic treatment. This results show a relatively lower number of children seeking treatment for their skin diseases than a study done in Kesbawa-Piliyandala area²⁴.

Direct questioning revealed that majority use single native hair oil for pediculosis capitis with low efficacy. Unavailability of treatment in government hospitals which can be obtained free of charge, high cost of licensed anti lice treatment, congestion at schools, lack of awareness about the disease and inability to accept pediculosis capitis as a disease that requires treatment are main factors that may lead to increased incidence of pediculosis capitis in the country.

Since there are hardly any comparable studies conducted in Sri Lanka for the given age range the scope for elaborate comparison is rather limited.

Conclusion

The present study showed a higher prevalence of skin diseases among school children. Children with higher family income and higher paternal education shows decline in the incidence of both transmissible and non-transmissible skin diseases. Majority of these children /their parents do not bother to have any treatment for these skin diseases as some of them are minor nuisances to them. Lower incidence of scabies, bacterial infections and dermatophyte infection indicate good access to healthcare and improved socioeconomic conditions.

While this study revealed some valuable information on the prevalence and patterns of dermatological diseases further studies with better precision to cover other regions of the country are of utmost value for thorough understanding.

Recommendations

Since our health system provide regular school medical inspections to all school children, special attention should be paid to commoner transmissible and non-transmissible dermatological diseases found in the present study. To reduce the burden of head lice, improvement of living conditions and accessibility of efficient cost effective treatment are equally important. Since we have come across 5 leprosy patients out of 1500 students it is worthwhile considering special awareness programmes and screenings at schools in high prevalent areas like Kurunegala.

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