

Pattern of pediatric dermatoses and seasonal variations in a tertiary referral center in central India

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Background: Skin diseases in the pediatric population are common worldwide, including rural and urban areas. There is a variation in the pattern and presentation of dermatoses, with eczemas being the most common skin disorder in developed countries and infestations in the developing countries. To study pattern, age-gender wise distribution and seasonal variations of various pediatric dermatoses.

Methods: All children in the age group of 1-12 years of either sex were recruited in the dermatology outpatient department from November 2014 to October 2016.

Results: Infections and Infestations were the most common dermatoses (46.3%), followed by dermatitis and eczema (20.24%). Among, the most common types of infections and infestations were scabies (33.49%), followed by viral (30.4%), and bacterial (23.3%) infections. Impetigo ($P<0.001$), furunculosis ($P=0.025$), molluscum contagiosum ($P<0.001$), hand foot mouth disease ($P=0.004$) and atopic dermatitis ($P=0.003$) were significantly higher in the age group of 1-4 years. We also found a significant association between the seasonal variation and the bacterial infections, pediculosis and varicella.

Conclusion: In our study, skin infections and infestations outnumbered other pediatric dermatoses. These are potentially controllable and hence strategies that target infections and infestations may be a key to an efficient child health care program.

Keywords: Pediatric dermatoses, seasonal variations, central India

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INTRODUCTION

Associated with significant morbidities, skin diseases are of the major health problems among children¹. Dermatological problems constitute at least 30% of all outpatient visits to pediatric clinics and 30% of all visits to dermatology clinics^{2,3}. The prevalence of pediatric dermatoses in various parts of India has ranged from 8.7% to 35% in school-based surveys⁴. The pattern of skin diseases relies in various factors such as poverty, malnutrition, overcrowding, poor hygiene, illiteracy, and social backwardness in many parts of India⁵. The direct effects of climate on the skin may play a minor but

significant role in determining the geographical and seasonal variation of many dermatoses⁶. Pediatric dermatoses requires a separate view from adult dermatoses, as there are important differences in clinical presentation, treatment, and prognosis.

MATERIALS AND METHODS

The aim of study was to determine the pattern of pediatric dermatoses and their seasonal variations. To this end, we obtained the institutional ethical committee clearance. We recruited all children between age group 1-12 years of either sex, attending dermatology department during the

period of November 2014 to October 2016. Wherever needed, we recorded a detailed history, a complete skin examination, along with routine examinations in the predesigned pro forma.

Statistical analysis

Categorical variables were expressed in frequencies and percentages. Pearson's chi2 test and Fisher exact test were performed to find correlation of skin diseases with age, sex and seasonal variation. All the tests were two sided. $P < 0.05$ was considered as statistical significance.

Ethical considerations

The written informed consent was obtained from all participants.

RESULTS

In this study, a total of 800 children in age group

of 1-12 years were included, among whom 466 (58.25%) were girls and 334 (41.75%) were boys with ratio being 1.39:1. The majority of patients (286; 35.75%) belonged to the age group of 1-4 years. A total of 820 dermatoses were recorded in the patients. As depicted in Table 1, infections and infestations (380, 46.34%), were the most common type of dermatoses found followed by eczematous dermatoses (166, 20.24%), papulosquamous disorders (51, 6.21%), pigmentary disorders (43, 5.24%), and genetic disorders (29, 3.53%). In the skin infections, bacterial infection was the leading presentation ($n=120$), followed by infestations ($n=109$), viral ($n=107$) and fungal infections ($n=40$). Among bacterial infections, impetigo (54, 45%) was most common form followed by secondary pyoderma (41, 34.16%). The prevalence of impetigo was more prevalent in boys ($p=0.16$) and in the age group of 5-8 years ($P < 0.001$) which was statistically significant (Figure 1)

The most common viral infections include molluscum contagiosum (MC), varicella and herpes

Table 1. Distribution of dermatoses according to sex

Type of dermatoses	Boys	Girls	Total (%)
Infections and infestations	162	218	380 (46.34%)
Eczema and dermatitis	68	98	166 (20.24%)
Papulosquamous disorders			
Psoriasis	8	8	
Pityriasis rosea	4	7	51 (6.21%)
Other	13	11	
Pigmentary disorders			
Vitiligo	14	25	43 (5.24%)
Postinflammatory hyperpigmentation	1	3	
Genetic disorders			
Nevi	8	16	
Ichthyosis	1	2	29 (3.53%)
Neurofibromatosis	1	1	
Papular urticaria/ Insect bite reaction	11	17	28 (3.41%)
Nutritional disorders	11	13	24 (2.92%)
Hair disorders	08	14	22 (2.68%)
Urticaria	03	12	15 (1.82%)
Polymorphic light eruption	07	06	13 (1.58%)
Acne vulgaris	01	09	10 (1.21%)
Drug reactions	01	01	02 (0.24%)
Miscellaneous			
Palmoplantar keratoderma	4	0	
Connective tissue disorders	1	2	
Mastocytosis	0	2	37 (4.51%)
Juvenile xanthogranuloma	1	0	
Linear porokeratosis	0	1	
Other	12	14	
Total	341	479	820 (100%)

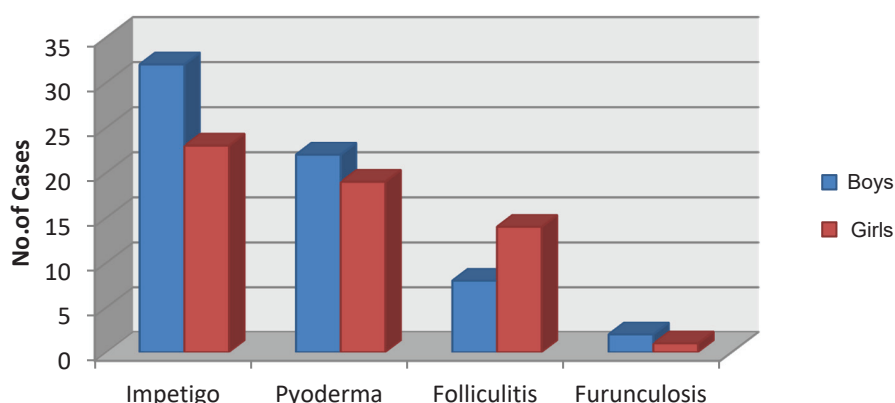


Figure 1. Sexwise distribution of bacterial infections

zoster. The majority of MC patients belonged to age group of 1-4 and 5-8 years which was statistically significant ($P < 0.001$). All the six cases of hand-foot-and-mouth disease occurred in the age group of 1-4 years ($P = 0.004$; Table 2).

After other eczematous eruptions including asteatotic eczema, nummular eczema, and xerosis, the most common condition, in eczema and dermatitis, was atopic dermatitis. Most children with atopic eczema were in the age groups of 1-4 and 5-8 years, which was statistically significant ($P = 0.003$; Table 2). Scabies was most common form of infestations ($n = 109$) followed by pediculosis. Pediculosis which was more frequently recorded in girls than boys ($P = 0.008$). Tinea corporis and tinea capitis accounted for the largest group of fungal infections. Its prevalence among boys showed statistically significant associations ($P = 0.034$; Table 3).

In the present study, the majority of dermatoses were recorded in summer (331; 41.37%), winter (267,

Table 3. Sexwise distribution of fungal infections and infestations

Infections and infestations	Boys	Girls	Total	P-value
Dermatophytoses	21	14	35	0.034
Intertrigo	0	3	3	0.270
Pityriasis versicolor	1	1	2	1.000
Scabies	33	51	84	0.628
Pediculosis	4	21	25	0.008

33.37%) and rainy season (202, 25.25%) (Figure 2). Maximum cases of impetigo, secondary pyodermas and folliculitis were documented in summer and rainy seasons (Figure 1). Varicella was the most common viral infection in summer. Scabies was noted predominantly in winter, while pediculosis ($P = 0.015$) was seen more frequently in summer. In this study, fungal infections were observed throughout the year with no statistical difference. The prevalence of eczemas and pityriasis alba was higher in winter. (Table 4)

Table 2. Distribution of viral infections, eczema and dermatitis according to age

Viral infections, Dermatitis & Eczema	1-4 yrs	5-8 yrs	9-12 yrs	Total	P-value
Molluscum contagiosum	34	16	8	58	<0.001
Varicella	10	11	9	30	0.960
Herpes zoster	0	3	3	6	0.179
Hand-foot-mouth disease	6	0	0	6	0.004
Warts	1	2	1	4	0.925
Herpes labialis	0	1	0	1	0.492
Other eczematous eruptions	28	26	21	75	0.949
Atopic dermatitis	17	14	1	32	0.003
Pityriasis alba	8	12	8	28	0.627
Contact dermatitis	8	4	5	17	0.529
Pompholyx	6	2	1	9	0.144
Keratolysis exfoliativa	0	3	0	3	0.061
Seborrheic dermatitis	0	1	1	2	0.565

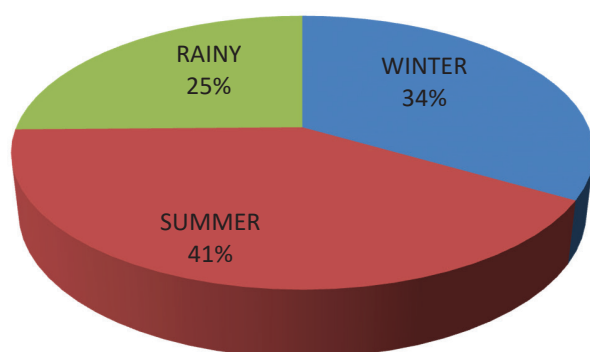


Figure 2. Seasonal variation in pediatric dermatoses

DISCUSSION

The pattern of skin diseases differs from one country to another and within various regions of the same country. Low socio-economic status, malnutrition, overcrowding, and poor standard of hygiene are important factors responsible for the distribution of skin diseases in developing countries

such as India⁷. Various climatic factors that may affect the incidence of skin diseases include coldness, heat, light, sunshine, and humidity. The type and prevalence of the disease in each community may be directly or indirectly affected by the climate.

In this study, the majority of patients (286; 35.75%) belonged to the age group of 1-4 years, in line with the observations recorded by Patel *et al.*⁸, Jawade *et al.*⁹, Karthikeyan *et al.*¹⁰ and Hassan *et al.*¹¹. This can be explained on the basis that the infants are mostly confined to their household whereas preschool children are prone to skin infections due to increased environmental exposure. The girls outnumbered 466; 53.25 %) the boys (334; 41.75%) with a girl: boys ratio 1.39: 1 which is comparable with the study by Nageswaramma *et al.*¹². In this study, infections and infestations were the most common group (380; 46.34%) followed by eczemas and dermatitis (166; 20.24%). A similar pattern of dermatoses has been reported in the study conducted by

Table 4. Seasonal variations in infections, infestations, dermatitis and eczema

Infections/infestations	Winter	Summer	Rainy	Total	P-value
I) Bacterial infections				120	
Impetigo	7	16	31	54	<0.001
Secondary pyoderma	7	16	18	41	0.008
Folliculitis	1	8	13	22	<0.001
Furunculosis	1	1	1	3	0.925
II) Viral Infections				107	
Mollusum contagiosum	16	29	13	58	0.377
Varicella	7	19	4	30	0.042
Herpes zoster	0	5	1	6	0.092
Hand-foot-mouth disease	2	3	1	6	0.431
Warts	0	1	3	4	0.062
Viral exanthema	2	0	0	2	0.135
Herpes labialis	1	0	0	1	0.368
III) Fungal Infections				40	
Dermatophytosis	12	15	8	35	0.815
Intertrigo	1	1	1	3	0.919
P. versicolor	1	1	0	2	0.702
IV) Infestations				109	
Scabies	35	33	16	84	0.177
Pediculosis	6	13	0	25	0.015
V) Mycobacterial infections	0	1	3	4	0.062
VI) Dermatitis and eczema					
Atopic dermatitis	11	17	4	32	0.195
Pityriasis alba	17	9	2	28	0.004
Contact dermatitis	10	7	0	17	0.372
Pompholyx	2	5	2	9	0.662
Keratolysis exfoliativa	1	2	0	3	0.542
Seborrheic dermatitis	1	2	0	3	0.542
Other eczema	49	24	2	75	0.001

Karthikeyan *et al.*¹⁰ and Nageswaramma *et al.*¹².

Bacterial infection (124; 15.12%) was the most common entity followed by viral (107; 13.04%) and fungal (67; 4.8%) infections. In the infestations group, scabies accounted for the maximum number of cases (109; 13.29%). These results are consistent with studies conducted by Patel *et al.*⁸, Karthikeyan *et al.*¹⁰ and Balai *et al.*¹³.

In the viral infections, the most common entity was MC (58; 7.07%) followed by varicella (30; 3.65%) and hand- foot-and-mouth disease (6; 0.73%). Similar observations have been reported in several studies^{8,13,14}. The hand-foot-and-mouth disease has recently been rising due to the probable mass immunization programs in India. Polio vaccination has eliminated polio viruses from the gut to increase the chances of coxsackie and echovirus infections¹⁵. Tinea corporis was the most frequent fungal infection followed by tinea capitis, tinea faciei, and tinea manuum. The fungal infections were more frequently encountered in boys in the age group of 5-8 years. These results are in accordance with the study conducted by Roy *et al.*¹⁶ and Sharma *et al.*¹⁷ The fungal infections can be attributed to the hot and humid climate and recent changes in dermatophyte flora. Large families, sharing of towels, clothing, and hair accessories with infected individuals may lead to the spread of fungal infections¹⁸.

We recorded 4 boys with Hansen's disease. Dogra *et al.* reported the similar results. (0.4%)⁷. Jawade *et al.* found childhood leprosy in 2.02%⁹. Despite the statistical elimination of leprosy in this region, childhood leprosy cases continue to present in alarming numbers. It indicates that familial contacts play a significant role in the development of the disease.

Eczema and dermatitis were the second most common group of dermatoses in our study constituting 20.24% of the total cases. Other eczematous eruptions including winter dermatitis, nummular eczema, and xerosis constituted the majority of cases followed by atopic dermatitis, pityriasis alba and contact dermatitis, which were consistent with the study by Bhatia *et al.*¹⁹ The increased incidence of atopic dermatitis may be associated with environmental pollution, exposure to agricultural chemicals, early weaning from breast feeding and increased awareness.

In our study, psoriasis followed by pityriasis rosea

accounted for the largest number of patients with papulosquamous disorders. Karthikeyan *et al.*¹⁰, and Roy *et al.*¹⁶ reported the prevalence of psoriasis as 1.4% and 2.17 %, respectively. Similar to Roy *et al.*, 4.75% of patients had vitiligo in our study¹⁶. Papular urticaria and insect bite reaction followed by urticaria were the most common hypersensitivity disorders. Similar findings have been reported in the studies by Roy *et al.*¹⁶, Sardana *et al.*²⁰ and Sayal *et al.*²¹. The high prevalence of papular urticaria can be explained by the fact that most of these children are from rural or semi-urban areas and are prone to insect bites due to weather conditions, lack of suitable clothing. Our study also reported a few number of patients with phrynoderma. Karthikeyan *et al.*¹⁰ and Jawade *et al.*⁹ studies showed an incidence of 2.8% and 2.70% respectively, who had nutritional dermatoses.

Acne was documented in 10 adolescent patients. The incidence of acne in the present study was low since this condition mainly a dermatosis of adolescents and young adults whereas our study was limited to the age group of 1-12 years. Roy *et al.*¹⁶ and Bisht *et al.*²² reported an incidence of 3.5% and 0.69%, respectively.

In this study, hair disorders constituted 1.58% of the total cases. Alopecia areata was the most common followed by diffuse hair loss which is comparable to the studies conducted by Bisht *et al.*²² and Sharma *et al.*²³ Genetic disorders had been reported in 3.53% of our study. We also reported two cases of drug reactions, angioedema in one case and maculo-papular eruption in another one.

The prevalence of certain dermatoses may be affected by seasonal and climatic changes. This was quite evident in our study in which impetigo, secondary pyodermas and folliculitis were most frequently noted in summer and rainy seasons. Scabies was noted predominantly in winters while pediculosis and varicella were observed more frequently in summer and winter. Although dermatophytes were more prevalent in summer, they have been reported throughout the year. The studies conducted by Patel *et al.*⁸, Balai M *et al.*¹³, Bisht *et al.*²², and Banarjee *et al.*²⁴ have reported that the bacterial infections are more common in the summer and rainy seasons, while scabies and pityriasis alba were more reported in the winter. On the other hand, fungal infections were more

frequent in summer while popular urticaria was seen in rainy season. High temperature and humidity in the summer and rainy seasons lead to rapid proliferation of pyogenic bacteria, and therefore high prevalence of bacterial infections. Scabies were more prevalent in winter, which may be because people spend more time indoors and in closer proximity to each other at this time of year.

CONCLUSION

The study emphasizes the importance of recognizing pediatric dermatoses at an early stage so that one can prevent their long term consequences on children, parents, and society. This study concluded that infections and infestations outnumbered other pediatric dermatoses in India. The incidence of skin infections can be reduced by raising awareness about nutrition, sanitation, and personal hygiene. Further studies are required in different regions to evaluate the actual magnitude of skin disorders in pediatric group.

Conflict of interest: None declared.

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