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Original Research Article

Clinico-epidemiological study of dermatological disorders in pediatric population at tertiary care centre

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ABSTRACT

Background: Children in India constitute a substantial portion of the population, with nearly half a billion children, about 40% of the total population. Skin diseases are prevalent among them, accounting for 30% of dermatologist and pediatrician visits and conditions vary widely across regions due to factors like poverty, malnutrition, hygiene, and climatic influences. Pediatric dermatology addresses unique challenges in managing skin diseases from infancy to adolescence, necessitating tailored approaches distinct from adult care. Understanding these variations is crucial for effective diagnosis and treatment, ensuring optimal childhood health outcomes.

Materials and Methods: A hospital-based clinical descriptive study was conducted, involving 600 children under the age of 16, clinically diagnosed with skin diseases over a period of one and half year after ethical committee approval.

Results: In this study, 600 pediatric patients (316 males, 284 females; mean age 8.06 ± 5.10 years) were analyzed for dermatoses. The majority of patients were aged 11-16 years (36.33%). A total of 642 skin disorders were recorded, with infections and infestations being the most common (39.41%), followed by eczematous diseases (21.49%). Among infections, bacterial infections were most prevalent (36.76%), with impetigo being the most common bacterial infection (52.7%). Viral infections were led by verruca vulgaris (43.4%), while Tinea was the predominant fungal infection (58.49%). The study highlights significant variations in dermatoses across different age groups, with a higher incidence of bacterial infections in younger children and fungal and viral infections in older children.

Conclusion: Pediatric dermatoses present varied challenges in diagnosis and treatment globally, affecting rural and urban populations differently. Our study categorized these conditions into fewer than eight groups, highlighting infections as most prevalent, followed by eczematous and pigmentary disorders. Disease distribution is influenced by age, gender, socioeconomic factors, family history, and seasonal variations. Effective strategies require enhancing public awareness, improving hygiene practices, and implementing targeted interventions based on regional epidemiology to reduce the burden and improve pediatric health outcomes.

1. Introduction

In India, with its expansive population pyramid, children constitute a significant portion of the population. Nearly half

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a billion children reside in India, making up approximately 40% of the total population.[1] Skin diseases are prevalent among children and are a major cause of morbidity. Dermatological issues account for about 30% of all visits to dermatologists and pediatricians.[2–4] School-based surveys in India have reported skin disease prevalence rates ranging from 8.7% to 35%,[4] with higher rates observed in rural areas.[5] While many skin conditions are temporary, chronic and recurrent diseases like atopic dermatitis can cause considerable morbidity and have a psychological impact on both children and their parents, affecting children's overall development.[6] Pediatric dermatology focuses on the skin care needs and diseases of individuals from birth to adolescence, a crucial period marked by significant physiological, psychological, and developmental changes.[7,8] Pediatric dermatoses require a distinct approach from adult dermatoses due to notable differences in clinical presentation, management, and prognosis.[9] A wide range of primary skin disorders can occur during childhood, and the skin often serves as an indicator of underlying systemic diseases and hereditary syndromes. The disease spectrum in the pediatric population is unique, highlighting the importance of evaluating skin diseases in children separately. The pattern of skin diseases varies significantly across different geographical locations and over time within the same country. Factors such as poverty, malnutrition, overcrowding, poor hygiene, illiteracy, and social backwardness contribute to these variations.[10,11] The prevalence of certain skin diseases among children in a community can reflect the health, hygiene, and personal cleanliness of that society.[12] Climatic factors such as cold, heat, light, sunshine, and humidity play a role in determining the incidence of skin diseases.[13] Additionally, varying levels of exposure to external factors and different stages of skin development can result in varying prevalence rates of dermatoses among infants, toddlers, and children. Evaluating skin disorders is a crucial component of primary health care for children. Understanding the common dermatoses in different age groups and climatic conditions in a specific geographical location can aid in narrowing down diagnoses and providing appropriate patient care.

2. Materials and Methods

A hospital-based clinical descriptive study was conducted in the Department of Dermatology, Venereology, and Leprosy at P.E.S. Institute of Medical Sciences and Research, Kuppam. The study included 600 children under the age of 16 who were clinically diagnosed with skin diseases. The research was carried out from January 2016 to May 2017. Informed consent was obtained from each participant, and the study received prior approval from the institutional ethical committee.

2.1. Sample size

The study included 600 children under the age of 16 who were clinically diagnosed with skin diseases.

2.2. Inclusion criteria

1. Pediatric patients attending the Dermatology Outpatient Department (OPD).
2. Pediatric patients referred to dermatology from other departments.

2.3. Exclusion criteria

1. Patients unwilling to provide consent.
2. Patients receiving immunosuppressive therapy.
3. Patients with HIV infection.
4. Patients with sexually transmitted infections.

3. Observation & Result

In this study, a total of 600 pediatric patients aged 16 years and below were included. The cohort comprised 316 males and 284 females, resulting in a male-to-female ratio of 1.112:1.

3.1. Age distribution

The majority of children were in the age group of 11-16 years (n = 218, 36.33%), followed by those in the 6-10 years age group (n = 169, 28.17%). The youngest patient was a 1-day-old infant, and the oldest was 16 years old.

Mean ±SD= 8.064167±5.102175

3.2. Spectrum of pediatric dermatoses

A total of 642 dermatoses were recorded, with patients having more than one skin disorder. The major categories of dermatoses with their percentages are as follows. (Table 1)

Table 1: Percent wise distribution of the major dermatoses in the study (n=number of patients, %=Percentage)

Dermatoses	Number	%
Infection And Infestations	253	39.41 %
Eczematous Diseases	138	21.49 %
Papulosquamous Diseases	55	8.56 %
Hypersensitivity Diseases	55	8.56 %
Acne	37	5.76 %
Pigmentary Diseases &Nutritional dermatoses	28	4.36%
Nevi	12	1.87 %
Miliaria	10	1.55 %
Hair,Nail& Keratinisation disorders	25	3.89 %
Other	29	4.51 %
Total	642	

In the present study, Infections and infestations were the most common (n=253, 39.41%), cause of skin disease, followed by Eczematous diseases (n=138, 21.49%). Papulosquamous diseases and Hypersensitivity diseases both place third place, both having equal share (n=55, 8.56 %).

3.3. Infections and infestations

In the present study, a total of 253 children presented with infections. Among infections, bacterial infections were the most common infections (n=93, 36.76%), followed by parasitic infestations (n=54, 21.34%). (Figure 1)

In present study, a total of 253 children presented with infections, 11-16yr old children presented with highest number of infections (n=103, 40.71%), followed by 6- 10yr group (n=71, 28.06%).

High incidence of Bacterial infections are noted in <1yr and 1-5yr age groups. 6 out of 15 children, i.e. 40% in the age group <1 yr and 28 out of 64 children,i.e. 43.75%,in the age group 1-5 yr had some form of bacterial infection.

Fungal and Parasitic infections were more recorded in 11-16yr old children. Viral Infections are commonly seen in both 6-10 and 11-16 yr age groups.

3.4. Bacterial infections

Of the total 253 infections reported, a total of 93 bacterial infections were recorded. Impetigo(Fig 2) was the most common infection (n=49, 52.7%), followed by Pyoderma (n=23, 24.7%), Folliculitis (n=13, 13.9%) and Furuncle (n=8, 8.6%). (Table 2)

Table 2: Pattern of various bacterial infections.

Type	<1yr	1-5yr	6-10yr	11-16yr	Total
Impetigo	6	24	16	3	49
Pyoderma	-	2	7	14	23
Folliculitis	-	-	3	10	13
Furuncle	-	2	4	2	8
Total	6	28	30	29	93

Among all age groups, Impetigo was more common in 1-5yr and 6-10yr age groups. Pyodermas and all children <1yr reported with impetigo. Furuncles were common in 6-10yr group.

3.4.1. Viral infections

In the present study, a total of 53 viral infections were recorded. Verruca vulgaris was the most common disease (n=23, 43.4%). (Table 3)

Veruca vulgaris and Herpes infections are most common viral infection seen in 11- 16yr age group.

Varicella (Figure 3) is seen almost equally in all age groups.

Table 3: Pattern of viral infections

Type of Infection	<1 yr	1-5 yr	6-10 yr	11-16yr	Total
Verruca	0	3	8	12	23
Varicella	0	2	3	2	7
Exanthema	1	3	4	0	8
Hand Foot Mouth	3	1	2	0	6
Molluscum	0	1	1	2	4
Herpes	0	1	1	2	4
Gianotti- Crosti	0	1	0	0	1
Total	4	12	19	15	53

Hand Foot Mouth disease is predominantly seen in <1yr age group.

3.5. Fungal infections

In the present study, a total of 53 fungal infections were recorded, of which dermatophyte infections are the commonest (n=31, 58.49%), while candida infections formed the least.

Candidiasis (Figure 4) was more prevalent in <1yr age group.

11-16yr old group children showed more incidence of Tinea and Pityriasis versicolor.

3.6. Parasitic infections

In the present study, 53 cases were presented with Scabies and 1 case was presented with pediculosis. 11-16 yr group are the maximum cases (n=27, 50%) presented with scabies.

3.7. Eczematous diseases

Out of the 642 dermatoses recorded in the study, Eczematous diseases formed the second largest group (n=141, 21.96%). 6 children presented with more than one diagnosis. Pityriasis alba is the most common cause (n=39, 27.6%), followed by Atopic dermatitis (n=27, 19.1%), Contact dermatitis(n=21,14.9%) and Seborrhoeic Dermatitis(n=20, 14.2%).(Table 4)

Table 4: Pattern of eczematous diseases

Type of ezcema	<1yr	1-5yr	6-10yr	11-16yr	Total
P alba	3	20	10	6	39
Atopic	8	8	10	1	27
Contact	1	6	6	8	21
Seborrhoeic	10	3	1	6	20
Photodermatitis	0	2	7	7	16
Intertrigo	6	3	2	2	13
Pompholyx	0	0	0	5	5
Total	28	42	36	35	141

The eczematous diseases had wide range of distribution affecting all age groups. Pityriasis alba, Atopic dermatitis

(Figure 5), Seborrhoeic dermatitis and Intertrigo seen more in younger age groups, whereas Contact dermatitis, Photodermatitis and Pompholyx were seen in older age groups.

The younger age groups, upto 10 yr, had significantly higher rates of major eczematous diseases.

3.8. Papulosquamous diseases

A total of 60 children presented with papulosquamous diseases. Psoriasis is the most common papulosquamous disease (n=24, 40%) in the present study. Lichen Nitidus was the second most common disease (n=12, 20%).

A total of 37 (5.76%) children presented with Acne. Acne was very commonly seen in teenage age group patients belonging to 11-16year age group.

3.9. Hypersensitivity disorders

Papular urticaria was the most common hypersensitivity disorder (n=30, 58.1%) followed by Urticaria (n=23, 40.3%). 18 cases of Acute Urticaria and 5 cases of Chronic urticaria were recorded. 2 cases of drug induced urticaria were recorded.

3.10. Pigmentary disorders

3.10.1. Vitiligo

In the present study, 14(2.2%) cases of vitiligo were recorded. More number of females presented with vitiligo.(Figure 6)

3.10.2. Nevi

In the present study, a total of 12(1.87%) cases presented with nevi. Nevus depigmentosus(3 cases) was the commonest, followed by Verrucous epidermal naevus(2 in number)(Figure 7). Other types of nevi like nevus of Ota, Nevus sebaceous, Blue nevus, Becker nevus, Nevus anemicus, Junctional nevus and Melanocytic nevus were seen in single cases

3.11. Hair disorders

A total of 9 cases (1.4%) children had hair disorders. Alopecia areata (Figure 8) was the most common hair disorder (n=6, 66.7%), followed by telogen efflvvium and trichotillomania.

Hair diseases were commonly noted in 11-16yr age group and females affected more than males.

3.12. Nutritional dermatoses

A total of 14 cases of Phyrnoderma (2.2%) were seen. 6-10 year old children presented more in number.

Among Keratinisaton disorders (1.4%), 5 cases presented with ichthyosis vulgaris and 4 cases of palmoplantar keratoderma were seen.

Similarly, 9 cases (1.4%) of Miliaria were seen with 7 of them as Miliaria rubra and 2 were miliaria crystallina.

Trachonychyia (n=4, 0.55%) was the common nail disorder seen along with 3 cases of nail dystrophy (0.45%).

Morphea (n=2, 0.34%) and 1 case of SLE were seen under Connective tissue disorders (0.47%).

In Neonatal conditions, we noticed 3 cases of Erythema Toxicum Neonatorum (0.47%) and Neonatal Cephalic Pustulosis (0.47%) each, 2 cases of Neonatal acne (0.34%) and one case of Mongolian spots and Aplasia cutis each.

In this study, rare Genodermatoses (0.34%) like Anhidotic Ectodermal Dysplasia (n=1)) and Xeroderma pigmentosa (n=1) were noted.

Few miscellaneous conditions seen in this study were Infantile Hemangioma(n=3, 0.47%), Hyperhidrosis(n= 4,0.62%), Pyogenic granuloma (n=2, 0.34%) , Adverse drug reaction(n=2, 0.34%) and geographic tongue (1 case).

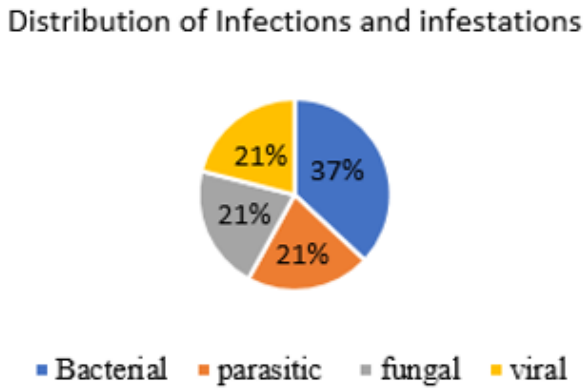

Figure 1: Distribution of infections and infestation in the study

Figure 2: Bullous impetigo

4. Discussion

Skin diseases in children are frequently encountered, and their characterization is essential for developing academic,

Figure 3: Varicella

Figure 4: Candidial intertrigo

Figure 5: Atopic dermatits

Figure 6: Vitiligo

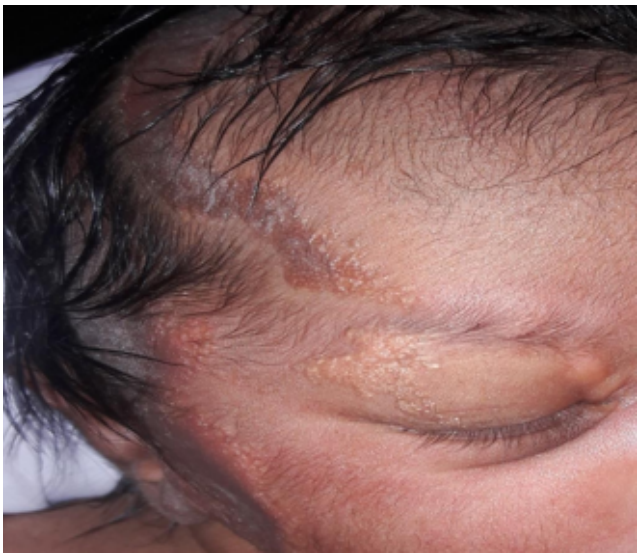

Figure 7: Linear verrucous epidermal nevus

Figure 8: Alopecia areata

research, and health plans. The pattern of skin diseases in the pediatric age group varies significantly from one country to another and within the same country from one state to another. This variation is influenced directly or indirectly by factors such as climate, external environment, dietary habits, and socioeconomic status.

In the present study, males outnumbered females with a male-to-female ratio of 1.112:1. Similar high male ratios were recorded in studies conducted by Rather et al. in Jammu and Kashmir,[1] Nagarajan et al. in Northeast India, Patel et al. in Gujarat,[10] Balai et al. in Southwest Rajasthan and Vani et al. in Andhra Pradesh.[9] This may indicate that males are more commonly affected by skin diseases due to higher levels of environmental exposure. It may also reflect the higher male-to-female population ratios in these specific areas.

In contrast, Reddy et al. from North Kerala reported a lower male-to-female ratio of 0.94:1, which can be attributed to the higher female population in Kerala. Studies by Patel et al. reported the highest number of cases in the 1-5 year age group, comprising 31.84% of the total cases.[10] Similarly, Sharma et al. found that skin infections are more common in younger age groups.[14] In the present study, the majority of patients were in the 11-16 year age group, accounting for 36.33%, with a mean age of 8.06 ± 5.10 years. This finding is consistent with the studies by Reddy et al., where adolescents constituted the major group at 48%, and by Rather et al., where 50.30% of cases were in the 12-19 year age group.[1] These differences in the pattern of dermatoses across various regions of the country indicate that adolescents are more commonly affected in these specific areas.

4.1. Infections & infestations

Infections and infestations constituted the major dermatoses in the present study, accounting for 39.41% of cases. A similar pattern, predominantly involving infections and infestations, has been observed in various Indian studies: Reddy et al. (33.8%),[8] Nagarajan et al. (36.25%),[15] Balai et al. (40.60%),[16] Patel et al. (39.98%),[10] Rather et al. (43.73%),[1] Vani et al. (53.83%),[9] Thakare et al. (32.25%),[17] Karthikeyan et al. (37.82%),[4] Sacchidanand et al. (32.47%),[18] and Bisht et al. (36.46%).[19]

In contrast, studies conducted outside India, such as those by Gul U et al. in Turkey,[20] Wenk C et al. in Switzerland,[21] Child FJ et al. in London,[22] and Hon KL et al. in China,[23] reported a lower incidence of infections and infestations. This clearly highlights the differences in the spectrum of skin diseases between developed countries and India, which can be attributed to higher levels of personal hygiene, socioeconomic status, and other related factors.

Lack of health awareness, poor personal hygiene, poverty, overcrowding, environmental factors, poor nutritional status, and low socioeconomic status, as well as the rural population involved in the study, might have contributed to the observed scenario.

In the present study, bacterial infections were the most common, comprising 15.5% of the overall population, followed by parasitic infections at 9%, and fungal and viral infections each at 8.83%. A similar pattern was observed by Patel et al.,[10] with bacterial infections being the most common (39.15%), followed by parasitic (22.96%), fungal (21.70%), and viral infections (16.19%). Balai et al.[11] also reported bacterial infections as the most common (13.72%).

In contrast, Nagarajan et al. in Northeast India found that viral infections were the most common dermatoses (16.5%), followed by parasitic infestations (12.25%), bacterial (11.25%), and fungal infections (8.50%). Reddy et al. in North Kerala reported fungal infections as the most common (44.59%), followed by viral (40.54%), bacterial (14.18%), and parasitic infestations (3.6%). Similarly, Rather et al. in Jammu & Kashmir noted fungal infections as the most common (14.9%), with parasitic infestations second most common (11.76%), followed by viral (10%), and bacterial infections being the least common (7.05%).[1] Vani et al. in Coastal Andhra Pradesh observed parasitic infestations as the most common, followed by bacterial, fungal, and viral infections.[9]

This differences in the various studies may be attributed to the region of the study, local environmental factors, study population, nutritional status and various host factors.

4.2. Bacterial infections

In the present study, impetigo was the most common bacterial infection, accounting for 52.7% of all bacterial dermatoses, followed by pyoderma (24.7%), folliculitis (13.9%), and furuncle (8.6%). This finding is consistent with several studies, including those by Balai et al.,[16] Sharma et al.,[14] Sayal et al.,[24] Mitra et al.[25] Koley et al.,[19] Vani et al.,[9] and Nagarajan et al.,[15] all of which identified impetigo as the most common bacterial infection. Conversely, Patel et al.[10] reported pyodermas (53.85%) as the most common bacterial infection, followed by impetigo (22.12%) and folliculitis (19.55%). Similarly, Bhatia et al.[20] and Ghosh et al.[22] also found pyodermas to be the most common bacterial infection. Reddy et al.[8] reported furunculosis (38%) as the most common bacterial infection, followed by impetigo (28.5%) and secondary pyodermas (14.2%). Rather et al.[1] found folliculitis to be the most common bacterial infection, followed by impetigo.

4.3. Viral infections

In the present study, verruca vulgaris was the most common viral infection, affecting 43.4% of patients, followed by viral exanthema (15%), varicella (13.2%), hand-foot-mouth disease (11.32%), and molluscum contagiosum (7.54%). Verruca was more commonly seen in the adolescent age

group. Herpes also showed a significant number of cases. This finding aligns with the studies by Nanda et al.[21] and Vani et al.,[9] which also reported a higher incidence of verruca. Hand-foot-mouth disease constituted 10% of viral infections in the study by Reddy et al.[8]Molluscum contagiosum was identified as the most common viral dermatosis in the studies by Reddy et al.,[8] Patel et al.,[10] Rather et al.,[1] and Balai et al.[16] In these studies, verruca vulgaris was the second most common viral infection. Conversely, Nagarajan et al.[15] reported varicella (6%) as the most common viral infection, followed by molluscum contagiosum (4%) and hand-foot-mouth disease (4%). Similarly, Jawade et al.[26] found molluscum contagiosum to be a prevalent viral dermatosis.

4.4. Fungal infections

In the present study, dermatophytic infections (58.49%) were the most common fungal infections, followed by pityriasis versicolor. Studies by Rather et al.,[1] Vani et al.[9], Reddy et al., Balai et al.,[18] Ghosh et al.,[27] and Sardana et al. also identified dermatophytic infections as the most common fungal infections. While many studies noted tinea capitis as the most common dermatophytic infection, the present study found tinea corporis to be the most prevalent. Candidiasis was observed more commonly in infants in this study.

Nagarajan et al. and Patel et al.[28] reported candidiasis as the most common fungal infection in their studies, with a higher prevalence in infants. These findings may be attributed to a higher rate of dermatophytic infections in parents in this region, from whom the children might have acquired the infection, combined with factors such as poor personal hygiene and overcrowding. The prevalence of candidiasis in infants is likely due to improper drying of the napkin areas, leading to maceration and creating favorable conditions for the growth of the organism.

4.5. Parasitic infections

Parasitic infestations were the second most common infections in the present study, accounting for 21.34% of all dermatoses. Scabies was the most prevalent parasitic infestation, followed by a very low number of cases of pediculosis. This is consistent with the findings of studies by Sharma et al.,[29] Nagarajan et al..[15] Vani et al..[9] Reddy et al.,[8] and Sacchidanand et al.[18] Scabies was particularly common in the adolescent age group. In contrast, studies by Karthikeyan et al.[30] from Pondicherry and Sharma and Sharma.[29] from Himachal Pradesh indicated that pediculosis was the most common infestation. This discrepancy may be due to factors such as overcrowding in hostels and homes, poor personal hygiene, lack of awareness regarding blanket therapy, improper utilization of topical medications, and reinfections.

4.5.1. Eczematous disorders

In the present study, eczematous disorders formed the second major group with 21.96% of all dermatoses. Similarly, eczema was the second most common dermatosis in almost all other Indian studies, such as Reddy et al. (32.6%).[8] Balai et al. (34.86%),[16] Rather et al. (21.67%).[1] Nagarajan et al. (14.5%).[15] Patel et al. (17.90%).[10] and Vani et al. (17.24%).[9]

In the present study, pityriasis alba was the most common eczematous disorder, accounting for 27.6% of all eczemas, followed by atopic dermatitis (19.1%), contact dermatitis (14.9%), and seborrheic dermatitis (14.2%). Pityriasis alba was more frequently observed in the 1-5 year age group. Similar findings were reported by Nanda et al. (5.2%).[31] and Sharma et al. (4.9%).[29] where pityriasis alba ranked as the second most common disease. Seborrheic dermatitis was predominantly seen in infants, while photodermatitis constituted a significant proportion at 11.34%.

Studies conducted in developed countries, such as by Child et al. in London,[22] have reported a higher incidence of eczematous disorders compared to infections. Atopic dermatitis was identified as the most common eczema in studies by Sacchidanand et al. (6.12%),[18] Balai et al. (19.27%),[16] Thakare et al. (5.25%).[17] and Vani et al. (8.32%).[9]

Seborrheic dermatitis was reported as the most common eczema by Rather et al. (7.25%),[1] Patel et al. (30.53%),[10] and Sardana et al. (10.49%).[28] It ranked second in prevalence according to Nagarajan et al. (3%),[15] Balai et al. (16.76%),[16] and Thakare et al. (4.36%).[17] Nagarajan et al. highlighted pompholyx/dyshidrotic eczema as the most common eczema (6.5%),[15] whereas Reddy et al. found juvenile plantar dermatoses to be the most common (4.3%).[8]

The observed pattern in the present study could be attributed to various factors including dietary habits, environmental allergens, genetic predisposition of the study population, cool climate conditions, low socioeconomic status, malnutrition, use of harsh soaps, and insufficient awareness regarding the use of moisturizers.

In present study, significant number of patients presented with papulosquamous disorders.(8.56%). Psoriasis was the commonest disorder with 4.% of all dermatoses , followed by Lichen Nitidus (2%), Lichen planus (1.160%), Pityriasisrosea (1.160%). Guttate psoriasis was seen more commonly.

Studies like Nagarajan et al. (3.50%), Thakare et al (3.66%), Balai et al.(1.66%) and Karthikeyan et al (1.60%) showed significantly lesser prevalence of Papulosquamous disorders when compared to present study..Sachidanand et al. reported incidence of Psoriasis as 4.28, similar to present study.

Sharma et al., also showed psoriasis as the commonest disease. Rather et al. showed 1.08% incidence of psoriasis.[1]

Karthikeyan et al. reported prevalence of psoriasis as 1.4%. Balai et al. showed very less incidence of psoriasis.This pattern may be due to genetic predisposition to different papulosquamous disorders of the population studied.

5. Conclusion

Pediatric dermatoses pose unique challenges in diagnosis and treatment due to their varied clinical presentations, management strategies, and prognostic outcomes. These conditions are prevalent globally, affecting both rural and urban populations with distinct patterns observed between developed and developing regions. Our study categorized the majority of pediatric dermatoses into fewer than eight disease groups, highlighting infections as predominant, followed by eczematous and pigmentary disorders. Age, gender, socioeconomic factors, family history, and seasonal variations significantly influence disease distribution. Effective reduction in pediatric dermatoses incidence hinges on enhancing public awareness of disease etiology, transmission, and preventive measures, alongside improving sanitation, nutrition, and personal hygiene practices among children. Tailored health education and targeted interventions informed by regional epidemiological insights are crucial for mitigating pediatric dermatoses burden and improving overall childhood health outcomes.

6. Source of Funding

None.

7. Conflict of Interest

None.

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