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Research Article

The Spectrum of Pediatric Skin Diseases: A Prospective Study in Sudan

Mahasin Nsraldein Abass[1], Muaath Ahmed Mohammed[1,2]*, and Amani Hashim Elgadal[3]

[1]Pediatric Council, Sudan Medical Specialization Board, Khartoum, Sudan
[2]Department of Physiology, Faculty of Medicine, Ibnsina University, Khartoum, Sudan
[3]Department of Pediatric, Faculty of Medicine, Karary University, Khartoum, Sudan

Abstract

Background: In line with the World Health Organization's (WHO) campaign to improve community dermatology services, research on the spectrum of pediatric skin diseases is crucial for both patients and policymakers. Identifying the spectrum of pediatric skin conditions among children visiting the Khartoum Dermatological Hospital's outpatient dermatology clinic was the goal of this study.

Methods: Over six months, a prospective cross-sectional study including children (0–18 years old) was undertaken. Once the pertinent medical history and examinations were gathered, dermatologists made the diagnosis. Skin conditions were divided into several categories. The analysis of the data was done with the SPSS version 23.

Results: A total of 320 children, with a male-to-female ratio of 1.1:1, were enrolled. Ten categories with 38 different skin diseases were established after diagnosis. Infections in 152 (47.5%), eczematous disorders in 89 (27.8%), and appendageal disorders in 19 (5.93%) children were the most prevalent conditions by group. Impetigo (37.5%), scabies (10.9%), and seborrheic dermatitis (10.6%) were the most frequently seen diseases. These illnesses most commonly afflicted the areas of the limbs (30%), face (20%), and scalp (18.7%). Papules in 148 (46%) and scales in 74 (23%) children were the most prevalent primary and secondary efflorescence, respectively. A clinical diagnosis was made in the majority (266 [83.1%]) of the cases.

Conclusion: The most frequently observed group was infection. This demonstrates how crucial it is to maintain good personal and family hygiene, minimize overcrowded spaces, and promoting public health.

Keywords: pediatric, children, spectrum, pattern, skin, dermatoses, diseases, ailments

Corresponding Author: Muaath Ahmed Mohammed; email: mwawssi0@gmail.com

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1. Introduction

In the pediatric outpatient department (OPD), dermatological conditions account for at least 4–35% of cases [1, 2], and children make up 30% of cases that are seen by dermatologists [3]. The diversity and commonality of skin illnesses are influenced by several factors, including personal hygiene, health status, education level, living in crowded areas, family structure, environment, race, and socioeconomic status [4–6]. The World Health Organization (WHO) revised 18 studies on skin conditions from resource-constrained African nations and found that the high infection-related conditions in developing African nations were caused by a tropical climate, crowded living conditions, poor hygiene habits, and limited water availability [7]. According to the WHO survey, pediculosis capitis, pyoderma, scabies, tinea capitis, viral skin disorders, and dermatitis were the most frequent skin ailments [7]. These results pose a challenge to national health authorities and public health organizations, especially in poor countries, who need to think carefully about and put into practice efficient protocols and strategies for treating and preventing skin diseases.

Skin and subcutaneous illnesses were ranked as the fourth most common cause of disability globally and the eighteenth most common cause of disability-adjusted life years (DALYs) globally, according to the Update of the Global Burden of Disease research [8].

One of the most prevalent childhood illnesses in several developing countries is skin disease [9]. Many common conditions, such as atopic and seborrheic skin diseases, are regarded as crucial components of primary- and secondary-care physician practice, while chronic and uncommon skin diseases, such as Pityriasis lichenoides, typically appear at the tertiary-care level [10, 11].

The spectrum of skin diseases is divided into several groups (e.g., atopic or allergic, infectious or infestation, systemic, and miscellaneous) for explanation and education [12, 13]. These groups may be acute or chronic, recurrent or remitting, and differ significantly in how they manifest and are managed between children and adults [14, 15]. Future office research in this area, like this study, can therefore offer crucial information that can enhance patient outcomes and future planning.

Children with dermatosis not only have severe morbidity, but their parents also experience tremendous psychological distress [14]. Relevant epidemiological studies are required because they support policy-making as well as public health assessment [16].

Childhood skin disease has not been extensively studied in Sudan, despite these conditions representing a significant social and economic burden. This prospective, facility-based study at the OPD dermatology clinic at the Khartoum Dermatology Hospital aimed at documenting the frequency and spectrum of childhood skin diseases in this society.

2. Materials and Methods

This prospective cross-sectional study lasted six months from October 2021 to March 2022. In the Khartoum Dermatology Teaching Hospital's outpatient clinic, 320 pediatric patients between the ages of 0 and 18 were included. Patients from primary medical services and secondary hospitals both inside and outside the state of Khartoum visit the OPD clinic, which is a tertiary facility. Patients of all ages are seen in the clinic; according to information from the hospital's medical records

office, about 2500 children are anticipated to be seen annually. With the following assumptions: n = sample size, N = population size, p = probability, z = confidence interval at 95% (1.96), d = error proportion (0.05), the total sample size (320) was calculated using the Stephen Thompson formula ($n = \frac{N \times p(1-p)}{\left[(N-1) \times \left(\frac{d2}{z2}\right)\right] + p(1-p)}$). Using convenient sampling, informed consent was collected, and patients and/or guardians were interviewed to explain the goal of the study. Data collection sheets were used to capture demographic factors such as age, sex, presenting complaints, full history, and thorough general and dermatological examination. Dermatologists then evaluated the patient files, made the diagnosis, and requested additional testing as needed. People who have been referred for a workup are noted as incomplete and have an appointment to meet them in the upcoming clinics. Version 23 of the Statistical Package for Social Science (SPSS) was utilized to evaluate the gathered data. Numbers and percentages were used to display categorical data. The Sudan Medical Specialization Board's (SMSB) Research Ethical Committee and the state of Khartoum's Ministry of Health's research department provided their ethical approval. Additionally, a formal acceptance letter was acquired from the hospital's administrative head office.

3. Results

3.1. Characteristics of study participants

A total of 320 children were recruited. There were 174 (54.4%) male children and 146 (45.6%) female children, meaning that the male-to-female ratio was 1.1:1. Infants under one year old accounted for 44 (13.75%), preschoolers (ages 1–5) 97 (30.3%), school-age children (ages 6–12) 104 (32.5%), and teens (ages 13–18) 75 (23.4%). The majority of patients (266 [83.1%]) come from urban areas, and 190 (59.3%) of them have poor socioeconomic levels.

3.2. Spectrum of skin disorders and nature of the lesions found

Ten categories were established after a total of 38 skin conditions were studied. Among them, the most frequently studied were: infections – 152 (47.5%), eczematous disorders – 89 (27.8%), appendageal disorders – 19 (5.93%), papulosquamous disorders – 18 (5.62), keratinization disorders – 11 (3.4%), pigmentary disorders – 7 (2.18%), xerodermas disorders – 2 (0.62%), systemic disorders – 2 (0.62%), miscellaneous – 2 (0.62%), and blistering disorders – 1 (0.31%). The most commonly identified lesions were impetigo – 37 (11.56%), scabies – 35 (10.93%), seborrheic dermatitis – 34 (10.62%), and tinea capitis – 30 (9.37%; Table 1).

The majority of the disorders were concentrated in the limbs (30%), face (20%), scalp (18.7%), and trunk (16.8%). Papule (148 [46%]) was the most frequently observed primary skin efflorescence, while scale (74 [23%]) was the most frequently observed secondary skin efflorescence.

3.3. Need for workup

While most skin conditions were identified by clinical diagnosis, 54 (16.8%) needed routine and specialized investigations (such as ANA profile, HIV testing, Elisa, skin scraping, swabs, biopsy, and nail clipping).

3.4. Comparison with other studies

The discovered spectrums of skin disorders are compared with those from other African [13, 17],

Chinese [18], and Indian [19] studies, as illustrated in Table 2.

4. Discussion

Our study demonstrates the high frequency and diverse nature (38 distinct diagnoses) of skin illnesses among the 320 pediatric cases seen in the OPD clinic of Khartoum Dermatology Hospital over six months.

Infections accounted for 47.5% of all skin disorders in our study. This is similar to what other authors [12, 17, 19, 20] reported in their studies on a spectrum of pediatric skin ailments. The majority of the children in our study come from lower socioeconomic strata, where personal hygiene was not as important. This could account for the high occurrence of infections in our study. The most prevalent infectious dermatoses in our study were fungal infections, which were followed by bacterial, parasitic, viral, and mycobacterium dermatoses.

The results of our study are in line with the findings of many other studies, which indicate that fungal infections predominate [16, 17, 21].

However, others have reported that, in the pediatric age group, bacterial infections are more common than fungal and viral infections [22, 23]. The study population's environmental, social, hygienic, and dietary status might all be contributing factors to this discrepancy. Improved identification and management of these ailments at the primary-care level are also necessary. In our study, the majority of fungal infections were attributed to tinea capitis (9.3%). This was in contrast to findings from studies conducted in South Africa (2.1%) and Tanzania (19.1%) [17, 13]. High humidity, unhygienic conditions, and poor personal hygiene all contribute to the growth of fungal skin diseases [9]. Tinea capitis is more common in children due to their sebum, lack of fungistatic fatty acids, and normal commensal (Pityrosporum ovale) [24]. In addition, it should be noted that tinea capitis is communicable and can be passed on through the sharing of personal objects like shavers and combs [24]. Therefore, it is crucial to promote community awareness and health education to lessen the spread of these infections. The majority of bacterial infections in our study were impetigo (11.5%). This was in line with the findings of an Egyptian study (12.04%), but it differed from those reported in a South African study (1.7%) [13, 25]. Antimicrobial resistance and noncompliance with prescribed drug regimens may be the cause of this frequency of impetigo in our society. In our study, the majority of parasite illnesses were scabies (10.9%). This was more than the findings from research conducted in Nigeria (1.6%), South Africa (0.7%), and Tanzania (7.4%) [12, 13, 17]. The high rate of scabies could be attributed to the fact that more cases are referred to tertiary clinics because most cases go unrecognized at the primary- and secondary-care levels. Skin infections caused by viruses (2.8%) and mycobacterium (0.3%) were less prevalent. Most of them are not life-threatening, but some, like viral warts, may indicate immunosuppression, especially if the lesions are widespread and severe. Fortunately, there are fewer referral cases as a result of these findings, which indicate that general practitioners (GPs) and pediatricians have a high detection rate of these diseases.

In our study, eczematous illnesses (27.2%) constituted the second most common category of pediatric dermatoses. The most prevalent eczematous condition in infants is seborrheic dermatitis (10.6%). The percentage was larger than that of a study conducted in South Africa (6%), but it was lower than that of an Indian study (42.5%) [19].

Table 1: Spectrum of pediatric skin disorders.

Disease	Number of patients seen	Percentage
Infections	152	47.5
Fungal	61	19
Tinea capitis	30	9.37
Tinea versicolor	16	5
Tinea corporis	10	3.12
Tinea pedis	2	0.62
Tinea cruris	2	0.62
Tinea faciei	1	0.31
Bacterial	45	14.06
Impetigo	37	11.56
Folliculitis	7	2.18
Cellulitis	1	0.31
Parasitic	36	11.2
Scabies	35	10.93
Cutaneous larva margin	1	0.31
Viral	9	2.81
Mullscoum contagiousm	6	1.87
Common wart	2	0.62
Herpes simplex	1	0.31
Mycobacterium	1	0.31 0.31
Lupus vulgaris	1	
Eczematous disorders	89	27.8
Seborrhic dermatitis	34	10.62
Other eczemas	28	8.75
Urticarial	20	6.25
Atopic dermatitis	7	2.18
Appendageal disorders	19	5.93
Acne vulgaris	9	2.8
Alopecia areata	4	1.25
Hair fall	3	0.93
Miliria crystalline	3	0.93
Papulosquamous disorders	18	5.62
Pityriasis rosea	9	2.8
Psoriasis	3	0.93
Pityriasis rubra pilaris	3	0.93
Pityriasis alba	2	0.62
Lichen planus	1	0.31
Keratinization disorders	11	3.4
Planter keratosis	9	2.8
Palmer keratoderma	1	0.32
Planter keratoderma	1	0.32
Pigmentation disorders	7	2.18
Vetiligo	7	2.18
Xerodermas disorders	2	0.62
Ichthyosis	1	0.31
Xerosis	1	0.32
Systemic disorders	2	0.62
Post-kala-azar	2	0.62
Miscellaneous	2	0.62
Calcinosis cutis	1	0.31
Pyoderma gangrenosum	1	0.31
Blistering disorders	1	0.31
Epidrmolysis bullosa	1	0.31

In our study, atopic dermatitis (2.18%) was the least common eczematous condition. This was similar

Table 2: Comparison of obtained spectrum with other findings.

Diagnosis	Our study	Tanzania [17] 2015	South Africa [13] 2016	China [18] 2004	India [19] 2023
	Diagnosis (%) *N* = 320	Diagnosis (%) *N* = 340	Diagnosis (%) *N* = 419	Diagnosis (%) *N* = 331	Diagnosis (%) *N* = 206
1	Infections (47.5)	Infections (52)	Atopic dermatitis (60.1)	Endogenous eczema (33.4)	Infections (40.29)
2	Eczematous disorders (27.8)	Atopic dermatitis (31.5)	Viral warts (11.0)	Melanocytic nevi (10.2)	Eczematous disorders (19.41)
3	Appendageal disorders (5.93)	Papular urticaria (5.6)	Seborrhoeic dermatitis (6.0)	Viral warts (5.7)	Disorders sebaceous and sweat glands (13.10)
4	Papulosquamous disorders (5.62)	Acne vulgaris (3.2)	Vitiligo(4.1)	Vitiligo (5.39)	Papulosquamous (6.31)
5	Keratinization disorders (3.4)	Vitiligo (2.9)	Molluscum contagiosum (3.8)	Epidermal and sebaceous nevi (5.12)	Hypersensitivity syndrome (5.82)
6	Pigmentary disorders (2.18)	Pityriasis alba (2.9)	Dermatophytosis (2.9)	Vascular nevi (4.31)	Disorders of pigmentation (5.33)
7	Xerodermas disorders (0.62)	Pityriasis rosea(2.1)	Acne vulgaris (1.9)	Pityriasis alba (3.23)	Disorders of head and nail (3.39)
8	Systemic disorders (0.62)	Albinism (2.1)	Impetigo(1.7)	Other dermatitis (2.96)	Cutaneous tumors and tumor syndrome (1.94)
9	Miscellaneous (0.62)	Nevi(2.1)	Infantile haemangioma (1.4)	Tinea infections (2.70)	Vascular disorders (1.45)
10	Blistering disorders (0.31)	–	Albinism (1.2)	Urticaria (2.70)	Disorders of cornification (0.97)
11	–	–	Nappy dermatitis (1.0)	Acne vulgaris (2.43)	Photodermatoses (0.97)
12	–	–	Papular urticaria (1.0)	Neurofibromatosis (1.62)	Histiocytosis and malignant skin tumors (0.48)
13	–	–	Pityriasis rosea (1.0)	Molluscum contagiosum (1.62)	Miscellaneous (0.48)
14	–	–	Morphea(1.0)	Impetigo/folliculitis/ cellulitis (1.35)	-

to the findings of research conducted in Nigeria (2.6%) [26], but less than what was observed in American and other Nigerian studies (13.2%) [27, 28]. Thirty-one loci associated with the incidence of atopic dermatitis were identified through the analysis of genetic research data from Europe, Asia, America, and Africa [29–31]. These loci comprise 15 million genetic variants. These findings demonstrate the correlation between ethnicity and atopic dermatitis, with African Americans being the most frequently afflicted. Furthermore, a recent systematic assessment of data from 378 articles spanning the years 1958 to 2018 found that the frequency patterns for atopic dermatitis were inconsistent worldwide, with symptoms in children generally falling between 1.7% and 32.8% [32].

Acne vulgaris (2.8%) was the most prevalent appendageal disorder in our study, and it was mostly identified in teenagers. This finding may be related to the role hormones play in the

pathophysiology of this disease in this age group [33]. Pityriasis rosea (2.8%) and Psoriasis (0.93%) were the most prevalent papulosquamous illnesses. Our study's Pityriasis rosea frequency was similar to that of numerous previous studies [3, 34], however, several other researches [35, 36] showed psoriasis as a common papulosquamous illness. Additionally, psoriasis was only reported in one child out of 1000 participants in another study [4]. The most prevalent keratinization disease was planter keratosis (2.8%). The most prevalent pigmentary condition was vitiligo (2.18%). Results from further research [3, 20, 36] were in agreement with our findings. The following groups of disorders were less frequently reported: xerodermas (0.62%), systemic (0.62%), miscellaneous (0.62%), and blistering (0.31%). Remarkably, 83.1% of the patients in our research had a clinical diagnosis. This was similar to the Turkish study that reported 80.0% [37].

5. Limitation

The results of this study might not apply to other contexts because we used a convenience sampling technique to select participants.

6. Conclusion

As one might expect in a tropical dermatology institution, our analysis showed a preponderance of infections and eczematous dermatoses; however, a few differences in particular findings from regional and international studies indicate population variance. It's critical to make sure those pediatricians, clinical researchers, and primary-care physicians receive dermatology education that emphasizes correct identification, diagnosis, and treatment of common skin infections as well as the value of early referral to situations that are beyond their field of practice.

Declaration

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Ethical Considerations

The Sudan Medical Specialization Board's (SMSB) Research Ethical Committee and the state of Khartoum's Ministry of Health's research department provided their ethical approval. Additionally, a formal acceptance letter was acquired from the hospital's administrative head office.

Competing Interests

None declared.

Availability of Data and Material

The data utilized and additionally analyzed during this study is accessible from the corresponding author upon reasonable request.

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None.

Abbreviations and Symbols

OPD: Outpatient department

DALYs: Disability-adjusted life years

GP: General practitioner

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