



Prevalence of skin diseases in children 1 to 6 years old in the city of Bogota, Colombia

Elizabeth García^{a*}, Evelyne Halpert^b, Elizabeth Borrero^c, Milciades Ibañez^d, Pablo Chaparro^e, Jorge Molina^f and Maritza Torres^f

ABSTRACT

Background: Skin diseases represent an important part of the morbidity among children and are possibly influenced by geographic, racial, social, cultural, and economic factors. Despite being so frequent around the world, skin diseases have not been important in developing strategies in public health.

Aim: The purpose of this study was to evaluate the prevalence of skin diseases among the student population between 1 and 6 years of age in Bogotá, Colombia between March 2009 and June 2011.

Materials and methods: This cross-sectional study was performed across a probabilistic, stratified, randomized sampling by proportional assignment (based on locality and type of institution) and was developed in schools in Bogotá, Colombia.

Results: A total of 2437 children between 1 and 6 years of age were examined, and 42.8% (1035) presented a dermatologic disease. Papular urticaria was the most frequent (62.9%) (IC: 58.4%; 67.1%), followed by dermatitis/eczema (13.0%) (IC: 10.8%; 15.4%), and infectious diseases (12.3%) (IC: 9.7%; 15.3%).

Conclusion: The research demonstrates a high prevalence of papular urticaria as a result of flea and mosquito bites and infectious diseases of the skin in the studied population. The dermatologic diseases found are easy to diagnose, respond to the proper treatment, and are preventable. However, the fact that many of the examined children likely had not visited the doctor for the detected pathology could indicate the lack of access to health services affecting this population.

Keywords: Papular urticaria, Flea bite, Chickenpox scars, Skin diseases

INTRODUCTION

Skin diseases represent an important part of the morbidity among children and are possibly influenced by geographic, racial, social, cultural, and economic factors.¹ In developing countries, skin

diseases constitute a significant public health problem because of certain climatic conditions such as high temperatures, humidity, poor hygiene, scarce access to water, and family households that may contribute to the development of these diseases.

^aAllergy Section, Hospital Universitario Fundación Santa Fe de Bogotá, Faculty of Medicine, Universidad de los Andes, Bogotá, Colombia
*Corresponding author. Sección de Alergia Pediátrica, Fundación Santa Fe de Bogotá, Av 9 No 116-20, oficina 213, Bogotá, Colombia E-mail: eligarcia.gomez@gmail.com
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In 2005, The World Health Organization (WHO) published a detailed review of the literature about the epidemiology and management of the most common skin diseases among children in developing tropical countries. This review examined 18 studies mostly conducted in rural areas, and those studies found infection to be the most frequent skin disease. Bacterial diseases had the highest prevalence, oscillating between 0.2 and 35%, followed by tinea capitis with an occurrence of 1–17%, scabies prevalence varied between 0.2% and 24%; viral infections appeared at a rate of 0.4–9% (mostly molluscum contagiosum); pediculosis capitis prevalence between 0 and 54% and reactions caused by insect bites had an occurrence rate of 0–7.2%.² The frequency of skin diseases in those studies varied between 21 and 87%; despite being so frequent around the world, skin diseases have not been considered when developing strategies in public health.² Therefore, it is of great importance to have national estimates of these diseases to develop strategies for their control and prevention. Given the diversity of environmental, social, and economic conditions in Colombia, each city must be studied independently. Thus, this study was performed in Bogotá, Colombia, which is a major city and the largest urban settlement in Colombia, with approximately 9 000 000 inhabitants. Bogotá is located 2640 m above sea level with no seasonal changes other than 2 rainy periods and a temperature that oscillates between 8 °C and 20 °C.

In Bogotá, the socioeconomic stratum is classified into 6 levels based on the classification of properties by characteristics of the dwelling, the immediate surroundings, and urban characteristics. The socioeconomic stratum has been used as an indicator of poverty and a determinant of economic and social segregation.^{3,4} Strata 1 (low-low) and 2 (low) include 48.8% of the population in the city, as well as the stratum with the lowest income (US 376.30 US on average for the year 2018), the highest rates of informal work (52.8%), and school lag (22.3%),⁵ levels of inequality and poverty without major fluctuations between 2010 and 2018 (Gini index around 0.5 and monetary poverty around 11.9%).^{4,5} Due to these characteristics, this population has a higher risk of skin diseases. In a previous study, in the city of

Bogotá, the prevalence of papular urticaria caused by flea bites in this population was 20.3% (CI 95%: 18.2 to 22.5%) in children aged 1–6 years.⁶ Also, observing that the indicators of poverty had a risk factor associated with developing flea bite papular urticarial,⁶ which could be a public health problem that needs further study. Therefore, the aim of this study was to evaluate the prevalence of skin diseases among the student population aged 1–6 years old from March 2009 to June 2011.

MATERIALS AND METHODS

A cross-sectional study was carried out in the population of students ranging in age from 1 to 6 years old in the city of Bogotá between March 2009 and June 2011. Materials and methods have been described in a previous study.⁶ Briefly, the children attended teaching institutes such as daycare centers, nurseries, and schools registered in Bogotá. The sample framework for the study was provided by the district educational secretariat, and the list of all daycare centers and nurseries was supplied by the Social Welfare Secretariat and the National Institute for Family Wellbeing. We conducted a probabilistic, stratified, randomized sampling by proportional assignment (locality and type of institution: public or private) in two-stage sampling where the primary sampling units were the teaching institutions and the secondary sampling units were children 1 to 6 years old enrolled at these institutions.

The sample size was estimated based on the prevalence of papular urticaria of 16.3%,⁶ absolute precision of 5%, and a relative standard error of less than 15%. The effect of the clusters' design was adjusted by 1.5, and the no response effect was adjusted by 5%. The total sample size was 2437 children (with 95% confidence, standard error of 12.5%, and adjusted by 5% of losses) distributed between the strata. A census was conducted, and the sample was randomly selected from kids that had been living in Bogotá for at least 1 year.

For the data collection, we developed a structured survey and conducted a clinical dermatologic exam complemented with pictures of skin lesions when presented. The dermatologic medical exam consisted of information regarding

Skin Diseases	Prevalence	
	%	CI 95%
Skin diseases	42.8	39.5-46.1
Papular urticaria	62.9	58.4-67.1
Papular urticaria by flea bite	47.4	43.0-51.8
Papular urticaria by unidentified bites	15.5	13.1-18.2
Dermatitis	13.0	10.8-15.4
Atopic dermatitis	6.5	4.8-8.8
Contact dermatitis	5.6	4.0-7.7
Pityriasis alba	0.2	0.1-0.6
Juvenile plantar Dermatitis	0.2	
Hand dyshidrosis	0.3	
Perioral dermatitis	0.1	
Infectious diseases	12.3	9.7-15.3
Viral	6.9	5.1-9.3
Molluscum contagiosum	5.4	3.8-7.6
Verruca vulgaris	1.6	0.7-3.6
Pyodermas	3.4	2.2-5.2
Impetigo	1.7	1.0-3.0
Folliculitis	1.7	0.8-3.7
Infestations	1.0	0.4-2.1
Scabies	1.0	0.4-2.1
Superficial fungal infections	0.9	
Tinea	0.9	
Scars	6.1	4.1-9.0
Chickenpox scars	5.4	3.4-8.3
Other scars	0.8	0.5-1.2
Keratosi pilaris	2.4	1.6-3.7
Naevus	0.9	0.4-2.1

Table 1. Most frequent skin diseases in schooled children 1 and 6 years of age in Bogotá.

symptoms and signs of skin lesions. We conducted a pilot test of the instrument, and it was modified accordingly to the results. The survey team was thoroughly trained. The survey was designed for the study directly to the parents. For the collection

of dermatologic information, the dermatologist trained general practitioners. The doctors practiced the medical exam on the children and elaborated on the corresponding dermatologic clinical history. Afterward, the dermatology specialist

reviewed the medical exam results, the diagnosis, and the pictures taken.

In order to diminish bias with the physical examination by general physicians on patients with skin lesions, the lesions were photographed and the images were reviewed by a pediatric dermatologist, along with the clinical history. When necessary, the pediatric dermatologist also evaluated the patients in person, to clarify the diagnosis and offer appropriate treatment. Photographs of the skin lesions were obtained with a Canon EOS 60D single-lens, 18-megapixel, APS-C sensor, reflex camera. Photographs were taken under natural light and a flash, at a distance between 10 and 20 cm, depending on whether a single lesion or a larger area was being targeted. Moreover, the 2 general practitioners who did the physical examination spent 1 month in a pediatric dermatology practice before the start of the study.

For the statistical analysis, we used SPSS 15.0 and calculated the prevalence of dermatological skin diseases with their respective 95% confidence intervals. In addition, we calculated the frequencies of the distribution of dermatoses and the socioeconomic strata. The study fulfilled the requirements established by Colombian regulations and was approved by the ethics committee of Fundación Santa Fe de Bogotá.

RESULTS

During the study, 2437 children between 1 and 6 years of age were examined, and 42.8% (1035) were found to have a dermatologic disease; 50.3% were females. Moreover, 38.9% were under 5 years old and 61.1% were between 5 and 6 years old. There was a predominant low strata population (89%). Among the cutaneous pathologies, the most frequent were papular urticaria, with 62.9% of the total dermatologic diseases found. The most frequent cause of papular urticaria was the fleabite (47.4%) while the rest was caused by unidentified bites (either fleas or mosquitoes). Dermatitis/eczemas group was the second most frequent pathology, which represented 13.0% of the total. Atopic dermatitis was the most frequent type of dermatitis (6.5%) followed by contact dermatitis (5.6%). The infectious disease group was third in frequency with a prevalence of 12.3%; molluscum contagiosum was the most frequent followed by

impetigo and folliculitis. Conversely, 6.1% of cutaneous pathologies were from scars, with chickenpox being the most frequent. Keratosis pilaris had an occurrence of 2.4%, and naevus was observed in 0.9% of the cases (Table 1).

Substantial differences were found between the distributions of dermatosis and the socioeconomic strata of the subjects. Indeed, the following diseases were more prevalent in the lower strata than in the higher strata: papular urticaria (27.6% vs 20.8%), dermatitis-eczema (5.9% vs 2.8%), and scars (2.9 vs 0.1%). Moreover, the prevalence of children without dermatosis was higher within higher strata than lower strata (65.4% vs. 56.2%) ($p = 0.049$).

DISCUSSION

Published studies concerning the most frequent skin diseases use different methodologies; therefore, it is difficult to compare these studies. Most of the published studies use the hospital's clinical histories for their retrospective analysis. In the field of skin diseases in Colombia, this is the first study using the above-described methodology. The wide-ranging differences in the prevalence of dermatologic diseases, which oscillate between 20% and 60%, could be explained by the heterogeneity of the performed studies.^{7,8} Populations studies constitute another kind of study.⁹⁻¹³ These studies provide more reliable information with a higher degree of precision and reliability in the estimations. Our study used a robust epidemiological design to properly assess the prevalence of skin diseases in children between 1 and 6 years old. One of the main findings of this study was the high prevalence of papular urticaria, which is the primary cause of skin disease in this age group. This is one of the most particular allergic tropical problems although it can be observed in any country where causal insects are present.¹⁴

Similarly, a study conducted in México that examined 10,000 patients visiting Children Hospital IMAN between 1971 and 1975 concluded that papular urticaria represented 16.3% of the skin diseases and was the primary cause of consultation. The second cause of consultation was atopic dermatitis at 12.9% prevalence.¹⁵ Notably, 2 decades later, 5250 pediatric patients were

studied in a referral center in Mexico City with a prevalence of papular urticaria of 2.2% and the primary cause of consultation was atopic dermatitis (14.5%). Such differences were attributed to improvement in sanitation, housing, and socioeconomic status.¹⁶

It is important to highlight that Mexico City's climatic and socio-economic conditions are similar to Bogotá. In other reports, such as the report from the dermatologic center in Bamako (Mali, Africa), the prevalence of papular urticaria in 3479 children that attended to the center in 1 year was 6.8%¹⁷ whereas in a reference center south of India, of the 2100 children who attended in one year, the papular urticaria prevalence was 5.2%.¹⁸ In southwest Nigeria, 1415 Nigerian adolescent students were studied, and papular urticaria was the third most common skin disorder with 120 patients (8.5%).¹⁹ Differences found in papular urticaria prevalence could be due not only to the different methodologies employed, but also because India, Nigeria, Damietta, and Bamako present important climatic, socioeconomic, and racial differences when compared with Bogotá.

The high prevalence of papular urticaria in our study could also be due to the age group studied. Indeed, our group has shown that papular urticaria is more prevalent in this age group, and the other studies mentioned analyzed broader age groups, where this disease is much less prevalent. Since our group has focused on the research of papular urticaria, the general practitioners were highly trained in the proper diagnosis of this disease, which could also lead to confirmation bias. Also, these studies focus on skin diseases in referral centers and do not reflect the real prevalence of skin diseases. For example, many children with papular urticaria may not attend these centers, so the disease could be underestimated. Conversely, in studies where the reported frequency of dermatologic diseases was compared with a previous study performed 30 years ago, atopic dermatitis was the most frequent skin disease (35%).²⁰ In the first study, infectious dermatitis, among them scabies, occupied the first place. In recent decades, there has been a rise in the presence of atopic dermatitis. As a part of the international study of Asthma and Allergy in Childhood Phase III, our group also found that in Bogotá, the prevalence of current symptoms of

eczema is 14.3% among school children between 6 and 7 years of age.²¹ Which strongly correlates with the present study. Conversely, in Colombia 2 studies have been performed to determine the prevalence of atopic dermatitis: one in 1998,²² and the other 10 years later²³ were using the modified ISAAC surveys in a population. Together, these studies revealed that the atopic dermatitis prevalence in children between 1 and 4 years of age increased from 2.1% to 4.9% between 1998 and 2009.

Studies in developed countries have also shown a high prevalence of atopic dermatitis,²⁴ that among 1105 children under 16 years old, 25.9% presented with atopic dermatitis. In the United States, the prevalence of atopic dermatitis ranges from 6% to 12.98%, depending on the study design and approach used to assess for it.²⁵

Notably, in this study, we also found a high prevalence of infectious skin diseases. Since most of the study population belonged to low socioeconomic backgrounds, experienced poor hygienic conditions, and had poor access to medical services, infectious diseases may be frequent and pose serious health problems. As such, in developing countries, infectious skin diseases remain a significant public health problem. For example, a study performed by dermatologists on 420 primary school children in Dares Salam showed that 57.3% had some kind of skin disease, with infections being the most frequent (30.4%), and mainly fungi.²⁶ In comparison with the present study, the prevalence in this population was 42.8% for skin disease and 12.3% for infectious diseases indicating similar results. El-Khateeb et al²⁷ conducted a cross-sectional study in Damietta, Egypt, and found that half of the skin diseases discovered was due to infections (50.9%) and it was the third cause of skin diseases²⁷ with parasitic infections dominating and being more common in rural areas. In a study made from clinical charts in a hospital in Thailand, infections were the second most frequent skin disease at 21.9% prevalence after eczemas with a prevalence of 41.2%.²⁸ Notably, in our study, molluscum contagiosum was the most frequent infectious pathology, which is concordant with the WHO report that exposes viral diseases as a primary cause of skin disease in the world.² Due to the urban nature of our study, parasitic

infections may be low, and thus, viral infections predominate.

The presence of chickenpox scars in 2.3% of the children with dermatologic pathology is notable; this is possibly explained by the low coverage of the vaccine due to high costs. Keratosis pilaris is a dermatologic condition with a genetic predisposition, which is considered physiologic. It is a frequent condition in cold climates that dry out the skin.

This study demonstrates a high prevalence of inflammatory and infectious diseases and reactions to flea and mosquito bites on the skin in the studied population. The dermatologic diseases found are easy to diagnose, respond to the proper treatment, and are preventable. However, the fact that many of the examined children had not received medical attention for the detected pathology could indicate the lack of access to health services affecting this population. The strengths of this study include the high sample size and a robust epidemiological design focused on a specific age group. Moreover, the diagnoses of skin diseases were done by trained general practitioners and confirmed by one highly trained dermatologist. As in all prevalence studies, one of the limitations of this study is that it is not possible to establish causal associations with this study design.

Based on the results of this study, it is necessary to guarantee timely access to health care services while improving the hygienic conditions of homes and public places and undertaking preventive programs such as complete vaccination and specific fumigations, which will ultimately reduce the frequency of these diseases.

Abbreviations

CI: confidence interval

Authors' information

EG, MD. Sección de Alergia Pediátrica, Fundación Santa Fe de Bogotá; Facultad de Medicina, Universidad de los Andes, Bogotá-Colombia.

EH, MD, MSc. Sección de Dermatología Pediátrica. Fundación Santa Fe de Bogotá. Bogotá-Colombia.

EB, MD, MSc. Centro de Estudios e Investigación en Salud-CEIS. Fundación Santa Fe de Bogotá. Bogotá-Colombia.

MI, MSc. Universidad del Rosario, Bogotá-Colombia.

PC, MD, MSc. Universidad del Valle, Cali-Colombia.

JM, Dr. Rer. Nat. Associate Professor, Universidad de los Andes, Bogotá-Colombia.

MT, MSc. Universidad Manuela Beltrá, Bogotá-Colombia.

Authors' contributions

EH and EG were responsible for the project approach, study design, analysis of results, training of general practitioners and preparation of the manuscript. EB carried out study design, analysis of results, and preparation of the manuscript. MI and PC carried out the statistical analysis. JM and MT participated in the analysis of results and preparation of the manuscript. All authors read and approved the final version of the manuscript.

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Availability of data and materials

All dataset used or analyzed in this study are available from corresponding author on reasonable request.

Consent for publication

All authors agreed to the publication of this work.

Ethics approval and consent to participate

The present study complied with the ethical requirements (in accordance with Law 8430 of 1993) established by Colombian law, and was approved by the Ethics Committee from the Fundación Santa Fe de Bogotá.

Declaration of competing interest

The authors declare that they have no competing interests.

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Author details

^aAllergy Section, Hospital Universitario Fundación Santa Fe de Bogotá, Faculty of Medicine, Universidad de los Andes, Bogotá, Colombia. ^bDermatology Section, Hospital Universitario Fundación Santa Fe de Bogotá, Bogotá, Colombia. ^cEje de Salud Pública, Hospital Universitario Fundación Santa Fe de Bogotá, Bogotá, Colombia. ^dBioestadística y Epidemiología, CICS Universidad del Rosario, Bogotá, Colombia. ^eEscuela de Salud Pública,

Maestría en Epidemiología, Universidad del Valle, Bogotá, Colombia. [†]Centro de Investigaciones en Microbiología y Parasitología Tropical, Departamento de Ciencias Biológicas, Universidad de los Andes, Bogotá, Colombia.

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