



Prevalence of Skin Allergies in Adolescents in Namibia

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Abstract

Skin allergy is a type of allergy that results in skin lesions due to reactions that occur in the immune system when the body is exposed to allergens. There are several types of skin allergies which include atopic dermatitis, contact dermatitis, urticaria, angioedema and hay fever. However, there is little known about skin allergy in Namibia as no studies have ever been done on this condition among adolescents in the country. The aim of this study was to determine the most prevalent skin allergy, find out the most common causes of skin allergies as understood by participants and confirmation by clinicians, and assess the impact of socio-demographic factors on prevalence in skin allergies in adolescents in Namibia. The study was cross sectional with sample size of 150 participants aged 15-30 years who were selected using simple random sampling technique. The questionnaires were administered to the randomly selected young patients that attended the dermatology clinic at Windhoek Central Hospital between July and September 2014. All descriptive and inferential analyses were performed using Microsoft Excel, SPSS 22, and Stata 12.

The most prevalent skin allergy was the atopic dermatitis (43.4%) seconded by contact dermatitis (31.3%). It was observed that the type of occupation and exposure to possible causes significantly affected the prevalence of skin allergies in adolescents in Namibia. It was also observed, though not significant at 5% level, that the age-specific prevalence in skin allergies tended to increase with age. Furthermore, ethnicity and gender did not reveal any significant effects on skin allergies. Skin allergy is becoming a significant public health burden in adolescents in Namibia. It was found that atopic dermatitis and contact dermatitis were the most prevalent skin allergies in adolescents in Namibia. Furthermore, it was observed that occupation and weather change significantly affected the prevalence of skin allergies in adolescents in Namibia.

Keywords

Multinomial logistic regression, Prevalence, Skin allergies, Atopic dermatitis, Contact dermatitis, Allergens

Abbreviations

AD: Atopic Dermatitis; CD: Contact Dermatitis; MOHSS: Ministry of Health and Social Services; OR: Odds Ratio; SADC: Southern African Development Community; SPSS: Statistical Package for Social Sciences; WHK: Windhoek

Introduction

Skin allergy is a body reaction induced by allergen substances, when the skin becomes red, bumpy, scaly, itchy or swollen. There are various types of allergies in Southern African countries, people suffer from skin problems because of skin flora, culture and diversity [1]. It is observed that problem with skin allergy seems to be a problem that affects many adolescents in Namibia. Skin allergy is where the immune system reacts with substances like protein that cause symptoms on the skin, which results to hives, eczema, psoriasis, itching and rashes. This disorder of the skin affects mostly adolescents with a very sensitive skin especially when it comes in contact with substances that cause allergy. People suffering from skin allergies are often allergic to more than one substance. Skin conditions caused by allergies may result in dermatitis. Skin diseases are influenced by many factors such as genetics, climate, occupation, sanitation, and medical care [2]. Allergy affects all ages, in all parts of the world. In Southern Africa with its long grass and pollen people often get skin allergies especially those that live in traditional houses. The reason behind this is still unclear but genetics may play a role. There are many articles written about skin diseases in literature. Most of the studies available relate more to dermatitis [3].

Adolescents and small children are the ones at a high risk of getting skin allergy than adults because of spending most of their times outdoors. Though skin allergy is not a deadly disease, it can irritate the skin in such a way that can significantly increase the absenteeism rate from school among adolescents [4]. Some types of allergies mainly affect the skin resulting in scales around the scar/wound which usually have a dark pigment. The main skin allergy is said to be urticaria, which affects the lower arms and legs. This disease is further subdivided into popular urticaria and cholinergic urticaria [5]. They are mostly common in people during spring time of the year, not only in African but also other parts of the world. Eczema is associated with dermatitis that affects mostly the African heritage. There are many types of this dermatitis such as atopic dermatitis, Seborrheic dermatitis, contact dermatitis, and hay fever. All these diseases are caused by infections and can be prevented [6].

Atopic dermatitis (Eczema) is a scaly, itchy rash that often affects the face, elbows and knees. Eczema is well defined as a chronic skin condition that usually begins in infancy or early childhood and is

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often associated with food allergy, allergic rhinitis and asthma [7]. The cause might be unknown but certain foods can trigger eczema, especially in young children [8]. Eczema appears and disappears and it mostly manifest on the ankles, face, elbow knee folds and neck. It is usually triggered by infections, emotional stress, sweating and even heat. Other potential triggers include dust mites, or contact with irritants like wool or soaps [9].

Contact dermatitis is when certain substances come into contact with the skin they may cause a rash. There are two kinds of contact dermatitis, irritant and allergic. The irritant contact dermatitis occurs when a substance damages part of skin and the substance comes in contact with the skin [10]. These reactions appear most often on the hands and might be due to substances contracted in the workplace like in the saloons. Allergic contact dermatitis is best known by the itchy, red, blistered reaction experienced after touching poison ivy. This type of allergic reaction is caused by a chemical in the plant known as urushiol. Allergic contact dermatitis reaction happens after a day or two after contact. Once a reaction starts, it may take 2-4 weeks to go away, even with treatment. Things like nickel, perfumes, dyes, some medication ingredients, rubber (latex) products and cosmetics also frequently cause allergic contact dermatitis [11]. Allergy develops after repeated exposure to the causative allergen. Urticaria is sometimes called hives which further means a vascular reaction of the skin. This condition is well known to be triggered by emotions or heat. Urticaria can be either acute or chronic [12]. Acute urticaria resolves in less than 6 weeks of a new onset whereby chronic urticaria can be worsened by physical factors like sunlight, vibration, cold, water and cacogenics. Immunologic stimulus of urticaria is antigens binding to IgE on the mast cell surface resulting in degranulation, which causes the release of histamine.

Allergic rhinitis is another name for hay fever an allergic reaction of skin triggered by allergen pollen. Hay fever is caused by the body's defense overreacting to pollen released into the air by plants. Pollen releases a substance known as histamine from the skin (mast cells), and it is responsible for the signs and symptoms of sneezing, sore, runny eyes, blocked nose and itchy palate. Twenty percent of hay fever cases are seasonal and one can present the symptoms if allergic to pollen at a certain time of the year [13]. Angioedema is a recurrent problem that reappears throughout life [14]. The most common parts of the body involved are eyes, lips, tongue, genital and throat. There are no specific symptoms but swelling, itching or burning occur most. Angioedema is treatable depending on the cause if known, if not then swelling only stops after weeks, months or years because no one can predict when it can go away. The cause can be only confirmed by appropriate testing. Antihistamine oral drug is the best form of treatment with the purpose of stopping the swelling (especially eyes). Other medications can also be given but only reserved when antihistamine fails to prevent angioedema e.g. corticosteroid tablets, danazol or tranexamic acid.

Materials and Methods

Study settings and population

The study design was cross-sectional. It involved 150 participants randomly selected to represent a cross section of the population of Windhoek. The variables were measured and responses to questions were recorded and no follow ups were done. The patients with different types of skin allergies including atopic dermatitis (AD) and contact dermatitis (CD) were determined by the doctors. At recruitment any person who agreed to take part in the study signed a consent form. Only 150 patients were selected using simple random sampling technique. The selected people were the young ones aged between 15-30 years with a condition of skin allergies (AD, CD, urticaria, angioedema and hay fever). The study was conducted at Windhoek Central Hospital at the dermatology clinic. The data from the dermatology clinic was collected daily during the period of June and September 2014.

Ethical approval and consent forms

Permission was obtained from the MOHSS research committee to carry out this research. Permission was also obtained from the

management of Windhoek Central Hospital research committee to carry out research in the wards. Individuals were asked if they were willing to take part by filling a questionnaire and if they did not want to take part their decision was respected. All those who participated in the study signed a consent form. Anonymity and confidentiality were practiced; their identity did not appear on the questionnaire and hence remained anonymous.

Sampling procedures

Since it was mostly adolescents who were more susceptible, a survey was conducted among those that visited the dermatology clinic and a non-probability, convenience was used. Data were collected every day except Fridays and weekends for a period of four weeks. The study used a simple random sampling method to select a representative sample of 150, not everyone that walked in the clinic had skin allergies, others had other skin related problems like burns, acne, psoriasis, fungal infections, Kaposi sarcoma, genital warts, tinea capitis, etc. Each individual with skin allergy was provided with a questionnaire as they get in the dermatology clinic regardless of whether it was a first time or follow up until a sample of 150 was reached on the basis of their capability and willingness. This applied only to populations who came for the treatment at the dermatology clinic. The willing respondents were informed about the main aim of the study and given a questionnaire to complete. The study looked at the age range of 15-30 years. The study was conducted for all outpatients or hospitalised adolescents. The limit to the observational cross-sectional study is by looking at the complications.

Data collection method

The study used a close ended questionnaire to collect data. The questionnaire was given to all selected participants. The questionnaire had questions structured in English. Participants who did not understand English were helped through the questionnaire by clinicians fluent in a language they understood. Consisting of close ended questions, each questionnaire was composed of two parts. The first part contained the objectives and the significance of the study (consent form). The second part consisted of questions concerning the study. All questionnaires were instantly completed by the selected participants without taking them home. Certified clinicians helped to verify the validity of the participants' responses.

Statistical analysis

All descriptive and inferential analyses were performed using Microsoft Excel, SPSS 22, and Stata 12. Pearson Chi-square test of contingency was used to test for any association between the types of skin allergies and variables such as age, gender, ethnic group, and occupation. Multinomial logistic regression modelling was used for in-depth inferential analysis of prevalence of skin allergies in adolescents in Namibia.

Results

Prevalence

The prevalence of skin allergies were estimated as 43.4% for atopic dermatitis (AD), 31.3% for contact dermatitis (CD), 13.3% for urticaria, 6% for angioedema, and 6% for hay fever as shown in (Table 1). It was observed that the most prevalent skin allergies in adolescents in Namibia are AD and CD with a combined prevalence of 74.7%.

Age

In the present study, however, it was observed that there was no significant association between the age and the type of skin allergy (p -value = 0.064) as shown in (Table 1). Similarly, the subsequent in-depth analysis confirmed that the likelihood of skin allergies did not significantly differ amongst age groups as shown in (Table 2) (all age-specific p -values > 0.05).

Gender

The prevalence of skin allergies were estimated as 41.3% for males and 58.7% for females as shown in (Table 1). In general, it was

Table 1: Prevalence of skin allergies in adolescents in Namibia.

| Factor | Atopic dermatitis | Contact dermatitis | Urticaria | Angioedema | Hay fever | Total | p-value |
|------------------------|-------------------|--------------------|------------------|--------------|--------------|------------------|---------|
| Age group | | | | | | | 0.064 |
| 15-17 | 13 (20.0) | 6 (12.8) | 2 (10.0) | 4 (44.4) | 1 (11.1) | 26 (17.3) | |
| 18-20 | 11 (16.9) | 5 (10.6) | 4 (20.0) | 1 (11.1) | 1 (11.1) | 22 (14.7) | |
| 21-23 | 12 (18.5) | 9 (19.1) | 4 (20.0) | 2 (22.2) | 0 (0) | 27 (18.0) | |
| 24-26 | 13 (20.0) | 13 (27.7) | 5 (25.0) | 1 (11.1) | 2 (22.2) | 34 (22.7) | |
| 27-30 | 16 (24.6) | 14 (29.8) | 5 (25.0) | 1 (11.1) | 5 (55.6) | 41 (27.3) | |
| Gender | | | | | | | 0.245 |
| Males | 22 (33.8) | 24 (51.1) | 9 (45.0) | 4 (44.4) | 3 (33.3) | 62 (41.3) | |
| Females | 43 (66.2) | 23 (48.9) | 11 (55.0) | 5 (55.5) | 6 (66.7) | 88 (58.7) | |
| Ethnic group | | | | | | | 0.536 |
| Vamboes | 21 (32.3) | 13 (27.2) | 11 (55.0) | 3 (33.3) | 3 (33.3) | 51 (34.0) | |
| Herero | 10 (15.4) | 8 (17.2) | 3 (15.0) | 1 (11.1) | 1 (11.1) | 23 (15.3) | |
| Damara/Nama | 5 (7.7) | 6 (12.8) | 3 (15.0) | 0 | 0 | 14 (9.3) | |
| Coloured | 10 (15.4) | 2 (4.3) | 1 (5.0) | 2 (22.2) | 3 (33.3) | 18 (12.0) | |
| Kavango | 4 (6.2) | 3 (6.4) | 0 | 1 (11.1) | 0 | 8 (5.3) | |
| Caprivians | 3 (4.3) | 6 (12.8) | 0 | 1 (11.1) | 1 (11.1) | 11 (7.3) | |
| Tswana | 3 (4.3) | 5 (10.6) | 1 (5.0) | 1 (11.1) | 1 (11.1) | 11 (7.3) | |
| Others | 9 (13.8) | 4 (8.5) | 1 (5.0) | 0 | 0 | 14 (9.3) | |
| | | | | | | | |
| Occupation | | | | | | | 0.042 |
| Cleaning | 6 (9.2) | 8 (17.0) | 2 (10.0) | 0 | 1 (11.1) | 17 (11.3) | |
| Farming | 3 (4.6) | 3 (6.4) | 2 (10.0) | 0 | 1 (11.1) | 9 (6.0) | |
| Office work | 6 (9.2) | 2 (4.3) | 1 (5.0) | 1 (11.1) | 2 (22.2) | 12 (8.0) | |
| Street business | 6 (9.2) | 7 (14.9) | 2 (10.0) | 0 | 0 | 15 (10.0) | |
| Security guard | 4 (6.2) | 2 (4.3) | 1 (5.0) | 0 | 0 | 7 (4.7) | |
| Hair dresser | 4 (6.2) | 3 (6.4) | 2 (10.0) | 0 | 1 (11.1) | 10 (6.7) | |
| Students | 33 (50.8) | 18 (38.3) | 6 (30.0) | 3 (33.3) | 1 (11.1) | 61 (40.7) | |
| Others | 3 (4.6) | 4 (8.4) | 4 (20.0) | 5 (55.6) | 3 (33.3) | 19 (12.7) | |
| | | | | | | | |
| Possible causes | | | | | | | 0.026 |
| Medication | 5 (7.7) | 4 (8.5) | 1 (5.0) | 1 (11.1) | 0 | 11 (7.3) | |
| Weather change | 10 (15.4) | 8 (17.0) | 11 (55.0) | 4 (44.4) | 2 (22.2) | 35 (23.3) | |
| Dust/sweat | 7 (10.8) | 1 (2.1) | 4 (20.0) | 1 (11.1) | 1 (11.1) | 14 (9.3) | |
| Clothes | 4 (6.2) | 4 (8.5) | 1 (5.0) | 0 | 2 (22.2) | 11 (7.3) | |
| Cosmetics | 8 (12.3) | 5 (10.6) | 0 | 0 | 0 | 13 (8.7) | |
| Jewelleries | 5 (7.7) | 4 (8.5) | 0 | 0 | 0 | 9 (6.0) | |
| Family (genetics) | 8 (12.3) | 0 | 0 | 0 | 0 | 8 (5.3) | |
| Detergents/plants | 6 (9.2) | 11 (23.4) | 2 (10.0) | 2 (22.2) | 3 (33.3) | 24 (16.0) | |
| Pollen/food | 12 (18.5) | 10 (21.3) | 1 (5.0) | 1 (11.1) | 1 (11.1) | 25 (16.7) | |
| Total | 65 (43.4) | 47 (31.3) | 20 (13.3) | 9 (6) | 9 (6) | 150 (100) | |

All percentages are given in parentheses. The denominator for all row/column total percentages is sample size 150 but the denominators for all cell percentages are the respective column totals.

observed that females were more prevalent than males for all skin allergies but not significant at 5 % level (p-value = 0.245). Similarly, the subsequent in-depth analysis confirmed that the likelihood of skin allergies did not significantly differ between males and females as shown in (Table 2) (p-value > 0.429).

Ethnicity

It was observed that the most susceptible ethnic groups were the Vambo, Coloured, and Herero as shown in (Table 1). However, it was observed that there was no significant statistical association between type of skin allergy and ethnicity (p-value = 0.536). Ethnicity was excluded in the subsequent in-depth multinomial logistic regression because this p-value was too big.

Occupation

In this study, it was observed that there was significant statistical association between type of skin allergy and occupation (p-value = 0.042) as shown in (Table 1). Similarly, the subsequent in-depth analysis confirmed that the likelihood of skin allergies significantly differed amongst occupation categories as shown in (Table 2). Among adolescents with AD, the odds for manual labour workers was about 7.3 times than that for other occupation workers (OR = 7.247, p-value = 0.019), the odds for office workers was about 12.4 times than that for other occupation workers (OR = 12.411, p-value = 0.004), and the odds for students was about 15.7 times than that for other occupations (OR = 15.713, p-value = 0.001). Among adolescents with

CD, the odds for manual labour workers was about 6.5 times than that for other occupations (OR = 6.446, p-value = 0.024), the odds for office workers was about 7.1 times than that for other occupations (OR = 7.062, p-value = 0.022), and the odds for students was about 7.3 times than that for other occupations (OR = 7.301, p-value = 0.014).

Cause

In the present study, it was observed that there was significant statistical association between type of skin allergy and possible causes (p-value = 0.026) as shown in (Table 1). In general, weather change and type of food were observed as significant possible causes of most skin allergies in adolescents in Namibia. Similarly, the subsequent in-depth analysis confirmed that the likelihood of skin allergies significantly differed amongst possible causes as shown in (Table 2). Among adolescents with AD, the odds for medication was about 0.9 times than that for other possible causes (OR = 0.828, p-value = 0.856) and the odds for weather change was about only 0.2 times than that for other possible causes (OR = 0.196, p-value = 0.001). Among adolescents with CD, the odds for medication was about 0.7 times than that for other possible causes (OR = 0.738, p-value = 0.768) and the odds for weather change was about only 0.1 times than that for other possible causes (OR = 0.122, p-value < 0.001).

Discussion

Asthma which is also associated with allergy is considered to be the most common disease among children globally with 30% of deaths

Table 2: Multinomial logistic regression analysis for prevalence of skin allergies in adolescents in Namibia.

| Skin allergy type ^a | Factor | Log (OR) | Standard error | Wald | Degrees of freedom | p-value | OR | 95% Confidence interval of OR |
|--------------------------------|------------------------|----------------|----------------|--------|--------------------|---------|--------|-------------------------------|
| Atopic dermatitis | Intercept | -0.669 | 0.838 | 0.637 | 1 | 0.425 | - | - |
| | Gender | | | | | | | |
| | Male | -0.383 | 0.484 | 0.625 | 1 | 0.429 | 0.682 | 0.264, 1.762 |
| | Female | 0 ^b | - | - | 0 | - | - | - |
| | Age group | | | | | | | |
| | 15-17 | -0.172 | 0.799 | 0.047 | 1 | 0.829 | 0.842 | 0.176, 4.027 |
| | 18-20 | 0.208 | 0.844 | 0.061 | 1 | 0.805 | 1.232 | 0.235, 6.442 |
| | 21-23 | -0.034 | 0.749 | 0.002 | 1 | 0.964 | 0.966 | 0.223, 4.191 |
| | 24-26 | -0.227 | 0.709 | 0.102 | 1 | 0.749 | 0.797 | 0.198, 3.202 |
| | 27-30 | 0 ^b | - | - | 0 | - | - | - |
| | Occupation | | | | | | | |
| | Labour work | 2.005 | 0.856 | 5.481 | 1 | 0.019 | 7.427 | 1.386, 39.794 |
| | Office work | 2.519 | 0.869 | 8.397 | 1 | 0.004 | 12.411 | 2.259, 68.175 |
| | Students | 2.754 | 0.804 | 11.727 | 1 | 0.001 | 15.713 | 3.248, 76.017 |
| | Others | 0 ^b | - | - | 0 | - | - | - |
| | Possible causes | | | | | | | |
| | Medication | -0.188 | 1.042 | 0.033 | 1 | 0.856 | 0.828 | 0.108, 6.380 |
| | Weather change | -1.629 | 0.499 | 10.634 | 1 | 0.001 | 0.196 | 0.074, 0.522 |
| | Others | 0 ^b | - | - | 0 | - | - | - |
| Contact dermatitis | Intercept | -0.535 | 0.797 | 0.451 | 1 | 0.502 | - | - |
| | Gender | | | | | | | |
| | Male | 0.477 | 0.504 | 0.894 | 1 | 0.344 | 1.610 | 0.600, 4.325 |
| | Female | 0 ^b | - | - | 0 | - | - | - |
| | Age group | | | | | | | |
| | 15-17 | -0.798 | 0.883 | 0.817 | 1 | 0.366 | 0.450 | 0.080, 2.541 |
| | 18-20 | -0.460 | 0.919 | 0.251 | 1 | 0.616 | 0.631 | 0.104, 3.819 |
| | 21-23 | -0.222 | 0.783 | 0.080 | 1 | 0.777 | 0.801 | 0.173, 3.717 |
| | 24-26 | -0.068 | 0.713 | 0.009 | 1 | 0.924 | 0.934 | 0.231, 3.781 |
| | 27-30 | 0 ^b | - | - | 0 | - | - | - |
| | Occupation | | | | | | | |
| | Manual labour | 1.863 | 0.827 | 5.083 | 1 | 0.024 | 6.446 | 1.276, 32.571 |
| | Office work | 1.955 | 0.854 | 5.244 | 1 | 0.022 | 7.062 | 1.325, 37.631 |
| | Students | 1.988 | 0.811 | 6.008 | 1 | 0.014 | 7.301 | 1.489, 35.791 |
| | Others | 0 ^b | - | - | 0 | - | - | - |
| | Possible causes | | | | | | | |
| | Medication | -0.304 | 1.032 | 0.087 | 1 | 0.768 | 0.738 | 0.098, 5.576 |
| | Weather change | -2.105 | 0.558 | 14.252 | 1 | 0.000 | 0.122 | 0.041, 0.363 |
| | Others | 0 ^b | - | - | 0 | - | - | - |

^aThe reference category for the skin allergy type dependent variable is: Others; ^bThese parameters are set to zero because they are redundant as these factor categories were chosen to be the reference categories.

and it is high in the SADC region than other parts of Africa [15,16]. Atopic dermatitis affects more than 15% of children worldwide and contact dermatitis affects more than 20% of children worldwide [17]. The prevalence of skin allergy reported in this study was 43.4% for AD and 31.3% for CD which reveals that Namibia is amongst the significantly affected SADC countries.

Though not significant at 5% level, it was observed that skin allergies tended to increase with age and that higher prevalence was observed for females than for males. The difference in gender-specific prevalence might have been due to various factors such as social, environmental or even genetics. As for social factors females are known to over dress themselves with jewellery e.g. earrings, rings, necklace and bracelets to mention a few which are mostly made of nickel which may trigger skin allergy [18].

Though not significant at 5% level, it was observed that the most susceptible ethnic groups are the Vambo, Coloured, and Herero. Similar studies also found no significant statistical association between ethnicity and type of skin allergies [5,19].

In this study, it was found that occupation significantly affects prevalence of skin allergy in adolescents in Namibia. A similar study also found a significant association between occupation and type of skin allergies and that most prone are health workers and metal workers who suffer most from contact dermatitis [20].

In the current study, it was observed that weather change significantly affects prevalence of skin allergy in adolescents in Namibia. This implied that most people's skins take a while before adjusting to a new season. Substances that come in contact with the skin change the inner immune system that lead to manifestation of the symptoms. Genetics also plays a vital role in AD but it is not yet known which gene is responsible for effecting of this condition. The other causes are pollen, plant substances, and food that are said to trigger skin allergy in AD. In this study, about 12% of respondents said they come from a family that suffers from asthma. Similar studies had found that most children with AD got it from their parents [20,21].

Conclusions

Skin allergy is becoming a significant public health burden in adolescents in Namibia. It was found that atopic dermatitis and contact dermatitis were the most prevalent skin allergies in adolescents in Namibia. In addition, it was observed that occupation, weather change, plants/detergent, and food/pollen significantly affected the prevalence of skin allergies in adolescents in Namibia. Though not significant at 5% level, it was observed that females were more affected by skin allergies than males and that the Vambo ethnic group had a higher prevalence of skin allergies than other ethnic groups. Furthermore, though not significant at 5% level, it was found that

the prevalence of skin allergy increased with age. With such a high estimated prevalence of skin allergy, it is necessary to understand the epidemiology of the skin allergy conditions in adolescents in Namibia in order to come up with timely and more appropriate interventions.

Competing Interests

There were no competing interests amongst authors.

Authors Contributions

INP was the principal investigator and wrote the initial draft manuscript. OPLM was responsible for all statistical aspects. MM reviewed and edited the draft manuscript. SRM played leadership roles in the project and ensured quality and coherence of this manuscript.

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