

Factors Contributing to Allergic Conjunctivitis Among Children Aged Below Five Years Attending Murang'a County Referral Hospital

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ABSTRACT

Introduction: The incidence of allergy-related diseases (ARDs), such as allergic conjunctivitis (AC), eczema, and rhinitis (AR), has increased globally in recent decades. A single cause for this increase cannot be identified. The prevalence of these conditions is higher in Africa and other low- and middle-income countries (LMICs).

Objective: This study aimed to assess the factors contributing to allergic conjunctivitis in children aged < five years at Murang'a County Referral Hospital, Kenya.

Design: This was A Hospital-based cross-sectional study. Multi-staged sampling followed by systematic purpose sampling was used to reach caregiver-child pairs.

Setting: Murang'a County Referral Hospital.

Participants: A total of 104 children aged <5 years were included in the study, consisting of 82 (78.8%) males and 22 (21.2%) females.

Results: The results of this study revealed that the majority of the children with conjunctivitis resided in rural areas (52.9%). Family history of allergic conditions ($p < 0.0001$), exposure to dust ($p < 0.0001$), and children whose caregivers were farmers ($p < 0.001$) were likely to have conjunctivitis at 60.6%, 71.2%, and 65.4%. The majority of the patients experienced itching in the eyes and red eyes (95.2% and 59.6%). AR was the most common morbidity (42.3%) while atopic dermatitis and asthma accounted for 23.1% and 19.2% respectively. Other factors associated with AC included the use of firewood and charcoal.

Conclusion: Allergic conditions remain a public health concern among children below five years of age. The most common precipitating factors are dust, hot humid weather, pesticide use, and smoke from use of either firewood or charcoal. Therefore, emphasis should be placed on addressing the prevention of disease, health education, and home management of acute symptoms.

Keywords: [Allergic conjunctivitis, Under five, risk factors]

INTRODUCTION

The incidence of allergy-related diseases (ARDs), such as allergic conjunctivitis, eczema, and rhinitis, has increased globally in the last decades¹. Allergic conjunctivitis (AC) is an inflammation of the outer lining of the eyeball (conjunctiva) caused by a hypersensitivity reaction². Ophthalmic

allergies are one of the most common conditions encountered in clinical practice. Various forms of allergic conjunctivitis are classified as sight-threatening or non-sight-threatening. Sight-threatening symptoms include vernal-keratoconjunctivitis (VKC) and atopic keratoconjunctivitis (AKC), while non-sight-threatening symptoms

include seasonal allergic conjunctivitis (SAC), perennial allergic conjunctivitis (PAC) and giant papillary allergic conjunctivitis. They all involve the same mechanism of allergen stimulation of the immune system and trigger the formation of various body chemicals that result in acute or late allergic reactions. Seasonal allergic conjunctivitis and perennial allergic conjunctivitis are the most common forms of allergic conjunctivitis in the community³. Allergic conjunctivitis frequently occurs in pediatric patients. AC in childhood often poses problems of diagnosis and management because young children are less able to communicate their symptoms and instead resort to frequent blinking and eye rubbing, which is sometimes associated with a red eye. Eye rubbing can disrupt the corneal epithelium and exacerbate ocular surface inflammation⁴.

A single cause of this increase cannot be pinpointed, and experts are therefore considering the contribution of numerous factors, including genetics, air pollution, areas of residence, pets, early childhood exposure, environmental factors such as dust, pollen grains, smoke, certain plants, climatic factors such as cold air, moisture, and medicinal factors such as medical products, cosmetics, perfumes, aerosols, and certain foodstuffs, for example, animal proteins and their products such as fur, skin, and secretions⁵.

Allergic conjunctivitis is often under diagnosed common eye problem affecting 15-25 % of the world population⁶. In Africa and other low- and middle-income countries (LMICs), the prevalence of these conditions is higher in urban than in rural areas. Although data on risk factors for ARDs from Africa are scarce, evidence suggests that there may be important differences in risk factors between high-income countries (HICs) and LMICs⁷. The prevalence of AC in Kenya is approximately 27.3%⁸.

In Murang'a County, this condition is more common in peri-urban and urban areas, mostly in children and young adults. The associated costs have increased

substantially, as more of the population requires treatment for this condition and other allergy-related diseases.

Understanding the risk factors associated with allergic conjunctivitis in children below five years at Murang'a County Referral Hospital is key to identifying the causes of these conditions and will inform local intervention strategies for prevention and treatment. Therefore, we undertook a primary data analysis from the sampled participants to investigate the risk factors.

MATERIALS & METHODS

Study design and setting

A hospital-based cross-sectional study was conducted from July to December 2020 in Murang'a County Referral Hospital Pediatric Outpatients.

Selection and recruitment of study participants

The sample size of 104 Participants was computed using the slovin's formula.

Data Collection

Data were collected from all eligible and consenting caregivers using the researcher administered a structured questionnaire to collect data on socioeconomic and environmental factors and the use of medicinal and cosmetic products. Parameters to assess the symptoms of allergic conjunctivitis were also taken.

Statistical Analysis

The statistical software package IBM SPSS version 26.0 was used to conduct data analysis. Quantitative data were summarized using descriptive statistics. Descriptive analysis was used to describe the proportions and frequencies of respondents to summarize the study variables. Bivariate analyses were conducted for AC outcome variables. Multinomial logistic regression was used to identify factors associated with allergic conjunctivitis. Associations with a p-value < 0.05 was considered statistically significant.

RESULT

Socio-demographic and economic characteristics

A total of 104 children aged below 5 years were included in the study, consisting of 82 (78.8%) males, 22 (21.2%) females, with a mean age of 1.64 months (+/- 0.059

months). Majority of the children with conjunctivitis resided in the rural areas at 52.9%). family history of allergic conditions, exposure to dust, and children whose caregivers were farmers were likely to have conjunctivitis 60.6%, 71.2%, and 65.4%, respectively). Table 1

Table 1: Socio-demographic and economic characteristics

Variable	Children below 5 years with conjunctivitis N= 104	
	n	%
Social-economic characteristics		
Sex of the Child		
Male	82	78.8
Female	22	42.9
Age of child (months)		
0-06	7	6.7
7-12	21	20.2
13-59	76	73.1
Area of residence		
Rural	55	52.9
Urban (town)	35	33.7
Town out skirts	14	13.5
Type of housing		
Permanent	44	43.3
Semi-permanent	39	37.5
Temporary	20	19.2
Source of water for domestic use		
River	10	9.6
Piped Water	77	74
Well	17	16.3
Family history of allergic conditions		
Yes	63	60.6
No	41	39.4
Economic activities		
farmers	68	65.4
Business	20	19.2
Formal employment	16	15.4
Environmental characteristics		
Source of fuel for domestic use		
Firewood	32	30.8
Charcoal	30	28.8
Kerosene	06	5.8
Gas	30	28.8
Electricity	06	5.8
History of a family member who smokes		
Yes	44	42.3
No	60	57.7
Exposure to allergens		
Dust	74	71.2
Pollen grains	20	19.2
Cold weather	2	1.9
Smoke	8	7.7
Use of chemical and cosmetic products		
Household detergents		
yes	27	26
No	77	74
Body sprays and perfumes		
Yes	43	41.3
No	61	58.7
Body lotions and body oils		
Yes	40	38.5
No	64	61.5
Pesticide and herbicides		
Yes	68	65.4
No	36	34.6

Symptoms of allergic conjunctivitis

The age group most commonly affected by AC was between 13- 59 months, with 76 children affected (73.1%). Majority of the patients experienced itching in the eyes and

red eyes, as seen in 95.2% and 59.6% respectively. Many of the patients with AC had allergic rhinitis, atopic dermatitis, and asthma, accounting for 42.3%, 23.1%, and 19.2%, respectively. Table 2

Table 2: Symptoms of allergic conjunctivitis

Variable	Total Number of children n	Symptoms					Symptoms in other parts of the body		
		Underlying eye disease	Tearing	Itchiness	Swollen eyes	Red eyes	Skin	Nose	Chest
All	104	7	44	99	53	62	23	44	20
Age Group in months									
0-06	7	0	6	0	3	3	2	8	3
07-12	21	0	12	22	16	24	3	12	7
13-59	76	7	26	77	34	35	18	24	10
Sex									
Male	82	5	24	69	37	37	16	28	14
Female	22	2	20	30	16	25	7	16	6
Frequency of symptoms during different seasons of the years									
Winter	2	0	1	9	0	7	2	4	3
Summer	74	5	38	68	33	45	17	29	13
spring	28	2	5	22	20	10	4	11	4

Associations of socio-economic and environmental factors with allergic conjunctivitis

A bivariate analysis revealed an association between AC and socioeconomic factors. Children whose caregivers were farmers were likely to have AC (65.4%). Exposure to dust was the main cause of AC and

mostly occurred during summer, as was seen in 74(71.2%) of the cases. Other factors associated with AC included use of firewood and charcoal as a source of fuel that is 71.2% and 30.8%, respectively). Allergic rhinitis (AR) was the most common comorbidity identified in patients in this study at 42.3%. Table 3

Table 3: Associations of social-economic and environmental factors with allergic conjunctivitis

Variable	Total sample N (%)	Allergic conjunctivitis n (%)	P value
Outcome Variables			
Allergic conjunctivitis	104 (100)	104	
Individual-level factors			
Sex of the Child			0.010
Male	82 (78.8)	78.8	
Female	22 (42.9)	42.9	0.010
Age of child (months)			
0-06	7 (6.7)	6.7	0.0001
7-12	21 (20.2)	20.2	0.0001
13-59	76 (73.1)	73.1	0.0001
Area of residence			
Rural	55 (52.9)	52.9	0.43
Urban (town)	35 (33.7)	33.7	0.43
Town out skirts	14 (13.5)	13.5	
Family history of allergic conditions			
Yes	63 (60.6)	60.6	0.0001
No	41 (39.4)	39.4	
Economic activities			
farmers	68 (65.4)	65.4	0.001
Business	20 (19.2)	19.2	
Formal employment	16 (15.4)	15.4	
Environmental factors			
Source of fuel for domestic use			
Firewood	32 (30.8)	30.8	0.0001
Charcoal	30 (28.8)	28.8	0.0001
Kerosene	06 (5.8)	5.8	
Gas	30 (28.8)	28.8	

Table 3 To Be Continued...			
Electricity	06 (5.8)	5.8	
Exposure to allergens			
Dust	74 (71.2)	71.2	0.0001
Pollen grains	20 (19.2)	19.2	0.0001
Cold weather	2(1.9)	1.9	0.007
Smoke	8 (7.7)	7.7	0.01
Use of pesticides and herbicides			
Yes	68(65.4)	65.4	0.0001
No	36(34.6)	34.6	
Allergy symptoms in other parts of the body			
Skin	23	22.1	0.0001
Nose	44	42.3	0.0001
chest	20	19.2	0.0001

DISCUSSION

Allergies are known to affect approximately 20% of the world's population. They are often familial in nature. The eyes and nose are the most common sites for allergens to attack; thus, one of the most common allergic reactions is allergic conjunctivitis. Some of the most common allergens are dust, pollen grains, animal dander among others^{9,10}. In most cases, AC is mild; however, with repeated reactions of the allergens, it becomes severe, resulting in itchiness, swelling, and redness of the eyes¹¹.

Our findings demonstrated that the predominant sex affected was male. However, the difference was not statistically significant. In the present study, 73.1% of children aged 13- 59 months were more affected. AC is said to occur mostly in children aged > 3 years, and continues until puberty. This could be explained by the fact that these children play outdoors where they are dusty, have other allergens such as pollen grains, and are likely to wipe their eyes using the dirty arms, hence introducing foreign substances to the conjunctiva¹². Exposure to dust is the main cause of AC and occurs during the summer. Other factors associated with AC include the use of firewood as the fuel source. In this study, most of the children who had an encounter with dust and used firewood as a source of fuel; 71.2% and 30.8%, respectively) developed AC.

Allergic rhinitis (AR) was the most common comorbidity identified in patients in this study at 42.3%), which could be explained by the fact that both AR and AC have an

anatomical connection between the organs involved, which facilitates the propagation of the disease. In addition, the pathophysiological mechanisms implicated in both conditions share common features¹³.

95.2% of the patients experienced itching in the eyes, while 59.6% reported of redness of the eyes. Eighty% of patients who had itchiness reported to have more than six episodes of itching per day. Other symptoms associated with this condition include tearing and swelling of the eye¹⁴. Children from farmers that were caregivers were more likely to be affected by AC at 65.4%). This could be due to exposure to pesticides and herbicides used in farming.

CONCLUSION

Allergic conditions remain a public health concern among children below the age of five years. The most common precipitating factors are dust, hot humid weather, pesticide use, and smoke from use of either firewood or charcoal. Therefore, emphasis should be placed towards addressing the prevention of diseases, health education, and home management of acute symptoms.

Declaration by Authors

Ethical Approval: This study was conducted according to the guidelines laid down in the Declaration of Helsinki research ethics and guidelines. All procedures involving participants were approved by the Ethical Review Committee of Jomo Kenyatta University of Agriculture and Technology. National Commission of Science and Technology and County

Director of Health Services in Murang'a County. Written informed consent was obtained from all the participating parents.

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Authors' Contribution: IR formulated the research question, designed the study, and analysed the first draft of the article. VN contributed to the conception, design, and data analysis and wrote the draft of the current study. PK formulated the research questions and designed this study. All the authors have read and approved the final version of the manuscript. IR is the primary responsibility for the final content.

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