TITLE OF STUDY:

Epidemiology of Ocular Allergy among school children in Trinidad and Tobago

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Definition of terms

The definitions were retrieved from the Merriam- Webster Dictionary

1. Prevalence- the percentage of a population that is affected with a particular disease at a given time.
2. Allergen- a substance (such as pollen) that induces allergy
3. Pollen- a mass of tiny particles in the anthers of a flower that fertilize the seeds and usually appear as fine yellow dust
4. Asthma- a chronic lung disorder that is marked by recurring episodes of airway obstruction manifested by labored breathing accompanied especially by wheezing and coughing that is triggered by hyperreactivity to various stimuli such as allergens.
5. Rhinitis- inflammation of the mucous membrane of the nose
6. Vernal keratoconjunctivitis- combined inflammation of the cornea and conjunctiva due to warm seasons
7. OA- ocular allergy
8. AC- allergic conjunctivitis which is inflammation of the conjunctiva due to allergic response
9. Seasonal allergic conjunctivitis(SAC)- type of ocular allergy that occurs in response to specific allergens that are prevalent during certain seasons
10. Perennial allergic conjunctivitis (PAC)- type of ocular allergy that occurs throughout the year

Abstract:

Aim: To determine the epidemiology of ocular allergy(OA) in secondary school children in Trinidad and Tobago

Method: A descriptive cross-sectional school-based study was done using the ISAAC questionnaire to assess the epidemiology of OA. A spinner wheel website was used to select schools to be included. Information on demography, presence of ocular allergy symptoms, associated risk factors, and impact of ocular allergy were obtained. The data collected was exported to Statistical Package for Social Sciences (SPSS) and the correlation between variables was examined with the use of Pearson Chi-square test using a p-value of <0.05 as the threshold for statistical significance.

Results- A total of 420 students comprising of 198 males (47.1%) and 222 females (52.9%) aged 11–18 years participate in the study. The prevalence of OA was 49.3% (207 children) and SAC was the most prevalent (90.3%) type of OA found. The prevalence of OA was higher among 14 years age group (23.4%) and females (58.8%). Difficulty breathing, wheezing, asthma, food, rhinitis, atopic eczema, and mites were associated with OA.

Conclusion- The prevalence of OA among secondary school students in Trinidad was relatively high (49.3%) as compared to various studies conducted across the globe.

Introduction:

The eye is one of the most common sites for the development of allergic inflammatory disorders, because it has no mechanical barrier to prevent the impact of allergens such as pollen on its surface.[1] Ocular allergy (OA), also known as ocular conjunctivitis, can be defined as a group of hypersensitivity disorders to normally harmless substances, known as allergens and can be observed as the only dominant presentation of an allergic sensitization.[2] When the immune system identifies an otherwise harmless substance as an allergen, it begins to overreact and produce antibodies which travel to cells that release chemicals causing an allergic reaction. Symptoms of this reaction include watery eyes, itchiness, redness, a gritty sensation, eyelid swelling, possible pain, and sensitivity to light. There are several types of ocular allergies including seasonal allergic conjunctivitis (SAC) and perennial allergic conjunctivitis (PAC), vernal keratoconjunctivitis (VKC), atopic keratoconjunctivitis (AKC) and giant papillary conjunctivitis (GPC).[3]

Numerous studies have been conducted on ocular allergies in different places. Reports from studies conducted in the USA, Sweden, Brazil, and Uganda showed that ocular allergy affected about 15-20% of the worldwide population.[4] which on average is 1.58 billion persons. Ocular allergy affects children more than adults. The prevalence of ocular allergy is influenced by demography and environmental conditions. There is a need to assess the prevalence of ocular allergy in Trinidad and Tobago weather. The study is therefore geared towards determining the prevalence of ocular allergy among high school children.

Statement of Problem

Globally there are many factors which trigger ocular allergies prevalence such as pollen, dust, pets' systemic reactions and food reactions. Allergies occur frequently in all pediatric age groups, affecting up to 40% of children. However, although the symptoms of ocular allergy are not life threatening, affected individuals have a significant impact on productivity and quality of life[5] as children can be impacted behaviorally, emotionally, and mentally.

The geographic location of Trinidad increases the risk of ocular allergy due to factors such as Saharan Dust from Africa. Various studies have been conducted on ocular allergy in children, however, none has been done in the Caribbean especially in Trinidad therefore there is a need to assess the prevalence of ocular allergy in Trinidad to compare with findings from other places. Therefore, this study was aimed to determine the epidemiology of ocular allergy in children in Trinidad and Tobago

Aim of the Study:

To determine the epidemiology of ocular allergy in secondary school children in Trinidad and Tobago.

Objectives of Research:

1. To determine the prevalence of ocular allergy among secondary school students
2. To assess the most prevalent type of ocular allergy among secondary school students
3. To determine the demographic distribution of the prevalence
4. To ascertain the risks and associated factors of ocular allergy.

Research Questions:

1. What is the prevalence of ocular allergies among secondary school children?
2. What is the most prevalent type of ocular allergy among secondary school children?
3. What is the demographic distribution of the prevalence?
4. What are the associated factors and risks of ocular allergies among secondary school children?

Relevance of Study to Public Health

This research has not been previously conducted in Trinidad and Tobago nor in the Caribbean region therefore the information collected via this study will be beneficial to eye care professionals in our region to understand the prevalence, distribution, and main causes of ocular allergy in children. This study will also be beneficial to future researchers whether locally or internationally because we will now have available research on ocular allergy for Trinidad and Tobago. This study will also be able to bring awareness and knowledge of this information to the local public which is of importance as it will allow parents and children to become aware of the symptoms and possible factors that lead to ocular allergy.

Delimitation of the study

This study was delimited to school students that attend government funded coed secondary schools who are less than 19 years old.

Literature Review

Introduction:

The literature review compiles relevant studies to the topic "The Prevalence of Ocular Allergies among Secondary School Students." A total of 28 studies conducted in various countries were reviewed to gather information and be used as a comparative point of view for studies related to the research study. Information obtained from these studies were supported by the underlisted objectives:

- To determine the demographic prevalence of OA among secondary school children.
- To determine the demographic distribution of the prevalence
- To assess the most prevalent type of OA among secondary school students
- To ascertain the risks and associated factors of ocular allergy

Global

General Prevalence:

Ocular allergies, also known as allergic conjunctivitis, begins when the conjunctiva is irritated. The prevalence of ocular allergies via estimates suggest that ocular allergies affect 15% to 20% of the worldwide population.[4] Generalizing the major cause of ocular allergies are subjective based on etiology and demographic data based on the worldwide population.

Demographic distribution of prevalence:

Gender and Age

A community-based study was conducted among 1571 school children in Ghana where they gathered information physically by taking case history and observing the anterior and posterior segments of the eye.[6] It showed that the prevalence of AC was 39.9% (626 students) with a higher prevalence in females, 335 being affected (56.7%) followed by 271 males (43.3%). The most prevalent age group was 13-16 (39.9%), followed by 5-8 (30.5%) and 9-12 (29.6%).

A 10-year year gap ISAAC questionnaire-based study conducted in Kyoto Japan to determine the changing prevalence of childhood allergic diseases was reviewed.[7] A total of 13,215 children between ages 7-15 were selected randomly in 1996 and 2006. The result showed that in the year 1996, 2158 (13.3%) experienced symptoms of AC however it was more prevalent in females 1087(13.5%) followed by 1064 males 13.2%). While in 2006, 3324 (25.2%) experienced allergic symptoms where AC was more prevalent in males 1688 (25.1%) followed by 1633 (25.2%). However, this study did not break down the prevalence per age group. The prevalence of OA increased from 1996 to 2006 due to increased exposure of children to Japanese cedar pollinosis (JCP).

A study done in Hyderabad India among 158 children between the ages of 5-15 years olds found that OA was most prevalent among males 57.4% followed by females with 42.4%. The age group most affected were 5-7 year olds with 64 children (40.5%), followed by 49 children(31%) of ages 8-10, 26 children(16.6%) ages 11-13 and 19 children(12%) between 14-16 years were seen to be affected.[8]

A descriptive hospital-based study among 1007 persons between the ages 1 month to over 50 years old in Jos the capital city of Plateau State in North Central Nigeria found that AC was most prevalent in females with 498 affected (51.2%) followed by 474 males (48.8%). The most prevalent age group was children 1 month- 10 years old with 240 children (24.7%). This was followed by 21-30 year olds (23.4%), 11-20 year olds (21.7%), 31-40 year olds (15%), 41-50 year olds (10.7%) and 4.9% over 50 years old.[9]

Ethnicity

Though ethnicity was not a variable in our study there have been previous studies that showed differences in OA prevalence based on ethnicity.

A study conducted in a multiethnic population of the city of Bradford England stated that the prevalence of AC was higher in Asian children (59 per 100 000) and lower in white children (12 per 100 000). It is possible that OA is multifactorial but perhaps with a greater genetic predisposition in certain ethnic communities.[10]

A study conducted in Nigeria stated that the prevalence of AC was 32% which is similar to what pertains in some of the African hospital studies but differs in presentation from the Caucasians.[9]

In Northern India, it was said that the prevalence of AC was 12.22%.[11] Since India has an average temperature of 26°C and Nigeria has an average temperature of 29°C[12] meaning that Nigeria is a hotter climate this can account for the higher prevalence there.

Most common type of OA in secondary school students

Seasonal AC (SAC) and perennial AC (PAC) are the most prevalent types of OA.[13] SAC is reported to be more common than PAC in temperate climate countries[13] however, in tropical climates, perennial symptoms appear to be more common.[4] A study conducted in Thailand among 445 patients with AC showed that the majority (82%) of the patients had PAC contrary to temperate climates, where SAC is usually the highest incidence[14]. This was followed by 10.6% VKC, 4.7% AKC and 2.9% GPC.

A community-based cross-sectional, observational study conducted in Western Odisha stated that the most prevalent type of AC reported in children is simple allergic conjunctivitis with a prevalence of 59.36 % (260 children) followed by VKC which was 31.05 % (136 children), few reported with phlyctenular conjunctivitis i.e., 5.47 % (24 children) and AKC prevalence were least (4.10 %) among all.[15]

A community-based cross-sectional study done in Gambella Town Southwestern Ethiopia found the prevalence of VKC among children in the study area to be 64 (11.1%). However, the most prevalent was mixed type of VKC with 34 children being affected (53.1%) followed by palpebral type 28 (43.8%); this finding is supported by other studies done in Ethiopia Egypt and India.[16]

Risks factors of OA

A study done at the Allergy Secondary Care Department of a University Hospital in Brazil did a retrospective analysis of medical records of children and adolescents with severe ocular allergies.[17] A total of 16 patients with ocular pruritus and perennial symptoms were examined. Data recorded for the patient's presence of allergic comorbidities, sensitizations identified by

serum specific IgE testing, and symptom control were assessed for all patients. The most frequent allergen for patients that underwent sensitization identity test were allergens of mites, animals, and pollen however it is unclear for allergens of grass or fungi, therefore the dominance of caustic factors presented were allergies to dust mites and domestic animals.[17]

The prevalence of asthma and allergies in children have been noted to be a causative factor pertaining to OA. Association of allergic symptoms and asthma are related to exposure of indoor and outdoor allergens.[18] Climate change also increases asthma and allergies related to airborne pollen.[19] A study conducted in Spain among children under age 14 showed that asthma is a risk factor of AC. The study showed that asthma corresponded to the high frequency of sensitization to perennial allergens.[20]

Food allergens are triggers OA for some but more frequently in children.[21] Ocular symptoms are experienced by consumption of food and food particles when it comes into contact with the airways of some individuals.[21] Food allergies are commonly due to 8 foods in particular: milk, nuts, peanuts, eggs, fish, shellfish, wheat, and so.[22] A study done at a pediatric allergy unit in France stated that 14% of patients diagnosed with food allergies experience ocular involvement.[21]

Associated factors of OA:

There is a disorder inherited from parents that is known as atopic dermatitis also known as eczema which is easily seen but not contagious that triggers AKC. A study done in Europe states that atopic dermatitis frequently occurs in Asian and African ethnic groups.[23] A study done in Japan including 1079 participants, 4.4% reported AKC and a study done in Thailand with 445

participants, 4.7% reported AKC[24] which can show that the likelihood of dermatitis in Asians can also be reflected in that there is a prevalence of AKC in these areas.

Contact lens wear increases the occurrence of GPC; this affects the inner surface of the eyelid as it becomes irritated, red and swollen as large bumps are noticed.[25] A retrospective study conducted among 47 contact lens patients, ten (21.27%) of them developed GPC. It was due to how often the lenses were replaced, 36% of patients who replaced their lenses at 4 weeks or longer and 4.5% in patients who replaced their lenses at less than 4 weeks.[26]

Regional

Demographic distribution of Prevalence:

A study done in the state of Curitiba Brazil among 3012 children between the ages 12-18 were surveyed for OA where a prevalence of 20.7% reported symptoms of OA. AC was more prevalent in females (56.1%) compared to males (45.9%). The most prevalent type of AC was perennial with 450 PAC patients followed by 137 patients with SAC. However, this specific study did not note which ages were most prevalent.[4]

A cross-sectional retrospective study conducted in Ángeles Puebla Hospital México among 761 patients, showed a prevalence of 38.4% AC which is 292 patients.[27]

Risk factor of OA

A transversal and descriptive study was made in patients with SAC and PAC conducted in Mexico.[28] After informed consent, they obtained a complete clinical evaluation, laboratory studies and skin tests for aeroallergens. The most frequently involved allergens in this study were pollens and house dust mites.

Associated factors of OA

A study done in the state of Curitiba Brazil showed that asthma was a prominent factor of ocular allergies. Asthma was reported in 31.4% of children. The results show that of the children diagnosed with perennial symptoms rhinitis was the most common factor with 64.6%.[4] According to an abstract by Latin American Society of Allergy, Asthma and Immunology, Brazilian states that experience pollinosis from grasses are found towards the southern states where there are subtropical climates.[29] Brazilian states that are dependent on vegetation show higher symptoms of skin sensitivity associated with allergic rhinoconjunctivitis and asthma.

Methodology

Introduction:

This chapter outlined the ethical considerations, research design, study size, study population, sample size, sampling procedure, inclusion and exclusion criteria, test and instrument used, data collection procedure, data analysis, legal and ethical considerations.

Ethical Considerations:

- Approval was granted by the University of the West Indies Research and Ethics committee.
- Permission to conduct the study in schools was obtained from the Ministry of Education.
- Permission to conduct the study in secondary schools was obtained from the schools' principals.
- Consent was obtained from the parents of the students.

Research Design:

This study was a descriptive cross sectional designed study, where a survey based on Ocular Allergies was distributed between students of Couva East Secondary, Aranguez North Secondary and Barrackpore West Secondary School within Trinidad.

Study Setting:

The study was done in Trinidad and Tobago which is an archipelagic state in the southern Caribbean, lying northeast of the South American nation of Venezuela and south of Grenada in the Lesser Antilles.[30] Trinidad is one of the twin islands of Trinidad and Tobago, which has a current population of 1.4 million persons.[31] Trinidad is broken up into three general regions, which are north, central, and south. Each area has several types of schools which includes coed schools, girls only schools and boys only schools. Within those groupings, some of these schools are either fully government funded, partially government funded and private schools.[32]Therefore, this study was conducted in one co-ed fully government funded school in each region to avoid bias and a wider range of participants.

Study Population:

The population of this study included secondary school students in Trinidad who are between the ages of 11-18 years.

Inclusion Criteria:

- Children who are registered in the selected co-ed fully government funded secondary schools in Couva.
- Children who have resided at least six months in Trinidad and Tobago

Exclusion Criteria:

- Children over the age of 18 years old currently registered to a co-ed fully government funded secondary school.
- Children who have had surgery or other conditions that present with the same symptoms as ocular allergy.
- Children that experience ocular allergy symptoms that are not triggered by an external factor like previous surgeries.

Study sample

Sample Size:

The sample size was determined using the RAOSOFT sample size calculator. With the population size of Trinidad and Tobago at 1,403,375, but of that only 56,262 students are enrolled in coed government schools. Therefore, using that value, a confidence interval of 95% and a margin of error of 5%, the sample size was calculated to be 383 students. To compensate for those who might not be willing to participate in the study the sample size was increased by 20% giving

approximately 458 students. Therefore, the total sample size was 458 participants. However, only 420 students responded

Sampling Technique:

In this project the use of simple random sampling was used which is a sampling technique whereby each member of a population has an equal chance of being chosen, using an unbiased selection method. The goal of simple random sampling is to create an unbiased, manageable, balanced subset of individuals that is representative of a larger group that would otherwise be too challenging to sample.

A list of all the coed fully government funded schools were put together for each area separately (north, central, south). All coed government secondary schools were placed into a website called Spinner Wheel which automatically determined the school for each area which were Couva East Secondary, Barrackpore West Secondary and Aranguez North secondary. Since a minimum of 482 students are needed, we divided that by the 3 schools being investigated which is roughly 150 students per school. This was divided into 5 to determine the number of students per form level that will be chosen. The minimum of students per form level was 30.

Data Collection Procedure:

1. An ethics form and research project proposal will be submitted to obtain clearance from the Ethics committee and Ministry of Education. Permission to conduct this study on the students of the selected co-ed fully governmental schools will be applied for to the principal of said schools to gain approval and consent forms will be given to the potential participating students or the parents of these students.

2. After which, student names from each form level were collected and a minimum of 30 students per form level were randomly picked via excel to participate.
3. Data was then collected via the distribution of consent forms and questionnaires (ISAAC) to the selected students of each co-ed fully government funded secondary school. These questionnaires contained relevant questions relating to ocular allergy in addition to questions relating to demographic patient data.
4. The questionnaires and consent forms were recollected, and the data was analyzed.

Data Analysis:

All data obtained was entered into Google Forms which created a Microsoft Excel sheet then exported to Statistical Package for Social Sciences (SPSS) software which is a statistical software that allows the quantitative analysis of complex data. The data was tabulated, and percentages were used to determine the prevalence with respect to different variables and statistical tests such as chi-squared tests were used to determine correlations in the data. The statistical results would allow us to make conclusions of the prevalence of Ocular allergy in secondary school students of Trinidad.

Data Protection:

Personal information like the patient's contact number was not collected in order to maintain their anonymity in this study and the names collected are not included or displayed in this study in order to protect that participants confidentiality. Consent forms were distributed for proper consent via signature before the questionnaire was given to the subject. All data collected remains only accessible to the researchers of this project and is password protected on everyone's device.

RESULTS

Demographic profile of study participants

This study included 420 subjects. Their ages ranged from 11 to 18 years with a mean age (± SD) of 14.36 ± 22.65 years. Majority of the participants were females (n= 222, 52.9%) and the highest participating age group was 14-year-olds (n= 108, 25.7%). More than half 320 (76.2%) of the study participants resided in an area where there are a lot of trees (Table1).

Table 1: Demographic profile of participants

Variable	Subgroup	Frequency (N= 420)	Percentage (N=100%)
Gender			
	Male	198	47.1
	Female	222	52.9
Age (years)			
	Less than or equal to 12	54	12.9
	13	72	17.1
	14	108	25.7
	15	78	18.6
	16	74	17.6
	More than or equal to 17	34	8.1
Form level			
	Form 1	100	23.9
	Form 2	75	17.9
	Form 3	112	26.8
	Form 4	53	12.7
	Form 5	78	18.7
Place of residence			
	Lives around a lot of trees/ grass	320	76.2
	Does not live around trees/grass	100	23.8

Objective 1: To determine the prevalence of OA in secondary school students.

The prevalence of OA in this study was 49.3% (207 children), SAC was most prevalent with 197 students being affected (90.3%). The month in which OA was most prevalent was January where a total of 110 (26.3%) students experienced symptoms. There was a significant association between month and symptoms experienced (<0.001). The most prevalent symptom experienced was itching and tearing (100%). The most prevalent severity of symptoms was mild with 89 students being affected 1-4 times (Table 2).

Table 2: Prevalence of OA

Variables	Frequency (%)	P-value
Presence of OA		
Yes	207 (49.3)	<0.001
No	212 (50.5)	<0.001
I cannot remember	1 (0.2)	<0.001
Months experienced OA		
January	110 (52.3)	<0.001
February	71 (33.3)	<0.001
March	89 (42.7)	<0.001
April	52 (24.5)	<0.001
May	44 (21)	<0.001
June	46 (21.7)	<0.001
July	46 (21.7)	<0.001
August	56 (26.5)	<0.001
September	58 (27.2)	<0.001
October	53 (25)	<0.001
November	62 (29.3)	<0.001
December	81 (38.4)	<0.001

Type of OA		
Perennial ocular allergy	20 (9.7)	<0.001
Seasonal ocular allergy	187 (90.3)	<0.001
Symptoms experienced		
Itching/tearing	207	<0.001
Photophobia	73 (26.4)	<0.001
Foreign body sensation	74 (26.5)	<0.001
Severity of symptoms		
I cannot remember	89 (21.2)	<0.001
1-4 times (mild)	27 (6.4)	<0.001
5-10 times (moderate)	37 (8.8)	<0.001
more than 10 times (severe)	55 (13.1)	<0.001

Objective 2: Most prevalent type of OA among secondary school students.

Prevalence of perennial OA

The prevalence of perennial OA was 9.7% (20 students), PAC was more prevalent in females (5.8%) than in males (3.9%). OA was found to be higher among those less or equal to 12 years (2.9%) (Table 3).

Table 3: Prevalence of Perennial ocular allergy

Presence of Perennial ocular allergy	
Demographics	**Frequency (%)**
Gender	
Male	8 (3.9)
Female	12 (5.8)
Age (in years)	
Less or equal to 12	6 (2.9)
13	3 (1.5)
14	4 (1.9)
15	1 (0.5)
16	4 (1.9)
More than or equal to 17	2 (1.0)

Prevalence of Seasonal OA

The prevalence of seasonal OA was 90.3% (187 students). SAC was more prevalent among females (53.1%) than males (37.2%). SAC was more prevalent in the 14-year-old age group (21.3%) than others (Table 4).

Table 4: Prevalence of Seasonal ocular allergy

Presence of seasonal ocular allergy	
Demographics	**Frequency (%)**
Gender	
Male	77 (37.2)
Female	110 (53.1)
Age (in years)	
Less than or equal to 12	23 (11.1)
13	29 (14)
14	44 (21.3)
15	31 (15)
16	39 (18.8)
More than or equal to 17	21 (10.1)

Objective 3: Demographic distribution of the prevalence of ocular allergy.

The prevalence of OA was higher in female students (58.8%) than males (41.2%) over the last 12 months (Table 5). The most prevalent age group consisted of 14-year-olds (23.4%) and the least prevalent age group consisted of students 17 years old and over (10.6%).

Table 5: Demographic distribution of OA

Presence of ocular allergy			
Demographics	**Frequency**	**Percentage**	**P value**
Gender			
Male	85	41.2%	0.127
Female	122	58.8%	0.127
Age (in years)			
Less than or equal to 12	29	14 %	0.457
13	32	15.4%	0.344
14	48	23.4%	0.221
15	32	15.4%	0.096
16	44	21.2.%	0.060
More than or equal to 17	22	10.6%	0.685

Objective 4: To ascertain the risks and associated factors of ocular allergy.

The most prevalent risk factor was difficulty breathing and wheezing (27.2%), followed by asthma (9.5%) and food allergies (8.3%) (Table 6).

Table 6: Risk and associated factors

Variable	Frequency (%)	P value
Experienced difficulty breathing or wheezing in the last 12 months?		
Yes	114 (27.2)	
No	93 (22.2)	< 0.001
Diagnosed with allergic rhinitis?		
Yes	23 (5.5)	
No	185 (44.0)	0.016
Diagnosed with asthma?		
Yes	40 (9.5)	0.216
No	168 (40.1)	
Diagnosed with atopic eczema?		
Yes	18 (4.3)	0.020
No	190 (45.2)	
Do you have a pollen allergy?		
Yes	29 (6.9)	0.013
No	178 (42.5)	
Do you have any food allergies?		
Yes	35 (8.3)	0.140
No	173 (41.2)	
Do you have a mite's allergy?		
Yes	11 (2.6%)	0.198
No	196 (46.8%)	
Do you wear contact lenses?		
Yes	2 (0.5%)	0.548
No	205 (48.9%)	

Table 7: Impact of OA on students' lives

The most prevalent impact of OA on students' daily study and activities was somewhat (46.9%) however the majority of the students did not need to visit the doctor because of the symptoms experienced (181 students). Only a small number of students had to ask for school leave (13 students) and had to visit the doctor (26 students) because of the impact of OA (Table 7).

Impact	Frequency	Percentage
OA affected daily activities		
I cannot remember	22	10.6%
Negligible	75	36.3%
Somewhat	97	46.9%
Had to ask for school leave	13	6.2%
Visited a doctor due to OA		
Yes	26	12.6 %
No	181	87.4%

Discussion:

Prevalence of ocular allergy in secondary school students.

The prevalence of OA in this study was 49.3% which was higher than what was recorded by Kumah et al in a community-based study conducted in school children in Ghana to determine the prevalence of ocular allergy (39.9%).[6] The difference in the result could be due to the study in Ghana including observation of posterior and anterior segments of the eye which would have allowed proper and possibly clearer diagnosis of allergic conjunctivitis which was not done in our study.

In this study, the most prevalent symptoms were itching and tearing (100%). The symptoms experienced showed a significant relation to ocular allergies as p-value (<0.001) was < 0.05.

Similar findings were recorded in a study in Shanghai China[33] and Hyderabad India.[8] Majority (87.4%) of those with OA did not seek medical attention in this study. Similar finding was recorded in a study in Ghana with 70% of OA patients not receiving treatment.[6]

Demographic distribution of the prevalence of ocular allergy.

In this study, the OA prevalence was significantly higher in female students (58.8%) than male students (41.2%) which could be due to the sample size containing more female participants. This finding was not significant as the p-value (0.127) was greater than 0.05 which indicates that results are independent of each other. This proves that participants do not need to be a male nor a female to experience allergic conjunctivitis. This finding is like a descriptive study done in North Central Nigeria where OA was found to be more prevalent in females (51.2%) than males (48.8%).[9] Whereas other studies like a cross-sectional survey done in Chandigarh, India found that males had a higher prevalence of OA than females.[11] However, the reason for this difference remains unknown; they could be due to different lifestyles or genetic susceptibilities.[34]

In general, the most prevalent OA age group in this study was 14 years olds (23.4%), followed by 16-year-olds (21.2%) although it was not statistically significant. This shows that age does not affect allergic conjunctivitis from occurring. However, symptoms of OA were found to be mainly associated with those 14 to 16 years. This finding aligns with a study conducted in Kumasi Metropolis by Kumah et al where the highest prevalence was also found among 13–16-year-olds.[6]

Most prevalent type of ocular allergy among secondary school students.

The most prevalent type of OA in this study was SAC (44.5%) and was usually triggered by exposure to airborne pollens produced by plants, the signs and symptoms typically occurring in spring and summer.[35] Though other studies state that in tropical climates, perennial symptoms appear to be more common.[4] However, despite Trinidad and Tobago being a tropical island SAC was the most common ocular allergy in this study. There is a need to conduct more population-based OA studies in Trinidad to compare with our research findings.

The month in which OA was most prevalent was January where 26.3% of students experienced symptoms. This finding could have been due to the Sahara dust surge that occurred at the end of December into January.[36]

Risks and associated factors of ocular allergy

Breathing and wheezing sound were found to be significantly associated with OA in the study. Similar findings were reported in a study in Brazil.[4] This could be due to the presence of pollinosis by grasses found towards the southern states of the Caribbean where there are subtropical climates.[29]

Our study showed that OA did not impact the daily activities of the majority of our study participants with OA. Mikhail et al recorded that OA impacted daily activities of their study participants like physical problems (81.9%), sleep issues (78.3%), work/school related issues (78.3%) and emotional issues (86.7%).[37]

Limitation of the study

1. The covid-19 pandemic limited direct or face to face interaction with the students to do proper questioning and tests with the students.
2. There is no previous research done based on this topic in Trinidad and Tobago to compare with the current study findings.
3. This is a questionnaire-based study, so we cannot verify that these individuals have ocular allergies.
4. This study is limited to only secondary students and not the general population of younger kids that are also prone to ocular allergy.

Conclusion:

In conclusion, it was found that the prevalence of OA was found to be relatively high (49.9%), especially seasonal allergic conjunctivitis during pollen and Sahara dust surges. It was found that specifically females and students in the 14-year-old age group were affected the most. It was deducted that OA is independent of gender and age($p > 0.05$) and can therefore, present itself to anyone. Additionally, persons suffering from OA in this study most commonly experienced eye itching and tearing. Lastly, the most prevalent risk factor associated with OA was found to be difficulty breathing and wheezing.

Recommendations:

1. More studies related to OA should be done in other Caribbean countries.
2. A population-based study that will include younger children and clinical assessment should be done in Trinidad and Tobago.
3. There is a need for more eye health education among school children to increase knowledge and awareness of OA.

Next steps:

1. The outcome of this study will be presented to Optometry students and lecturers of the Optometry unit to relay the findings of the epidemiology of ocular allergy in Trinidad and Tobago among secondary school students.
2. The study will be prepared as a manuscript and possibly sent to peer-review journals for publication.

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Appendices:

1.Ethical Approval Letter

THE UNIVERSITY OF THE WEST INDIES
ST. AUGUSTINE, TRINIDAD AND TOBAGO, WEST INDIES
CAMPUS RESEARCH ETHICS COMMITTEE
TELEPHONE: (1-868) 662-2002 ext. 82755 E-mail: campusethics@sta.uwi.edu

October, 28 2022

Dr. Ngozika Ezinne
Narissa Gertiesingh, Ryan Poonan
Optometry Unit,
Faculty of Medical Sciences
Email: ngozika.ezinne@sta.uwi.edu

Dear Dr. Ngozika Ezinne,

Ref: CREC-SA.1799/10/2022

Title: Epidemiology of Ocular Allergy among secondary school children in Trinidad and Tobago

I am pleased to advise that your application for research on the above captioned topic has been approved on behalf of Campus Research Ethics Committee, St. Augustine.

Approval is valid for one (1) year.

Sincerely,

Professor Jerome De Lisle
Chair
Campus Research Ethics Committee

2.Permission Letter to the Ministry of Education

Optometry Unit, Department of Clinical Surgical Sciences,
Faculty of Medical Sciences,
University of the West Indies

The Permanent Secretary
Ministry of Education
5 St. Vincent Street
Port of Spain

The Chief Education Officer

Dear Sir,

Re: permission to conduct research in secondary schools

Our names are Narissa Gertiesingh and Ryan Poonan. We are Optometry students at the University of the West Indies, Saint Augustine Campus. Our aim will be to gather information for research as part of the requirements for completion of our Optometry degree. Our research is titled "The Epidemiology of Ocular Allergies Amongst Secondary School Students". Our supervisor for this research project is Dr. Ngozika Ezinne.

This research project aims to determine the prevalence of Ocular Allergies amongst students in secondary schools, as well as deduce risk factors that may contribute to one experiencing symptoms. Ocular allergy occurs when something an individual is allergic to irritates the delicate membrane covering the eye and the inside of the eyelid. Ocular allergies present itself with symptoms of watery eyes, itchiness, redness, a gritty sensation, eyelid swelling, possible pain and sensitivity to light. Ocular allergies symptoms can lead to emotional, mental, and physical inability of a child to develop holistically affecting educational outcomes and limiting their true potential. We chose to conduct this study on high school students because the condition is known to be common among young adults and children.

The purpose of this letter is to ask for your permission to conduct our survey and gather information about secondary school students to detect students who had, could have or be at risk of having this problem. The questionnaire will be based on symptoms of various ocular allergies, demographic information, general medical information, and identity information to generation the rate of prevalence of ocular allergies. The information gathered will remain secure and confidential to only the participating researchers. Ethical clearance has been obtained from the UWI Research and Ethics Committee. The following schools have been selected for the screening:

1. Couva East Secondary School
2. Barrackpore West Secondary School
3. Arranguez North Secondary School

Thank you in advance for your time and cooperation.

Regards,

Narissa Gertiesingh and Ryan Poonan

3..Permission Letter to school principals

Optometry Unit, Department of Clinical Surgical Sciences,
Faculty of Medical Sciences,
University of the West Indies

Address of School.

The Principal

Dear Sir/Ma'am,

Re: Permission to Conduct Research in Secondary Schools

Our names are Narissa Gertiesingh and Ryan Poonan. We are Optometry students at the University of the West Indies, Saint Augustine Campus. Our aim will be to gather information for research as part of the requirements for completion of our Optometry degree. Our research is titled "The Epidemiology of Ocular Allergies Amongst Secondary School Students". Our supervisor for this research project is Dr. Ngozika Ezinne.

This research project aims to determine the prevalence of Ocular Allergies amongst students in secondary schools, as well as deduce risk factors that may contribute to one experiencing symptoms. Ocular allergy occurs when something an individual is allergic to irritates the delicate membrane covering the eye and the inside of the eyelid. Ocular allergies present itself with symptoms of watery eyes, itchiness, redness, a gritty sensation, eyelid swelling, possible pain and sensitivity to light. Ocular allergies symptoms can lead to emotional, mental, and physical inability of a child to develop holistically affecting educational outcomes and limiting their true potential. We chose to conduct this study on high school students because the condition is known to be common among young adults and children.

The purpose of this letter is to ask for your permission to conduct our survey and gather information about secondary school students to detect students who had, could have or be at risk of having this problem. The questionnaire will be based on symptoms of various ocular allergies, demographic information, general medical information, and identity information to generation the rate of prevalence of ocular allergies. The information gathered will remain secure and confidential to only the participating researchers. Ethical clearance has been obtained from the UWI Research and Ethics Committee.

Thank you in advance for your time and cooperation.

Regards,

Narissa Gertiesingh and Ryan Poonan

4.Consent Form to Parents/Students

Consent Forms for Parents and Students

Principle Investigator: Dr. Ezinne N.E

Research Investigators: Narissa Gertiesingh & Ryan Poonan

Our names are Narissa and Ryan. We are Optometry students associated with the University of the West Indies. We were given permission to conduct a survey about the epidemiology of ocular allergies. Ocular allergy also known as ocular conjunctivitis can be defined as an eye allergy that occurs when something an individual is allergic to irritates the delicate membrane covering the eye and the inside of the eyelid. Ocular allergies are common within our population due to the geographic location and demographic of Trinidad and Tobago.

There are various types of ocular allergies including seasonal and perennial allergic conjunctivitis, vernal keratoconjunctivitis, atopic keratoconjunctivitis and giant papillary conjunctivitis. Ocular allergies present itself with symptoms of watery eyes, itchiness, redness, a gritty sensation, eyelid swelling, possible pain and sensitivity to light. Children who may experience these symptoms will not know the difference between the types of ocular allergies and can be treated incorrectly.

The prevalence of ocular allergies is substantial therefore, accounts of the number of secondary school children who are prone to ocular allergies therefore, it is difficult for the government or any organization to know the extent of the problem and plan intervention.

Purpose:

This study will give awareness of the number of students who experience ocular allergy symptoms. This will help the government or school authorities in planning good eye care services for school children. To obtain such important information I invite your child/ward to participate in this study.

What is the duration of taking part in the study?
The answering questionnaire process will take approximately 15 minutes per student.

What will happen to my child or ward?
The study will involve completing a questionnaire related to ocular allergies.

What is in it for my child or ward?
By allowing your child or ward to participate in the survey, he/she can know his/her status of their susceptibility of contracting ocular allergies and prevalence of what type they are most susceptible.

What will happen if my child or ward drop out of the study early?
Your child or ward is free to withdraw from this screening at any point in time for any reason he/she sees fit. There will be no penalties whatsoever.

What are my child or ward responsibilities if he/ she in participating in the study?
Your child or ward first responsibility is to answer as honestly and truthfully as he/she can to the questions on the questionnaire.

What about Confidentiality?
The results from the study will be kept secured and will not be given to anyone outside the study. Your name and your child or ward's name will never be used in any report. All information acquired from the screening will be stored on a password protected computer. Coded identifiers will be used to maintain confidentiality.

How long will the investigators use and share my child or ward's information?
This information will remain accessible for 5 years preceding the start of the study or until the study becomes published. After which all data identifiers will be destroyed.

What if my child or ward change his/her mind about sharing his/her research information?
Your child or ward is free to withdraw from participating in this study at any given time, there will be no penalties whatsoever.

Right to refuse or withdraw:
Your child's participation is by free will and he/she can withdraw from the study after having agreed to participate. Your child/ward is free to refuse any part of the examination. I assure you that the study will not involve putting any harmful thing in their eyes and no form of the test will cause discomfort to them. You may contact us on these phone numbers Narissa: 334-1908 or Ryan: 721-9086 if you need further clarification.

This screening was approved by the Ministry of Education.

Consent letter for the parents of the students

My child has been invited to take part in the survey for ocular allergies in secondary schools. I have read the information provided to me or it has been read to me and I understand it very well. I have had opportunity to ask questions about it and all my questions have been answered to my satisfaction. I consent voluntarily to my child/ward's participation in this survey. I uunderstand that my child/wards have the right to withdraw from the study at any time.

Name of Parents/Guardian: ----------

Signature of parents---------- Date: ----------

Statement by the Researcher

I will provide verbal and/ or written information regarding this survey/study. I agree to answer any future questions concerning this Study/ Project to the best of my knowledge.

I will adhere to the approved procedure for this study.

Name of researcher: ----------

Signature: ---------- Date: ----------

5. Questionnaire

OCULAR ALLERGY QUESTIONNAIRE

Please read the following questions carefully and tick the most suitable option for you and write where needed.

Name: _____

School: _____

Class: _____

Sex: Male ☐ **Female** ☐

DOB: ____/____/____

Month **Day** **Year**

Age: _____

Question 1
Do you live around a lot of trees or grass areas?

Yes☐ No☐

Question 2
In the last 12 months, did you experienced eye itching/tearing in the absence of fever/cold?

Yes ☐ No ☐

Question 3
At which month(s) did you have this experience? Please tick as many months as it fits you.

Jan☐ Feb☐ Mar☐ Apr☐ May☐ Jun☐

Jul☐ Aug☐ Sept☐ Oct☐ Nov☐ Dec☐

Question 4
In the past 12 months, in the absence of fever/cold, how many times did you experience itchy/watery/redness of eye?

1-4 times ☐ 5-10 times ☐ More than 10 times ☐ Not at all ☐

Question 5
In the past 12 months, how bad did the above experience affect your study and daily activity?

Negligible ☐ Somewhat ☐ Had to ask for school leave ☐

Question 6
In the past 12 months, did you have to see a doctor for the itchy/watery eye?

Yes☐ No☐

Question 7
While experiencing these symptoms how did you deal with them?

Negligible☐ Waited for them to go away☐ Took medication☐

If you took medication what are the names? _____

Was the medication prescribed by a doctor? Yes☐ No☐

Was the medication bought over the counter from a pharmacy? Yes☐ No☐

Question 8
When you had the above experience, did you also experience light phobia? For example, you felt like squinting or uncomfortable/difficult looking at your desk lamp.

Yes☐ No☐

Question 9
When you had the above experience, did you also have foreign body sensations? For example, you felt like there was sand in your eye

Yes☐ No☐

Question 10
When you had the above experience, did you also have itchy nose, or running nose or blocked nose in the absence of fever and cold?

Yes☐ No☐

Question 11
How much time do you spend outside daily?

Less than 1 hour☐ 1-2 hours☐ 2-3 hours☐ more than 3 hours☐

Question 12
Are you physically active? For example, you take part in hikes, play sports.

Yes☐ No☐

Question 13
Have you been diagnosed as having allergic conjunctivitis?

Yes☐ No☐

Question 14
Have you ever been diagnosed with allergic rhinitis?

Yes☐ No☐

Question 15
Have you ever experienced difficulty in breathing or wheezing?

Yes☐ No☐

Question 16
Have you been diagnosed as having asthma?

Yes☐ No☐

Question 17
Have you been diagnosed as having atopic eczema?

Yes☐ No☐

Question 18
Have you ever had pollen allergy?

Yes☐ No☐

Question 19
Have you had any food allergy?

Yes☐ No☐

If yes, what _____

Question 20
Are you allergic to mites?

Yes☐ No☐

Question 21
Do you wear contact lenses?

Yes☐ No☐

If yes, how often do you:

Wear them _____

Dispose of them _____

Clean them _____

Are your contact lenses:

Soft Contact Lenses ☐ Rigid/Hard Contact Lenses ☐ Scleral Contact Lenses ☐

Thank You for your Participation!