



Awareness and Knowledge of Ocular Allergy among Undergraduate Students in Public Universities in Zimbabwe: An online survey

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Abstract

BACKGROUND

Despite the increasing prevalence of ocular allergies globally, there is a lack of literature regarding the awareness and knowledge levels of ocular allergies in Zimbabwe. This study aimed to assess the awareness and knowledge of ocular allergy among undergraduate students in public universities in Zimbabwe.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted across eleven public universities in Zimbabwe, and questionnaires were sent via WhatsApp and other social media platforms. The study was carried out between April 2022 and November 2022. A three-section self-administered online questionnaires created electronically on Google Forms were used to collect the data.

RESULTS

The study included 1000 undergraduate students, comprising 54.1% males and 45.9% females. Their age ranged between 18 and 42 years. Most students (29.3%) were from the science faculties and were in their third year (34.0%). Almost all the participants (96.1%) were enrolled in the conventional study type. A significant association was found between sex and place of origin, the year of study, and the course of study ($p < 0.001$). Most of the students had a fair knowledge of ocular allergies, and there was a significant association with the programme of study ($p < 0.05$). More than half of the participants (55.3%) reported that ocular allergies are eye inflammation in response to a harmless foreign substance. Most of the participants had poor knowledge of the forms of ocular allergy. Sources of information on ocular allergy, as reported by the participants, included friends or relatives, the internet, media, eye specialists, training programs, books, and schools.

CONCLUSION AND RECOMMENDATION

Awareness and knowledge of ocular allergies among University undergraduate students in Zimbabwe is good, whilst significant gaps exist in their knowledge of the forms of ocular allergies. However, students enrolled in science-related programmes had a better understanding of ocular allergies compared to their counterparts. There is a need for health education on ocular allergy.

Keywords: Ocular Allergy, Awareness, Knowledge, Allergen, Zimbabwe

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Introduction

Ocular allergy (OA) is a major public health problem due to its effect on quality of life and cost of management (1). Ocular allergy causes a significant social and economic burden on the individual because it is always chronic and affects numerous physiological processes (1,2). It is one of the most prevalent ocular disorders in clinical practice that could affect the individual (3,4). Ocular allergy was reported as one of the major reasons for regular outpatient department visits globally (1,4,5). Ocular allergy is triggered by exposure to pollen, dust, ragweed, flowers and pet dander (6,7), and it affects all age groups but is more common among children and the youth (8,9).

The global prevalence of ocular allergy (OA) has risen over the past four decades, with an estimated 40% of the world's population affected. This increase has been linked to factors such as industrialisation, rising air pollution, changes in lifestyle, childhood nutrition, and greater awareness and diagnosis of the disease. (5,9–11). Consequently, prevalence is higher in urban and industrialised areas than in rural areas (12).

Despite the increase in the prevalence of OA, the actual prevalence is still unknown and assumed to be unreported due to a paucity of OA data (13). The prevalence of OA varies greatly depending on the country and even regions within the same country due to the disease's highly varied character as well as ethnic differences, allergen species and environmental risk factors (2,14).

Ocular allergy can impair vision, disrupt normal daily activities and negatively influence the quality of life, academic performance, and work productivity (1,14). The consequences of OA are unlikely to be reduced substantially due to the continuous climate change and the lack of priority given to it (5). Studies on the awareness of OA reported less than 40% awareness in different geographical regions, despite the high global prevalence of OA (1,5,9,15). The awareness is even lower in Africa despite the risk factors of OA being

highly present (14). Approximately 19.1% of awareness was recorded among university students in Ghana (5) against 34.7% reported in Saudi Arabia (15). Several studies have assessed the level of awareness and knowledge of OA (1,5,9,15); however, most of these studies have been conducted outside Zimbabwe. Despite the high number of hospital visits for OA-related complaints in Zimbabwe (16), no study has specifically investigated the awareness and knowledge levels. To reduce the high burden of OA in Zimbabwe, there is a need to assess ocular allergy awareness and knowledge, identifying potential gaps for early detection and management. The study aims to assess the awareness and knowledge of ocular allergy among undergraduate students in public universities in Zimbabwe. Findings which would be compared with the global findings. The results will inform the development of sensitisation programs and implementation of policies on prevention and treatment strategies to reduce the burden in Zimbabwe.

Methods

A descriptive cross-sectional study was conducted across eleven public universities in Zimbabwe, and questionnaires were sent via WhatsApp and other social media platforms. The study was carried out between April 2022 and November 2022 among undergraduate students only. Students from the following accredited universities in Zimbabwe participated in the study: Bindura University of Science Education, Chinhoyi University of Technology, Great Zimbabwe University, Gwanda State University, Harare Institute of Technology, Lupane State University, Manicaland State University of Applied Sciences, Marondera University of Agricultural Science & Technology, Midlands State University, National University of Science and Technology (Zimbabwe), and the University of Zimbabwe. These institutions are strategically located in central business districts and major cities across Zimbabwe, with a population ranging from 200,000 to 2.7 million (17). These urban settings are characterised by diverse

demographic profiles, including a mix of low- to middle-income populations and a high concentration of youth and tertiary-level students (17). Self-administered online questionnaires created electronically on Google Forms were used to collect the data.

This study utilised convenience sampling, which required participants' availability and accessibility; our study employed a markup point of 1000 participants using a sample size from a previous study by Kyei et al (5) as a benchmark. To ensure that the sample size met the minimum statistical requirements, the university student population of 90,000 (as per the Zimbabwe Council for Higher Education (ZIMCHE), 2018 (18)) was used. The minimum sample size was calculated at a 95% confidence interval using the Raosoft calculator (19). The minimum sample size was 385, derived using the following equations:

$$x = Z(c/100)2r(100-r)$$

$$n = N x / ((N-1)E^2 + x)$$

$$E = \text{Sqrt}[(N - n)x/n(N-1)] \quad (19)$$

$$N = \text{total population size (90,000)}$$

$$r = \text{estimated response proportion (in percentage; set to 50\% for maximum variability and conservative estimate)}$$

$$Z(c/100) = \text{Z-score for confidence level } c \quad (1.96 \text{ for } 95\% \text{ confidence})$$

$$E = \text{desired margin of error (5\%)}$$

$$X = \text{initial sample size estimate without finite population correction}$$

$$n = \text{adjusted minimum required sample size after applying finite population correction (19)}$$

To account for non-response, 10% was added to the sample size, bringing the final minimum sample size to 424. Student representatives were tasked with disseminating the questionnaire links to their respective student bodies. Given the study's 8-month data collection period, a larger sample was included to improve the precision and reliability of our estimates. Larger studies reduce the margin of error and standard deviation, yielding results that are more robust and less sensitive to variability. Additionally, a larger sample size helps control the risk of false-negative or false-

positive findings, enhances the power of subgroup analyses, improves the generalisability of the findings, and facilitates meaningful comparisons with similar studies.

Data collection

A questionnaire was used to assess respondents' knowledge and awareness of ocular allergy, along with demographic details such as age, gender, year of study, and college major. It included multiple-choice and true/false questions, was anonymous, and was distributed via social media by university representatives. Questionnaires were delivered in English for clarity, and the survey took 4 - 6 minutes to complete. The validated three-part questionnaire was originally developed by Kyei et al (5). Awareness was defined as having heard of ocular allergy and assessed through questions on global and national epidemiology. Knowledge questions focused on the definition, symptoms, causes, and treatment of the condition.

Data analysis

The data obtained were entered into the Statistical Package for the Social Sciences (SPSS version 21). Descriptive statistics, frequency tables and percentages were used in the data analysis and interpretation. The relationship between awareness of ocular allergy and demographic factors such as age, gender, level, and programme of study was assessed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations

Ethical approval was obtained from the Bindura University of Science Education Ethics Committee with approval number 0016/2022. Participants were given a full explanation of the study's purpose. Participants' anonymity, confidentiality, and privacy were all maintained. The research did not utilise the individuals' real names or identities. Participation in the study was entirely optional, and participants were free to leave at any moment. At the beginning of the questionnaire, participants were required to indicate their

consent by selecting an "I Agree" option before proceeding with the questionnaire. Participants who did not provide consent were unable to complete the survey

Results

The study included 1000 undergraduate students, comprising 54.1% males and 45.9% females. Their age ranged between 18 and 42 years. Most of the students were black and from rural areas (Table 1). Most students (29.3%) were from the science faculties and were in their third year (34.0%).

Almost all the participants (96.1%) were enrolled in the conventional study type. A significant association was found between sex and place of origin, the year of study, and the course of study ($p < 0.001$) (Table 1).

Knowledge of ocular allergy according to the programme of study

Overall, most of the students had a fair knowledge about understanding of ocular allergies. More than half of the participants (55.3%) reported that ocular allergies are eye inflammation in response to a harmless foreign substance.

Among the programs of study, the participants from the Health Sciences had the highest response concerning this option. Most participants (37.1%) reported that the structures involved in ocular allergy included the conjunctiva, cornea, and eyelid. Among the program of study, most business student participants (40.1%) chose this option. About 60.6% of the participants reported that ocular allergies are transmitted from person to person.

Table 1:
Demographic Characteristics of Participants

Variables		Sex		Total (%)	p-values
		Female	Male		
Race	Black	454	534	988 (98.8)	0.654
	Mixed	5	6	11 (1.1)	
	White	0	1	1 (0.1)	
Place of Origin	Farm	65	187	252 (25.2)	P < 0.001
	Peri-urban	72	58	130 (13.0)	
	Rural	127	185	312 (31.2)	
	Urban	195	111	306 (30.6)	
Year of Study	1	127	52	179 (17.9)	P < 0.001
	2	126	185	311 (31.1)	
	3	117	223	340 (34.0)	
	4	85	73	158 (15.8)	
	5	4	7	11 (1.1)	
	6	0	1	1 (0.1)	
Program of study	Arts	97	131	228 (22.8)	P < 0.001
	Business	81	56	137 (13.7)	
	Education	82	165	247 (24.7)	
	Health Sciences	71	24	95 (9.5)	
	Sciences	128	165	293 (29.3)	
Type of Study	Block	16	23	39 (3.9)	0.533
	Conventional	443	518	961 (96.1)	
Total		459 (45.9)	541 (54.1)	1000 (100)	

Concerning preventing ocular allergies, avoiding the source of the trigger (34.5%) was the primary response, followed by staying away from those with the disease (28.7%). Most participants (83.2%) knew the

substances that triggered eye allergies, Table 2. A Pearson Chi-square association test showed that there was a significant relationship between all the questions on knowledge of ocular allergy and the programme of study, $p < 0.05$.

Table 2:
Knowledge of Ocular Allergy According to Programme of Study

Variables	Sub-group	Programme of study					Total	P-value
		Arts	Business	Education	Health Sciences	Sciences		
What is your understanding of ocular allergy?	Inflammation of the eye in response to a harmless foreign substance	109 (47.8)	86 (62.8)	128 (51.8)	73 (76.8)	157 (53.6)	553	$P < 0.001$
	Discomfort and pain in the eye	86 (37.7)	39 (28.5)	83 (33.6)	14 (14.7)	97 (33.1)	319	
	Caused by the frequent rubbing of the eye	30 (13.2)	10 (7.3)	31 (12.6)	3 (3.2)	25 (8.5)	99	
Eye structures involved in ocular allergy include?	Do not know	3 (1.3)	2 (1.5)	5 (2.0)	5 (5.3)	14 (4.8)	29	$P < 0.001$
	Conjunctiva, cornea, eyelid	89 (39.0)	55 (40.1)	86 (34.8)	36 (37.9)	105 (35.8)	371	
	Conjunctiva	74 (32.5)	27 (19.7)	82 (33.2)	16 (16.8)	106 (36.2)	305	
	Cornea	40 (17.5)	29 (21.2)	54 (21.9)	11 (11.6)	54 (18.4)	188	
	Conjunctiva, cornea, limbus, eyelid	19 (8.3)	23 (16.8)	19 (7.7)	26 (27.4)	17 (5.8)	104	
	Do not know	6 (2.6)	3 (2.2)	6 (2.4)	6 (6.3)	11 (3.8)	32	
Are ocular allergies transmitted from person to person?	Yes	162 (71.1)	69 (50.4)	166 (67.2)	32 (33.7)	177 (60.4)	606	$P < 0.001$
	No	49 (21.5)	53 (38.7)	62 (25.1)	53 (55.8)	96 (32.8)	313	
	Don't know	17 (7.5)	15 (10.9)	19 (7.7)	10 (10.5)	20 (6.8)	81	
What is the best way to prevent ocular allergy?	Avoid the source of triggers	65 (29.8)	43 (31.4)	75 (30.4)	53 (55.8)	109 (37.2)	345	0.023
	Stay away from those with the disease	72 (31.6)	40 (29.2)	77 (31.2)	19 (20.0)	79 (27.0)	287	
	Apply anti-allergic drugs	68 (29.8)	39 (28.5)	68 (27.5)	15 (15.8)	71 (24.2)	261	
	Visit eye clinics	15 (6.6)	10 (7.3)	14 (5.7)	5 (5.3)	21 (7.2)	65	
	Don't know	8 (3.5)	5 (3.6)	13 (5.3)	3 (3.2)	13 (5.3)	42	
Do you know substances that trigger allergies in the eye?	Yes	196 (86.0)	102 (74.5)	212 (85.8)	67 (70.5)	255 (87.0)	832	$P < 0.001$
	No	32 (14.0)	35 (25.5)	35 (14.2)	28 (29.5)	38 (13.0)	168	

Knowledge of the signs and symptoms of ocular allergy

Table 3 describes the participants' knowledge of the signs and symptoms of ocular allergy. More than 50% of the participants reported "yes" to all the signs and symptoms of ocular allergy. The most common sign was redness (94.0%), followed by itching (71.1%) and tearing (69.0%), Table 3.

Knowledge of the forms of ocular allergy

Most of the participants had poor knowledge about the forms of ocular allergy. The majority wrongly identified Bacterial Conjunctivitis (86.6%) and viral conjunctivitis (54.1%) as forms of ocular allergy, whilst most of the participants correctly identified seasonal conjunctivitis (63.2%), with the other forms of ocular allergy having less than fifty percent (50%) "Yes" response, Table 4.

Awareness of ocular allergy according to the programme of study

More than three-fourths of the participants reported that ocular allergy affects millions of people annually. This response was

also predominant among the individual study programs. More than half of the responders thought that 40% of Zimbabweans suffer from ocular allergies. About 58.6% of the participants reported that ocular allergy could lead to visual loss. Most participants said that ocular allergy is commonly encountered by general and eye care practitioners (71.1%) and is associated with itching (62.2%), Table 5. A Pearson Chi-square association test showed that there was a significant relationship between the awareness of the prevalence of ocular allergy in Zimbabwe and the programme of study.

Sources of information on ocular allergy among participants

Sources of information on ocular allergy, as reported by the participants, included friends or relatives, the internet, media, eye specialists, training programs, books, and schools. Among the participants, 625 (62.5%) said that they learned about the topic mostly from friends or relatives. With 306 (30.6%) responding that the internet was the second most used resource. Figure 1

Table 3:
Knowledge of Signs and Symptoms of Ocular Allergy

Signs and symptoms	Count (%)		
	Yes	No	Do not know
Redness	940 (94.0)	42 (4.2)	18 (1.8)
Itching	711 (71.1)	181 (18.1)	108 (10.8)
Tearing	690 (69.0)	160 (16.0)	150 (15.0)
Blurred vision	638 (63.8)	200 (20.0)	162 (16.2)
Discharge	623 (62.3)	231 (23.1)	146 (14.6)
Photophobia	609 (60.9)	215 (21.5)	176 (17.6)
Headache	599 (59.9)	302 (30.2)	99 (9.9)
Nausea	501 (50.1)	310 (31.0)	189 (18.9)

Table 4:
Knowledge of the Forms of Ocular Allergy

Forms of ocular allergy	Frequency (%)		
	Yes	No	Do not know
Bacterial conjunctivitis	866 (86.6)	92 (9.2)	42 (4.2)
Seasonal conjunctivitis	632 (63.2)	247 (24.7)	121 (12.1)
Viral conjunctivitis	541 (54.1)	226 (22.6)	233 (23.3)
Giant papillary vernal conjunctivitis	468 (46.8)	228 (22.8)	304 (30.4)
Perennial conjunctivitis	457 (45.7)	232 (23.2)	311 (31.1)
Atopic keratoconjunctivitis	420 (42.0)	211 (21.1)	369 (36.9)

Discussion

Allergic ocular conditions have been on the rise over the last decade (2,20). Health promotion and education on ocular allergies and their triggers remain one of the non-pharmacological strategies for preventing allergic eye conditions (21). The knowledge of ocular allergies among participants was adequate; on average, 59% of the participants

understood that OA conditions are inflammatory reactions to harmless foreign substances. The participants were between the ages of 18 and 42 years; hence, our sample covered the entire demographic spectrum of adult participants who may be susceptible to different types of ocular allergic conditions.

Table 5:
Awareness of Ocular Allergy According to Programme of Study

Variables	Sub-group	Programme of study					Total	P-values
		Arts	Business	Education	Health Sciences	Sciences		
"In your opinion, does ocular allergy affect millions of people worldwide each year?"	Yes	188 (82.5)	104 (75.9)	201 (81.4)	83 (87.4)	239 (81.6)	815	0.255
	No	29 (12.7)	23 (16.8)	32 (13.0)	4 (4.2)	36 (12.3)	124	
	Don't know	11 (4.8)	10 (7.3)	14 (5.7)	8 (8.4)	18 (6.1)	61	
"About forty percent of the Zimbabwean population suffers from ocular allergy".	Yes	126 (55.3)	89 (65.0)	126 (51.0)	50 (52.6)	172 (58.7)	563	$P < 0.001$
	No	69 (30.3)	31 (22.6)	87 (35.2)	16 (16.8)	82 (28.0)	285	
	Don't know	33 (14.5)	17 (12.4)	34 (13.8)	29 (30.5)	39 (13.3)	152	
"Could ocular allergy lead to visual loss?"	Yes	137 (60.1)	80 (58.4)	136 (55.1)	61 (64.2)	172 (58.7)	586	0.246
	No	51 (22.4)	41 (29.9)	61 (24.7)	20 (21.1)	61 (20.8)	234	
	Don't know	40 (17.5)	16 (11.7)	50 (20.2)	14 (14.7)	60 (20.5)	180	
"Ocular allergy is one of the most common eye conditions encountered by General Practitioners as well as eye care practitioners"	Yes	165 (72.4)	89 (65.0)	176 (71.3)	65 (68.4)	216 (73.7)	711	0.497
	No	33 (14.5)	30 (21.9)	41 (16.6)	15 (15.8)	37 (12.6)	156	
	Don't know	30 (13.2)	18 (13.1)	30 (12.1)	15 (15.8)	40 (13.7)	133	
"The majority of people who have ocular allergy experience itching as the primary source of discomfort."	True	131 (57.5)	89 (65.0)	152 (61.5)	64 (67.4)	186 (63.5)	622	0.174
	False	58 (25.4)	32 (23.4)	60 (24.3)	20 (21.1)	51 (17.4)	221	
	Do not know	39 (17.1)	16 (11.7)	35 (14.2)	11 (11.6)	56 (19.1)	157	
Total		228	137	247	95	293	1000	

As noted in a previous study (5), we anticipated that the type of educational programme participants were enrolled in could influence their knowledge of ocular allergies. Specifically, we reasoned that students in science-related programmes might be more informed about ocular allergies, possibly due to their exposure to medical or eye care professionals, and therefore may have a more advanced understanding compared to those in non-science-related programmes (9). Consistent with our expectations, participants who were enrolled in the health sciences programme responded overwhelmingly (77%) that allergies are inflammatory in their origin, with Pearson's Chi-square showing a statistically significant association between knowledge of OA and type of programme. This proportion is consistent with proportions reported in entirely different population demographics in Saudi Arabia (15). Participants who were enrolled in the arts programme tended to lean more towards a more basic understanding of ocular allergies, such as "discomfort and pain within the eye". Indeed, because the majority of the participants in this study were enrolled in the health sciences programme we could argue that the knowledge of participants was adequate because the sample included more participants enrolled in science programmes, however in the absence of all the participants enrolled in science programmes, participants awareness was 54% which was still adequate hence these results

cannot be attributed to overrepresentation of some group of participants over others.

With respect to their knowledge of ocular structures affected by allergic conditions, the majority of the participants in the health sciences group indicated all the relevant ocular structures that could be affected in an allergic eye condition while the Arts group did not consider the limbus for instance as one of the ocular structures that is susceptible to ocular allergies. This could be attributed to their limited detailed knowledge about the anatomical structures of the eye, unlike the participants in the health science programme. The level of knowledge about allergic conditions, being one of the most common eye conditions encountered by GPs and primary eye care providers, was the same across the different student groups. Surprisingly majority of participants in the Arts group agreed that allergic conditions can be contagious. This knowledge might have been influenced by acute hemorrhagic conjunctivitis, which is a very common seasonal infectious ocular condition of viral origin and is very popular in many parts of Africa (Popularly known as "Apollo" in West Africa). Participants with a science background, however, understood allergic conditions enough to know that the majority of allergic eye conditions are not contagious. We, however, note another line of evidence suggesting that having a scientific background does not influence one's knowledge or awareness of allergic ocular conditions (15).

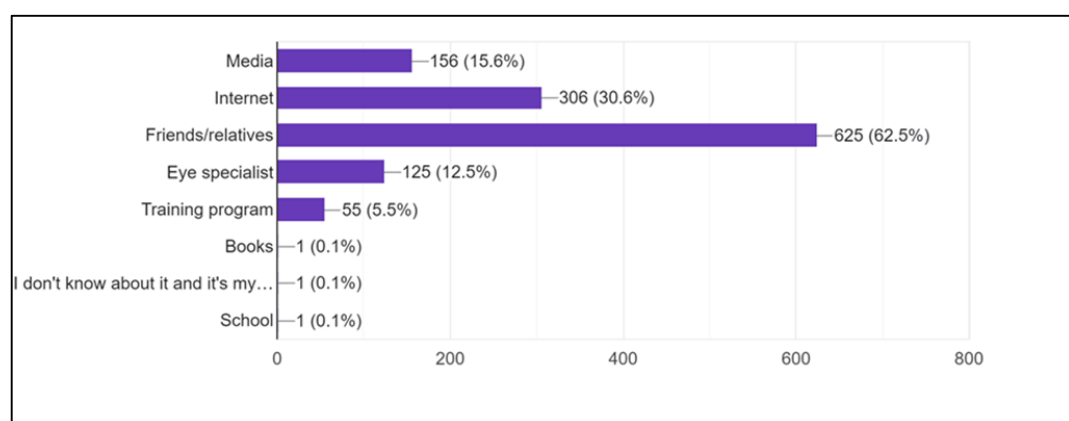


Figure 1:
Sources of Information on Ocular Allergy among Participant

While this may be the case, the demographic composition of participants in the study conducted in Saudi Arabia is entirely different and may be less exposed to allergic eye conditions compared to the demographic features of the participants involved in our study. Also, variations in upbringing and cultural differences between the participants in the two settings may have contributed to this discrepancy.

Regarding the common signs and symptoms of ocular allergies, participants were questioned about several signs and symptoms, in all cases, more than half of the participants' responses suggested good knowledge of signs and symptoms of ocular allergy with 94% responding that redness is the main symptom of ocular allergy followed by itching at 74%. In the study by Kyei et al (5), an equally high proportion (86.5%) of participants reported itching as the main symptom of ocular allergy. While in the current study, itching was the second most common symptom after redness, indeed, itching has been reported widely as the hallmark of ocular allergies, without which it would be difficult to make a definite diagnosis (22). Hyperaemia (Redness) is also an important sign of ocular allergy, usually occurring together with itching, which results mainly from rubbing of the eyes and subsequent dilation of blood vessels in the conjunctiva for increased blood flow to the location of the allergen. Expectedly so, because it could be related to more serious health conditions than ocular allergy. Nausea was the least recognised symptom of ocular allergy.

Our results indicate that a large proportion of the participants demonstrated poor knowledge about the forms of ocular allergy, as evidenced by their incorrect identification of bacterial conjunctivitis (86.6%) and viral conjunctivitis (54.1%) as types of ocular allergy. This misconception may stem from the overlapping symptoms of conjunctivitis and ocular allergies, such as redness, itching, and tearing, leading to confusion between infectious and allergic etiologies. Additionally, limited exposure to

eye care education may contribute to the misunderstanding. However, a significant portion (63.2%) correctly identified seasonal conjunctivitis as a form of ocular allergy, possibly due to greater public awareness of its association with allergens like pollen, with the Jacaranda season in Zimbabwe linked with OA (23). The lower recognition of other allergic conjunctivitis forms may indicate a lack of knowledge about the different subtypes or limited firsthand experience with these conditions.

The awareness of participants assessed on the prevalence of ocular allergies was good (>50%) regardless of the participants' programme of study. This shows a general level of good knowledge among the participants about the epidemiological characteristics of ocular allergies. Contrary to previous reports that the internet is the main source of information on ocular allergy (5), the majority (62.5%) of participants in the current study indicated that families and friends were their primary sources, followed by 30% who obtained their information from the internet. This is indicative of good interaction between families and friends. However, our results also indicate that only 0.1% of the participants got their information from school.

Study strengths and limitations

We acknowledge that participants in this study were selected from all public universities in Zimbabwe, which eliminates issues of the generalisability of results. Nonetheless, to the best of our knowledge, this is the first of this kind of study in any Zimbabwean population.

Conclusion

Undergraduate students in Zimbabwe have a good awareness of ocular allergies, but knowledge gaps remain, especially regarding different forms. Science students understand definitions, signs, and symptoms better than others. Targeted education is essential to improve awareness.

Recommendations

We recommend future studies that will randomly sample students from Universities across the country and possibly include an equal number of participants in each programme of study and university.

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Availability of data statement. Data is available upon request from the corresponding author.

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