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Research Article

First Aid Awareness of Eye Injuries Among University Students and Staff: A Cross-Sectional Study at Al-Baha University, Saudi Arabia.

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Abstract

Background: Eye injuries are a major cause of preventable visual impairment worldwide. Immediate and appropriate first aid is crucial in mitigating complications, yet public awareness remains inadequate in many settings.

Aim: To assess the awareness level regarding first aid for eye injuries among Al-Baha University students and staff, and to examine the association between sociodemographic variables and first aid practices and knowledge.

Methods: A descriptive cross-sectional study was conducted among 569 participants at Al-Baha University using a self-administered, structured questionnaire. The tool assessed sociodemographic characteristics, awareness level of first aid for different types of eye injuries, and sources of information and awareness engagement. Data were analysed using SPSS employing both descriptive and inferential statistics, including chi-square tests and bivariate logistic regression to explore associations and predictors of practice and knowledge levels.

Results: Although 84.00% of participants demonstrated good theoretical knowledge, only 39.90% had good practical awareness. Female participants and diploma holders had significantly higher awareness regarding the practices of first aid for eye injury ($p< 0.05$). Knowledge was associated with marital status, profession, academic affiliation, and years of experience. Participants with good practices were 4.42 times more likely to have good knowledge ($p< 0.001$).

Conclusion: There is a significant gap between knowledge and practice in eye injury first aid. Enhanced training and structured educational programs are needed, particularly in university environments, to promote effective emergency responses.

Keywords: Eye injuries; First aid awareness, Public health; Ocular trauma; Health education; Sociodemographic factors

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Introduction

The eye is one of the most essential sensory organs, providing critical visual input that influences daily functioning, communication, and overall quality of life. Any impairment or damage to the eye can significantly impact an individual's independence, productivity, and psychological well-being (Assi et al., 2020, Assi et al., 2021, Hirneiss, 2014). Given its importance, injuries affecting the eye are a critical public health concern worldwide due to their high prevalence and potential to cause permanent visual impairment and blindness. They are a leading cause of preventable vision loss, particularly in low- and middle-income countries where access to appropriate eye care remains limited, imposing a substantial burden on healthcare systems, individuals, and communities (Aghadoost, 2014, Li et al., 2023). It

is estimated that eye injuries contribute to approximately 1.6 million cases of blindness, 2.3 million cases of bilateral low vision, and 19 million cases of monocular blindness worldwide annually (Li et al., 2023, Négrel and Thylefors, 1998).

Eye injuries can result from various causes, including blunt trauma, chemical exposure, penetrating injuries, and foreign bodies. These injuries are particularly prevalent in industrial and occupational settings such as construction, metalwork, agriculture, and laboratory work, where the absence or improper use of protective eyewear significantly increases the risk of ocular trauma (Singh et al., 2023, Almoosa et al., 2017, Mancini et al., 2005, Kyriakaki et al., 2021). Work-related eye injuries constitute a significant proportion of emergency department visits, highlighting the importance of implementing effective safety measures and promoting awareness in high-risk environments (Xiang et al., 2005).

Despite advancements in medical care, inadequate awareness and improper handling of ocular injuries remain prevalent, contributing to adverse outcomes and increased healthcare burdens. Early intervention plays a critical role in determining the prognosis of eye injuries. Prompt and appropriate first aid measures can significantly improve outcomes by preventing complications and reducing the severity of visual impairment. This is especially crucial for injuries involving chemical exposure or foreign bodies, where delays in treatment can result in irreversible damage (Duvall-Young, 2018, Pargament et al., 2015). However, studies have shown that poor knowledge of first aid measures for eye injuries is common, even among individuals expected to have a higher level of competence, such as health science students. Research has demonstrated that inadequate first aid can exacerbate injuries, complicate treatment, and worsen visual outcomes (Amro, 2021, Asiri et al., 2024, Idrees et al., 2024).

In Saudi Arabia, studies assessing awareness level regarding eye injury first aid have identified significant knowledge gaps across various populations (Dhabaan et al., 2021, Asiri et al., 2024, Alhothali et al., 2023). University settings are particularly important for evaluating eye injury awareness due to the diverse activities undertaken by students and staff, including laboratory work, recreational sports, and industrial training, all of which present potential hazards if proper safety measures are not observed. Furthermore, the transition from high school to university exposes students to unfamiliar risks associated with practical work in various academic disciplines, increasing their vulnerability to ocular injuries (Maurya et al., 2013, Ajayi and Ajayi, 2008, Idrees et al., 2024). Despite the prevalence of these risk factors, research focused on eye injury first aid awareness among university students and staff remains limited. Therefore, identifying knowledge gaps and providing targeted education can significantly improve outcomes and reduce the burden of ocular injuries on both individuals and healthcare systems.

Aim of the Study

This study aims to assess the awareness level of first aid for eye injuries among university students and staff at Al-Baha University, and to examine how sociodemographic factors influence this awareness. It further seeks to explore the association between sociodemographic variables and participants' knowledge and practices, identifying key factors influencing preparedness and response in ocular emergencies.

Materials and Methods

Study Design and Setting

This descriptive cross-sectional study was conducted at Al-Baha University, Saudi Arabia, from May 2024 over two months. The study aimed to assess the awareness level of first aid for eye injuries among students and staff members across various faculties and deanships. Participants were recruited from Medical Faculties, Scientific and Engineering Faculties, Humanitarian, Educational and Administrative Faculties, and Supporting Departments and Deanships.

Study Population and Sampling

The target population included students, faculty members, and employees aged 18 years or older who were willing to participate. A total of 569 participants were included, providing a representative overview of awareness levels across the university population.

Data Collection Tool and Procedure

Data were collected using a self-administered structured questionnaire designed by the researcher following a comprehensive literature review. The questionnaire was distributed online via university e-mail addresses, and participants provided informed consent prior to participation. The questionnaire consisted of 27 questions divided into four sections:

1. Sociodemographic Information (9 questions): Age, gender, nationality, marital status, children status, educational level, profession, academic affiliation, and years of experience.

2. History of Ocular Diseases (1 question)

3. Awareness Level (13 questions): Practices and knowledge of appropriate first aid measures for various eye injury scenarios such as chemical injuries, penetrating injuries, blunt trauma, scratches, foreign bodies, and thermal burns.

4. Sources of Information and Awareness Engagement (4 questions): sources of information on first aid for eye injuries, perception of the importance of awareness, prior participation in training, and support for organizing educational workshops.

Awareness levels were determined based on participants' responses to 13 structured items, each reflecting a first aid scenario. A scoring system was applied wherein one point was awarded for each correct response. Cumulative scores below 60% were classified as indicative of poor awareness, while scores of 60% or above denoted good awareness.

Validity, Reliability, and Pilot Testing

The content validity of the questionnaire was established through expert consultation with specialists in ophthalmology and public health from Al-Baha University. To ensure clarity, relevance, and comprehensiveness, a pilot study was conducted with 10% of the sample (N=30). As no adjustments were deemed necessary, their responses were included in the final analysis.

Reliability was assessed using the test-retest method and Cronbach's alpha coefficient, yielding a value of 0.89, indicating a high level of internal consistency.

Ethical Considerations

Ethical approval was obtained from the Scientific Research Ethics Committee (Approval No. 45125907) at the Deanship of Innovation and Scientific Research, Al-Baha University. Participants were assured of their anonymity and the confidentiality of their responses. They were informed that participation was voluntary and that they could withdraw from the study at any time without consequences.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' demographic characteristics and awareness levels. To examine relationships between sociodemographic variables and participants' levels of awareness, practices and knowledge regarding first aid for eye injuries, inferential statistics were applied. These included chi-square tests and likelihood ratio tests, with statistical significance established at $p < 0.05$. Furthermore, bivariate logistic regression analysis was conducted to identify key predictors of good knowledge and proper first aid practices.

Results

Sociodemographic profile of study participants

The survey included 569 participants who completed the questionnaire. The participants' ages ranged between 18 and 60 years, with a mean age of 22.23±10.47 years. Notably, more than half of the participants (56.94%, N=324) were aged 20 years or younger. The majority of participants (94.38%) were Saudi nationals. Most of the participants were female (83.83%), and 80.49% were single, whereas a small percentage of 19.51% were married, with an overall of 17.92% reporting having children. (Table 1).

Table 1: Sociodemographic Characteristics of Study Participants (gender, nationality, material status, having children, and age) (N=569).

Variables		Frequency (N)	Percentage (%)
Gender	Female	477	83.83
	Male	92	16.17
Nationality	Saudi	537	94.38
	Non-Saudi	32	5.62
Marital status	Unmarried	458	80.49
	Married	111	19.51
Having children	No	467	82.07
	Yes	102	17.92
Age	≤ 20	324	56.94
	21 – 30	146	25.66
	31 – 40	48	8.44
	41 – 50	40	7.03
	> 50	11	1.93
	Mean ± Std. Deviation	22.23 ± 10.47	

The majority of participants held a bachelor's degree (64.85%), followed by secondary school education or less (19.51%). In terms of profession, 80.49% of the participants were students, followed by employees (11.25%) and staff members (8.26%). Regarding academic affiliation, over half of the participants belonged to the medical faculties (56.24%) of Al-Baha University, followed by the humanities, education, and administrative faculties (19.16%) and scientific and engineering faculties (17.22%). When asked about their experience, 53.60% reported having 1–5 years of experience, while 21.96% had less than one year, and 12.82% had 11–20 years (Table 2).

Table 2: Sociodemographic Characteristics of Study Participants (educational levels, profession, speciality, and experience) (N=569).

Variables		Frequency (N)	Percentage (%)
Educational level	Secondary school or below	111	19.51
	Diploma	49	8.61
	Bachelors (B.Sc.)	369	64.85
	Masters (M.Sc.)	12	2.11
	Ph.D. or higher	28	4.92

Profession	Student	458	80.49
	Faculty member	47	8.26
	Employee	64	11.25
Academic Affiliation	Medical Faculties	320	56.24
	Scientific and Engineering Faculties	98	17.22
	Humanitarian, Educational and Administrative Faculties	109	19.16
	Supporting Departments and Deanships	42	7.38
Experience	< 1 year	125	21.96
	1 – 5 years	305	53.60
	6 – 10 years	40	7.00
	11 – 20 years	73	12.82
	> 20 years	26	4.56

Out of the 569 participants, the majority (86.6%, N=493) reported having no prior history of eye disease or ocular surgery. In contrast, 13.4% (N=76) indicated a history of eye-related medical conditions (Fig. 1).

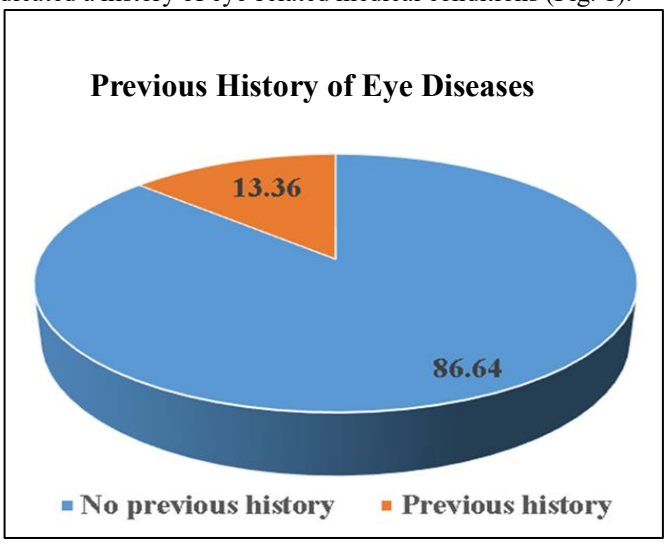

Fig. 1: Distribution of participants based on their previous history of eye diseases (N=569).

First aid awareness of eye injuries

This research investigation assessed the first aid awareness of eye injuries among university participants, revealing several critical insights. The results of this study provided a mixed response of correct answers, misconception, and areas requiring improvements (Table 3).

When participants were asked about the appropriate first aid response to the entry of a foreign body into the eye, 74.87% correctly identified rinsing the eye with clean water as the best method for removing small particles such as sand or dust. A smaller proportion (8.44%) indicated they would seek immediate medical help, which may not be necessary unless symptoms persist. Notably, 6.50% reported using tissue paper to remove the impurities, a potentially harmful practice that can worsen irritation or introduce infection. In response to a scenario involving curettage or scratching of the cornea, the majority of participants (77.15%) correctly identified seeking immediate medical assessment at a hospital emergency department as the appropriate action. In contrast, 6.85% chose to apply an eye sanitizing solution, while smaller proportions suggested blinking to moisturize the eye (5.27%) or using a warm compress (4.75%). In cases involving eye penetration by a sharp object, 68.54% emphasized not touching the eye while seeking urgent medical attention. However, 11.60% incorrectly selected the option of removing the object immediately, a highly dangerous action that can lead to severe complications or further injury.

Regarding the appropriate response to an eye injury caused by plant branches or leaves, 43.05% of participants correctly identified visiting a doctor promptly as the best course of action to assess the condition and receive necessary treatment. Meanwhile, 19.51% reported that they would blink frequently to remove impurities. When asked about the appropriate immediate action following a direct blow to the eye, the majority of participants (57.29%) correctly identified applying a cold compress to reduce swelling and monitoring for changes in vision or symptoms requiring medical care. A smaller percentage (11.07%) chose to apply pressure with a clean cloth in cases of visible bleeding, which may be inappropriate depending on the injury's nature. Notably, 18.10% of respondents stated they did not know the correct action to take. In response to the question about the appropriate procedure for a bruised eye, 50.79% of participants correctly selected applying a cold compress to reduce swelling as the best initial action. Meanwhile, 22.32% chose to apply a warm compress, which is not recommended during the acute phase of injury. In cases of eye bleeding following an injury, 37.61% of participants correctly identified that the eye should be covered with a clean cloth without

applying pressure, followed by seeking immediate medical help. However, 25.66% of participants admitted they did not know the appropriate action to take.

Regarding exposure to thermal burns, only 29.35% correctly identified rinsing the eye with lukewarm water several times and monitoring for symptoms that may require medical attention. A notable 41.65% indicated that they did not know the correct response. In response to chemical exposure in the eye, the majority of participants (62.03%) correctly identified rinsing the eye with clean water several times followed by seeking medical help as the appropriate immediate step. Regarding the recommended duration for eye washing after chemical exposure, the highest proportion of participants (29.87%) reported that they did not know the correct duration, while 16.69% correctly selected rinsing the eye with water for 15 minutes. When asked about the correct course of action in the event of an eye injury while wearing contact lenses, the highest proportion of participants (43.06%) correctly responded that if symptoms are severe, contact lens removal should be postponed until a doctor can provide proper guidance. The second most common response (26.71%) was from participants who stated they did not know the correct action.

The participants correctly recognized key symptoms that require immediate medical attention, including sudden loss of vision (80.14%), intense pain (68.01%), and changes in pupil shape (64.50%). Other correct responses included sudden flickering or dark spots in the field of vision (60.11%), double vision (46.75%), and extreme sensitivity to light (40.25%). However, a considerable number also selected less critical symptoms such as itching or distraction (38.84%), redness (30.40%), and tearing (16.52%), which do not typically require urgent care. Regarding potential complications that may occur if appropriate first aid is not administered in a timely manner, the majority correctly identified serious consequences. A decrease in vision level (67.66%) was the most commonly recognized complication, followed by blindness (57.29%), corneal opacity (54.30%), and retinal detachment (47.45%).

Table 3: Frequency and percentage distribution of first aid awareness of eye injuries (N=569)

S. NO.	Questions	Response of the participants	No.	%
1	What do you think is correct if small impurities or a foreign body get into the eye (such as grains of sand)?	Use tissue paper to remove impurities	37	6.50
		Seek immediate medical help	48	8.44
		Rinse the eye with clean water	426	74.87
		Blowing air towards the eye	25	4.39
		I don't know	33	5.80
2	What is the correct action in the event of curettage or scratching of the cornea?	Go to the hospital emergency department to assess the situation	439	77.15
		Blink frequently to moisturise the eyes	30	5.27
		Apply a warm compress to the eyes	27	4.75
		Apply drops of eye sanitising solution	39	6.85
		I don't know	34	5.98
3	What immediate step should be taken if the eye is pierced with a sharp object (such as a nail or skewer)?	Remove the sharps immediately, go to the hospital	66	11.59
		Apply pressure to the eye with a clean cloth to stop bleeding	39	6.85
		Rinse with lukewarm water and soap; immediately seek medical attention	10	1.75
		Do not touch the eye and keep the sharps on position, immediately go to the hospital	390	68.54
		I don't know	64	11.20
4	What is the correct action in the event of an eye injury caused by plant branches or leaves?	Close your eyes and keep them closed, and seek health care attention if symptoms develop	67	11.77
		Blinking frequently to remove any impurities from the eye	111	19.51
		Visit a doctor as soon as possible to assess the condition and provide the necessary treatment.	245	43.05
		Apply drops of eye sanitizing solution	59	10.36
		I don't know	87	15.29
5	What is the correct action in the event of a direct blow to the eye?	Apply pressure to the eye with a clean cloth in case of any bloody bleeding	63	11.07
		Apply a cold compress to reduce swelling, and monitor for a change in vision or the appearance of symptoms that may require medical care	326	57.29
		Apply a warm compress and apply sterile eye drops	41	7.20
		Rubbing the eye to relieve pain and swelling, then visit your doctor to evaluate the condition	36	6.32
		I don't know	103	18.10
6	What is the appropriate procedure if the eye is bruised?	Apply a cold compress to reduce swelling	289	50.79
		Apply a warm compress immediately to relieve pain	127	22.32
		Rinse the eye with saline and then cover	25	4.39
		Eye scrub to increase blood flow	11	1.93
		I don't know	117	20.56

7	What is the correct action if bleeding comes out of the eye after the injury?	Tilt the head back to stop bleeding, and wipe the eye with a clean cloth and dampened in saline	32	5.62
		Use an ice pack to stop the bleeding, then seek medical help	85	14.94
		Apply direct pressure to the eye with a clean cloth to stop the bleeding, then seek medical help	92	16.17
		Cover the eye with a clean cloth and avoid any pressure on the eye, and seek medical help	214	37.61
		I don't know	146	25.66
8	What is the correct action if the eye is exposed to thermal burns?	Use alcohol to disinfect, then cover the eye with a clean bandage	39	6.85
		Apply pressure to the eye using ice packs to relieve pain from burns	81	14.23
		Rinse the eye with lukewarm water several times, and monitor for any symptoms that may require medical attention	167	29.35
		Gently rub the eye to relieve pain, remove any sticking material, and then seek medical attention	45	7.91
		I don't know	237	41.65
9	What is the immediate step to take if a chemical enters the eye?	Close your eyes and keep them closed, and seek medical help	56	9.84
		Blinking frequently to try to get some of the chemical liquid out, then seek medical help	24	4.22
		Rinse the eye with clean water several times, then seek medical help	353	62.03
		Apply eye sanitizing solution and immediate seek medical help	78	13.71
		I don't know	58	10.19
10	How long is the recommended eyewash with water if exposed to a chemical?	5 minutes	126	22.14
		15 minutes	95	16.69
		Continue to wash with water until medical help arrives	140	24.60
		Eye wash is with saline solution only and not water	38	6.68
		I don't know	170	29.87
11	What is the correct action if an eye injury occurs while wearing contact lenses?	Whatever the type of injury, the contact lens must be removed	135	23.72
		If symptoms are severe after injury, lens removal should be postponed until you reach the doctor for any possible advice	245	43.06
		If the contact lens is not damaged, it is safe to leave it as such	22	3.86
		Contact lens can protect the eye from further damage during injury	15	2.64
		I don't know	152	26.71
12	Which of the following symptoms do you think indicates a serious eye injury that requires immediate medical attention? (You can choose more than one answer)	Change in the shape of the pupil	367	64.50
		Sudden loss of vision	456	80.14
		Dual Vision	266	46.75
		Extreme sensitivity to light	229	40.25
		Sudden flickering or dark spots in the field of vision	342	60.11
		Feeling intense pain	387	68.01
		Feeling slight pain	66	11.60
		Itching or distraction	221	38.84
		Redness	173	30.40
		Tears	94	16.52
		I don't know	47	8.26
13	What complications do you think are likely to occur in the eye if the correct first aid is not performed in time? (You can choose more than one answer)	Decrease in vision level	385	67.66
		Corneal opacity	309	54.30
		Retinal detachment	270	47.45
		Blindness	326	57.29
		No complications will occur	28	4.92
		I don't know	104	18.27

Association between the sociodemographic variables and practices regarding the awareness of first aid for eye injuries
The overall awareness levels regarding eye injury first aid practices were categorised as poor and good. Among the 569 participants, 60.10% (n=342) demonstrated *poor awareness*, whereas 39.90% (N=227) showed a good level of awareness (Table 4).

Table 4: Awareness Levels of Participants Regarding First Aid Practices for Eye Injuries

Awareness level	Frequency	Percent
Poor	342	60.10
Good	227	39.90
Total	569	100.00

The distribution of participants' awareness levels as poor and good further provides the association between sociodemographic variables and first aid practices for eye injury, as shown in Table 5. A chi-square test of

independence was performed to examine the association between sociodemographic variables and awareness levels. Gender was significantly associated with awareness levels ($\chi^2(1)=3.208$, $p=0.046$) with a greater proportion of females (41.50%) exhibited good awareness compared to males (31.50%). The educational status of participants showed a statistically significant association ($\chi^2(4)=8.981$, $p=0.050$) with diplomas having highest proportion of good awareness (43.40%), while those with bachelor's degrees had a notably low level (22.50%). Other sociodemographic parameters such as age ($\chi^2(4)=2.458$, $p=0.642$), nationality ($\chi^2(1)=0.431$, $p=0.322$), marital status ($\chi^2(1)=0.856$, $p=0.207$), having children ($\chi^2(1)=1.097$, $p=0.175$), profession, Academic Affiliation, and years of experience did not show statistically significant associations with the awareness levels of practices of the first aid for eye injuries.

Table 5: Distribution of Participants' Awareness Levels and Their Association with Sociodemographic Variables Related to Practices of First Aid for Eye Injury

Sociodemographic data		Awareness Level		Chi-square (df)	Likelihood ratio	p value
		Poor; N (%)	Good; N (%)			
Gender	Male	63 (68.48)	29 (31.52)	3.208 (1)	3.286	0.046*
	Female	279 (58.49)	198 (41.51)			
Age	≤ 20	194 (59.88)	130 (40.12)	2.458 (4)	2.514	0.642
	21-30	83 (56.85)	63 (43.15)			
	31-40	30 (62.50)	18 (37.50)			
	41-50	28 (70.00)	12 (30.00)			
	> 50	7 (63.64)	4 (36.36)			
Nationality	Non-Saudi	21 (65.63)	11 (34.37)	0.431 (1)	0.438	0.322
	Saudi	321 (59.78)	216 (40.22)			
Marital status	Married	71 (63.96)	40 (36.04)	0.856 (1)	0.864	0.207
	Unmarried	271 (59.17)	187 (40.83)			
Having children	No	276 (59.10)	191 (40.90)	1.097 (1)	1.110	0.175
	Yes	66 (64.71)	36 (35.29)			
Educational level	Secondary school or below	69 (62.16)	42 (37.84)	8.981 (4)	9.483	0.050*
	Diploma	209 (56.64)	160 (43.36)			
	Bachelors (B.Sc.)	38 (77.55)	11 (22.45)			
	Masters (M.Sc.)	7 (58.33)	5 (41.67)			
	Ph.D. or higher	19 (67.86)	9 (32.14)			
Profession	Faculty member	33 (70.21)	14 (29.79)	2.903 (2)	2.982	0.225
	Student	268 (58.52)	190 (41.48)			
	Employee	41 (64.06)	23 (35.94)			
Academic Affiliation	Medical Faculties	179 (55.94)	141 (44.06)	6.048 (3)	6.141	0.105
	Scientific and Engineering Faculties	63 (64.29)	35 (35.71)			
	Humanitarian, Educational and Administrative Faculties	70 (64.22)	39 (35.78)			
	Supporting Departments and Deanships	30 (71.43)	12 (28.57)			
Experience	< 1 year	82 (65.60)	43 (34.40)	7.057 (4)	7.101	0.131
	1 – 5 years	168 (55.08)	137 (44.92)			
	6 – 10 years	26 (65.00)	14 (35.00)			
	11 – 20 years	48 (65.75)	25 (34.25)			
	> 20 years	18 (69.23)	8 (30.77)			

***p value ≤ 0.05**

Association between the sociodemographic variables and knowledge regarding the awareness of first aid for eye injuries

Out of the 569 participants, 84.00% (n=478) demonstrated good knowledge, while only 16.00% (N=91) had poor knowledge of first aid for eye injuries (Table 6). Chi-square analysis was conducted to explore the relationship between sociodemographic variables and knowledge levels (Table 7). Marital status showed a statistically significant association with knowledge of first aid for eye injuries ($\chi^2(1)=4.376$, $p=0.029$), with unmarried participants having good knowledge (85.59%) compared to married ones (77.48%). Having children also showed a significant association ($\chi^2(1)=5.254$, $p=0.019$), as participants without children demonstrated better knowledge (85.65%) than those with children (76.47%). Similarly, profession was significantly associated with knowledge levels ($\chi^2(2)=8.010$, $p=0.018$) in which faculty members had a greater proportion of good knowledge (87.23%) in comparison to the students (85.37%) and employees (71.88%). Academic affiliation also had a significant

relationship with knowledge levels ($\chi^2(3)=9.735$, $p=0.021$). Participants from medical faculties had the highest proportion of good knowledge (88.13%), while those from supporting departments and humanitarian faculties showed lower levels. Additionally, years of experience were significantly associated with knowledge of eye injury first aid ($\chi^2(4)=12.636$, $p=0.013$),with participants having less than one year or between one to five years of experience demonstrating higher levels of knowledge compared to those with longer professional experience. However, gender ($p=0.072$), age ($p=0.076$), nationality ($p=0.217$), or educational level ($p=0.739$) were not significantly associated with knowledge of first aid for eye injury awareness.

Table 6: Awareness Levels of Participants Regarding First Aid Knowledge for Eye Injuries

Awareness level	Frequency	Percent
Poor	91	16.00
Good	478	84.00
Total	569	100.00

Table 7: Distribution of Participants' Awareness Levels and Their Association with Sociodemographic Variables Related to Knowledge of First Aid for Eye Injury

Sociodemographic data		Awareness Level		Chi-square (df)	Likelihood ratio	p value
		Poor; N (%)	Good; N (%)			
Gender	Male	20 (21.74)	72 (78.26)	2.697 (1)	2.520	0.072
	Female	71 (14.88)	406 (85.12)			
Age	≤ 20	40 (12.34)	284 (87.66)	8.478 (4)	8.198	0.076
	21-30	28 (19.18)	118 (80.82)			
	31-40	11 (22.92)	37 (77.08)			
	41-50	10 (25.00)	30 (75.00)			
	> 50	2 (18.18)	9 (81.82)			
Nationality	Non-Saudi	3 (9.37)	29 (90.63)	1.105 (1)	1.225	0.217
	Saudi	88 (16.38)	449 (83.62)			
Marital status	Married	25 (22.52)	86 (77.48)	4.376 (1)	4.079	0.029*
	Unmarried	66 (14.41)	392 (85.59)			
Having children	No	67 (14.35)	400 (85.65)	5.254 (1)	4.839	0.019*
	Yes	24 (23.53)	78 (76.47)			
Educational level	Secondary school or below	22 (19.82)	89 (80.18)	1.983 (4)	1.980	0.739
	Diploma	7 (14.28)	42 (85.72)			
	Bachelors (B.Sc.)	57 (15.45)	312 (84.55)			
	Masters (M.Sc.)	2 (16.67)	10 (83.33)			
	Ph.D. or higher	3 (10.71)	25 (89.29)			
Profession	Faculty member	6 (12.77)	41 (87.23)	8.010 (2)	7.009	0.018*
	Student	67 (14.63)	391 (85.37)			
	Employee	18 (28.12)	46 (71.88)			
Academic Affiliation	Medical Faculties	38 (11.87)	282 (88.13)	9.735 (3)	9.564	0.021*
	Scientific and Engineering Faculties	19 (19.39)	79 (80.61)			
	Humanitarian, Educational and Administrative Faculties	24 (22.02)	85 (77.98)			
	Supporting Departments and Deanships	10 (23.81)	32 (76.19)			
Experience	< 1 year	16 (12.80)	109 (87.20)	12.636 (4)	11.102	0.013*
	1 – 5 years	41 (13.44)	264 (86.56)			
	6 – 10 years	13 (32.50)	27 (67.50)			
	11 – 20 years	15 (20.55)	58 (79.45)			
	> 20 years	6 (23.08)	20 (76.92)			

***p value < 0.05**

Association between first aid practices and knowledge of eye injuries

A total of 569 participants were evaluated to examine the relationship between their level of knowledge and first aid practices for eye injuries. Data analysis revealed a highly significant association between knowledge and practice levels ($\chi^2(1)=27.138$, $p < 0.001$) (Table 8). These results indicate that higher knowledge levels are

positively associated with better first aid practices. Among participants with poor practice (N=342), 77.48% (N=265) had good knowledge, whereas 22.52% (N=77) had poor knowledge. In contrast, among those with good practice (N=227), 93.83% (N=213) demonstrated good knowledge, and only 6.17% (N=14) had poor knowledge.

Table 8: Association Between First Aid Practices and Knowledge of Eye Injuries

Awareness level		Knowledge			Chi-Square (df)	Likelihood ratio	Linear-by-linear association	p value
		Poor	Good	Total				
Practices	Poor	77	265	342	27.138 (1)	30.281	27.091	0.000**
	Good	14	213	227				
	Total	91	478	569				

**p value < 0.01

Bivariate logistic regression analysis predicting knowledge of eye injury management based on first aid practices

A bivariate logistic regression was conducted to determine whether first aid practices significantly predict knowledge of eye injury management (Table 9). The model was statistically significant (p<0.001), indicating that practice level significantly predicts knowledge. Participants with good first aid practices were 4.42 times more likely to have good knowledge compared to those with poor practices. The model's constant was also statistically significant (B=-1.705, p<0.001), reflecting the log-odds of having good knowledge among participants with poor practices.

Table 9: Bivariate Logistic Regression Analysis Predicting Knowledge of Eye Injury Management Based on First Aid Practices

		B	S.E.	Wald	df	p value	Exp(B)
Step 1[a]	Good knowledge	1.486	0.305	23.784	1	0.000	4.421
	Constant	-1.705	0.291	34.427	1	0.000	0.182
[a] Variable(s) entered on step 1: Practice							

Sources of Information and Support for Awareness Initiatives

Participants identified several sources of information regarding first aid for eye injuries. The most frequently reported source was online websites (22.14%), followed by school or university (18.80%) and family members (17.04%). Additional sources included reading from various materials (15.99%) and doctors or health practitioners (15.46%). Less commonly cited sources were friends (2.98%), television (2.46%), and printed publications (1.40%) (Fig. 2). Although these sources provided some level of awareness, only 15.29% of participants reported receiving formal training, while the vast majority (84.71%) had no prior training in first aid for eye injuries (Fig. 3A). This limited exposure to structured education contrasts with participants' strong perception of its importance, as 72.05% considered awareness of eye injury first aid to be very important (Fig. 3B). Reflecting this recognition, the vast majority of participants (87.52%) expressed support for holding workshops to raise awareness of proper first aid for eye injuries among university students and staff (Fig. 3C).

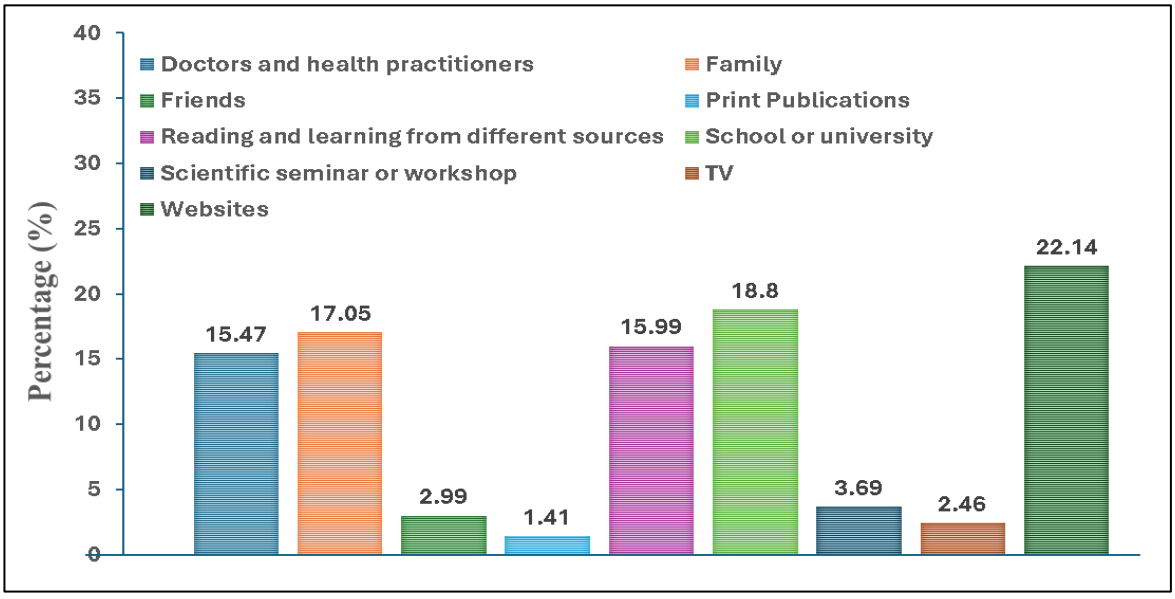

Fig. 2: Sources of information on eye injury first aid among study participants (N=569). The figure illustrates the distribution of participants' reported sources of information regarding first aid for eye injuries. Online websites were the most frequently cited source (22.14%), whereas printed publications were the least reported source (1.40%).

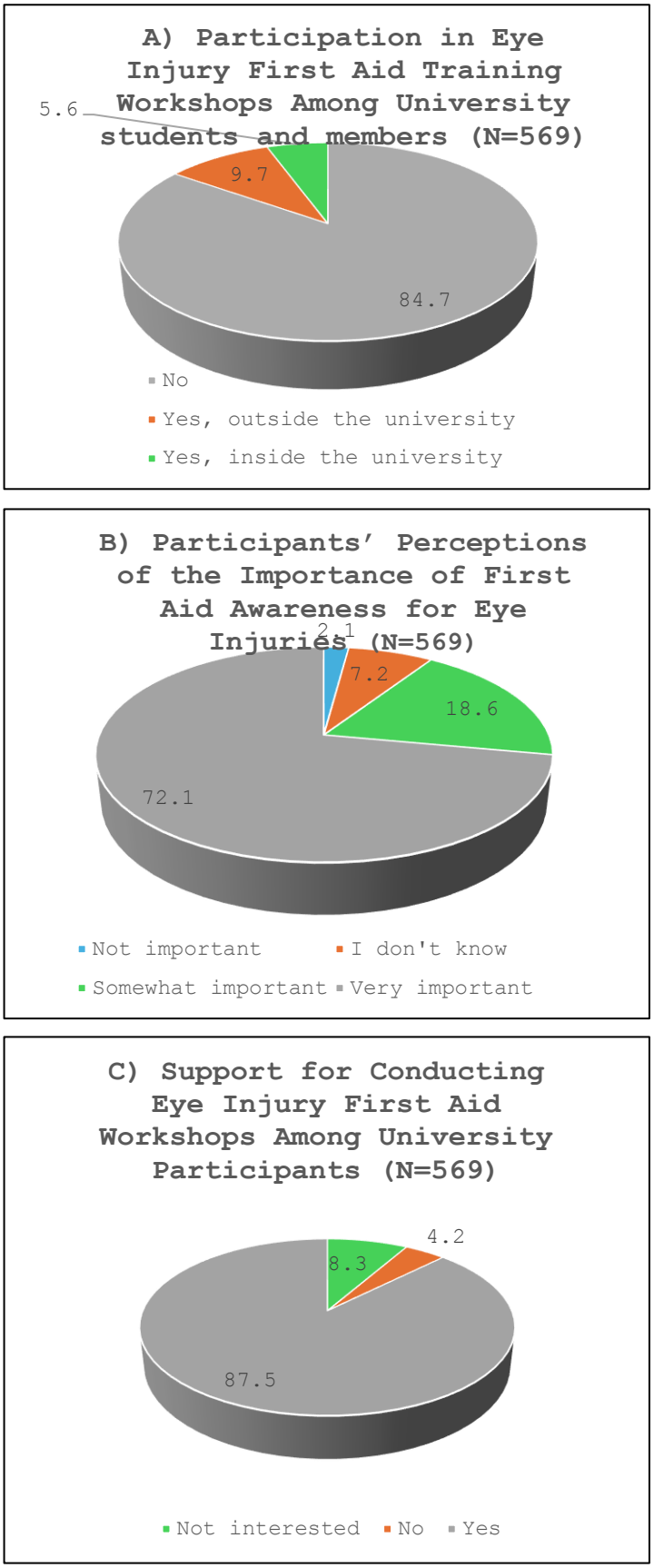

Fig. 3: Perceptions and Training History Related to First Aid for Eye Injuries Among University Participants (N=569). This figure presents: (A) the distribution of participants based on prior participation in training workshops on

eye injuries and corresponding first aid; (B) participants' perceptions of the importance of being aware of first aid procedures for eye injuries; and (C) the level of support for organizing university-based workshops aimed at improving awareness and preparedness for managing eye injuries.

Discussion:

The findings from this study provide a comprehensive overview of the awareness related to first aid for various types of eye injuries among the university community. The results revealed considerable variation in participants' understanding of appropriate first aid responses across different injury scenarios. While some situations were managed appropriately by a majority, others highlighted significant gaps in awareness, particularly in emergencies or less familiar injury types. Participants generally showed good awareness of how to respond to superficial ocular incidents. When asked about the correct action for small foreign bodies, such as grains of sand, 74.87% appropriately selected rinsing the eye with clean water. However, approximately a quarter (25.13%) selected incorrect or potentially harmful options, such as using tissue paper (6.5%) or blowing air (4.39%). These misinformed responses could exacerbate the injury by causing abrasions or introducing infection, and then, leading to serious complications, especially if the corneal epithelium is damaged (Duvall-Young, 2018). Awareness was also high for corneal abrasions, which can lead to infections and long-term visual complications if mismanaged with 77.15% correctly recommending immediate evaluation at a hospital emergency department. However, 22.85% either selected inadequate actions such as blinking, applying warm compresses or sanitising drops, or admitted uncertainty, highlighting a gap in basic ocular first aid practice awareness.

In more severe scenarios, such as penetrating eye trauma, 68.54% recognised the need to avoid disturbing the embedded object and seek urgent care. However, a concerning 31.46% opted for incorrect or dangerous responses such as removing the object (11.59%) or applying pressure (6.85%), both of which can worsen trauma and increase the risk of haemorrhage or infection (Duvall-Young, 2018). Injury from plant materials, often underestimated, was better understood by 43.05% of participants who chose to visit a doctor for evaluation, while the remaining 56.95% chose inappropriate actions. These misconceptions can delay necessary treatment and increase the risk of complications such as corneal ulcers or fungal keratitis (Singh et al., 2023, Andrastea and Lienderiwati, 2025). Awareness regarding thermal burn responses was notably lacking. Only 29.35% of participants correctly identified rinsing the eye with lukewarm water as the appropriate first step, while a significant percentage (70.65%) either selected inappropriate options or were unsure. This gap is critical, as immediate irrigation can greatly reduce tissue damage from heat exposure, while misconceptions, such as applying ice packs (14.23%) or disinfectants like alcohol (6.85%), pose additional risks including exacerbation of the injury (Duvall-Young, 2018).

Chemical exposure to the eye revealed significant gaps in awareness among participants. While 62.03% correctly identified repeated rinsing with water followed by medical attention as the appropriate first response, a notable 37.97% selected unsafe or uncertain alternatives, such as blinking, applying sanitizers, or failing to act. Critically, only 16.69% of respondents knew the recommended 15-minute rinsing duration, while the remaining 83.31% either underestimated the time or lacked knowledge altogether. This knowledge gap is particularly concerning, as immediate and prolonged irrigation is vital to reduce the severity of ocular damage from chemical agents. These findings closely mirror the results of Skruodyte et al., who reported limited public understanding of proper chemical eye injury management, especially regarding rinsing duration (Skruodyte et al., 2025). Similar deficiencies have been documented in several Saudi-based studies. Asiri et al. found that even among health science students, many lacked accurate knowledge of immediate responses to ocular chemical exposure (Asiri et al., 2024). Dhabaan et al. also reported considerable awareness gaps regarding first aid for eye injuries particularly for chemical injuries, among the general population (Dhabaan et al., 2021). In contrast, Bamahfouz et al. (2023) found that a majority of participants (56.62%) from the western region of Saudi Arabia demonstrated good knowledge of appropriate first aid responses for ocular chemical injuries, reflecting a relatively higher level of practical awareness compared to other regions (Bamahfouz et al., 2023).

Another awareness gap was seen in managing eye injuries in contact lens wearers. Although 43.06% understood that severe symptoms should prompt waiting for professional assessment before removing the lens, the remaining 56.94% either opted to remove the lens regardless of severity (23.72%) or were unsure (26.71%). These misconceptions may increase the risk of corneal injury, especially in chemical or penetrating trauma cases. A further considerable gap in understanding the appropriate management of ocular bleeding was observed among participants. While only 37.61% correctly identified the recommended action—covering the eye gently without applying pressure and promptly seeking medical care—the remaining 62.39% either expressed uncertainty or selected potentially harmful responses. Notably, 16.17% of participants chose to apply direct pressure to the injured eye—a practice that could worsen intraocular damage and lead to serious vision-threatening complications. Literature strongly recommends that ocular hemorrhage be managed with extreme caution, as applying pressure inappropriately may result in irreversible structural and functional impairment (Duvall-Young, 2018).

Overall, awareness regarding first aid practices was poor in 60.10% of participants, with only 39.90% demonstrating adequate practice-related awareness. This finding aligns closely with national studies that have identified similar gaps in preparedness for

managing ocular trauma among both the general population and health science students (Asiri et al., 2024, Dhabaan et al., 2021, Idrees et al., 2024, Aljohani and Alrasheed, 2024). However, other studies have reported relatively higher levels of awareness and more favorable practices regarding first aid for eye injuries. These findings suggest that awareness may vary geographically, potentially reflecting differences in local educational efforts, public health campaigns, or access to training resources (Taha et al., 2023, Bamahfouz et al., 2023, Alhothali et al., 2023, Alotaibi et al., 2023).

A significant portion of the study population (56.94%) was aged 20 years or younger, reflecting the dominant student demographic in a university setting. The relatively young age group may imply limited exposure to real-world injuries, which may contribute to reduced preparedness and lower awareness in responding to ocular emergencies. Interestingly, while the vast majority of participants (86.6%) reported no prior history of eye disease, this may partly explain the low level of first aid practice awareness observed in this study. A lack of personal experience with ocular conditions could result in diminished motivation to learn about eye injury responses. Prior studies have shown that firsthand experience with health conditions often prompts greater interest in prevention and care (Ivynian et al., 2020, Kenning et al., 2015). In the absence of such experiences, individuals may underestimate the risks associated with eye injuries and fail to seek relevant knowledge or training in first aid response. The study also revealed that 83.83% of the participants were female, and this demographic pattern toward females is consistent with enrollment dynamics in health science faculties in Saudi Arabia (Asiri et al., 2024). It is notable that female participants were significantly more aware of first aid practices for eye injuries than their male counterparts (p=0.046), which is supported by previous findings indicating higher preventive health engagement among women (Alhothali et al., 2023). Awareness levels were also significantly associated with participants' educational level (p=0.050). Interestingly, individuals holding diploma degrees exhibited the highest proportion of good awareness (43.4%), whereas those with bachelor's degrees had the lowest (22.5%). This finding appears counterintuitive, as higher academic qualifications are generally expected to correlate with better health knowledge. However, a plausible explanation may stem from the structure of diploma programs, which often prioritize hands-on training and skill-based learning, particularly in fields related to health sciences. Other demographic variables such as age, profession, academic affiliation, and years of experience, did not show a statistically significant association with practical awareness levels. This contrasts with findings from previous studies that reported correlations between some of these factors and awareness, which may be attributed to the relative homogeneity of the university sample or underlying cultural and contextual differences (Alotaibi et al., 2023, Gupta et al., 2019).

In terms of knowledge, 84.00% of participants demonstrated a strong theoretical understanding of first aid for eye injuries. However, this high level of knowledge stood in contrast to the lower levels of practical awareness observed, highlighting that theoretical understanding alone does not necessarily translate into the ability to respond effectively in real-life emergency situations. Significant associations were found between knowledge levels and marital status (**p=0.029**), parenthood (p=0.019), profession (p=0.018), academic affiliation (p=0.021), and experience (p=0.013). Participants who were unmarried or childless performed better, possibly reflecting fewer responsibilities and more time to engage in academic enrichment. Faculty members had the highest knowledge scores (87.23%), as expected, followed by students. Similarly, participants affiliated with medical faculties exhibited significantly higher knowledge levels than those from supporting departments or non-health-related disciplines. This finding highlights the role of curricular exposure in shaping theoretical understanding. Academic programs in medical fields often include content related to eye anatomy, pathology, and emergency care protocols, which likely contributes to a stronger cognitive foundation regarding eye injury management. In contrast, non-health disciplines may not prioritize such content, leading to observable knowledge gaps. Interestingly, participants with fewer than five years of experience demonstrated higher levels of knowledge compared to those with longer service. This difference may be attributed to more recent exposure to updated academic curricula, institutional orientation sessions, or awareness and safety initiatives that emphasise general injury prevention and emergency response. Conversely, those with longer professional tenure may experience a gradual decline in retained knowledge if ongoing educational reinforcement is lacking.

Despite the relatively high percentage of participants (84.00%) demonstrating good theoretical knowledge, overall awareness regarding actual first aid practices for eye injuries was still low, with 60.10% categorized as having poor practical awareness. This gap may be partially attributed to limited exposure to structured educational opportunities. Notably, the vast majority (84.7%) reported never having attended any training course or workshop on eye injury management, either within or outside the university. Only a combined 15.3% had participated in such training, which may explain the lower readiness to apply correct procedures in emergency scenarios. Moreover, participants' primary sources of information were largely informal. The frequently cited sources were online websites (22.1%) and family members (17.0%). While these sources offer accessibility, they may not always provide comprehensive or accurate instruction, especially in high-stakes emergency contexts. Scientific workshops or seminars, which are typically more structured and evidence-based, were cited by only 3.7% of participants. Similarly, healthcare professionals, a potentially reliable source, were named by just 15.5%. These findings reinforce the idea that limited engagement with formal,

high-quality training programs is a critical factor underlying the observed deficiency in practical awareness.

Conclusion and future recommendations

In conclusion, this study reveals a notable discrepancy between theoretical knowledge and practical application of first aid for eye injuries among students and staff at Al-Baha University. While most participants demonstrated an adequate level of theoretical understanding, a considerable proportion failed to identify correct actions in critical scenarios, particularly those involving chemical exposure, thermal burns, and penetrating injuries. These gaps are concerning given the potential for irreversible ocular damage if timely and appropriate first aid is not administered.

Several limitations should be acknowledged when interpreting the findings. The reliance on self-reported data introduces potential social desirability biases that may have influenced participants' responses. Additionally, the study was limited to a single academic institution, which may restrict the generalizability of the findings to broader populations. The assessment of awareness was also based on hypothetical scenarios rather than observed behavior in real-life emergencies, which may not accurately reflect participants' practical performance.

Despite these limitations, the study emphasizes the pressing need for structured and continuous first aid education tailored to university environments. Integrating awareness campaigns into orientation programs and co-curricular activities can foster greater engagement and preparedness among students and staff. Furthermore, incorporating first aid training -especially in non-medical disciplines- into academic curricula will help expand the reach and enhance the retention of emergency response competencies. Scenario-based, practical workshops should be developed to allow participants to engage in realistic training, and periodic refresher sessions are recommended for faculty and staff to prevent the gradual decline in retained knowledge over time.

Future research should aim to include participants from the broader Al-Baha community, encompassing diverse educational and occupational backgrounds to strengthen the external validity of the results. Longitudinal studies are also warranted to assess the long-term impact of educational interventions on both knowledge retention and actual first aid behavior in emergency contexts.

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References

1. AGHADOOST, D. 2014. Ocular trauma: an overview. *Archives of trauma research,* 3**,** e21639.
2. AJAYI, Y. & AJAYI, E. 2008. Prevalence of ocular injury and the use of protective eye wear among the dental personnel in a teaching hospital. *Nigerian quarterly journal of hospital medicine,* 18**,** 83-86.
3. ALHOTHALI, A. S., ALJABRI, M. K., ZAMZAMI, O. S., ALTHUBAITI, M. A., ALSHANBARI, A. S., ALSAEEDI, A. K., AL-GHAMDI, A., ALJABRI SR, M. K., ZAMZAMI, O. & ALTHUBAITI SR, M. A. 2023. Assessing the perceptions and practices toward eye injuries first aid among general population in the western region of Saudi Arabia: a cross-sectional study. *Cureus,* 15.
4. ALJOHANI, S. & ALRASHEED, S. H. 2024. Ocular injury first aid knowledge among primary school teachers in Qassim province: A cross-sectional study. *British Journal of Visual Impairment***,** 02646196241252614.
5. ALMOOSA, A., ASAL, A., ATIF, M., AYACHIT, S. & DOMS, P. 2017. Occupational Eye Injury: The neglected role of eye protection. *Bahrain Medical Bulletin,* 39**,** 82-84.
6. ALOTAIBI, S. A., ALNAYF, A. S., TAHA, E. B., MOHANDES, B., ALHADLAQ, A. M., ALOTAIBI, E. A., ALNAYF, A., TAHA, E. & ALHADLAQ SR, A. M. 2023. Community-level awareness of proper immediate steps regarding ocular chemical injury in Qassim region, Saudi Arabia. *Cureus,* 15.
7. AMRO, M. Y. 2021. Visual outcomes associated with delay from trauma to surgery for open globe eye injury in Palestine: a retrospective chart review study. *The Lancet,* 398**,** S14.
8. ANDRASTEA, K. D. P. & LIENDERIWATI, N. M. 2025. Mechanical Injury Predominates in Rural Bali, Indonesia: Implications for Prevention and Treatment of Ocular Trauma. *Bioscientia Medicina: Journal of Biomedicine and Translational Research,* 9**,** 6209-6222.
9. ASIRI, A. Y., ALAMRI, A. M., ALHARTHI, A. F., ALHARBI, A. M., ALANAZI, A. B., ALAWAMI, F. H., ALBALAWI, H. M., ALARKI, M. A., ALOTHMAN, N. A. & ALOKASI, N. Y. 2024. Assessment of Health Science Students' Knowledge of Ocular Chemical Injuries and Proper Immediate Action: A Cross-Sectional Study at King Khalid University. *Cureus,* 16.
10. ASSI, L., CHAMSEDDINE, F., IBRAHIM, P., SABBAGH, H., ROSMAN, L., CONGDON, N., EVANS, J., RAMKE, J., KUPER, H. & BURTON, M. J. 2021. A global assessment of eye health and quality of life: a systematic review of systematic reviews. *JAMA ophthalmology,* 139**,** 526-541.
11. ASSI, L., ROSMAN, L., CHAMSEDDINE, F., IBRAHIM, P., SABBAGH, H., CONGDON, N., EVANS, J., RAMKE, J., KUPER, H. & BURTON, M. J. 2020. Eye health and quality of life: an umbrella review protocol. *BMJ open,* 10**,** e037648.
12. BAMAHFOUZ, A., BAKRY, S. M., ALSHARIF, A. M., ALOMERI, S., ALSHARIF, E. F., ZAMZAMI, O. S., EMORSY, S., ALSHARIF, A., ALSHAREEF, E. F. & ZAMZAMI, O. 2023. Ocular chemical injuries in Western Saudi Arabia: A study of the public's level of knowledge and experience. *Cureus,* 15.

13. DHABAAN, W. A., ALMUTAIRI, K. H., ALZAHRANI, A. A., ALMUTLAQ, A. H., ASIRI, A. A. H. J., ALSHAHRANI, R. S. H., JALI, M. A. H. & ALQAHTANI, A. M. A. 2021. Assessing knowledge and practice about eye injuries first aid, with awareness about the importance of early management among general population in Asser Region, 2020. *Journal of family medicine and primary care,* 10**,** 2022-2027.
14. DUVALL-YOUNG, J. 2018. *Emergency, Acute and Rapid Access Ophthalmology: Practical, Clinical and Managerial Aspects*, Springer.
15. GUPTA, K., SINGH, S., YI, Y. X., JOON, Y. W., TING, Y. & SENG, Y. 2019. A comparative evaluation of first aid knowledge and attitude among medical, dental and pharmacy students in AIMST University, Malaysia. *International Journal of Applied Dental Sciences,* 5**,** 91-95.
16. HIRNEISS, C. 2014. The impact of a better-seeing eye and a worse-seeing eye on vision-related quality of life. *Clinical ophthalmology***,** 1703-1709.
17. IDREES, L., SALEM, I. W., JASTANYAH, A., ALGARNI, A., ALSHEIKH, R., ALYAMI, A. A., ALTURKISTANI, L., ALNEFAIE, R., HIJJI, S. & HEJJI, S. 2024. Assessment of Medical Students' Knowledge of Ocular First Aid During Trauma: A Cross-Sectional Study From King Abdulaziz University. *Cureus,* 16.
18. IVYNIAN, S. E., FERGUSON, C., NEWTON, P. J. & DIGIACOMO, M. 2020. Factors influencing care-seeking delay or avoidance of heart failure management: A mixed-methods study. *International journal of nursing studies,* 108**,** 103603.
19. KENNING, C., COVENTRY, P. A., GIBBONS, C., BEE, P., FISHER, L. & BOWER, P. 2015. Does patient experience of multimorbidity predict self-management and health outcomes in a prospective study in primary care? *Family practice,* 32**,** 311-316.
20. KYRIAKAKI, E. D., SYMVOULAKIS, E. K., CHLOUVERAKIS, G. & DETORAKIS, E. T. 2021. Causes, occupational risk and socio-economic determinants of eye injuries: a literature review. *Medicine and pharmacy reports,* 94**,** 131.
21. LI, C., FU, Y., LIU, S., YU, H., YANG, X., ZHANG, M. & LIU, L. 2023. The global incidence and disability of eye injury: an analysis from the Global Burden of Disease Study 2019. *EClinicalMedicine,* 62.
22. MANCINI, G., BALDASSERONI, A., LAFFI, G., CURTI, S., MATTIOLI, S. & VIOLANTE, F. S. 2005. Prevention of work related eye injuries: long term assessment of the effectiveness of a multicomponent intervention among metal workers. *Occupational and Environmental Medicine,* 62**,** 830-835.
23. MAURYA, R. P., SINHA, K., SEN, P. R., SINGH, V. P. S. M. K. & BHUSHAN, P. 2013. A clinico-epidemiological study of ocular trauma in Indian university students. *Pakistan Journal of Ophthalmology,* 29.
24. NÉGREL, A.-D. & THYLEFORS, B. 1998. The global impact of eye injuries. *Ophthalmic epidemiology,* 5**,** 143-169.
25. PARGAMENT, J. M., ARMENIA, J. & NERAD, J. A. 2015. Physical and chemical injuries to eyes and eyelids. *Clinics in dermatology,* 33**,** 234-237.
26. SINGH, S., CHAUHAN, S. S. & SHAHI, A. 2023. AN EPIDEMIOLOGICAL PROFILE, CLINICAL ASSESMENT AND INJURY PATTERN OF OCULAR TRAUMA IN RURAL POPULATION OF WESTERN UTTAR PRADESH-A TEACHING HOSPITAL BASED STUDY. *Int J Acad Med Pharm,* 5**,** 1448-1452.
27. SKRUODYTE, J., SVEIKATAITE, M., SVEIKATIENE, J. & SERPYTIS, P. 2025. Public Awareness of Ocular Chemical Injuries: A Cross-Sectional Study in Lithuania. *Clinics and Practice,* 15**,** 35.
28. TAHA, M., ALZUBAIDI, A. A., ALHAJRI, R., ALBUSAAD, R., ALJUMAIAH, R. & ALDWSRI, A. S. 2023. Community-Level Awareness of Proper Immediate Steps for Ocular Chemical Injury in Saudi Arabia. *Cureus,* 15.
29. XIANG, H., STALLONES, L., CHEN, G. & SMITH, G. A. 2005. Work-related eye injuries treated in hospital emergency departments in the US. *American journal of industrial medicine,* 48**,** 57-62.