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Knowledge and awareness of glaucoma in Hail city, KSA

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ABSTRACT

Background: Glaucoma is a severe condition that damages the optic nerve permanently, leading to vision loss and blindness if not treated. It's a major cause of irreversible blindness across the globe. The disease is complex and has many factors that contribute to its development, including genetics and environment. Therefore, any efforts to improve outcomes for individuals with glaucoma must prioritize raising awareness among the public, and this can lead to increased knowledge and understanding of the disease, which could result in positive behavior changes. *Methodology:* A descriptive hospital-based cross-sectional study was conducted from June 2022 to August 2022 among the Hail population regarding knowledge and awareness of glaucoma. *Result:* 377 participants who met the eligibility criteria and completed the study questionnaire. The average age of the participants was 31.5 ± 14.6 years, ranging from 18 to over 70 years. 79% of participants who knew that early detection helps avoid glaucoma complications. When it comes to symptoms, the most reported were headaches and blurred vision (61.3%), pain in the eye (56.2%), redness in the eye (48.8%), and nausea and vomiting (34.5%). Interestingly, 26.5% mentioned that glaucoma can be asymptomatic. Out of 217 people, 57.6% know that neglecting glaucoma can lead to a gradual and irreversible loss of vision as the main complication. *Conclusion:* Overall knowledge and awareness regarding glaucoma among study participants in Saudi Arabia. Exact 156 (41.4%) had a good understanding and awareness of glaucoma, while 221 (58.6%) needed a better knowledge level.

Keywords: Glaucoma, awareness, knowledge, Hail, KSA

1. INTRODUCTION

An optic neuropathy that progressively causes permanent injury to the optic nerve, glaucoma results in vision loss and blindness if left untreated. Being the dominant cause of irreversible blindness worldwide, it impacts an estimated eighty million individuals by 2020, projected to increase to 111.8 million by 2040 (Tham et al., 2014). The frequency of primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG) in a global perspective is 3.05% and 0.50%, respectively (Talaat et al., 2021). Patients with African descent had the highest prevalence of POAG, while those of Asian descent had the highest prevalence of PACG (Talaat et al., 2021). PACG

prevalence was higher in East than Southeast Asia, and POAG prevalence was higher in urban than rural populations (Chan et al., 2016). Glaucoma prevalence in Saudi Arabia is 5.6% (Khandekar et al., 2019).

Glaucoma is a complex disease with a multifactorial etiology involving genetic and environmental factors, including increased intraocular pressure (IOP), abnormal blood flow, oxidative stress, and autoimmune processes that can harm the optic nerve and retinal ganglion cells, resulting in a loss of visual field, which is highly harmful (Tezel, 2011). Glaucoma is often asymptomatic in its early stages, making early detection and treatment critical for preventing vision loss (Tezel, 2011). The pathophysiology of glaucoma involves a disruption of the delicate balance between the production and drainage of aqueous humor, leading to elevated intraocular pressure (IOP), the sole alterable risk factor for glaucoma (Weinreb et al., 2014). However, not everyone with high IOP develop glaucoma, and many patients with normal IOP can still develop the disease, suggesting that other factors, such as genetic susceptibility and vascular dysfunction, also play a role (Wang and Wiggs, 2014).

Glaucoma is associated with disorders such as hypertension and diabetes, and regular screening of people with risk factors for glaucoma increases the likelihood of early identification of the disease (Negussie and Alemu, 2022*).* Diagnosing glaucoma involves a combination of clinical examination, visual field testing, and imaging of the optic nerve head and retinal nerve fiber layer (Weinreb et al., 2014). Treatment options for glaucoma include topical, oral, and intravitreal medications; laser trabeculoplasty; and surgery (Weinreb et al., 2014). However, treatment is only helpful if those suffering from the disease know their need for it and have access to care (Heisel et al., 2021). As such, any initiative to improve glaucoma outcomes in a specific population must focus on raising public awareness, leading to increased knowledge and understanding, potentially leading to behavioral change (Heisel et al., 2021).

2. METHODOLOGY

Study design and study sample

A descriptive hospital-based cross-sectional study was conducted from June 2022 to August 2022 among the Hail population to figure out the level of knowledge and awareness of glaucoma. The Research Ethics Committee at the University of Hail approved the study with an approval number H-2022-372.

Data collection

A questionnaire with closed-ended questions, containing 33 questions that align with the study objectives, was created and translated into Arabic. The questionnaire is comprised of four parts: The first part contains one question inquiring if the participants have heard of glaucoma. The second part of the questionnaire focused on five demographic data questions: Gender, age, nationality, marital status, and educational level. The third part contains 12 questions focused on the glaucoma awareness of participants. The fourth part includes 15 questions focused on participants' knowledge about glaucoma. These questionnaires were conducted in hospitals in Hail, Saudi Arabia. The objectives of the study were explained, and verbal consent was obtained from each participant.

Data analysis

A statistical software IBM SPSS version 22 (SPSS, Inc. Chicago, IL) was utilized after data were extracted, revised, and coded. All statistical analysis were accomplished using two-tailed tests. P value less than 0.05 was statistically significant. Regarding glaucoma knowledge and awareness, each correct answer was scored 1 point, and each incorrect one was scored zero. The overall knowledge score was obtained by summing up all items' discrete scores where participants with an overall score of less than 60% of the total were considered to have poor knowledge. In comparison, others with an overall score of 60% of the whole or more were considered with good knowledge level. Descriptive analysis based on frequency and percent distribution was employed for all variables, including MS patients' biodemographic data, education, and nationality. Also, the participants' knowledge and awareness about glaucoma were tabulated while their overall knowledge level and source of information were graphed. Cross tabulation was used to assess factors associated with the participants' knowledge and awareness regarding glaucoma was tested using Pearson's chi-squared test and exact probability test for small frequency distributions.

3. RESULTS

A total of 377 eligible participants completed the study questionnaire. The participants ranged from 18 to more than 70 years old, with a mean age of 31.5 ± 14.6 years old. The exact 241 (63.9%) participants were females, and most (89.4%) were Saudi. A total of

183 (48.5%) were single, and 160 (42.4%) were married. As for educational level, 114 (30.2%) had secondary degree of education, 178 (47.2%) were university graduates, and 29 (7.7%) had post-graduate degrees (Table 1).

Table 1 Demographic information of study participants in Saudi Arabia.

Personal data	No.	%
Age in years		
18 – 30	188	49.9%
31 – 40	67	17.8%
41 – 50	53	14.1%
51 – 60	46	12.2%
61 – 70	15	4.0%
> 70	8	2.1%
Gender		
Male	136	36.1%
Female	241	63.9%
Nationality		
Saudi	337	89.4%
Non-Saudi	40	10.6%
Marital status		
Unmarried	183	48.5%
Married	160	42.4%
Divorced / widow	34	9.0%
Educational level		
Below secondary	56	14.9%
Secondary/diploma	114	30.2%
Bachelor's degree	178	47.2%
Post-graduate	29	7.7%

Table 2 presents the participants' knowledge and awareness about glaucoma among the study participants in Saudi Arabia. Generally, 79% of the participants know that early detection helps to avoid complications of glaucoma, 74.5% know that the risk of developing glaucoma increases with age, 74.5% think it is important to tell your doctor about glaucoma to avoid the prescription of medications that could worsen the disease, 73.7% believe that routine examination after the age of 40 is essential for the early diagnosis of glaucoma, 72.9% believe that people over the age of 60 are more likely to develop glaucoma, 72.7% told that glaucoma has treatment, and 72.1% know that glaucoma should be treated early.

Only 38.7% reported that glaucoma has a familial predisposition, and 24.2% know that glaucoma is not the same as cataract. With regard to the symptoms, the most known were headaches and blurred vision (61.3%), pain in the eye (56.2%), red eye (48.8%), nausea and vomiting (34.5%), while 26.5% said that glaucoma could be asymptomatic. Regarding the risk factors, 63.9% know about chronic diseases such as diabetes and hypertension, 48.3% reported previous eye surgeries or injuries, and 38.5% reported myopia and hypermetropia.

Table 3 demonstrates the participants' awareness and perception of glaucoma among the study participants in Saudi Arabia. A total of 109 (28.9%) participants are aware that glaucoma is a result from pressure damage to the nerve of vision, and 217 (57.6%) know that slow, irreversible loss of vision is the main complication with untreated (neglected) glaucoma. The overall knowledge and awareness regarding glaucoma among study participants in Saudi Arabia is shown in (Figure 1). Among the study participants, 156 (41.4%) had a generally good knowledge and awareness regarding glaucoma, while 221 (58.6%) had a poor knowledge level.

Table 2 Participants' knowledge and awareness about glaucoma among study participants in Saudi Arabia.

Knowledge/awareness items	Yes		No		Do not know	
	No	%	No	%	No	%
General knowledge						
The risk of developing glaucoma increases with age	281	74.5%	34	9.0%	62	16.4%
Anyone can have glaucoma	218	57.8%	72	19.1%	87	23.1%
Do you think that people over the age of 60 are more likely to develop glaucoma?	275	72.9%	43	11.4%	59	15.6%
Do you consider regular examinations after the age of 40 crucial for the early diagnosis of glaucoma?	278	73.7%	36	9.5%	63	16.7%
Does early detection help to avoid complications of glaucoma?	298	79.0%	33	8.8%	46	12.2%
Do you think that glaucoma may cause blindness?	246	65.3%	46	12.2%	85	22.5%
Is prevention of blindness from glaucoma possible?	208	55.2%	48	12.7%	121	32.1%
Do you believe it is possible to cure blindness caused by glaucoma?	184	48.8%	75	19.9%	118	31.3%
Glaucoma has treatment.	274	72.7%	37	9.8%	66	17.5%
Do you think we should treat glaucoma early?	272	72.1%	39	10.3%	66	17.5%
Do you think that the only treatment for glaucoma is surgical intervention?	161	42.7%	108	28.6%	108	28.6%
Do you think it is important to inform your doctor about your glaucoma condition in order to prevent the prescription of medications that could potentially exacerbate the disease?	281	74.5%	31	8.2%	65	17.2%
Vision is affected in the early course.	218	57.8%	76	20.2%	83	22.0%
Glaucoma has a familial predisposition.	146	38.7%	113	30.0%	118	31.3%
Glaucoma is the same as cataract.	159	42.2%	92	24.4%	126	33.4%
Symptoms knowledge						
Glaucoma can be asymptomatic.	100	26.5%	187	49.6%	90	23.9%
Do you think that nausea and vomiting can be symptoms of glaucoma?	130	34.5%	116	30.8%	131	34.7%
Do you think that pain in the eye is one of the symptoms of glaucoma?	212	56.2%	67	17.8%	98	26.0%
Do you think that headaches and blurred vision can be symptoms of glaucoma?	231	61.3%	50	13.3%	96	25.5%
Do you think that red eye is one of the symptoms of glaucoma?	184	48.8%	79	21.0%	114	30.2%
Risk factors knowledge						
Do you think chronic diseases like diabetes and hypertension are recognized as risk factors for glaucoma?	241	63.9%	48	12.7%	88	23.3%
Do you think previous eye surgeries or injuries are risk factors for glaucoma?	182	48.3%	75	19.9%	120	31.8%
Do you think that myopia and Hypermetropia are risk factors for glaucoma?	145	38.5%	119	31.6%	113	30.0%

Table 3 Participants' awareness and perception of glaucoma among study participants in Saudi Arabia.

General Awareness	No	%
Glaucoma results from		
Pressure damage to the nerve of vision	109	28.9%
Mature cataract	125	33.2%
Progressive increase in glasses numbers	32	8.5%
Do not know	111	29.4%
Complications with untreated glaucoma		
Slow, irreversible loss of vision	217	57.6%
Surgical operations cannot be performed on eyes	58	15.4%
Do not know	102	27.1%

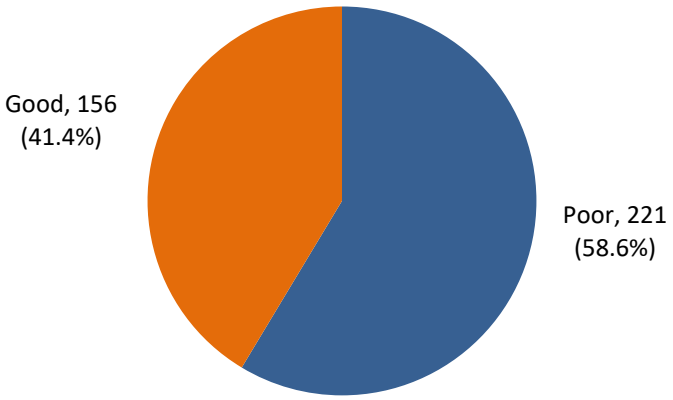

Figure 1 Knowledge and awareness regarding glaucoma among study participants in Saudi Arabia.

The source of information about glaucoma among study participants in Saudi Arabia is illustrated in (Figure 2). The most reported source included family/relatives and friends (37.6%), followed by mass media (33.2%) and health care setting/staff (29.2%).

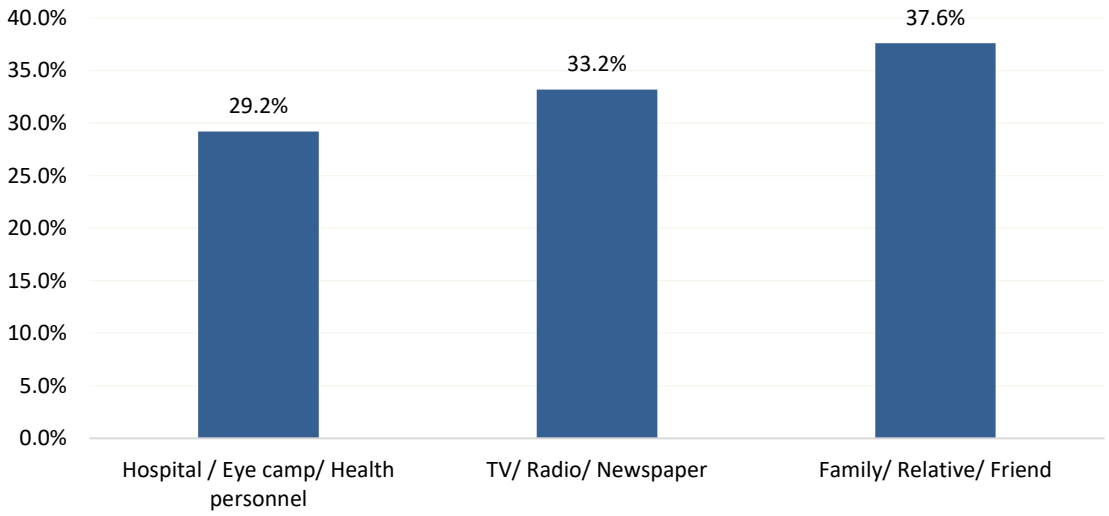

Figure 2 The source of information about glaucoma among study participants in Saudi Arabia.

Table 4 presents factors associated with the participant's knowledge and awareness regarding glaucoma. Approximately 48.4% of participants aged less than 30 years had good knowledge overall of glaucoma versus 13.3% of others aged 61–70 years with recorded statistical significance (P = .037). Additionally, 43% of Saudi participants had a good knowledge level compared to 27.5% of non-Saudi (P = .047). There was good knowledge about glaucoma among 47% of single participants compared to 20% of the divorced/widow group (P = .013). An exact of 62.1% of participants with post-graduate degrees had good knowledge overall about glaucoma in comparison to 32.1% of others with the lowest educational attainment (P = .049). Additionally, 51.8% of participants who gained information from health care setting/staff recorded a good knowledge level versus 24.6% of those who gained information from family/friends (P = .001). Regarding practice, 173 (45.9%) of the participants reported undergoing ocular examination/screening in the past year.

Table 4 The factors associated with participants knowledge and awareness regarding glaucoma.

Factors	Overall knowledge level				P value
	Poor		Good		
	No	%	No	%	
Age in years					.037*

18–30	97	51.6%	91	48.4%	
31–40	43	64.2%	24	35.8%	
41–50	31	58.5%	22	41.5%	
51–60	32	69.6%	14	30.4%	
61–70	13	86.7%	2	13.3%	
> 70	5	62.5%	3	37.5%	
Gender					
Male	73	53.7%	63	46.3%	.143
Female	148	61.4%	93	38.6%	
Nationality					
Saudi	192	57.0%	145	43.0%	.047*
Non-Saudi	29	72.5%	11	27.5%	
Marital status					
Unmarried	97	53.0%	86	47.0%	.013*
Married	97	60.6%	63	39.4%	
Divorced / widow	27	79.4%	7	20.6%	
Educational level					
Below secondary	38	67.9%	18	32.1%	
Secondary/diploma	68	59.6%	46	40.4%	.049*$
Bachelor's degree	104	58.4%	74	41.6%	
Post-graduate	11	37.9%	18	62.1%	
Source of your information/knowledge about glaucoma					
Hospital/eye camp/health personnel	53	48.2%	57	51.8%	.001*
TV/radio/newspaper	61	48.8%	64	51.2%	
Family/relative/friend	107	75.4%	35	24.6%	

P: Pearson X2 test $: Exact probability test * P < 0.05 (significant)

In the present study, we have surveyed to investigate the awareness and knowledge of the general population regarding glaucoma in Hail City, Saudi Arabia. Our findings will provide a clear picture of the general population's understanding of glaucoma in Hail City. This insight will enable healthcare officials to create effective management plans by achieving adequate interventions, promoting public health behaviors, and increasing the understanding of glaucoma and its associated risk factors. The results indicate satisfactory glaucoma awareness among participants in Hail, Saudi Arabia. Most participants acknowledge the significance of early glaucoma detection in preventing complications, and they also recognize the importance of regular examinations after age 40 for early diagnosis.

They also understand that individuals above the age of 60 face a higher risk of developing glaucoma, that early detection allows for effective treatment of the disease, and that treatment options exist for the disease if discovered early. However, some gaps in knowledge were identified in this study. Less than 40% of participants were aware of the familial predisposition of glaucoma, and only a quarter knew that glaucoma is not the same as cataracts. Additionally, although most of participants recognized common symptoms such as headaches and blurred vision, more than a quarter of them were unaware that glaucoma can be asymptomatic.

The result of our study showed that 58.6% of all participants had poor knowledge and awareness level, while 41.4% had an overall good understanding and awareness regarding glaucoma. The results matched what other studies have found in Abha and Riyadh AL-Anazi et al., (2018), Alamri et al., (2022) and better than other studies showed deficient awareness and knowledge of glaucoma Alqahtani et al., (2021), Ezinne et al., (2021), Ocansey et al., (2021), Marmamula et al., (2022) and other studies had a higher level of awareness and knowledge of glaucoma (Alemu et al., 2017; Abu Hassan et al., 2021; Becerril-Ledezma et al., 2022). The variation in glaucoma awareness between these studies could be attributed to several factors, including differences in sample sizes, the methods used to assess understanding, and the level of development in the studied areas.

A study conducted in Riyadh showed a suboptimal understanding on the level of awareness among physicians Alwazae et al., (2020), emphasizing that even physicians' awareness on glaucoma in our population require evaluation. The most reported source

of information about glaucoma was from family or relatives and friends at 37.6%, followed by mass media at 33.2%, and health care setting or staff at 29.2%. Previous studies have reported similar findings (Abu-Hassan et al., 2021; Alqahtani et al., 2021). One study proved that the preference of the majority of the participants in receiving information about glaucoma was through oral explanation (31%) followed by brochures (23%) and educational videos (22%) (Becerril-Ledezma et al., 2022). Regarding the awareness of risk factors, about 63.9% of participants knew that chronic diseases such as diabetes and hypertension are associated with glaucoma. Additionally, 48.3% were aware that previous eye surgeries or injuries could be considered risk factors, while 38.5% reported myopia and hypermetropia.

Our study group ages ranged from 18 to more than 70 years and they were divided into Saudi (89.4%) and non-Saudi (10.6%); male (36.1%) and female (63.9%); single and married; and according to the educational levels into below secondary (14.9%), secondary/diploma (30.2%), bachelor (47.2%), and post-graduate (7.7%). Despite the high prevalence of glaucoma, only 41.4% of our survey participants demonstrated a general knowledge and awareness of the condition. Compared to Hong Kong, China, representing 78.4% Lau et al., (2002), and Ondo state, Nigeria, which constitutes 49.7% Fasoranti et al., (2023), our study group might be considered to have low overall knowledge and awareness.

There were 48.4% of the participants from 18–30 years who were considered to be knowledgeable, representing the highest rate among other age groups, whereas in Ondo state, Nigeria constitutes 43.42% (Fasoranti et al., 2023). In contrast, participants aged 61–70 years had the lowest level of knowledge and awareness, accounting for 13.3% compared to 68% in Ondo state, Nigeria (Fasoranti et al., 2023). In our study group, males had 46.3% while females had 38.6%, whereas in Ondo state, Nigeria, 52% and 48.1% were male and female, respectively (Fasoranti et al., 2023). Unmarried Saudis are found to have more information about glaucoma in our study group.

People with post-graduate degrees had 62.1% overall good knowledge and awareness of glaucoma, the highest score achieved in comparison to the other groups in our study participants. According to our study results, overall knowledge increases as the academic level increases. The results indicate a strong association between higher educational levels, younger age, and increased levels of knowledge and awareness. This could be attributed to their access to technology and reference materials. Consider the limitations of this study when evaluating the findings. One limitation is that most of the surveyed population comprises educated adults aged between 18 and 30, potentially influencing their awareness and knowledge, as the older age group consistently refrained from responding to questionnaires. The yes/no questions may have an impact on the responses.

5. CONCLUSION

In conclusion, 41.4% of participants had good knowledge and reasonable awareness about glaucoma. The results suggest room for improvement in public awareness about glaucoma in Hail, Saudi Arabia, particularly considering the hereditary nature of the disease and the differences between glaucoma and cataract. Education and awareness campaigns may be helpful in addressing these gaps in knowledge and improving the early detection and treatment of glaucoma in the population.

Acknowledgment

We thank all the participants who contributed to the study.

Authors' contribution

Each author made a significant contribution to the work, including distributing and collecting the questionnaire, analyzing the data, and writing the project.

Ethical consideration

The study was approved by the Ethics Committee of Hail University (Ethical approval code: H-2022-372).

Informed consent

Written informed consent was obtained from all individual participants included in the study.

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This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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