

ORIGINAL ARTICLE

A study of medical students in Taif University awareness about cataract and its surgical procedures (extra-capsular cataract extraction and phacoemulsification)

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ABSTRACT

Background: Saudi studies conducted among the general population revealed insufficient knowledge regarding eye problems, including cataract. This study aimed to assess the knowledge of medical students about cataract.

Methodology: A cross-sectional study using self-administered questionnaires about cataract was conducted among 500 medical students of Taif University during the academic year 2018–2019.

Results: Almost 82% of the sample heard about cataract, 69% of the participants reported more than one correct answer about risk factors, 76% reported that aging was a risk factor of cataract, 70% said that cataract could cause blindness, while 82% replied that the surgical intervention was the recommended treatment of cataract. Only 17% of them reported the right answer to the causes of blindness in cataract. For most of these questions, the students in clinical years showed a highly significant difference in responding to the correct answers when compared to students in basic years.

Conclusion: Students from Taif University possess a good knowledge regarding cataract, but the deficient knowledge regarding some clinical aspects related to cataract calls for a curriculum reform of ophthalmology for sufficient training of medical students on clinical aspects related to cataract.

Keywords: Medical, students, Taif, awareness, cataract, surgical.

Introduction

Cataract is an eye disease that develops gradually, causing loss of vision, and blindness if left untreated [1]. The World Health Organization reported that cataract is the top leading cause of visual impairment worldwide accounting for 47.9% of blind cases [2]. In the Eastern Mediterranean Region, it is responsible for about 51% of blindness [3]. A cataract is an opacification of the lens of the eye, contributes to the majority of all blindness worldwide, and it is the leading cause of blindness in the developing and under-developed countries [4,5].

Studies of the general population reported low levels of awareness about common eye problems as cataract [6–8]. In the kingdom of Saudi Arabia (KSA), the Saudi board of ophthalmology reported that cataract ranked first among the top 10 causes of Blindness in the KSA [9]. An earlier study done in KSA, in the southwestern region in 1993, found that cataract was responsible for 52.6% of blindness and 20.6% of visual impairment. The

study revealed that proper management of cataract and correction of refractive errors would cure 73.6% of blind subjects and 88.5% of visually challenged people [10]. A recent study done in 2015 in Jizan city on randomly selected 3,800 subjects from the population, found that among the diagnosed blind cases, cataract accounted for 58.6% of the causes of blindness [11].

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Several recent studies have done since 2015, which assessed the Saudi population awareness about common eye diseases, including cataract. All these studies revealed insufficient knowledge regarding a lot of aspects related to that eye problem [12–16]. Ophthalmic consultations represent 9% of all health care visits, and general practitioners have an important role in the prevention of blindness [17]. Studies have found that basic ophthalmology education of medical students is insufficient, a matter that suggested the need to reassess the way ophthalmology is taught in medical schools [17,18].

Guedes [19] empathized that assessing the knowledge of medical students regarding most common medical problems they will face in their medical practice will have a reflection on their knowledge, as many of them will soon be managing patients. Also, the assessment of their knowledge regarding risk factors is crucial to prevent and control the causes of preventable blindness and visual impairment [19].

Advice to seek ophthalmologic consultation was found to have an essential role in preventing visual impairment, and knowledge was found to be a more important barrier to seeking medical care than a lack of access to care [20]. Lack of awareness about cataract is the main barrier towards decreasing cataract induced visual impairment [14].

The only public health education efforts about cataract in Saudi Arabia were from the Saudi Ophthalmology Society in cooperation with King Khaled Eye Specialist Hospital, other than that, the governmental efforts toward this issue are insufficient [21].

A careful literature search has found that despite the studies done in KSA to address the public awareness about cataract, no study was done to assess this awareness among the medical students.

The present study aimed to assess the knowledge of medical students, who will soon become general practitioners, regarding cataract as the most common cause of blindness in KSA. The result of this study can contribute to the discussions on curriculum reform to offer students appropriate training.

Methodology

A cross-sectional study was done on medical students of Taif University, college of medicine in the time from 1st January to 28th February 2019.

Students of both male and female sections of Taif medical college were the study population. The total number of students registered in the college in the academic year 2018–2019 was 763 students. The response rate was 65.5%, and 500 students were the study participants.

A pre-designed questionnaire was used and included questions on the demographic characters and educational grade. To assess the knowledge regarding cataract, the first question was, if the student previously heard about

cataract. Students who replied by “yes” were qualified to answer the second section that includes questions about cataract. The questions were about risk factors, symptoms, age of onset, the effect of sunglasses, proper age of eye screening, and relationship between cataract and blindness. Other questions were about the treatment of cataract, and specific questions on cataract surgery. The idea of the questionnaire's content was driven from questionnaires used in previous national and international studies [6,7,12–16]. Some of the questionnaire sections about cataract management and cataract surgery that were not present in questionnaires used in the previous studies were generated by an experienced ophthalmologist. Students were given four illustrated figures of different types of cataract to determine their diagnosis. These figures were selected and prepared by the same specialist.

The statistical package for the social sciences (SPSS) was used for data analysis. Qualitative data were expressed as numbers and percentages, and the Chi-square (χ^2) test was used to test the relationship between variables. A *p*-value of <0.05 was considered as statistically significant.

Results

Students in clinical years (4th, 5th, and 6th) represented 58.2% of the sample, and 51.4% of them were males. Among the participants, 410 students (82%) stated that they have heard about cataract before, and this group was qualified to respond to the subsequent questions. About 69% of the respondents reported more than one correct answer about risk factors of cataract, and 57.3% of them reported more than one correct answer about cataract symptoms.

About 76% of those who heard about cataract replied that aging is a risk factor of cataract, 70% reported that cataract could cause blindness, 82% of them replied that surgical intervention is the recommended treatment of cataract, while only 17% of them reported the right answer on causes of blindness in cataract. Only 22.4% of them reported the correct answer about the most common cause of blindness in KSA.

Of the 410 students, the percent of students who knew the correct answers about cataract were as follows: 61.7% of the participants answered correctly about methods of eye examination for cataract, 42.4% answered correctly about onset of surgery, 82.6% about if cataract can be treated without surgery, 53.1% about if complications of modern cataract surgery are common, 11.9% about timing of patient return to normal life after surgery, 28.5% about the duration of modern cataract surgery, 72.9% about the type of anesthesia in cataract surgery, and 50.4% about if the patient needs admission after surgery.

About 20% of the participants gave the correct answer about the best cataract surgery, 70.9% about which surgery needs lens implantation, 35.6% about the surgery in which lens is removed, covered by an elastic capsule partially attached to allow the implantation of an intraocular lens and requires a larger incision, and

30.4% about the surgery in which the eye's internal lens is emulsified with an ultrasonic handpiece and aspirated from the eye with insertion of an intraocular lens.

Table 1 shows that in comparison with students in basic years (1st, 2nd, and 3rd), students in clinical years showed a highly significant difference in responding the correct answers on questions about cataract risk factors, symptoms, age of onset, effect of sunglasses, and proper age of eye screening for cataract ($p < 0.05$).

Table 2 shows that students in clinical years showed a highly significant difference in giving the correct answers on questions about the most common cause of blindness in KSA, and if cataract can cause blindness ($p < 0.05$).

A non-significant difference was found between the two groups regarding the cause of blindness in cataract patients ($p = >0.05$).

Figure 1 shows that a non-significant difference was found between students in basic and clinical years regarding their response by the right answer on the diagnosis of illustrated four figures of different types of cataract ($p = >0.05$).

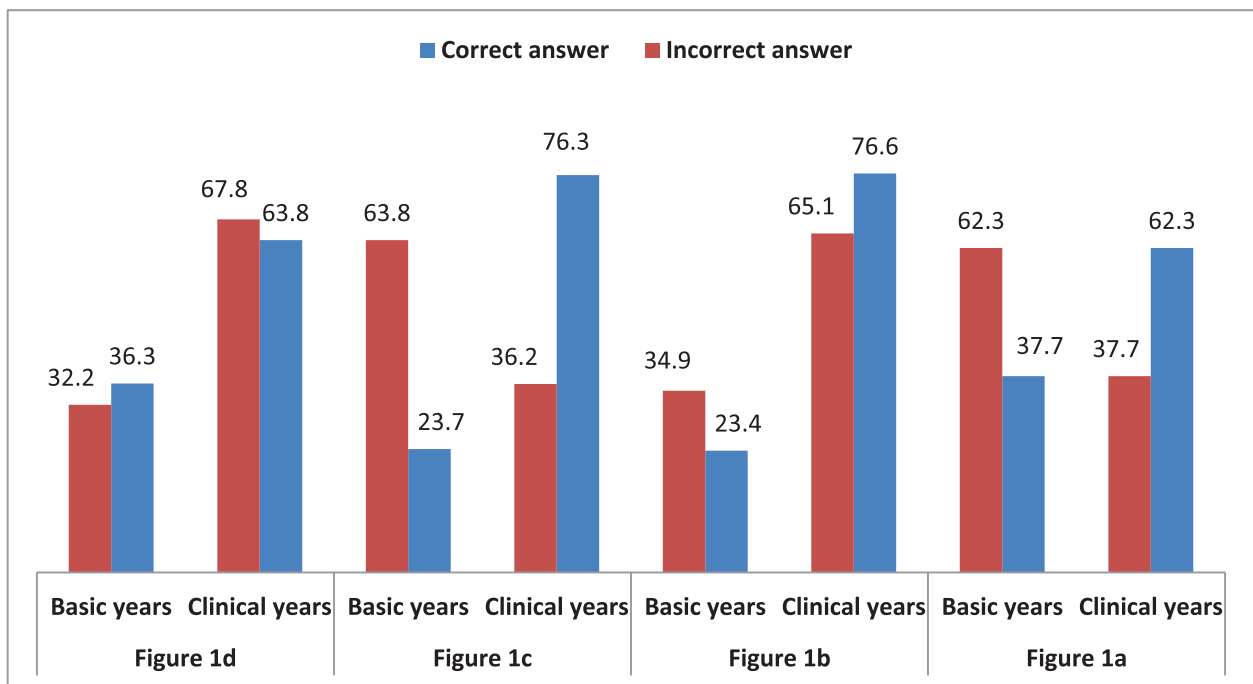
Table 3 shows that students in clinical years showed a highly significant difference in responding by the correct answers on questions about methods of eye examination for cataract, proper time of cataract surgery, type of anesthesia, surgery duration, if surgery is associated with

Table 1. Difference between basic and clinical year students' knowledge regarding cataract: risk factors, symptoms, age of onset, the effect of sunglasses, and proper age of eye screening.

p-value	χ^2 test	Clinical years	Basic years	Parameter
		No. (%)	No. (%)	
0.001<	69.72	274 (66.8) 17 (18.9)	136 (33.2) 73 (81.1)	Previous hearing about cataract Yes (410) No
0.001<	110	81 (90) 12 (54.5) 109 (68.1) 4 (22.2) 68 (56.7)	9 (10.1) 10 (45.5) 51 (31.9) 14 (77.8) 52 (43.3)	Part of the eye affected Anterior chamber Iris Lens (<i>Correct answer</i>) Pupil Cornea
0.001<	30.85	62 (75.6) 1 (11.1) 3 (37.5) 3 (23.1) 9 (60) 196 (69.3)	20 (24.4) 8 (88.9) 5 (62.5) 10 (76.9) 6 (40) 87 (30.7)	Risk factors of cataract Aging Exposure to radiation Following eye surgery Following eye trauma Use of steroids than one answer (<i>All answers are correct</i>)
0.006	12.38	53 (62.4) 44 (66.7) 9 (37.5) 168 (71.5)	32 (37.6) 22 (33.3) 15 (62.5) 67 (28.5)	Symptoms of cataract Blurring of vision Fog like over vision Decrease vision More than one answer (<i>All answers are correct</i>)
0.001<	78.5	260 (69) 14 (42.4)	117 (31) 19 (57.6)	Onset of symptoms Gradual (<i>Correct answer</i>) Sudden
0.001<	82.89	120 (62.5) 50 (57.5)	72 (37.5) 37 (42.5)	The common age of cataract? More than 60 (<i>Correct answer</i>) More than 40
0.001<	70.52	88 (63.8) 186 (68.4)	50 (36.5) 86 (31.6)	Do sunglasses improve symptoms? Yes No (<i>Correct answer</i>)
0.001<	74.89	88 (59.5) 186 (71)	60 (40.5) 76 (29)	Do sunglasses prevent cataract? Yes (<i>Correct answer</i>) No
< 0.001	86.47	18 (43.9) 75 (63.6) 64 (64) 117 (77.5)	23 (56.1) 43 (36.4) 36 (36) 34 (22.5)	Age of eye screening for cataract 35 years 40 years 45 years 50 years (<i>Correct answer</i>)

Table 2. Difference between basic and clinical year students regarding the relationship between cataract and blindness.

p-value	(χ^2) test	Clinical years	Basic years	Parameter
		No. (%)	No. (%)	
< 0.001	75.75	245 (69.2) 29 (51.8)	109 (30.8) 27 (48.2)	Cataract causes blindness Yes No
0.92	0.45	45 (65.2) 45 (65.2) 102 (68.9) 80 (66.7)	24 (35.3) 24 (34.8) 46 (31.1) 40 (33.3)	Causes of blindness with cataract Narrow vi Phacomorphic glaucoma (<i>Correct answer</i>) Keratitis Retinitis
0.017	10.14	53 (58.2) 57 (49.4) 143 (73.7) 18 (72)	38 (41.8) 39 (40.6) 51 (26.3) 7 (28)	The most common cause of blindness in KSA Cataract (<i>Correct answer</i>) Glaucoma Diabetic Retinopathy Refractive error



(N.B. For Figure 1a: $(\chi^2 = 1.46, p\text{-value} = 0.22)$)

(N.B. For Figure 1b: $(\chi^2 = 3.19, p\text{-value} = 0.07)$)

(N.B. For Figure 1c: $(\chi^2 = 5.12, p\text{-value} = 0.02)$)

(N.B. For Figure 1d: $(\chi^2 = 0.47, p\text{-value} = 0.49)$)

Figure 1. Difference between the knowledge of basic and clinical year students regarding diagnosis of different types of cataract in illustrated four figures.

complications, if patient needs admission after surgery, and when the patient returns to normal life after surgery ($p < 0.05$).

Table 4 shows that on asking specific ophthalmological questions about cataract surgery, students in clinical years showed a highly significant difference in giving the

correct answers on one question (best cataract surgery) ($p < 0.05$). A non-significant difference was found between the two groups regarding other sophisticated questions (surgery that needs lens implantation, surgery where lens is removed, covered by elastic capsule partially attached to allow the implantation of an intraocular lens

Table 3. Difference between basic and clinical year students regarding treatment conditions of cataract.

p-value	(χ^2) test	Clinical years	Basic years	Parameter
		No. (%)	No. (%)	
< 0.001	27.7	4 (33.3) 13 (36.1) 29 (82.9) 48 (64.9) 180 (71.1)	8 (66.7) 23 (63.9) 6 (17.1) 26 (35.1) 73 (28.9)	Methods of eye examination for cataract History taking (<i>wrong answer</i>) Visual acuity Slit lamp Ophthalmoscope More than one right answer
0.019	5.48	39 (54.9) 235 (69.3)	32 (45.1) 104 (30.7)	Cataract treated without surgery - Yes - No (<i>Correct answer</i>)
< 0.001	70.62	65 (65.7) 113 (64.9) 96 (70.1)	34 (34.3) 61 (35.1) 41 (29.9)	Onset of surgery Should not be done at all Done any stage (<i>Correct answer</i>) Patient waiting for the cataract to mature to do surgery
< 0.001	78.54	213 (71.2) 61 (55)	86 (28.8) 50 (45)	Anesthesia in cataract surgery Topical (<i>Correct answer</i>) General
< 0.001	70.97	15 (71.4) 74 (63.2) 111 (69.4) 74 (66.1)	6 (28.6) 43 (36.8) 49 (30.6) 38 (33.9)	Duration of modern cataract surgery 5 minutes 15 minutes (<i>Correct answer</i>) ½ hour 1 hour
< 0.001	71.32	122 (63.5) 152 (69.7)	70 (36.5) 66 (30.3)	Complications of modern cataract surgery are common? Yes No (<i>Correct answer</i>)
< 0.001	83.69	117 (57.6) 157 (75.8)	86 (42.4) 50 (24.2)	Does the patient need admission after surgery? - Yes - No (<i>Correct answer</i>)
< 0.001	71.2	36 (73.5) 53 (68.8) 96 (66.2) 89 (64)	13 (26.5) 24 (31.2) 49 (33.8) 50 (36)	When patients return to normal life after surgery 1 day (<i>Correct answer</i>) 3 days 7 days 10 days

Table 4. Difference between basic and clinical year students regarding knowledge about cataract surgery.

p-value	(χ^2) test	Clinical years	Basic years	Parameter
		No. (%)	No. (%)	
< 0.001	71.96	76 (72.4) 99 (63.1) 99 (66.9)	29 (27.6) 58 (36.9) 49 (33.1)	Best cataract surgery Phacoemulsification (<i>Correct answer</i>) Modern Extra-capsular cataract Intracapsular Cataract Extraction
0.22	3.01	48 (76.2) 163 (65.2) 58 (64.4)	15 (23.8) 87 (34.8) 32 (35.6)	What surgery needs lens implantation Phacoemulsification (<i>Correct answer</i>) Modern Extra-capsular cataract (<i>Correct answer</i>) Intracapsular Cataract Extraction
0.44	1.6	61 (72.6) 95 (65.1) 118 (65.6)	23 (27.4) 51 (34.9) 62 (34.4)	Which surgery lens is removed, covered by an elastic capsule partially attached to allow the implantation of an intraocular lens and requires a larger incision? Phacoemulsification Modern Extra-capsular cataract (<i>Correct answer</i>) Intracapsular Cataract Extraction
0.91	0.16	84 (67.2) 112 (67.5) 77 (65.3)	41 (32.8) 54 (32.5) 41 (34.7)	Which surgery the eye's internal lens is emulsified with an ultrasonic handpiece and aspirated from the eye with the insertion of an intraocular lens? Phacoemulsification (<i>Correct answer</i>) Modern Extra-capsular cataract Intracapsular Cataract Extraction

and requires a larger incision, and surgery where the eye's internal lens is emulsified with an ultrasonic handpiece, and aspirated from the eye with insertion of an intraocular lens) ($p = >0.05$).

Discussion

In the present study, 82% of the whole participants reported that they had heard about cataract. This percent is higher than that observed in a previous Saudi study done in Aljouf and Hail Province on the general population, where 70.90% have heard about cataract [13]. It is also higher than the percent observed in a study done in Abha City, where 77% of the participants heard about cataract [15]. It is also much higher than that figure reported in a study done in Nepal, which found that only 49.6% of the participants were aware of cataract [8]. An explanation of better hearing about cataract in the present study is that the participants are medical students with a high chance of hearing about different health issues when compared to other studies done on the general population.

In the present study, about 70% of those who heard about cataract reported that cataract could cause blindness. This percent is somewhat in agreement with the result revealed from a study done in Ghana (74.77%) [22]. On the other hand, the percent observed in the present study is much higher than that observed in studies done on the Saudi population in different Saudi cities.

In a study done in Al-Baha city, nearly half of the participants know that cataract could cause blindness [14]. Another study, done in Abha city, found that 54% of the participants knew that cataract could lead to loss of vision [15]. The same poor knowledge was observed in the study done in Makkah (22%) [12].

The knowledge of risk factors can minimize the incidence of cataract and improve eye care leading to better outcomes [14]. In the present study, 76.6% of students agreed that aging is a risk factor for cataract. The nearby result was observed in the study done in Ghana, where 78.9% of the participants reported the same relationship [22]. In contrast to this finding is that revealed from the study done in Makkah city, where less than 30 participants knew the relationship between aging and cataract.

In the current study, about 69% of the respondents reported more than one correct answer about risk factors of cataract, and 57.3% reported more than one correct answer about cataract symptoms. This result is much better than that declared in the previous study done in Makkah city, which observed deficient awareness about the definition, risk factors, and complications of cataract [12]. An explanation of that deficient knowledge in Makkah's study was the deficient health education programs by health care providers.

This result is also better than the level of knowledge observed in the study done in Abha city, which reported poor knowledge regarding risk factors. In the Abha study, the deficient knowledge about cataract risk factors called

for planning and conducting health education programs based on the gaps of the public awareness [14].

In the present study, 82% of the students replied that surgical intervention is the recommended treatment of cataract. In agreement with this result is that reported in a Brazilian study, where 85% of the subjects were aware of the surgical treatment of cataract [23]. This percent is also comparable to that revealed from the study done in Ghana, where 85% of the participants knew that surgical intervention is the recommended treatment of cataract [22].

On the other hand, this percent is higher than that observed in a similar study done in India, where more than 75% of the participants knew that cataract needs surgical treatment [24]. It is also higher than that reported in a study done on the Omani population, which revealed that 75.6% of the study population was aware of cataract management [25].

According to national studies, studies done in the Makkah region and Al-Baha City reported poor awareness about the treatment of cataract, where about 65% of the participants did not know that cataract can be treated surgically [12,14]. In the study done in Abha city, only 61.3% of the studied sample considered surgery to be the recommended treatment for cataract [15], and in the study done in Northwestern Saudi Arabia, only 64.1% of the participants knew that cataract should be treated surgically [16].

Fortunately, in the present study and other mentioned Saudi studies, the percent of students who replied that the surgical intervention is the recommended treatment of cataract is much higher than that observed in the study done in Ghana where less than half (44.86%) of the participants correctly identified surgery as the standard treatment for cataract [22].

More than 60% of the whole sample in the present study answered correctly about questions related to methods of eye examination for cataract (61.7%), type of anesthesia in cataract surgery (72.9%), and which surgery needs lens implantation (70.9%). On the other hand, less than 55% of the participants gave the correct answer about questions related to onset of surgery, if complications of modern cataract surgery are common, timing of patient return to normal life after surgery, duration of modern cataract surgery, and if the patient needs admission after surgery (50.4%).

This deficient knowledge about commonly asked questions, that any patient can ask a medical student in his normal life or a general practitioner in any health care setting, indicates the importance of raising awareness of medical students in all years about general information about cataract that can be directed to him by any individual in the community.

For specific questions about the surgical steps, only 35.6% of the participants replied correctly about which surgery lens is removed, covered by elastic capsule partially

attached to allow the implantation of an intraocular lens and requires a larger incision, and 30.4% replied correctly about the surgery in which the eye's internal lens is emulsified with an ultrasonic handpiece and aspirated from the eye with insertion of an intraocular lens.

The present work showed that when compared to students in basic years, students in clinical years showed a highly significant difference in giving the correct answers on questions about cataract risk factors, symptoms, age of onset, the effect of sunglasses, proper age of eye screening for cataract, if cataract is a leading cause of blindness, the most common cause of blindness in KSA and best cataract surgery.

On asking about clinical information regarding methods of eye examination for cataract, proper time of cataract surgery, type of anesthesia, surgery duration, if surgery is associated with complications, if patient needs admission after surgery, when he returns to normal life after the surgery, and best cataract surgery, students in clinical years showed a highly significant difference in giving the correct answers.

This promising result is a good indication of the efficiency of the theoretical content of the ophthalmology curriculum taught in Taif medical college.

On the other hand, a non-significant difference was found between the two groups regarding the cause of blindness in cataract patients. When asked to report the right diagnosis for four illustrated figure containing different types of cataract, a non-significant difference was found between the two groups.

This result indicates that medical education at Taif University should emphasize good training of medical students on the diagnosis of different types of cataract.

Previous studies concluded that medical students should have good training in diagnosing, referral, and even treatment of patients with the most common eye problems, such as cataract [18,19,24,26].

The present work showed that a non-significant difference was found between the two groups regarding other sophisticated questions regarding detailed information about the surgical procedures (surgery that needs lens implantation, surgery where lens is removed, covered by elastic capsule partially attached to allow the implantation of an intraocular lens and requires a larger incision, and surgery where the eye's internal lens is emulsified with an ultrasonic handpiece, and aspirated from the eye with insertion of an intraocular lens). This result indicates the importance of making a curriculum reform regarding the clinical content of the ophthalmology subject taught to medical students.

A large part of medical students will work in Primary Health Care settings, which is the entry to a network of services providing widespread community service [19]. They will also be an important source of information to the public [19]. Thus, good practical information and training should be directed to medical students to improve

their practical and clinical competencies [27]. Medical graduates will have an essential role in raising awareness about cataract among the general population, thus facilitating the timely utilization of relevant healthcare services leading to favorable treatment outcomes [27].

One of the limitations of this study was using self-reported questionnaires that may be prone to recall bias. The use of a cross-sectional study showed the relation between variables without closing a cause-effect relationship.

Conclusion

The present study showed a good level of knowledge of medical students of Taif University regarding risk factors of cataract, the relationship between cataract and blindness, symptoms, surgical intervention as the best method of management, methods of eye examination for cataract, and type of anesthesia in cataract surgery. While a deficient knowledge was present regarding specific information about cataract surgery. For most of these questions, students in clinical years showed a highly significant difference in responding to the correct answers when compared to students in basic years. The study calls for an ophthalmology curriculum reform in Taif medical college that guarantee good training of medical students on diagnosis and clinical aspects related to cataract.

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Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Informed consents were obtained from all students.

Ethical approval

The ethical approval was obtained from the Research Ethics Committee from Taif university with ethical application number 40-36-0151.

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Authors' contributions

Dr. Abdulmalik Hasan Salah Alghamdi: designed the study, developed the questionnaire and the informed consent, wrote the protocol, and planned the study. He

helped in statistical design and analysis. He will take the primary responsibility in responding to the reviewers' comments. Dr. Abdulaziz Abdulrhman Ibn Muhsin Altalhi: helped in questionnaire development. He helped in data collection, data entry, and the statistical design and analysis. Dr. Saud Mohammed Saad Alnefaie: helped in questionnaire development. He helped in data collection, data entry, and the statistical design and analysis. Dr. Ruba Ghazi Qadi: helped in questionnaire development. She helped in data collection, data entry, and the statistical design and analysis. Dr. Batool Meshal Alosaimi: helped in questionnaire development. She helped in data collection, data entry, and the statistical design and analysis. Dr. Bader Abdulaziz Salem Bahobail: helped in questionnaire development. He helped in data collection, data entry, and the statistical design and analysis.

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