Prevalence of Astigmatism among medical students in King Khalid University and its effects on academic performance

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Abstract

Background: Astigmatism is a clinically relevant disease that affects all age ranges as a widespread refractive defect. The objective of this research is to establish the prevalence of astigmatism among King Khalid University (KKU) medical students and also to detect the effect of this refractive error on the study group's academic results.

Methods: A cross sectional study was conducted among 201 students of King Khalid University, in Abha city. The participants chosen were students from all levels of the medical faculty, except those in the preparatory process. Each individual was asked to complete a questionnaire consisting of demographic features, education level, history of past refractive errors, family history of astigmatism, academic achievement problems and final GPA.

Results: Astigmatism was observed in 78 students (45.8 percent) out of a total 201 students. There was a strong link between the past history of astigmatism parents and the occurrence of astigmatism (p= 0.001). The level of astigmatism in students with a history of astigmatism was higher.

Conclusion: Among almost half of the included students, astigmatism was documented, particularly those with a positive family background of astigmatism and those who had impaired visual acuity for both far and close objects themselves. Students with astigmatism showed difficulties completing graph-based assessments or using microscopes, but there was no impact on the students' final GPA.

Key words: Astigmatism prevalence, performance, education, scores

Introduction

Many factors cause vision deficiency, one of which is refractive errors (REs). REs can be quickly corrected upon prompt diagnosis with proper glasses or contact lenses[1]. Uncorrected or inadequately corrected errors can however, result in vision disability or even blindness[1].

Multiple research has been conducted to study the prevalence of these errors among different age groups (from children to the elderly) and also among different ethnicities [2-5].

Refractive error is the most widespread ocular problem occurring among all age groups and is believed to be a global health challenge. According to several studies and WHO reports REs are the primary cause of any visual impairment and even in extreme cases lead to visual loss. In fact, it has been reported that uncorrected REs resulted in visual impairment and blindness in 101.2 million and 6.8 million people respectively in 2010 [6].

In addition to myopia and hyperopia, astigmatism, which typically accounts for around 13 percent of all REs, is another common form of RE. In fact, in some countries, such as Indonesia, Taiwan and Japan[7], it is the most common refractive error, with almost 50% of the population suffering from astigmatism in these areas[8-10].

A recent study conducted in Bangladesh detected that nearly 1 in 3 (32.4%) of those over the age of 30 had astigmatism [11]. Several researchers in Saudi Arabia documented an elevated incidence of REs with the prevalence of astigmatism in addition to myopia and hyperopia. More data on astigmatism in the Saudi community can also be used to provide useful knowledge on this disease in this region[12-14].

The prevalence and knowledge of REs among medical students at a Saudi Arabian University was investigated in one study[15]. However, the prevalence and effects of astigmatism among medical students in the southern province of Saudi Arabia has not been calculated by any of the published studies to date.

The main objective of this research was to determine the prevalence of astigmatism among medical students in the southern region of the Kingdom of Saudi Arabia at King Khalid University (KKU), and to determine the impact of astigmatism on the study group's academic results.

Materials and Methods

In this cross sectional study a firm questionnaire was developed and used in this cross-sectional analysis to gather the necessary data on vision status and diagnostic techniques for astigmatism. Each participant received the following information: age, gender, education degree, GPA, history of prior refractive errors, previous disorders of the medical or surgical eye, and family history of astigmatism. Data was entered in the SPSS ver.20 software for analysis, descriptive statistics (Mean, S.D, frequencies and percentages) were obtained; to measure the significant differences chi-square test was used to measure the significance differences at 5% level of significance. Informed consent regarding confidentiality of the data was obtained, further the questionnaire was anonymous

Results

A purposeful questionnaire was developed and used in this cross-sectional analysis to gather the necessary data on vision status and diagnostic techniques for astigmatism. Each participant received the following information: age, gender, education degree, GPA, history of prior refractive errors, previous disorders of the medical or surgical eye, family history of astigmatism.

Among them, 45.5% had age below 20 years and 42.9% had age above 20 years (Table 1), reflecting no significant difference in the two different age groups. Among 19 students with previous record of astigmatism, 17 (89.5%) still showed this condition and only 2 (10.5%) had normal vision; the difference is statistically significant ($P<0.05$). Out of 62 students with positive family history of astigmatism, about 66% (41/62) developed astigmatism. In comparison, among 139 students with negative family history of astigmatism, only 50 (36%) had astigmatism, indicating a statistically significant difference ($P<0.05$). Also 65.8% (48/73) of the students identified with astigmatism had impaired visual acuity for both far and near objects and 33.6% (50/139) of others did not with recorded statistical significance ($P<0.05$).

Finally on testing association between astigmatism and educational achievement, as shown in Table 2, 28.6% of the students with astigmatism recorded difficulty when performing exams containing graphs and pictures compared to 8.2% of normal students with statistical significance ($P<0.05$). As for the difficulties of using the microscope during tests, 50.5 percent of students with astigmatism replied yes, compared to 16.4 percent of regular students with a substantial difference ($P<0.05$). 37.4 percent of the students with astigmatism answered 'yes' when questioned for routine eye-examination, and 62.6 percent of students with astigmatism replied 'no' with a statistically important gap.

Figure 1. Prevalence of astigmatism among medical students in King Khalid University, Saudi Arabia, 2017

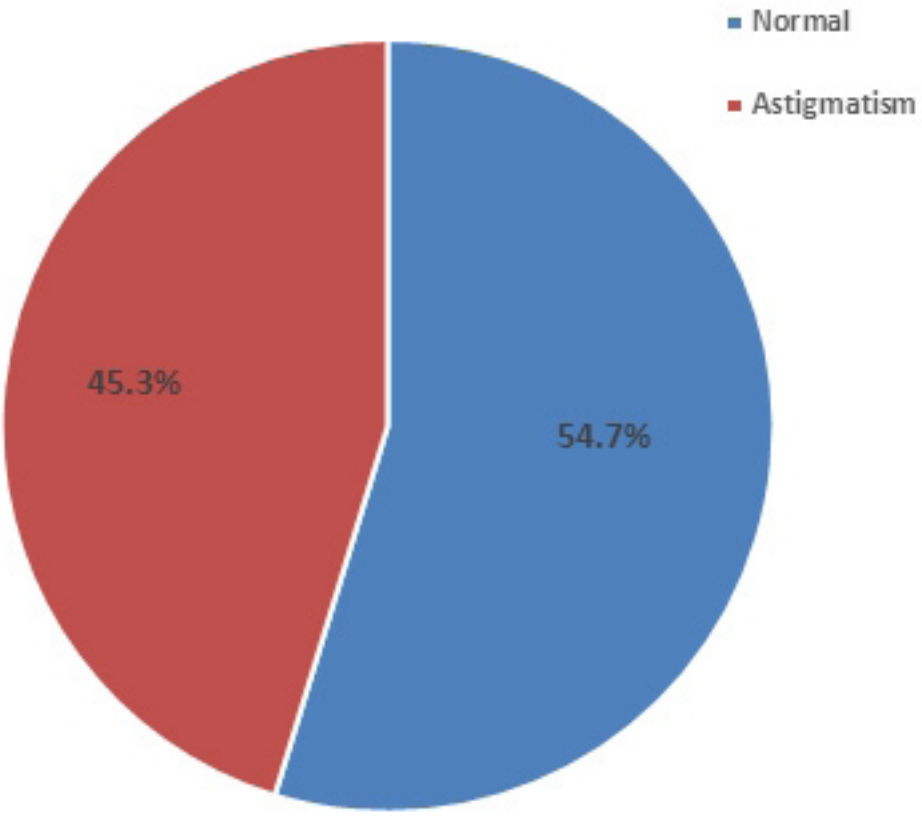

Table 1. Distribution of astigmatism status with bio-demographic characteristics of medical students in King Khalid University, Saudi Arabia, 2017

Factor		Total	Astigmatism				P
			Normal		Astigmatism		
			No	%	No	%	
Age in years	18	11 (5.5%)	6	54.5	5	45.5	0.789
	20	92 (45.8%)	48	52.2	44	47.8	
	23-26	98 (48.8%)	56	57.1	42	42.9	
Gender	Male	147 (73.1%)	81	55.1	66	44.9	0.860
	Female	54 (26.9%)	29	53.7	25	46.3	
Academic level	1-6	61 (30.3%)	33	54.1	28	45.9	0.906
	7-12	140 (69.7%)	77	55.0	63	45.0	
Previously suffered from any refractive error?	No	81 (40.3%)	63	77.8	18	22.2	0.515
	Myopia	63 (31.3%)	37	58.7	26	41.3	
	Hyperopia	8 (4.0%)	3	37.5	5	62.5	
	Astigmatism	19 (9.5%)	2	10.5	17	89.5	
	Myopia with astigmatism	30 (14.9%)	5	16.7	25	83.3	
Does any member of your family have astigmatism?	Yes	62 (30.8%)	21	33.9	41	66.1	0.001*
	No	139 (69.2%)	89	64.0	50	36.0	
Do you have impaired visual acuity for both far and near objects?	Yes	73 (36.3%)	25	34.2	48	65.8	0.001*
	No	128 (63.7%)	85	66.4	43	33.6	
Have you had any eye surgery?	Yes	8 (4.0%)	4	50.0	4	50.0	0.784
	No	193 (96.0%)	106	54.9	87	45.1	

* P < 0.05 (significant)

Table 2. Relation between astigmatism and academic performance of medical students in King Khalid University, Saudi Arabia, 2017

Academic performance		Astigmatism				P
		Normal		Astigmatism		
		No	%	No	%	
Have difficulty when performing exams containing graphs and pictures	Yes	9	8.2	26	28.6	0.001*
	No	101	91.8	65	71.4	
Have difficulty using microscope during your exams	Yes	18	16.4	46	50.5	0.001*
	No	92	83.6	45	49.5	
Check your eyes regularly?	Yes	24	21.8	34	37.4	0.015*
	No	86	78.2	57	62.6	
GPA	4.5-5	27	24.5	29	31.9	0.515
	4-4.5	20	18.2	19	20.9	
	3.5-4	27	24.5	16	17.6	
	3-3.5	19	17.3	16	17.6	
	2.5-3	10	9.1	9	9.9	
	2-2.5	7	6.4	2	2.2	

* P < 0.05 (significant)

Discussion

The present study identified the prevalence of astigmatism among the medical students of King Khalid University, Saudi Arabia, and its impact on academic success. This is possibly the first research undertaken in the southern province of Saudi Arabia for medical students [16] and this might be due to ethnic variation, genetic predispositions and environmental variations. No substantial variation was found between male and female students in the frequency of astigmatism (p=0.860). In fact, gender-based disparities in astigmatism have not been reliably reported, unlike myopia with increased incidence among females; some studies showed female predominance [15], some showed male predominance[15,16], while some showed no distinction at all[17].

This study showed that among those students with prior experience of some RE, especially astigmatism, as well as those with diminished visual acuity, astigmatism was greater for both far and close items. The theory behind this may be diminished understanding, acceptance of the issue at personal and family level, as well as inadequate approach towards avoiding and fixing the problem[15]. In addition, the slightly higher prevalence of astigmatism observed among students with a good family history of astigmatism (p=0.001) is compatible with other research suggesting the role of both genetic and environmental influences in the development of astigmatism [14-16].

Another leading factor to astigmatism may be tension among students due to improved academic success. Nevertheless, the exact underlying cause for the production of astigmatism is still unclear among medical students.

The key obstacles to academic success identified by research participants with astigmatism include trouble doing graph and image examinations and also difficulties with using the microscope during the test.

The drawbacks of the current research include limited sample size, featuring students from a single university department, their cross-sectional environments, and more male participants relative to females.

Conclusions

In conclusion, the prevalence of astigmatism was found to be 45.3 percent among the medical students of King Khalid University, Saudi Arabia, indicating one of the highest rates nationally and globally. In order to discover additional cases of astigmatism among medical students and its effect on their academic results, further surveys and investigations are needed. In addition, health education workshops need to be held to increase awareness about constant scanning to identify new cases and the importance of daily visual screening.

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