

## Prevalence and Awareness of Refractive Errors among Aljouf University Medical Students

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### ABSTRACT

**Purpose:** To evaluate the prevalence of refractive errors (REs) among medical students of Aljouf University.

**Methods:** A cross-sectional study was conducted anonymously on 278 students. A structured close-ended questionnaire was distributed for data collection and checking awareness concerning REs amongst them in the period between December 2016 and January 2017. All volunteering participants underwent ophthalmic examination including autorefractometer examination (Topcon RM-8000B, Tokyo, Japan).

**Results:** The response rate was 72.3%. Mean age was  $21.2 \pm 1.45$  years (range 19 - 25 years). 71.6% of the participant in the study was males. Results from the autorefractometer showed that 83.1% of participants suffered from REs. 74.129% were myopic, while 53.731% were astigmatic, and 47.264% had combined astigmatism and myopia. Furthermore, hypermetropia prevalence was 3.483%. 80.6% of males, while 89.5% of females suffered REs. However, there was no significant association between REs and gender ( $P > 0.05$ ). Only about half of the students (48.8%) involved in the study were aware of REs, which explains the notion that 51.5% of students enrolled were not using any kind of treatment for REs. Only 10.9% of students were engaged in regular follow up for eye care service.

**Conclusion:** The prevalence of REs among investigated students was 83.1%, which is one of the highest rates reported. There has to be a concern for a regular checkup starting from early ages as a preventive measure against REs through increasing knowledge, awareness and practice concerning REs particular for medical students as future health care professionals.

**Keywords:** Refractive errors, Autorefractometer, Medical students, Awareness, myopia, astigmatism, hypermetropia, Aljouf.

### INTRODUCTION

Visual impairment is one of the major worldwide health issues, where the uncorrected refractive errors (REs; myopia, hyperopia and astigmatism) contributes 43% toward the problem that makes it the major cause of blindness<sup>(1)</sup>. Several studies reported an increasingly epidemic rate for myopia prevalence, especially in East Asia, and among populations of Chinese descent<sup>(2-4)</sup>. However, myopia have been found to achieve higher intelligence test scores and higher educational levels than non-myopic<sup>(5)</sup>. The correlation between myopia and high education levels was settled long time ago. In European cohort, Mirshahi et al showed that individuals with higher level of education are more likely to be myopic<sup>(6)</sup>. Medical students are exposed to high level of eye effort through their college life<sup>(7)</sup>.

A study of myopia conducted in Taiwan that targeted medical students showed that myopic students constituted 90% of all students<sup>(7)</sup>. In Singapore, it was reported that the prevalence rate of myopia among medical students was 82%, while that of astigmatism was more than 70%<sup>(8)</sup>.

On the other side, European reports conducted on medical students in Denmark and Norway showed relatively lower prevalence rates of 50% and 50.3%, respectively<sup>(9,10)</sup>.

Nationally in Saudi Arabia, a study held in Al-Hassa that targeted primary school children showed that 89.36% had defective vision. Of those, 13.7% had refractive errors. Myopia was the major REs reaching 65.7%<sup>(11)</sup>. Generally, students have been reported to be at high risk for myopia<sup>(12)</sup>. Patients from Al-Jouf region examined in primary health care centers show that leading cause of visual impairment was refractive errors, with a rate of 36%<sup>(13)</sup>. REs were the second leading cause of visual impairment, estimating 24.7% among northern Saudi Arar population<sup>(14)</sup>. Low awareness of the problem is prevailing and hinders seeking for treatment. In Riyadh, a study conducted between the years 2003 and 2004 found only 8% of the affected persons were using eyeglasses for correction of REs<sup>(15)</sup>.

In Al-Jouf region, reports describing the prevalence of REs, and, awareness concerning REs particularly among medical students, as one of the most predisposed population, are rare. Therefore, the present study was planned to assess the prevalence of REs among Aljouf University medical student and to check and, their awareness concerning the problem.

#### **PARTICIPANTS AND METHODS**

**Study design:** This cross-sectional study enrolling on 278 students with mean  $\pm$  SDM of  $21.2 \pm 1.45$  years and range of 19 - 25 years in their age. 71.6% of the participant in the study was males. The study was conducted in College of Medicine, Aljouf University, Sakaka, Saudi Arabia in the period from December 15, 2016 to January 25, 2017. The study was approved by the Ethical Committee of the College of Medicine. Participation of students was anonymous and voluntarily, and, an oral informed consent was secured from each as confirmed by their filling of the questionnaire. A structured close-ended questionnaire was distributed to the targeted population to collect demographic data and history of REs. **Inclusion criteria:** Willingly participating medical students of both genders attending the College of Medicine, Aljouf University, Sakaka, Saudi Arabia. **Exclusion criteria:** Unwilling participants and those unavailable for any reason during the study period.

Autorefractometer (Topcon RM-8000B, Topcon Co., Tokyo, Japan) was used to check both eyes of each participant with the help of an experienced ophthalmology consultant. Refraction data were recorded as follows: An initial objective refraction result was recorded as the average of sex reading for each eye, then, subjective refraction was attempted to refine vision, using the results of the objective refraction as a starting point. Because of the age of our study population, no cyclopegia was used. We defined myopia as spherical equivalent (SE) of at least -0.05 diopter (D) in either eye, hypermetropia was defined as spherical equivalent (SE) of at least +0.05 diopter (D) in either eye, and, astigmatism was defined as cylindrical equivalent (CE) of at least -0.05 diopter (D) in any axis.

**The study was done according to the ethical board of King Abdulaziz university.**

**Statistical data analysis procedure:** Data were presented as frequencies (n and %) that were

analyzed by SPSS version 23. Comparisons were done using Chi Square and p value of  $\leq 0.05$  was considered significant.

#### **RESULTS**

A total number of 278 students of both genders belonging to all grades attending the College of Medicine were surveyed. 201 students positively responded giving a response rate of 72.3%. Their mean  $\pm$  SDM age was  $21.2 \pm 1.45$  years that ranged from 19 - 25 years. 71.6% of the enrolled participants was males (remaining 28.4% was females).

Autorefractometry showed that 167 of students (comprising 83.1%) suffered from a kind of REs. 74.129% were myopic, while 53.731% were astigmatic. Moreover, 47.264% had combined astigmatism and myopia. Furthermore, hypermetropia prevalence was 3.483% (Table 1). Table 1: Distribution of refractive errors among Aljouf University medical students. Data shown are frequencies (% and n).

All percentages were calculated out from the total (n = 201).

Type of the refractive error (REs)	%	n
Total	100%	201
Normal vision	16.915%	34
REs	83.085%	167
Myopia	74.129%	149
Astigmatism	53.731%	108
Myopia + Astigmatism	47.264%	95
Hypermetropia	3.483%	7

Gender-wise, 80.6% of males suffered REs, which was slightly lower compared to the rate of Res among females that reached 89.5%, but the difference was insignificant (p = 0.129).

Only 52.1% of medical student diagnosed with REs, had the knowledge and understanding of the refractive errors and the remaining 47.9% with REs lacked the awareness in regards to RE. Overall, 48.8% of students involved were aware of REs. Unfortunately, only 10.9% of the whole group of students was regularly following up for ophthalmic checkup. Among those who have been diagnosed with REs, 35.3% were using glasses, while 7.2% preferred contact lens, and, 4.8% undergone LASIK. The rest of participants

with REs (51.5 %) were not using any kind of treatment.

## DISCUSSION

RE is the most prevailing eye problem in current time worldwide. Uncorrected REs correlates significant consequent morbidities, i.e., ocular degeneration and blindness<sup>(1)</sup>. Worldwide studies agreed concerning the increasing prevalence of REs<sup>(16,19)</sup>. The present study is the first to address the issue among medical students attending Aljouf University College Medicine. Our results found a prevalence of REs reaching 83.1%. This prevalence rate is slightly lower than the study conducted on Singaporean medical students with a prevalence rate 90%. Studies in Norway and Denmark found that the prevalence is 50% and 53%, respectively<sup>(9,10)</sup>. However, reviewing recent studies conducted in Aljouf province and in a nearby province, Arar, prevalence of REs was estimated to be 36% in a random population representing the Aljouf total population, and was 26% in Arar population<sup>(13,14)</sup>. This indicates massively higher rates among our medical students.

However, these results has to be treated with cautions, as the differences in prevalence rates in Aljouf and Arar population when compared with students in medical faculty in the same area could be explained in behavioral matter. It has been proven that high intelligent people are more subjected to suffer from refractive errors especially myopia with strong association with educational level ( $P < 0.001$ )<sup>(6,20)</sup>. In agreement, Mirshahi et al reported higher REs prevalence among high educational level people vs. the general population<sup>(6)</sup>. It is well known that the cause of myopia is multifactorial, and the stress of the increasing education level and spent most of the time indoors is another factor<sup>(14)</sup>. Furthermore, in our sample and worldwide, nowadays students not only get their eyes stressed reading from books, but more dangerously from electronic screens with mush electron showering their eyes<sup>(16,20,21)</sup>.

Many studies addressed the gender-wise differences in prevalence of REs. In our study, there was nonsignificant higher REs rate among females inconsistency with Alshalan's et al study that targeted Aljouf population. Alshalan et al reasoned the higher prevalence among females to their loss fortune of suffering more diseases which may lead to visual impairment<sup>(13)</sup>. On the contrary, Dey et al in an Indian study targeting medical students, reported significantly higher

rate of REs among males reaching 65.15%. But they did not present reasoning<sup>(22)</sup>.

Considering knowledge about REs among our students, only 48% were aware of REs. This low rate of awareness possibly contributed towards higher rate of the issue and reduces chances of preventing and correcting it. In a study conducted in Riyadh, capital of the country, the investigators considered the unawareness of the problem, not only a major causative factor, but also a major factor hindering its correction<sup>(15)</sup>. In a reflection of the low awareness and inappropriate attitude and practice, 51.5% of our samples were not using any kind of treatment for REs, and only a small proportion (10.9%) were engaged in regular ophthalmic prophylactic care service as previously reported<sup>(15)</sup>. In our study, among those who had been diagnosed with REs, only 42.5% (35.3% were wearing glasses and 7.2% were using contact lenses) along with 4.8% who used corrective LASIK, leaving more than 50% ignoring the problem and susceptible for its consequences.

## CONCLUSIONS

The prevalence of REs was 83.1% among Aljouf University medical students presenting one of the highest rates nationally and internationally, as expected for higher education populations. There was nonsignificant higher rate among females despite their lower number among the sample studied. There was low level of preventative and corrective awareness among the studied participants. Strategies for raising knowledge, attitude and practice considering REs among our students and the population at large are mandatory to prevent morbid consequences.

## LIMITATIONS OF THE STUDY

- Majority of the participants were male in comparison with females because of the lower number of females student recently joined the college.
- Relationships with possible cofounders such as BMI, marital status, nutritional deficiencies, family history and smoking were not analyzed.

## CONFLICT OF INTEREST

We declare having no conflict of interest.

## AUTHORS' CONTRIBUTION

We acknowledge that all authors had equally participated in hypothesizing and designing the study, collecting, analyzing and presenting the

data, and, writing the manuscript towards its final presentation. We agreed about order in which authors were arranged on the manuscript.

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