



Refractive Errors among Saudi Medical and Pharmacy Female Students: A Questionnaire Survey Study

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Background: Visual impairment due to refractive errors (RE) is one of the most common problems worldwide. Uncorrected refractive errors pose a considerable impact on student's learning, academic achievement and by extension employability. Education and near-work are both strongly associated with increasing severity of RE.

Aim: To determine the prevalence of refractive errors among medical and pharmacy female students in Qassim University, KSA.

Subjects and Methods: A cross sectional study of all medical and pharmacy female students in Qassim university, KSA aged 17-23 years from September to December 2015 was conducted. A questionnaire containing demographic characteristics, onset of refractive error and parental history of wearing glasses was filled by each student. For each eye independently, visual acuity (VA) was assessed using the Snellen Tumbling C eye chart at 6 meters distance. Pinhole test to evaluate the improvement of VA was used where its improvement was considered as a refractive error.

Results: A total of 223 female students were studied. The prevalence of refractive errors was 72.2%.

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Inability to see distant objects was used as a preliminary indicator of myopia which represented 61.5%. Despite RE is prevalent, only 11.7% of the studied group with RE wore spectacles during the time of the study, cosmetic reason (70.2%), as one of the cultural barriers, was the major cause behind that. Positive parental history, studying for 6 hours or more/day and student performance of excellent/very good were the significant risk factors for RE.

Conclusion: Prospective studies among medical university students involved in prolonged reading to confirm the pattern of RE and its progression during the course of study as compared to other students are advocated. Moreover, there is a need for further studies to evaluate the cultural beliefs surrounding female use of spectacles in Saudi communities.

Keywords: Refractive errors; prevalence; medical students; Kingdom of Saudi Arabia.

1. INTRODUCTION

Visual impairment remains a major public health problem worldwide, with an estimated 161 million people with visual impairment, of whom 37 million are blind. According to World Health Organization (WHO) report, uncorrected refractive error remains the second commonest cause of global visual impairment next to cataract [1]. For students, uncorrected refractive errors pose a considerable impact on learning, academic achievement and by extension employability [2,3]. Genetic factors are thought to play a role in development of refractive errors. It has been established that myopia clusters within families, and familial high myopia has been linked to long arm regions on chromosomes 7, 12 and 18 [4,5]. Environmental risk factors have also been associated with refractive errors. Education [6,7] and near-work [8] are both strongly associated with increasing severity of myopia.

In different parts of Asia such as in India, the Andhra Pradesh Eye Disease Study shows 15.2% [9] prevalence rate of myopia. While study in a 15,068 Singapore military recruits aged 16 to 25 years, the prevalence rates of myopia were much higher with some racial variation, 82.2% in Chinese, 68.8% in Indians, and 65.0% in Malays [10]. Similar high rates of myopia (84%) were present in 16 to 18 years old Chinese children in Taiwan [11]. In Pakistan the prevalence rates of myopia, hypermetropia, astigmatism was 36.5%, 27.1%, and 37%, respectively in adults aged 30 years or more in the National Blindness and Visual Impairment Survey [12].

Many studies [2,3,13-15] on refractive errors have focused mainly on primary and secondary school children.

1.1 Aim and Rationale of the Study

Little is known about refractive errors and refractive spectacle use pattern among University students in Kingdom of Saudi Arabia settings. A personal observation of the researcher that female student in medicine and pharmacy colleges in Qassim university were unable to see the board in the class as well as trying to squeeze their eyes during walking in the corridors to constrict visual field for proper seeing of the distant objects was the rationale of this study. This study was to determine the prevalence of refractive errors among a representative sample of medical and pharmacy female students in Qassim University, KSA. It is hoped that the information from this study will add to the existing body of knowledge on this subject.

2. SUBJECTS AND METHODS

A cross-sectional study on a sample of 223 medical and pharmacy female university students aged 17-23 year old was carried in the context of time frame from September to December 2015. All female students from the three different levels of both medicine and pharmacy colleges who agreed to participate in the study were the target group. Those who didn't sign the written consent or refused sharing in the study or have had diabetes mellitus or any history of eye injuries or eye disease affecting visual function (e.g. corneal opacity, cataract or retinal pathology) were excluded. The response rate was 98.6%.

2.1 Ethical Considerations

Official approvals from the directors of both medicine and pharmacy colleges were obtained. A written consent form was signed by each female student before participation. The study

protocol was approved by the ethics committee at the corresponding colleges.

2.2 Study Tools

A questionnaire containing demographic characteristics of each student (age, academic grade, and academic performance), onset of refractive error and parental history of wearing spectacles was filled by each student. Questions regarding symptom of eye pains, eyestrain, and/or headache during studying and inability to see distant objects were present. Mean studying hours/day, and causes for non-wearing glasses regularly if so were also asked.

During morning working day in the clinic of the medical college, visual acuity (VA) of the students was assessed using the Snellen Tumbling C eye chart at 6 meters distance in a well-illuminated room. VA was performed for each eye independently, the right eye was tested first with the left eye covered and then the left eye was tested with the right eye covered. The top letter on the chart was designated as 6/60, and the lowest line of letters was designated as 6/6 [16]. Students who were wearing glasses, their VA were assessed while wearing them. The line with the smallest font in which more than half of the letters could be read by the student was recorded. Those with VA 6/12 or less with or without correction in one or both eyes were examined by pinhole test to evaluate the improvement of VA. An improvement of the VA with pinhole was considered as a refractive error [17,18].

2.3 Data Management

The collected data were analyzed using SPSS version 20. Qualitative data were expressed as number and percentage (NO and %), where chi-square test (χ^2) was used. Odds ratio (OR) and 95% confidence interval (CI) were also used. Quantitative data were expressed as mean and SD (mean \pm SD). P-value at 0.05 or less was significant.

3. RESULTS

A total of 223 female students, age between 17 to 23 years (mean \pm SD= 20.2 \pm 1.3) were included in the study. One hundred and sixty one students (72.2%) were designated to have a form of refractive error (Fig. 1). Inability to see distant objects was used as a preliminary indicator of

myopia, its prevalence was 61.5% (Table 1). Reasons for non-using of spectacles were shown in Fig. 2 which included cosmetic reason, as one of the cultural barriers, the major cause (113 students, 70.2%), followed by burden to the face (28 students, 17.3%), then cause pain (10 students, 6.2%), missing (6 students, 3.7%) and lastly no need (4 students, 2.5%). Only 41 of those diagnosed as having RE (25.5%) had worn glasses before. One hundred and ninety seven of all students (88.3%) were not wearing glasses at the time of the study, while 26 (11.7%) were wearing glasses at the time of the study. Thirty nine of those with RE (24.2%) had eye pains, eye strains and/or headache while reading. One hundred and one of all students (45.3%) had at least a family member using spectacles. Positive parental history, studying for 6 hours or more/day and student performance of excellent/very good were the significant risk factors for RE. However, age in years and academic grades were non-significant risk factors for developing RE among studied group. Inability to see distant objects and pain during reading were significantly more prevalent among students diagnosed as having RE.

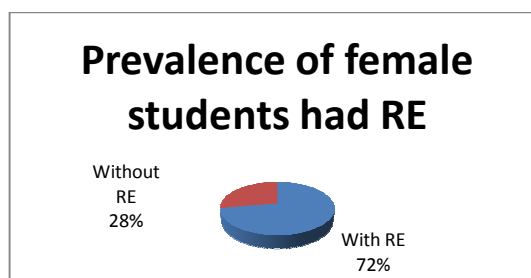


Fig. 1. Prevalence of RE among studied female students

4. DISCUSSION

Overall prevalence of ametropia in our study was 72.2%. This prevalence was close to that reported in Nigeria [19] among medical students of (79.5%). In contrast, it was far away from the prevalence reported in Malaysia [20] among Chinese and Indian medical students of 32.24%. In the current study, cycloplegic autorefractor hadn't been used but inability to see distant objects were used as an indicator for myopia which prevalent 61.5%. Myopia frequency was reported to be 63.6% between Nigerian medical students [19]. Reports on prevalence of myopia in medical students in Asian countries showed higher rates of 82 and 89.8% in Singapore

[21,22], 87.6% in Malaysia [20] and 92.8% in Taiwan [23]. However, similar studies on medical students in Norway [8], Denmark [24] and Turkey [25] yielded relatively lower prevalence rates

of 50.3%, 50% and 32.9%; respectively. Consistently high prevalence rates of myopia have been reported among medical students across several studies in many countries [26-28].

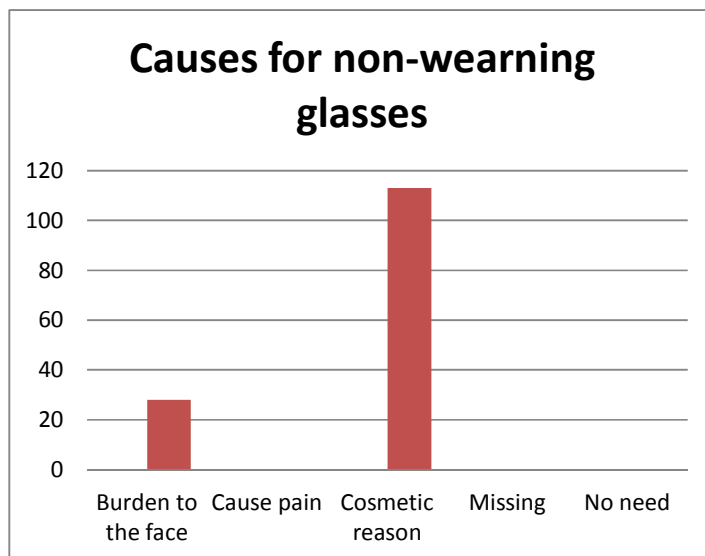


Fig. 2. Causes of non-wearing glasses among studied group

Table 1. Comparison between students with and without RE regarding risk factors

Parameter	RE		No RE		P-value	95% CI
	No	%	No	%		
Age (in years):						
• 18	58	36.1	21	33.9	0.76	0.59-2.04
• 20-23	103	63.9	41	66.1		
Parental history:						
• Present	83	51.6	18	29.1	0.002*	1.38-4.88
• Absent	78	48.4	44	70.9		
Studying hours daily:						
• ≥ 6 hours	110	68.3	33	53.2	0.035*	1.04-3.45
• <6 hours	51	31.7	29	46.8		
Academic grade:						
• 1 st	74	45.9	31	50	0.59	0.47-1.53
• 2 nd	48	29.8	14	22.6	0.28	0.73-2.89
• 3 rd	39	24.2	17	27.4	0.62	0.44-1.64
Academic performance:						
• Excellent/very good	73	45.3	19	30.6		
• Good/fair	88	54.7	43	69.4	0.045*	1.01-3.5
Inability to see distant objects (suspect myopia):						
• Yes	99	61.5	0	0	<0.001*	-----
• No	62	38.5	62	100		
Pain during reading:						
• Yes	39	24.2	0	0		
• No	122	75.8	62	100	<0.001*	-----
Total	161	100	62	100		

*Significant

It was observed that with increasing student academic performance the prevalence of RE increased. There were several studies have demonstrated a marked increase in the prevalence of myopia with a clear relationship to educational level [23,26,29]. Reasons behind this may include high level of educational attainment [30], above average intelligence [31], long and intensive study regimen [32] and prolonged near-work [20-23]. As medical students are a group of young adults who spend prolonged periods on reading and close work and with their intensive study regimen spans on the average 5 to 6 years, they have been reported to be at high risk for myopia [8,21-24]. The exact pathogenic mechanisms of the myopisation of ocular refractive apparatus by near-work are yet to be fully agreed upon. Prolonged near-work was thought to lead to progressive myopia through the direct physical effect of prolonged accommodation. But according to current theory prolonged near work leads to myopia via the blurred retinal image that occurs during near focus. This retinal blur initiates a biochemical process in the retina to stimulate biochemical and structural changes in the sclera and choroid that lead to axial elongation [33].

This study revealed that female students with positive parental history of wearing spectacles were significantly had RF. This result was in concordance with other studies [34,35] mentioned that there is compelling evidence for both genetic and environmental influence on refractive error development. A recent study among Chinese adults residing in Singapore indicated that myopia is 1.5-2.5 times more prevalent than in similarly aged European-derived populations in the USA and Australia [29]. A previous study [20] based in Malaysia among medical student population has examined the prevalence of myopia with respect to ethnicity and reported myopia in 93% of Chinese ametropes and 82% in Indian ametropes. In that study, near-work alone could not explain the disparities found in Chinese and Indian students. This fact may buttress the discordance in prevalence figures in the current and the above studies among Asians, Europeans and Caucasians [8,20-25]. It seems reasonable to assert that the pattern of refractive errors and its severity appear multi factorial and polygenic (genetic and racial traits), while near-work plays a significant myopiagenic effect.

Despite extensive literature search of major data-bases, there is paucity of studies on refractive errors among Saudi university students with which to compare our study. Nonetheless, the results of this study show a greater prevalence of refractive errors and myopia (depending only on inability to see distant objects) than would be expected in a general population in Saudi settings. Epidemiological studies among Saudi primary school children have reported refractive errors prevalence that ranges from 13.7% in Al-Hassa [36], 16.4% in Al-Taief [37] to 18-6% in Qassim Province [38], myopia (range, 5.8%-65.7%) being the commonest prevalent refractive error. The prevalence of RE among intermediate school entrants was 9.8% in Riyadh city, where myopia represented 4.5% [39]. However, the mean ages of these Saudi studies are much lower than that recorded in the current study. But the differences in age alone cannot account for the huge discrepancy in refractive errors and myopia prevalence. Indeed Framingham Offspring Eye Study [6] found the prevalence of myopia to decrease with age in 1585 offspring of 1319 parents. This is expected on account of decreasing growth of the eye after high school. The alarming prevalent figures recorded in the current study perhaps hinge on the extensive near-work by these medical students, considering the relative similarities, in terms of genetics and other environmental factors between the current study and previous mentioned Saudi studies.

Cosmetic reason, as one of the cultural barriers, was the most frequent cause behind un-wearing glasses and spectacles among studied female group. WHO 1993 [40] supported this finding, it mentioned that various factors are responsible for refractive errors remaining uncorrected: lack of awareness and recognition of the problem at personal and family level, as well as at community and public health level; non-availability of and/or inability to afford refractive services for testing; insufficient provision of affordable corrective lenses; and cultural disincentives to compliance.

The glasses acceptance rate in this study paralleled the numbers that had eye pains, eye strain while reading. This lays credence to a study in Benin-City, South-South Nigeria among 500 University students [41] that undergraduates would use refractive spectacles if they have asthenopic symptoms.

5. CONCLUSION

The predominant detected RE among medical and pharmacy female students in this study, lead us to believe that genetic, racial, environmental and occupational influences may play an important role. Prospective studies among medical university students involved in prolonged reading to confirm the pattern of RE and its progression during the course of study as compared to other students are advocated. Moreover, there is a need for further studies to evaluate the cultural beliefs surrounding female use of spectacles in Saudi communities. Periodic vision screening is to be accompanied by education and awareness campaigns to ensure that the corrections are used and barriers to compliance are addressed and removed.

6. LIMITATION OF THE STUDY

The pattern and type of refractive errors were not be detected as no cycloplegic autorefractor or cycloplegic retinoscopy were used. Male students were not included as all male and female students are separated for all education levels in the Kingdom. Cohort or longitudinal studies are needed to follow up medical and pharmacy students throughout academic grades till graduation.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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