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Original Research Article

Prevalence of Refractive Errors among Secondary-School Students in Baghdad City

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Abstract: ***Background:*** Refractive errors is the most common cause of visual impairment among school-aged students, forming a raising trend all over the world, reflecting negative impact on the achievement of two vital global indicators of development in the form of education and health. not Much existing new dated data on school-aged students refractive errors prevalence in Iraq were gathered to Understand prevalence of refractive errors which is vital to reduce the consequences of uncorrected refractive error as its most common causes are avoidable by early diagnosis and treatment. ***Aim***: The aim of this study was to evaluate the prevalence of refractive errors among secondary school students in Baghdad, Iraq. ***Method:*** a school-based descriptive cross-sectional study of 68 students (aged 16-17 years) whom was selected through random sampling technique, in one randomly selected high school in Baghdad, Iraq on March, 2024 was done. Data collection was done through a self-generated questionnaire that's been answered by targeted students themselves, there was 68 respondents have been gathered, data was graphed and analyzed, pie charts and frequency tables were used to summarize the data. ***Results:*** of 60 valid respondents were gathered, 30% (18) of students complained about visual problems, known cases of refractive errors with an exception of one case, the prevalence among students of myopia was 29.41% (5), hyperopia was none, astigmatism 17.64% (3), and a combined refractive error of myopia + astigmatism of 52.94% (9), a 66.66% (12/18) complain of negative impact on their life. Students with history of using spectacles were 28.33% (17), with a variable adherence of very good 58.82% (10), good 23.52% (4), average 5.88% (1), and poor 11.76% (2). Study shows a prevalence of compliance to annual eye examination of visual acuity of 36.66% (22). Study records an increase in time that's being spent on electronic devices with a 53.33% 3-5 hrs. period of time, and a predominance of 78.33% of smart phones being the most used, also a decreased out door time and near-vision tasks of 60% 3-5 hrs. period of time. Study shows a positive family history of refractive errors in both students parents of 26.66% (16), and in only one of them 40% (24). ***Conclusion:*** prevalence of refractive errors among Al-Harythia D.H.S students in Baghdad was high, these results suggest that lifestyle changes and prolonged near work activities may contribute to heightened eye strain. The findings provide information for screening programmes in school-aged children.

Keywords: Refractive error, astigmatism, hyperopia, myopia, secondary school, school-aged children.

INTRODUCTION

Refractive errors are a group of common vision disorders caused by the eye's inability to focus light correctly onto the retina, resulting in blurred or distorted vision. They occur when the shape of the eye prevents light from being precisely focused, leading to visual impairment at various distances. Refractive errors can present singularly such as myopia- nearsightedness, hyperopia- farsightedness, and astigmatism, or it may present as a combined refractive error, such as myopic astigmatism and hyperopic astigmatism.[1]

A recent meta-analysis study involved data from 98 countries revealed that uncorrected Refractive errors was among the leading causes for moderate or severe vision impairment.[2], And a study estimates that there is over 108 million individuals worldwide are affected by uncorrected refractive errors [3], WHO estimates also that severe Refractive errors

accounted for 5 million blind persons globally. Refractive errors are now prevalent and continue to increase globally, particularly myopia [4].

The risk of myopic complications, such as cataracts, glaucoma, retinal detachment, and blindness, is increasing as well [5].

Studies have shown that the major factors arising risk for myopia were genetic causes (myopia in parents), and environmental factors, as prolonged time spent on near-vision activities (especially abundance of computers and electronic gadgets like electronic tablets and smartphones), shorter distance from text to the eyes, using dim light while reading, less time spent outdoors, which all will cause more eye strain [6-9].

Since early vision problems are frequently asymptomatic, uncorrected refractive errors may adversely impact students academic performance, as well as their social and cognitive development, developing social or emotional issues to students, Low visual acuity will definitely jeopardise the achievement of two vital global evidences of development in the form of education and health, Students occasionally complain of headache and inability to read the material on the whiteboard or to read standard-sized printed texts, which can have a serious impact on a student learning abilities, academic performance, personality, even on their future job opportunities, and upcoming quality of life.

A significant impact of the visual acuity also has been concluded by a Nigerian study on the academic performance of school students [10].

It is worth mentioning that prevention or treatment of around 80% causes of visual impairment is possible [11]. These challenges can be effectively prevented through proper instruction, early detection of refractive errors, and timely interventions including corrective eyeglasses, pharmacological treatment, or appropriate vision therapy.

there is no comprehensive information about the prevalence of refractive errors among secondary school students in Iraq especially about those who's older than 15 year old, these students are in the preparation stages for university, and visual problems and refractive errors are very essential for them, a study was done about refractive errors among students aged 6-15 years old in Basra, Iraq shows a prevalence of 37/105 (35.24%)[12], and a study about Prevalence of refractive errors among school children in Massif, Kurdistan shows that prevalence of refractive errors in massif was 23.33% [13].

Another study was done in Thiqar, Iraq, about the prevalence of refractive errors among Secondary schooling graduate students, shows that 21.8% of the screened secondary schooling graduate students were positive for uncorrected refractive errors, and reports that many students with all three types of refractive errors having intermediate average of success caused by moderate academic performance due to eye strain during reading [14].

By taking all that was pre mentioned, an indispensable need to establish more studies about this wide-spreading health problem in various regions of Iraq arises to know national magnitude of refractive errors which will help the health authority to formulate appropriate strategy and proper planning in the future for functional screening program throughout the country.

This study aims to assess the prevalence of refractive errors among students of secondary schools in Baghdad.

REVIEW OF LITERATURE

Vision takes an important role in students intellectual and life skills development for learning and communication. While many screening programs in schools are being carried out, there is a lack of accurate data in the prevalence of visual impairment among students [15]. Limited research exists on the prevalence of refractive errors among children in various regions of Iraq, with a very little now dated data.

Prevalence of refractive errors was been assessed by many studies around the world, showing a present distribution of refractive errors among school-aged children and discussing the negative impact of visual impairment on their academic and life quality. A study was done to assess the prevalence of refractive error among school-aged children in Shiraz, Iran shows a prevalence of myopia was 11.6%hyperopia 6.7%and astigmatism 28.9%,[16] Astigmatism was the most common refractive error students. The myopia prevalence observed in this study was comparatively higher than in previous Iranian studies, These results may indicate the influence of changes in lifestyle and increased near work activities on the myopic progression in students.

Another study was conducted in Hargesia, Somaliland, Somalia, suggest that Refractive error was the cause of visual impairment in 76.8% of participants, and Only 16 of 91 (17.6%) students were using spectacles and the rest were unaware of the problem.[17].

Furthermore, a study in Almaty, Kazakhstan, suggest a prevalence of refractive errors of 31.6% myopia 28.3%. and assumed that Myopia is a leading refractive error in schoolchildren in Almaty, Kazakhstan.[18]

Last but not least, a study that was conducted in India suggest that Refractive error, especially myopia, is common in India. Differences in prevalence between states appear to be driven by literacy rates, suggesting that the burden of myopia may rise as literacy increases.[19]

The need for a present dated data that illustrate the real magnitude of the prevalence of refractive errors among Iraqi school-aged children become an indispensable demand to formulate a comprehensive strategies, implementations, and interventions to combat this rising trend.

The goal of this research is to throw light on prevalence of refractive errors among school-aged students especially those whom in secondary-school age, due to the very little affordable data about this trend, so This study is conducted to show the magnitude of visual problem among Al-Harythia D.H.S students in Baghdad city, Iraq.

METHODOLOGY

A cross-sectional descriptive study including a total of 68 students of Al- Harythia D.H.S for boys in Iraq, Baghdad on October 2024, using simple random sampling technique, Out of 6 educational sectors of Baghdad, one was randomly selected (Al-Karkh 1), and by a list of the selected sector high schools' provided by authorities, one boys high school was randomly selected. Students from urban areas, in grade 11 (aged 16 yr. old) were included, while the rest was excluded.

Screening of refractive errors, according to the defined protocols was treated on the school premises. The required equipments include a total of 210 printed sheets grouped as 70 questionnaire that were given to students with an brief explanation about refractive errors and clarifying each question that was involved in the questionnaire.

Informed consent was obtained from all participating students. Additionally, official permission was secured from the relevant educational authorities and high school administrations. Parental consent was also ensured through the school administrative channels.

Data was extracted on a self-generated structured questionnaire, it consists of various parts that include general questions about wearing spectacles, adherence to it, and compliance to eye examination annually, type of refractive error if diagnosed, average of daily time spent on electronic devices and studying, and the family history of a similar condition, then another part contains common symptoms that patients with such disease complained the most, with a scale of severity, all these questions were answered by the students themselves. The total samples that were obtained are 68 sample, 8 of them excluded for invalid answers and noncooperation, the budget of the study was 80,000 IQD which including transportation and provision of instrument that's used in obtaining data.

Study was limited by the uncooperative individuals whom were excluded for invalid answers, inability to do eye examination to asses visual acuity, this reflected negatively on the study due to the non-assuring informations of students themselves about their visual acuity statue and the inability to assess the refractive error, its severity ,degree and its type certainly, because of lack of required instrument and the absence of assistant specialized staff.

The questionnaire was reviewed by experts to establish face and content accuracy. Subsequently, it was pretested to assess reliability, with necessary modifications implemented prior to data collection. The collected data were analyzed using Microsoft Office Excel for data storage and pie chart visualization, and SPSS 26 for statistical summarization and result interpretation.

Ethical approval of the study was obtained from authorities of University of Ibn sina, and all those whom involved in this study as a subjects had the knowledgment of the disclosure that their responses will be used for research purposes and had agreed to submit the answers once prompted.

RESULTS

There were 60 student with an overall mean of age 16.5 (range 16-17 years), all subjects was on same grade (11), visual problems were presented in 30% (18) of students, with a 66.66% (12) complaining of negative impact on their life.

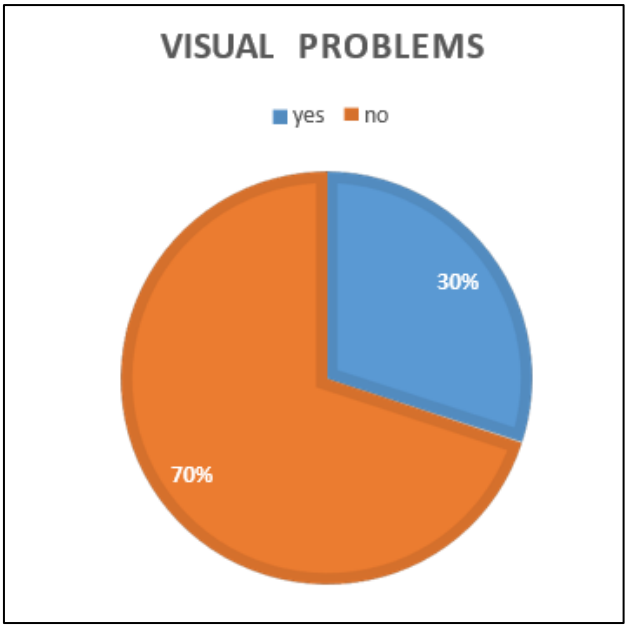

Chart-1: frequencey of vision problems among Al-Harythia D.H.S. eleven grade students.

Diagnosed refractive errors were as the following, myopia was the major refractive error among students with a prevalence of 29.41% (5), and astigmatism with a prevalence of 17.64% (3) , and a combined refractive error of astigmatism and myopia of 52.95% (9).

Table-1: prevalence of pre-diagnosed refractive errors among Al-Harythia D.H.S eleven grade students.

REs type	frequency	ratio
Nearsightedness(myopia)	5	29.41%
Farsightedness(hyperopia)	none	none
astigmatism	3	17.64%
astg.+near.	9	52.94%

History of students regarding use of spectacles was positive in 28.33% (17), and a prevalence of negative history of using spectacles of 71.66%.

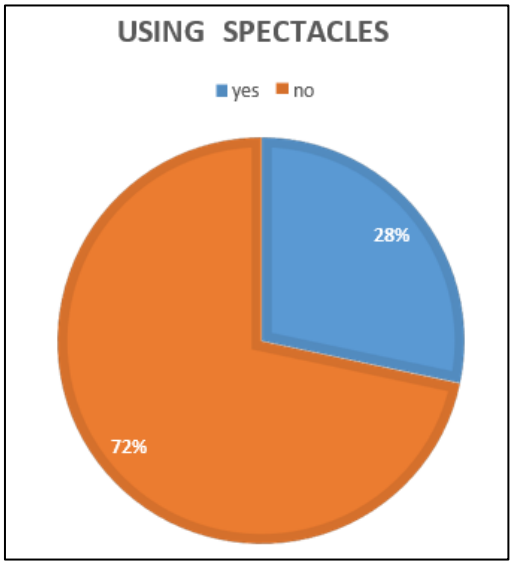

Chart-2: frequency of using spectacles among Al-Harythia D.H.S eleven grade students.

The adherence to wearing spectacles has shown a prevalence of very good adherence of 58.82% (10) , a prevalence of good adherence of 23.52% (4), a prevalence of average adherence of 5.88%(1), and a prevalence of poor adherence of 11.76% (2).

Table-2: percentage of adherence to wearing spectacles among Al-Harythia D.H.S. eleven grade students.

adherence	frequency	ratio
poor	2	11.76%
average	1	5.88%
good	4	23.52%
very good	10	58.82%

As a prevalence of compliance to an annual checkup schedule for eye examination for visual acuity, a 36.66% (22) of students were doing an annual eye examination that's done by an opticin or an ophthalmologist, unlikely the 63.33% (38) whome not compliant to annual checkup sessions.

Table-3: frequency of students whome compliant to an annual checkup program for visual acuity examination.

annual checkups	frequency	ratio
yes	22	36.66%
no	38	63.33%
total	60	

The questionnaire that was been applied also shown a variability in the period of time students spend in doing near-vision activities during their day like using electronic devices and studying, and as shown below:

Table-4: periods of Time that students spend in doing near-vision activities.

Time spent using electronics	frequency	ratio	time spent studying	frequency	ratio
0-2 hr.	3	5%	0-2 hr.	17	28.33%
3-5 hr.	32	53.33%	3-5 hr.	36	60%
6-8 hr.	15	25%	6-8 hr.	6	10%
9-11 hr.	10	16.66%	9-11 hr.	1	1.66%
Total	60		total	60	

The most used electronic device was the smart phone with a prevalence of 77% (46), and next comes the personal computers with a prevalence of 17% (10), smart tablets with a prevalence of 5% (3), and at last TV with a prevalence of 1% (1), all these electronic devices are associated with prolonged in door time spent and also prolonged near-vision activities.

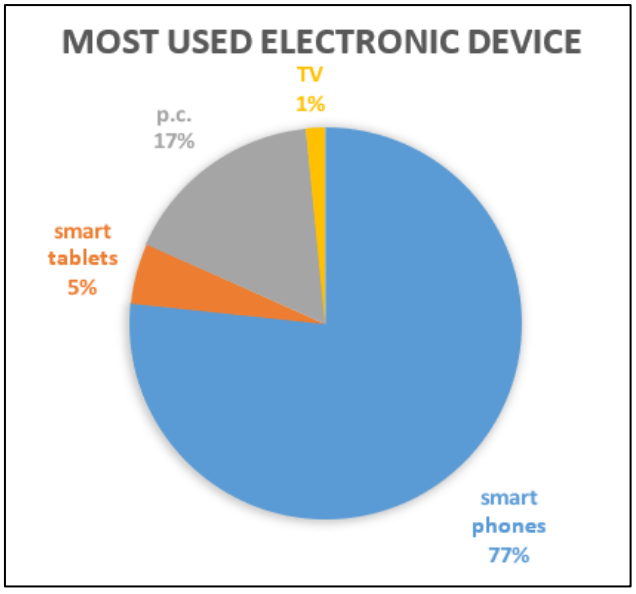

Chart-3: most used electronic devices daily

The study also shows a positive refractive errors family history in those students whom suffering vision problem with a prevalence of 26.66% (16) in both parents, and 40% (24) in only one of them, and a negative familial refractive errors history in 33.33% (20).

Table-5: family history of REs of students whom suffers vision problems

family hx. Of REs	frequency	ratio
both parents	16	26.66%
only one of them	24	40%
non of them	20	33.33%
total	60	

Students were asked several questions that representing the most common complains of patients with such conditions, and answers was as shown below:

Table-6: Students answers about symptoms associated with their visual issues

Q/rate	never	rarely	average	often	always
Q1	44	2	5	2	7
Q2	41	3	2	4	10
Q3	9	24	18	6	3
Q4	22	14	10	9	5
Q5	1	5	18	21	15

Q1/If they don't wear eyeglasses, they have problems seeing clearly, and their vision is blurry.
Q2/if they don't wear their eyeglasses, they have problems seeing the white board.
Q3/is doing tasks that needs focus ex.: schoolwork cause an eye ache making them rubbing it?
Q4/do they see specks, floaters or lines in their vision field?
Q5/How often do they sit close to TV, computer or placing electronic devices closes to their eyes?

DISCUSSION

Uncorrected Refractive errors in school-aged individuals are major public health issue having an immediate and long-term consequences on their academic and social life quality and carries a negative impact on the intellectual development. Various factors are associated to refractive errors remained uncorrected, like lack of awareness and recognition of the problem by patient himself and the family, also the lack of proper planning of educational campaigns, and the non-availability of effective health screening services, and the cultural disincentives to compliance to spectacles.

Result of present study suggest that 30% of students in eleven grade in Al-Harythia D.H.S were positive for uncorrected refractive errors, the prevalence of refractive errors among involved students were higher than that reported from similar study conducted in Thiqar, Iraq, of 21.8% among secondary schooling graduates [14], massif, Kurdistan 23.33%[13], Indonesia, Makassar 16.9% [20], Saudi Arabia 17.5% [21], and lower than the prevalence of refractive errors in Basra, Iraq 35.24% [12].

The observed variation could be attributed to differences in sampling methodologies, sample sizes, study populations, and geographical distributions across these studies.

Our study suggest that of the refractive errors causes being recorded, the combined refractive error myopia + astigmatism was the leading type found presenting 52.94%, which is variable from other studies done in various part of the world showing that myopia was the first type forming majority of refractive errors [12-14,17,20,21].

For myopia, our study shows a prevalence of 29.41%, which is similar to results of similar researches, but differs from not forming the first leading type.

And for astigmatism, our study shows a prevalence of 17.64% from total refractive errors and a prevalence of hyperopia of none. This differs from other similar study and that could be explained by the involvement of preschool children in the other studies and non-uniform definition of hyperopia among these studies.

Study shows a high prevalence of reluctance to the annual eye examination, 63.33% (38) were not compliant to the annual eye examination, this will lead to non-diagnosed refractive errors that may progress into a serious visual impairment affecting the social and academic life quality of the students reducing their future opportunities for a successful academic career and a job with a suitable income providing a decent life.

Spectacles considered as the most cost-effective treatment for correction of refractive errors, our study shows that almost all students whom complained about visual problems are wearing spectacles but with a variable degree of adherence, only 58.82% (10) of students have a very good adherence to spectacles, others varies from good to poor adherence and that

is similar to other studies that shows About 38% of the participants were noncompliant to spectacles wearing[22], that is may be explained by the socioeconomic statue of the student and the cultural disincentive to compliance to spectacles.

The present augmented magnitude of refractive errors may be explained by the increase in using information technology related gadgets in teaching and learning and also the over involvement of students in videogames, watching series or movies home by TV or pc placing screens close to their eyes , also the increased usage of smart phones occupying almost the whole day as shown in study, decreased out door activities and increased near-vision tasks, all these causes may contribute in the development of refractive errors by increasing eye strain and this may be one of leading causes of refractive errors development, although major etiological risk factors still need to be studied more clearly. Also a positive family history of refractive errors has been shown in this study with a 66.66% students' both or one of the parents affected by refractive errors, this may explain the occurrence of refractive errors through genetics reasons.

CONCLUSION & RECOMMENDATIONS

Not enough studies have been done on the prevalence of refractive errors among secondary school, in regarding to the extreme increase of using electronic devices and near-vision tasks among the school-aged children, that its extent was shown to be related to refractive errors one.

Uncorrected refractive errors were present in a considerable number of Al-Harythia D.H.S. These findings arises the urgency to implement a fundamental policies including screening of students for refractive errors that should be conducted at community level and integrated into school health programmes, and associated with the education and awareness by teachers and encouragement towards compliance to annular examination, and also through educational campaigns to ensure that correction is used and the cultural impediments are removed.

Correction should be affordable and available for people especially for those school-aged children, and Workshop and educational program should also be adapted for teachers and school health-care workers, and a proper health care planning and an effective strategy should be established depending on the current new rising magnitude of the disease and an intense interest should be given for the up-coming studies carrying the real prevalence of this errors among our society.

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