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The prevalence and causes of decreased visual acuity among medical students of Al Neelain University Sudan, 2021

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Abstract

Background: visual acuity is defined as the sharpness or clarity of vision, which is the measure of the ability of the eye to see and distinguish fine details. Reduced visual acuity, due to a reduced ability of the lens in the eye to focus light on the retina, result in images that appear blurry.

Objective: The aim of the study is to determine the prevalence and causes of decreased visual acuity among medical students in al Neelain University,2021.

Methodology: Analytical, cross-sectional study was conducted to determine the prevalence and causes of decreased VA in the regional university population.

Registered medical students in Al-Neelain University during the time of research, all ages between 18 and above 27 was included in this study and all nationalities both sexes.

Results: The study examined 200 students from all academic levels, who were aged between 18 and above 27 years.

The prevalence of decreased visual acuity was 42.4%

And the principal causes of decreased visual acuity in this study was found to be myopia (refractive error) (36.6%) students have myopia. Other causes were found to be retinal problem (6.4%), nystagmus ((4.9%), cataract (2.4%), diabetes (1.4%) and glaucoma (1.4%).

Conclusion: the prevalence of decreased visual acuity among medical students of al Neelain University is hight (42.4%), with myopia being the main cause.

Recommendations: The Results highlight the need for more vision screening at a large scale on medical school populations reflect the real situation on the ground, because vision is so important especially for medical students.

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Keywords: Vision impairment; Refractive error; Corrective status, Myopia; Medical student; Eye defects

1 Introduction

Visual acuity (VA) is defined as the sharpness or clarity of vision, which is the measure of the ability of eye to see and distinguish fine details. It is dependent on two factors: The viewing distance from the product; and the smallest feature or space that the eye can detect (for example, text size or stroke thickness).

Reduced visual acuity, due to a reduced ability of the lens in the eye to focus light on the retina, results in images that appear blurry.

Designing for reduced visual acuity involves considering the type size, weight, and font style of text. The ability to perceive details also depends on the ambient illumination and the contrast between the foreground and background.

Visual acuity is important for tasks such as: Seeing and reading text in print material, seeing and identifying graphical symbols and recognizing faces at various distances. Particular problems can arise when there is a requirement to change the viewing distance as part of an activity, since the ability of the eye to accommodate such change reduces with age. (1)

Visual acuity is limited by diffraction, aberrations, and photoreceptor density in the eye. Apart from these limitations, a number of factors also affect visual acuity, such as refractive error, illumination, contrast, and the location of the retina being stimulated. (2)

Eye diseases or conditions can cause decreased visual acuity. Some of the more common causes of decreased visual acuity are: macular degeneration, diabetic retinopathy, Retinitis pigmentosa, Amblyopia, Retinopathy of prematurity, Retinal detachment, Cataract, glaucoma and acquired brain injury. Decreased visual acuity can be corrected by deferent options include eyeglasses, contact lenses, and eye drops or other medicines. In some cases, surgery may be required. (3)

1.1 Problem statement

Visual disabilities is a severe worldwide public problem that includes health, social, psychological, and economic dimensions. It can affect school performance,employment opportunities, and subsequently affecting the quality of life of the individual, the family, and the community.

Data from the WHO revealed that about 285 million people are visually impaired worldwide.

Uncorrected refractive errors are the second major cause of treatable blindness,being one of the five priorities of the global initiative “VISION 2020” for the elimination of avoidable visual impairment.

The prevalence of visual problems is not distributed uniformly throughout the world. About 90% of visually impaired people are living in developing countries.

Globally, at least 1 billion people have a near or distance vision impairment that could have been prevented or has yet to be addressed.

The leading causes of vision impairment and blindness are uncorrected refractive errors and cataracts.

In terms of regional differences, the prevalence of distance vision impairment in low- and middle-income regions is estimated to be four times higher than in high-income regions. (4)

Myopia is quite frequent in the industrial nations: about 30 percent of the young adults are affected, and there is evidence that this proportion is increasing.

1.2 Justification

There are very few studies conducted to estimate the prevalence and causes of decreased visual acuity, so the aim of the present study is therefore to determine the prevalence and causes of decreased visual acuity among medical students of al neelain university.

Knowledge about this information would be of great help in the development of screening programs that aimed at preservation of visual health.

1.3 Research questions

1.3.1 Age

- (18-22) (23-27) (above27)
- Gender: Male, female
- Study year: First second third fourth fifth
- Have you ever had a low vision exam? (yes, no)
- what was the result? (Good, ok, poor (low vision))
- When watest? …
- What was the result? (I have good vision, I have low vision, other)
- At the present time, would you say your eyesight using both eyes' glasses or contact lenses, if you wear them) is excellent, good, fair, poor, or very poor?
- Excellent .....Good .... Fair. Poor...Very Poor…
- How much pain or discomfort have you had in and around your eyes (for example, burning, itching, or aching)? Would you say it is:
- (none, mild, moderate, sever, very sever)
- How much difficulty do you have reading street signs or the names of stores?
- No difficulty at all.
- A little difficulty.
- Moderate difficult
- Extreme difficulty.
- Stopped doing this because of your eyesight
- Because of your eyesight, how much difficulty do you have seeing how people react to things you say?
- (Circle One)
- No difficulty at all ...
- A little difficulty.
- Moderate difficult
- Extreme difficulty.
- Stopped doing this because of your eyesight
- Are you currently driving, at least once in a while? (yes, no, give up driving)
- IF YOU GAVE UP DRIVING: Was that mainly because of your eyesight, mainly for some other reason, or because of both your eyesight and other reasons?
- (Circle One)
- Mainly eyesight
- Mainly other reasons
- Both eyesight and other reasons
- How much difficulty do you have driving at night? Would you say you

1.3.2 have

- (Circle One)
- No difficulty at all ...
- A little difficulty.
- Moderate difficult
- Extreme difficulty.
- Stopped doing this because of your eyesight
- Because of your eyesight, how much difficulty do you have recognizing people you know from across a room?
- (Circle One)
- No difficulty at all ...
- A little difficulty.
- Moderate difficult
- Extreme difficulty.
- Stopped doing this because of your eyesight
- Do you wear glasses or contact lenses for distance?(Yes no)
- Do you have retinal problems? (yes no)
- Do you have cataract? (Yes no)

- Do you have glaucoma? (Yes no)
- Do you have a close relative who has glaucoma? (Yes no)
- Do you have diabetes? (Yes no)
- Do you have myopia? (Yes no)
- Do you have nystagmus? (Yes no)
- Do you have eye diseases? (Yes no)

1.4 Objective

1.4.1 General objective

to assess the prevalence of decreased visual acuity among medical students of AL Neelain university, and to identify some factors associated with decreased VA in the sample.

1.4.2 Specific objectives

- To assess the prevalence of decrease visual acuity among students.
- To identity the causes of decreased visual acuity among students

2 Literature review

Visual acuity (VA) is acuteness or clearness of vision, specially form vision, which is dependent on the sharpness of the retinal focus within the eye, the sensitivity of the nervous elements, and the interpretative faculty of the brain.

VA is a quantitative measure of the ability to identify black symbols on a white background at a standardized distance as the size of the symbols is varied.

The VA represents the smallest size that can be reliably identified.

VA is the most common clinical measurement of visual function.

A visual acuity of 20/20 is frequently described as meaning that a person can see detail from 20 feet away the same as a person with normal eyesight would see from 20 feet (5)

For the smallest point to be detected or the finest detail to be resolved requires a good optical system and appropriately spaced detectors. Visual acuity will be limited by one of these. Objects we look at will be imaged at the back of the eye. If we take a point source, the image will be distributed on the retina as a point spread function due to distortions created by the optics of the eye.

A point spread function describes the light distribution on the retina of a point source in visual space. An Airy disk pattern would be formed from a point source due to the diffraction of light

A line spread function describes the light distribution of an extended source and is often used to simplify calculations. (6)

Globally, at least 2.2 billion people have a near or distance vision impairment. In at least 1 billion – or almost half – of these cases, vision impairment could have been prevented or has yet to be addressed.

The leading causes of vision impairment and blindness are uncorrected refractive errors and cataracts.

The International Classification of Diseases 11 (2018) classifies vision eimpairment into two groups, distance and near presenting vision impairment.

- Distance vision impairment
- Mild –visual acuity worse than 6/12 to 6/18
- Moderate –visual acuity worse than 6/18 to 6/60
- Severe –visual acuity worse than 6/60 to 3/60
- Blindness –visual acuity worse than 3/60

2.1 Near vision impairment

- Near visual acuity worse than N6 or M.08 at 40cm.

A person's experience of vision impairment varies depending upon many different factors. This includes for example, the availability of prevention and treatment interventions, access to vision rehabilitation (including assistive products such as glasses or white canes), and whether the person experiences problems with inaccessible buildings, transport and information.

Globally, at least 2.2 billion people have a near or distance vision impairment. In at least 1 billion – or almost half – of these cases, vision impairment could have been prevented or has yet to be addressed.

This 1 billion people include those with moderate or severe distance vision impairment or blindness due to unaddressed refractive error (88.4 million), cataract (94 million), glaucoma (7.7 million), corneal opacities (4.2 million), diabetic retinopathy (3.9 million), and trachoma (2 million), as well as near vision impairment caused by unaddressed presbyopia (826 million)

In terms of regional differences, the prevalence of distance vision impairment in low- and middle-income regions is estimated to be four times higher than in high-income regions. With regards to near vision, rates of unaddressed near vision impairment are estimated to be greater than 80% in western, eastern and central sub-Saharan Africa, while comparative rates in high-income regions of North America, Australasia, Western Europe, and of Asia-Pacific are reported to be lower than 10%

Population growth and ageing are expected to increase the risk that more people acquire vision impairment. (7)

Visual acuity (VA) commonly refers to the clarity of vision, but technically rates an examinee's ability to recognize small details with precision. Visual acuity is dependent on optical and neural factors, i.e. (1) the sharpness of the retinal image within the eye, (2) the health and functioning of the retina, and (3) the sensitivity of the interpretative faculty of the brain.

Some people may suffer from other visual problems, such as severe visual field defects, color blindness, reduced contrast, mild amblyopia, cerebral visual impairments, inability to track fast-moving objects, or one of many other visual impairments and still have "normal" visual acuity. Thus, "normal" visual acuity by no means implies normal vision. The reason visual acuity is very widely used is that it is easily measured, its reduction (after correction) often indicates some disturbance, and that it often corresponds with the normal daily activities a person can handle, and evaluates their impairment to do them (even though there is heavy debate over that relationship). (8)

The main cause of reduced VA is uncorrected refractive errors (URE) that are mainly manifested as visual impairment (VI). According to the World Health Organization (WHO) survey, URE comprised 216.6 million of the global population in 2015. It can lead to a decline in learning ability and may compromise the individual's academic performance, social communication, psychological development and quality of life Myopia is the commonest cause of VI in children and young adults, with a prevalence of 28.3% in the world. It is reported that myopia affects 80–90% of teenagers in East Asia. Meta-analysis showed that 69% of people from the age of 1 to 18 are myopic. (9)

2.2 Globally, the leading causes of vision impairment are

- uncorrected refractive errors
- cataract
- age-related macular degeneration
- glaucoma
- diabetic retinopathy
- corneal opacity
- trachoma

There is substantial variation in the causes between and within countries according to the availability of eye care services, their affordability, and the eye care literacy of the population. For example, the proportion of vision impairment attributable to cataract is higher in low- and middle-income countries than high-income countries. In high income countries, diseases such as glaucoma and age-related macular degeneration are more common.

Among children, the causes of vision impairment vary considerably across countries. For example, in low-income countries congenital cataract is a leading cause, whereas in middle-income countries it is more likely to be retinopathy of prematurity. As in adult populations, uncorrected refractive error remains a leading cause of vision impairment in all countries amongst children. (10)

2.3 visual acuity also depends on a number of factors including

- Refractive errors.
- size of pupil.
- Illumination.
- Time of exposures of the target.
- Area of the retina stimulated.
- State of adaptation of the eye.
- Eye movement.

Refractive errors will affect visual acuity by causing defocus at the retina. Defocus will blur out fine detail, sharp edges and contrast sensitivity by affecting its point spread function.

Refractive errors such as myopia (short-sightedness) and hyperopia (long-sightedness) causes the point spread function to spread more laterally. Therefore, affecting resolution

The image at the back of the eye of an object is focussed sharply on the retina in an emmetropic eye. In a myopic eye, the optical system can be considered to be too strong, thus the image is focussed in front of the retina. The reverse occurs with a hyperopic eye where the optical system is too weak so the image is focussed behind the retina.

The size of the pupil is an important factor affecting visual acuity. Large pupils allows more light to stimulate the retina and reduces diffraction but resolution will be affected by aberrations of the eye. On the other hand, a small pupil will reduce optical aberrations but resolution will be diffraction limited. Therefore, a mid-size pupil of about 3 mm to 5 mm would be optimal, as this is a compromise between the diffraction and aberration limits.

To detect a small bright spot, detection is greatly dependent on the quantity of light rather than the exposure time. However, to detect a line, the acuity, (reciprocal width of the line) is proportional to the exposure time. There is no simple acuity-exposure time relationship for the resolution of the target.

Highest level of visual acuity is achieved if the eye is adapted to the same level as the test luminance for test luminance of 34 cd/m2 to 34,000 cd/m2. For test luminance less than 34cd/m2, adapting to a lower luminance will achieve a slightly better acuity.

Contrast sensitivity: Contrast is an important parameter in assessing vision. Visual acuity measurement in the clinic uses high contrast, that is, black letters on a white background. In reality, objects and their surroundings are of varying contrast.

Therefore, the relationship between visual acuity and contrast allows a more detailed understanding of our visual perception.

Grating patterns are used as a means of measuring the resolving power of the eye because the gratings can be adjusted to any size. The contrast of the grating is the differential intensity threshold of a grating.

We can determine the sensitivity of the visual system as a function of grating size (spatial frequency). The contrast of the grating patterns is adjusted to determine the threshold for a given spatial frequency.

That is, with a given spatial frequency, the contrast can be lowered until detection of the grating becomes impossible (contrast threshold). The reciprocal of this contrast threshold is called contrast sensitivity. (11)

2.4 Impact of vision impairment

2.4.1 It has Personal impact

Young children with early onset severe vision impairment can experience delayed motor, language, emotional, social and cognitive development, with lifelong consequences. School-age children with vision impairment can also experience lower levels of educational achievement.

Vision impairment severely impacts quality of life among adult populations. Adults with vision impairment often have lower rates of workforce participation and productivity and higher rates of depression and anxiety. In the case of older adults, vision impairment can contribute to social isolation, difficulty walking, a higher risk of falls and fractures, and a greater likelihood of early entry into nursing or care homes.

2.4.2 There are Strategies to address eye conditions to avoid vision impairment

While a large number of eye diseases can be prevented (e.g. infections, trauma, unsafe traditional medicines, perinatal diseases, nutrition-related diseases, unsafe use or self-administration of topical treatment), this is not possible for all.

Each eye condition requires a different, timely response. There are effective interventions covering promotion, prevention, treatment and rehabilitation which address the needs associated with eye conditions and vision impairment; some are among the most cost-effective and feasible of all health care interventions to implement. For example, uncorrected refractive error can be corrected with spectacles or surgery while cataract surgery can restore vision.

Treatment is also available for many eye conditions that do not typically cause vision impairment, such as dry eye, conjunctivitis and blepharitis, but generate discomfort and pain. Treatment of these conditions is directed at alleviating the symptoms and preventing the evolution towards more severe diseases.

Vision rehabilitation is very effective in improving functioning for people with an irreversible vision impairment that can be caused by eye conditions such as diabetic retinopathy, glaucoma, consequences of trauma and age-related macular degeneration. (12

The organ with the highest geometrical precision in the body is most likely the eye: for a human to be normal-sighted (or emmetropic), which means being able to see sharply at far distances, the geometrical length of the eye must be matched to its optical focal length with a precision of about 0.2 percent, less than the thickness of an eyelash. An increase in eye length of just 0.1 millimetre is sufficient to cause a measurable decline in visual acuity for distant objects — myopia. When this happens, the sharpest image projected by cornea and lens is formed, not on the photoreceptor layer of the retina, but in front of this layer.

Myopia is quite frequent in the industrial nations: about 30 percent of the young adults are affected, and there is evidence that this proportion is increasing.

Myopia is of diverse etiology. A small proportion of myopia is clearly familial, generally early in onset and of high level, with defined chromosomal localization and in some cases, causal genetic mutations. However, in economically developed societies, most myopia appears during childhood, particularly during the school years. The chromosomal localization characterized so far for high familial myopia do not seem to be relevant to school myopia. Family correlations in refractive error and axial length are consistent with a genetic contribution to variations in school myopia, but potentially confound shared genes and shared environments. High heritability values are obtained from twin studies, but rest on contestable assumptions, and require further critical analysis, particularly in view of the low heritability values obtained from parent–offspring correlations where there has been rapid environmental change between generations. Since heritability is a population-specific parameter, the values obtained on twins cannot be extrapolated to define the genetic contribution to variation in the general population. In addition, high heritability sets no limit to the potential for environmentally induced change. There is in fact strong evidence for rapid, environmentally induced change in the prevalence of myopia, associated with increased education and urbanization. These environmental impacts have been found in all major branches of the human family, defined in modern molecular terms, with the exception of the Pacific Islanders, where the evidence is too limited to draw conclusions. The idea that populations of East Asian origin have an intrinsically higher prevalence of myopia is not supported by the very low prevalence reported for them in rural areas, and by the high prevalence of myopia reported for Indians in Singapore. A propensity to develop myopia in “myopigenic” environments thus appears to be a common human characteristic. Overall, while there may be a small genetic contribution to school myopia, detectable under conditions of low

environmental variation, environmental change appears to be the major factor increasing the prevalence of myopia around the world. There is, moreover, little evidence to support the idea that individuals or populations differ in their susceptibility to environmental risk factors (13)

A study that was conducted in 2020, titled: the Prevalence of reduced visual acuity among school-aged children and adolescents in 6 districts of Changsha city: a population-based survey. Done by Menglian Liao, Zehuai Cai, Muhammad Ahmad Khan, Wenjie Miao, Ding Lin, Qiongyan Tang (14)

The main objective was to calculate and evaluate the prevalence of reduced uncorrected distant visual acuity (UCDVA) in primary, middle and high schools in 6 districts of Changsha, Hunan, China.

A population-based retrospective study was conducted in 239 schools in 6 districts of Changsha. After routine eye examination to rule out diseases that can affect refraction, 250,980 eligible students from primary, middle and high schools were enrolled in the survey. Then the uncorrected distant and near visual acuity of each eye were measured. Categories of schools, districts, grades, eye exercises and sports time were also documented and analyzed.

The result was: The overall prevalence of reduced UCDVA was 51.8% in 6 districts of Changsha. Results of individual districts were as follows: Furong district 59.9%. Tianxin district 62.3%, Wangcheng district 47.8%, Kaifu district 58.5%, Yuhua district 47.0% and Yuelu district 52.6% The proportion of normal VA is seen to decrease from primary grade 3.

The proportion of mildly reduced UCDVA is higher in primary grade 1 and 2. The proportion of moderately reduced UCDVA remains similar during 12 grades. The proportion of severely reduced UCDVA increases with grades. Multivariate analysis shows that the prevalence of reduced UCDVA is higher in key schools.

According to the existing data analysis results, the prevalence of reduced UCDVA among primary, middle and high school students in Changsha is very high. Some effective measures need to be taken to prevent it Another study that was conducted in 2021, July (15).

Titled Television-watching in the early years of life and the association with parents' concerns about decreased visual acuity in their elementary school-aged child: results of a nationwide population-based longitudinal survey of Japan (15). By Toshihiko Matsuo et al.

The main Purpose was to study the association between television-watching in the earlier years of life and subsequent parents' concerns about decreased visual acuity in their elementary school-aged child. The Study design was population-based longitudinal cohort.

Methods: Television-watching and its daily duration, as the main exposure, and parents' concerns for their child's decreased visual acuity during the school years, as the main outcome, were picked up from yearly questionnaires performed for the Longitudinal Survey of Newborns in the Twenty-First Century involving all babies born in Japan during either of two periods: between January 10 and 17, 2001 or between July 10 and 17, 2001 (N = 47,015).

As a result, Television-/video-watching as the main form of play of children at the ages of 1.5 years and 2.5 years was significantly associated with parents' concerns for their child's decreased visual acuity raised once or more in six surveys conducted between the ages of 7 and 12 years (odds ratio, and 1.09; 95% CI 1.05-1.15 and 1.04-1.14, respectively). The association remained significant after adjustment for confounding variables, including child's sex, preterm birth, multiple birth, mother's age at delivery, mother's and father's education, and residential area. Longer daily duration of television-watching at 2.5 years was significantly associated with concerns for the child's decreased visual acuity between the ages of 7 and 12 years, but not at the ages of 3.5, 4.5, and 5.5 years. The association remained significant in a sensitivity analysis of 28,820 children who participated in all six surveys.

In Conclusions Longer daily exposure to television in children in the earlier years of life was associated with parents' subsequent concerns about decreased visual acuity in their elementary school-aged child.

A study was conducted in 2020 March, by Koulong Wu et al. Rev Assoc Med Bras. Titled Physical performance is associated with visual acuity in university students: results of a school-based study. The main Objective of the study is to explore the relationship between physical performance and visual acuity in university students in China. (16)

the methods use was tests of standing long jump, 50-meter dash and pull-ups sit-ups were conducted. The visual acuity was measured using a logarithm of the minimum angle of resolution (logMAR) chart. Pearson correlation was used to test the correlation of physical performance with visual acuity in university students.

The Results of the study was the number of pull-ups was negatively associated with visual acuity in the left eye for male students, while a negative correlation was found between the time of the 50-meter dash and visual acuity in the right eye for female students. In Conclusions The study identified that physical exercise might help improve visual acuity. University students should practice strength exercises to improve physical performance.

A study that was conducted by Hezuo Liu, Shi Ren, Qi Sun, Yinglong Bai, Lingling Zhai, Wei Wei, Lihong Jia in 2016 , titled : Sleep time and homework hours/daily are associated with reduced visual acuity among school students aged 9–18 in Shenyang in 2016

The purpose of this survey was to explore the prevalence of reduced visual acuity and its associated factors among school students in Shenyang in 2016.

This was a cross-sectional study using data from the Ministry of Education' Student Physical Fitness (MESPF) monitoring in 2016. A total of 13,642 students aged 9–18 years were surveyed in Shenyang. The unaided distance visual acuity was measured, and questionnaire on lifestyle behaviors that may affect visual acuity was investigated among students. The prevalence of reduced visual acuity and its associated factors were analyzed.

The average prevalence of reduced visual acuity among students aged 9–18 years was 65.8%, and severe reduced. In Conclusions, sleep time <8 h and homework time ⩾1 h may be associated with reduced visual acuity among students in Shenyang. Therefore, it is benefit for student to get enough sleep and decreasing studying time in order to prevent and reduce poor vision. (16)

2.5 A study that was conducted by

- Leaveson Thom et al. Clin Optom In 2016, titled:
- The prevalence and causes of decreased visual acuity - a study based on vision screening conducted
- at Enukweni and Mzuzu Foundation Primary Schools, Malawi. (17)
- The study was based on the vision screening which was conducted by optometrists at Enukweni and Mzuzu Foundation Primary Schools.

Found that: The prevalence of decreased VA was found to be low in school-going population (4%, n=594). Even though Enukweni Primary School had few participants than Mzuzu Foundation Primary School, it had high prevalence of decreased VA (5.8%, n=275) than Mzuzu Foundation Primary School (1.8%, n=319). The principal causes of decreased VA in this study were found to be amblyopia and uncorrected refractive errors, with myopia being the main cause than hyperopia.

On Conclusion: Based on the low prevalence of decreased VA due to myopia or hyperopia, it should not be concluded that refractive errors are an insignificant contributor to visual disability in Malawi. More vision screenings are required at a large scale on school-aged population to reflect the real situation on the ground. Cost-effective strategies are needed to address this easily treatable cause of vision impairment.

3 Methodology

3.1 Study Design

Analytical, cross sectional institutional study design to determine the prevalence and causes of decreased VA in the regional university population.

3.2 Study setting

Al Neelain University is located in Khartoum City, Khartoum state near to Al-Morgan where the White and Blue Nile meet and continue north as The Nile. Neelain University was an extension of the Cairo University, Khartoum Branch, which was established in the year 1955, where this university was reigned in the year 1993, which at the time included four faculties. Faculty of Medicine was established in 1998, with a study duration of 6 years. In the first three years students study basic sciences, and later in the following three years they attend clinical rounds in addition to lectures.

The total number of students in faculty is 1304 students, the first level consists of two semesters first semester consists of 160 and second semester 168 students, second level consists of 255, third level of 245 students, fourth level of 255 and fifth level of 221 students.

3.3 Study population

3.3.1 Inclusion criteria

Registered medical students in Al-Neelain University during the time of research, all ages all nationalities both sexes.

3.3.2 Exclusion criteria

Students who refuse to fill the questionnaire.

3.3.3 Data collection

Data collection method: administered modified online questionnaire.

3.4 Sample size and sample technique:

Probability sampling (stratified sampling). Each level is considered a stratum and within each stratum systemic random sampling was used. An online random number generator was used to assign the starting point.

- Variables understudy
- age, gender, student, grade, causes of visual acuity reduction.
- Sample technique
- Convinced sample.

3.5 Sample size

- Population (N) = 1144 students.
- According to the formula
- Sample size (n) = n = N / (1 + Nd2)
- is to be used to calculate the sample size were
- n = sample size
- N = Total population
- n=1144/ (1+(1144 X 0.04 X0.04))
- = 296 students

3.6 Data analysis plan

Statistical analysis performed using SPSS version 20

3.7 Ethical consideration

Participant's privacy and dignity will perceived. All participant's certain defining data will not be included in the research data to be collected. Verbal consent will be acquired from every and each participant.

4 Results

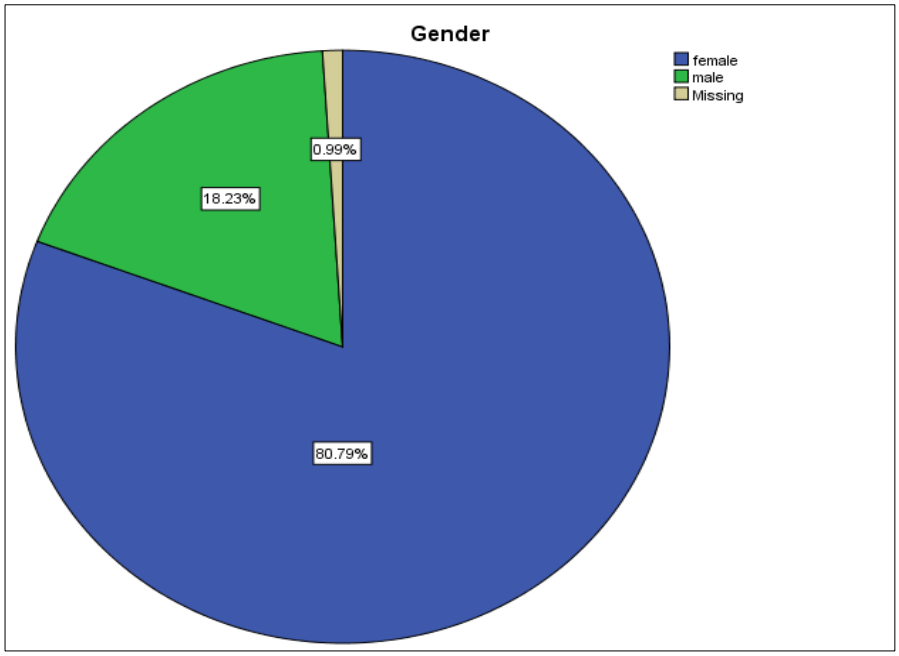

Figure 1 Gender Distribution of al neelain medical university participants 2021 (n=201)

The main participant was female 80.7%

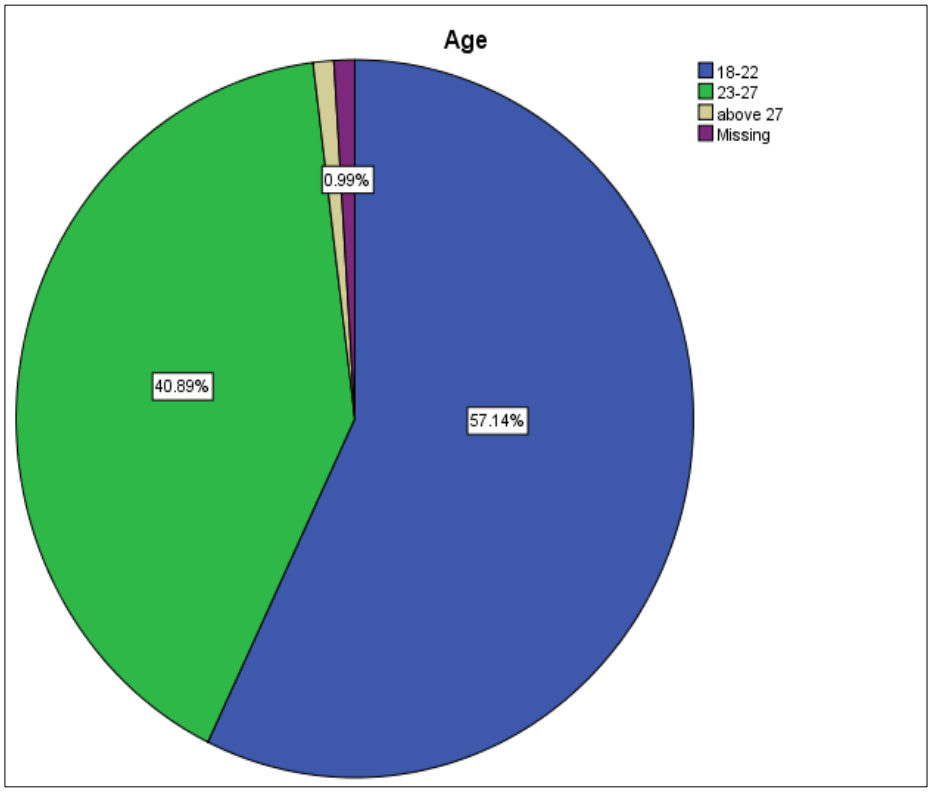

Figure 2 Age distribution of al neelain medical university participants 2021 (n=201)

The main age group of participants were students aged between 18 and 22 years old

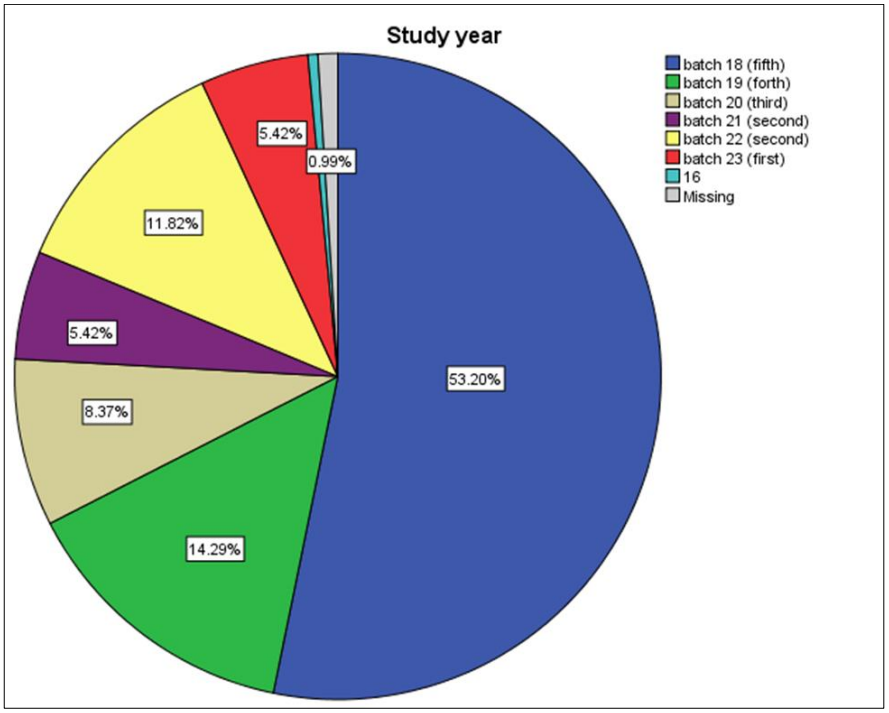

Figure 3 Academic levels distribution of al neelain medical university participants 2021 (n=201)

Most of the participants in this study were fifth year medical students (batch 18)

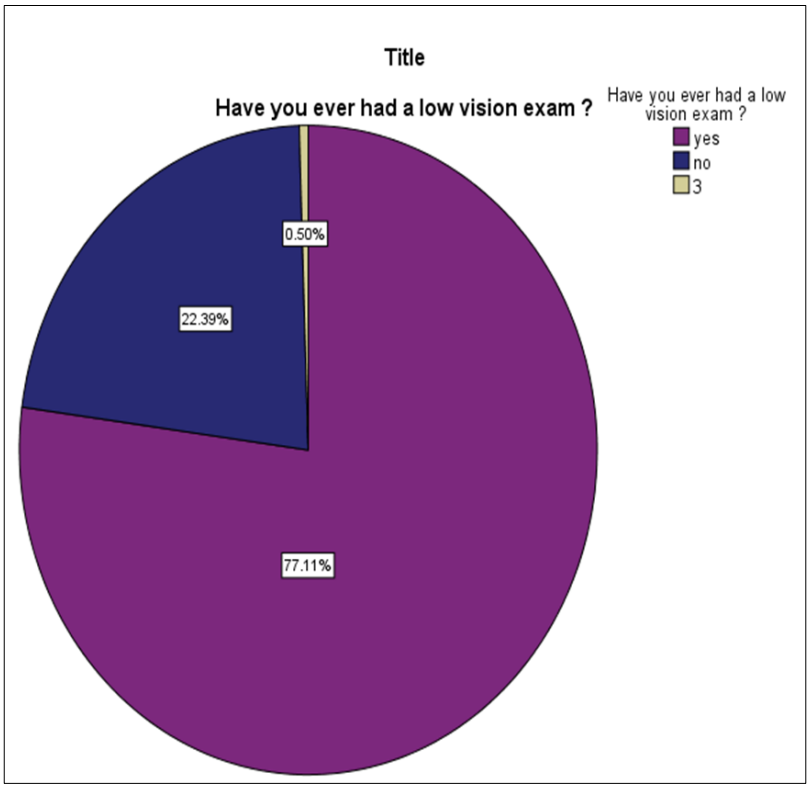

Figure 4 Who have a low vision exam in al neelain medical university participants 2021 (n=201)

Most of the participants have had a low vision exam.

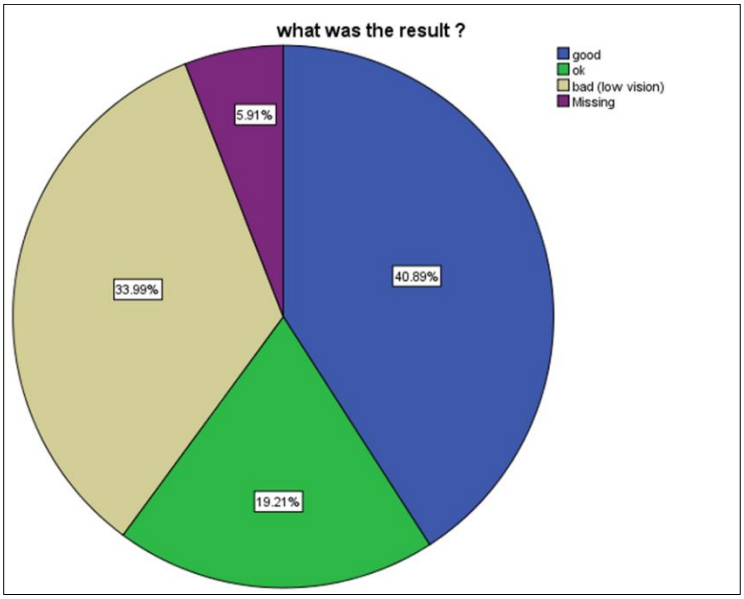

Figure 5 The result of the vision exam among al neelain medical university participants 2021 (n=201)

The main result of the low vision exam was good. Followed by 33.9% of participants had bad vision.

Table 1 Correlation between gender and the results of the low vision exam

		The results of the low vision exam			Total
		good	ok	bad (low vision)	
Gender	female	72	30	56	158
	male	11	9	13	33
Total		83	39	69	191

Gender * what was the result? Crosstabulation

Table 2 Distribution of the results of the low vision exam according to study year.

Count					
		The results of the low vision exam			Total
		good	ok	bad (low vision)	
Study year	batch 18 (fifth)	47	15	41	103
	batch 19 (forth)	11	8	10	29
	batch 20 (third)	7	1	8	16
	batch 21 (second)	4	2	5	11
	batch 22 (second)	9	11	2	22
	batch 23 (first)	4	2	3	9
Total		83	39	69	191

Study year * what was the result? Crosstabulation

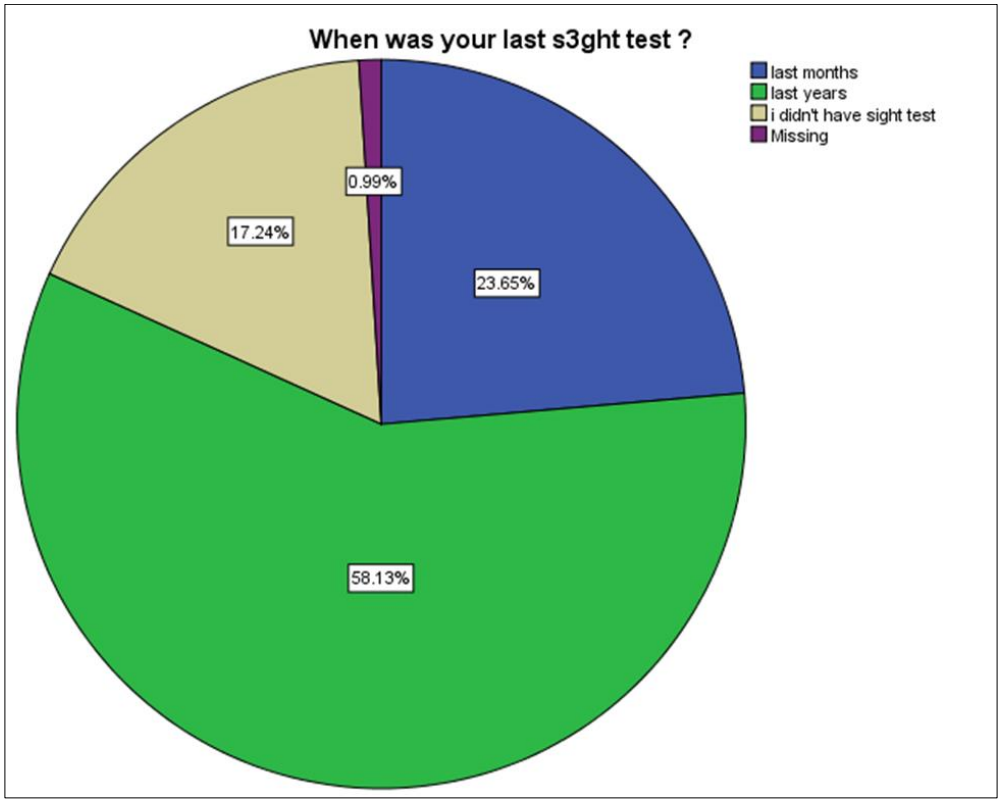

Figure 6 The time of taking sight test among al neelain medical university participants 2021 (n=201)

Most participants take their last sight test last years.

Table 3 The result of the sight test of al neelain medical university participants 2021 (n=201)

		Frequency	Percent
What was the result?	i have good vision	88	43.3
	i have low vision	81	39.9
	other	22	10.8
	Total	191	94.1

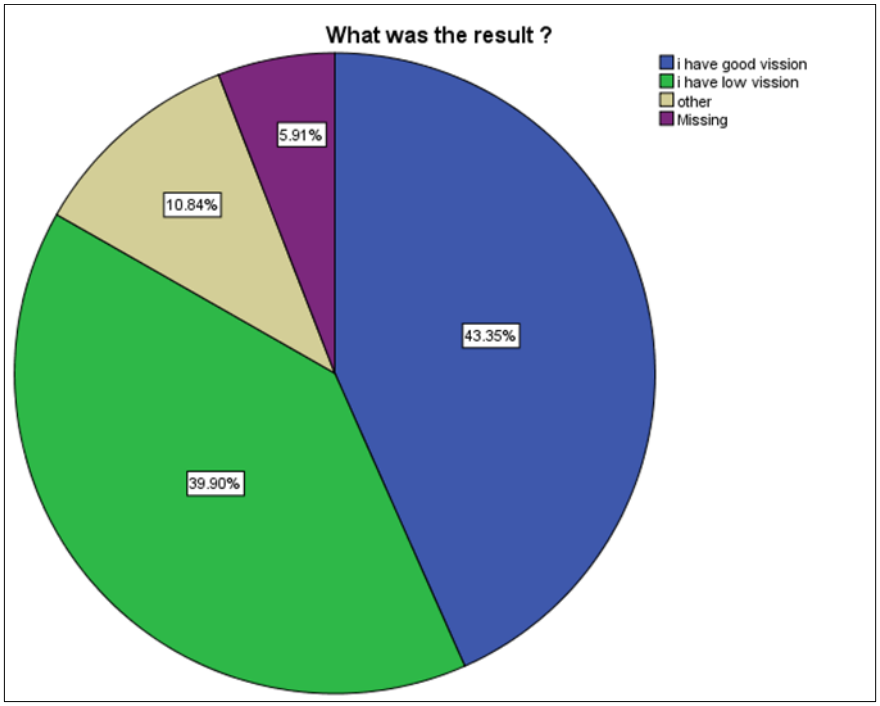

Figure 7 The result of the sight test of al neelain medical university participants 2021 (n=201)

Most participants have good vision.

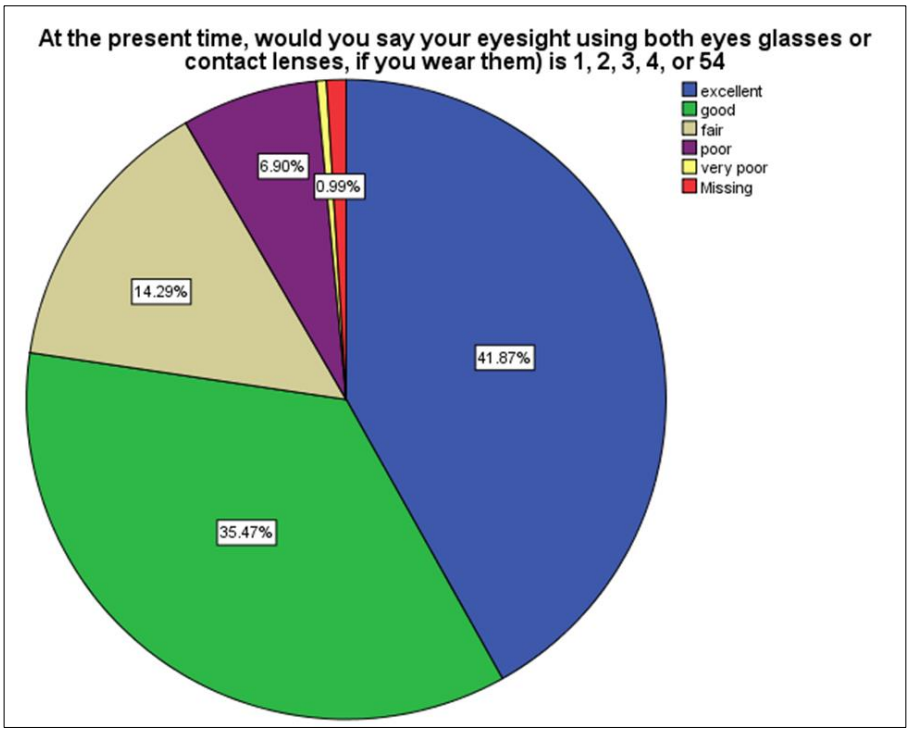

Figure 8 Distribution of study sample according to their eye sight in al neelain medical university participants 2021 (n=201)

Most of the participants have excellent and good vision

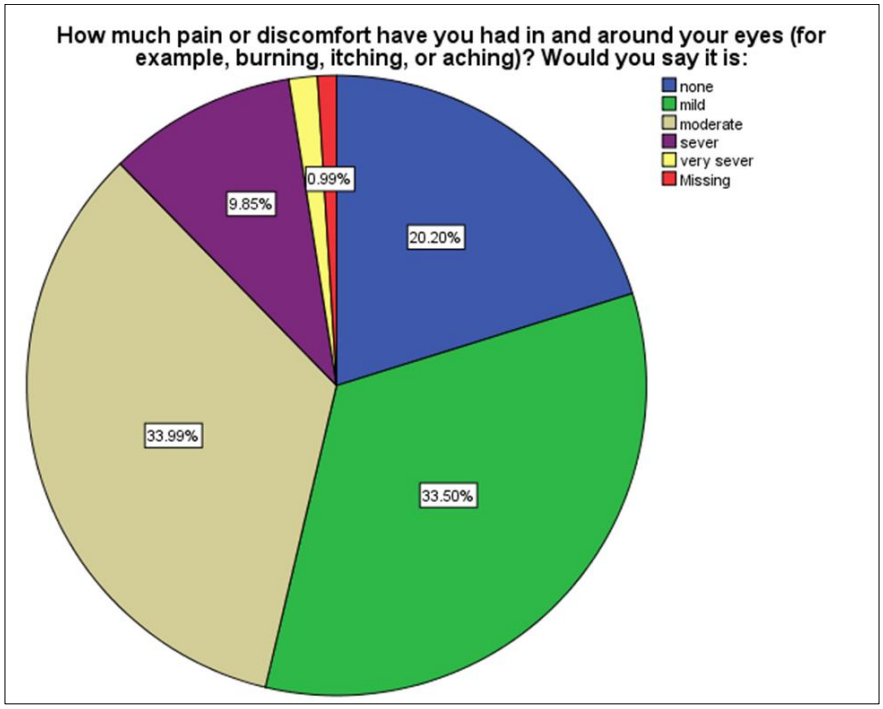

Figure 9 Students who experience pain or discomfort in and around their eyes in al neelain medical university participants 2021 (n=201)

Most of the participants have mild or moderate pain or discomfort in and around their eyes , and some students have severe pain

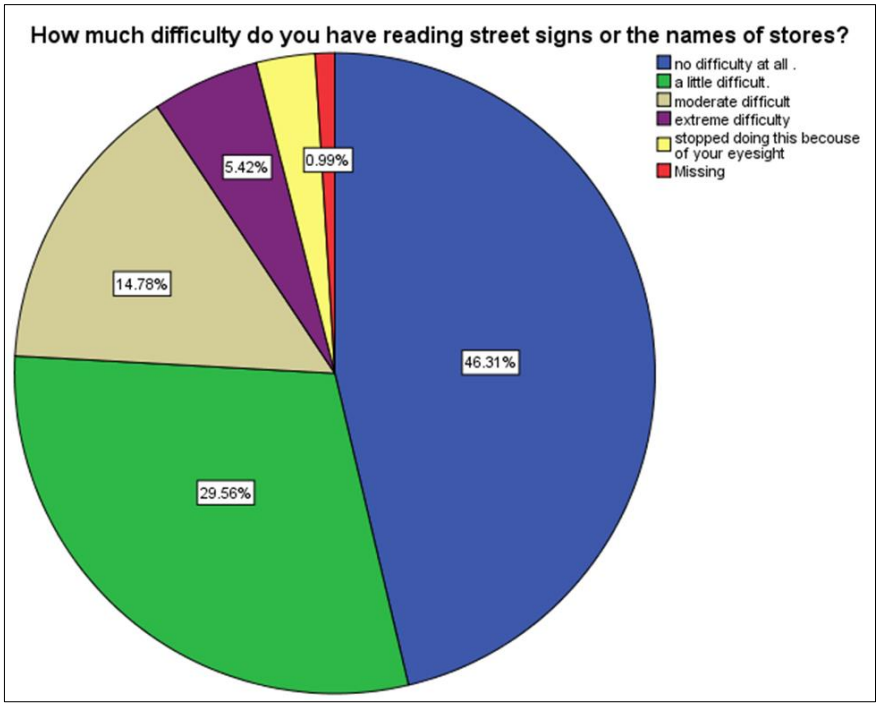

Figure 10 Students who have difficulty reading street signs or the names of stores among al neelain medical university participants 2021 (n=201)

Most of the participants have no difficulty at all reading street signs, followed by some participants have little difficulty.

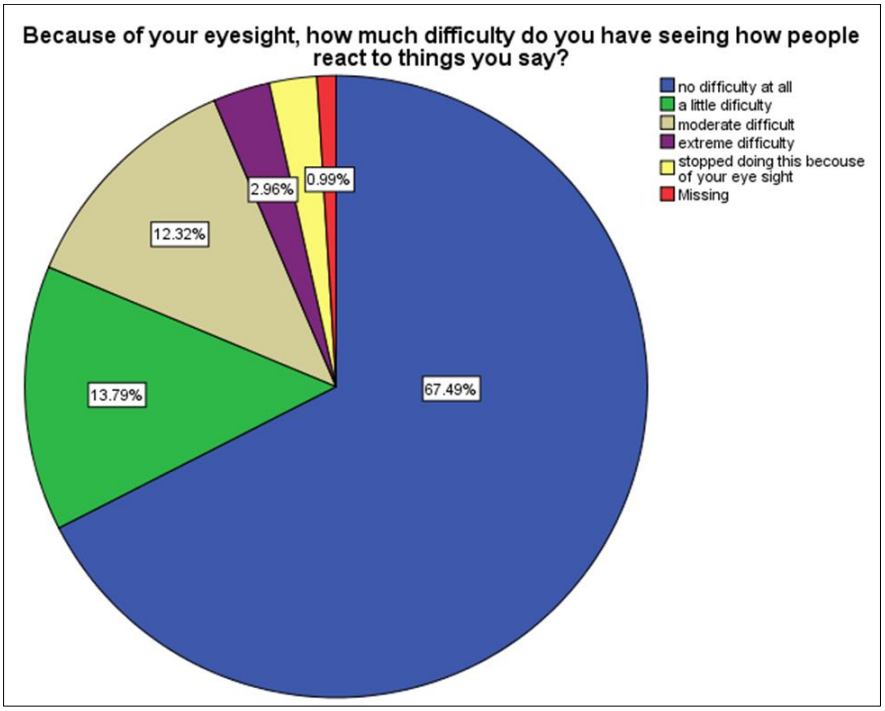

Figure 11 How much difficulty students have seeing people they know react to things they say in al neelain medical university participants 2021 (n=201)

Most of the participants have no difficulty at all seeing how people they know react to things they say

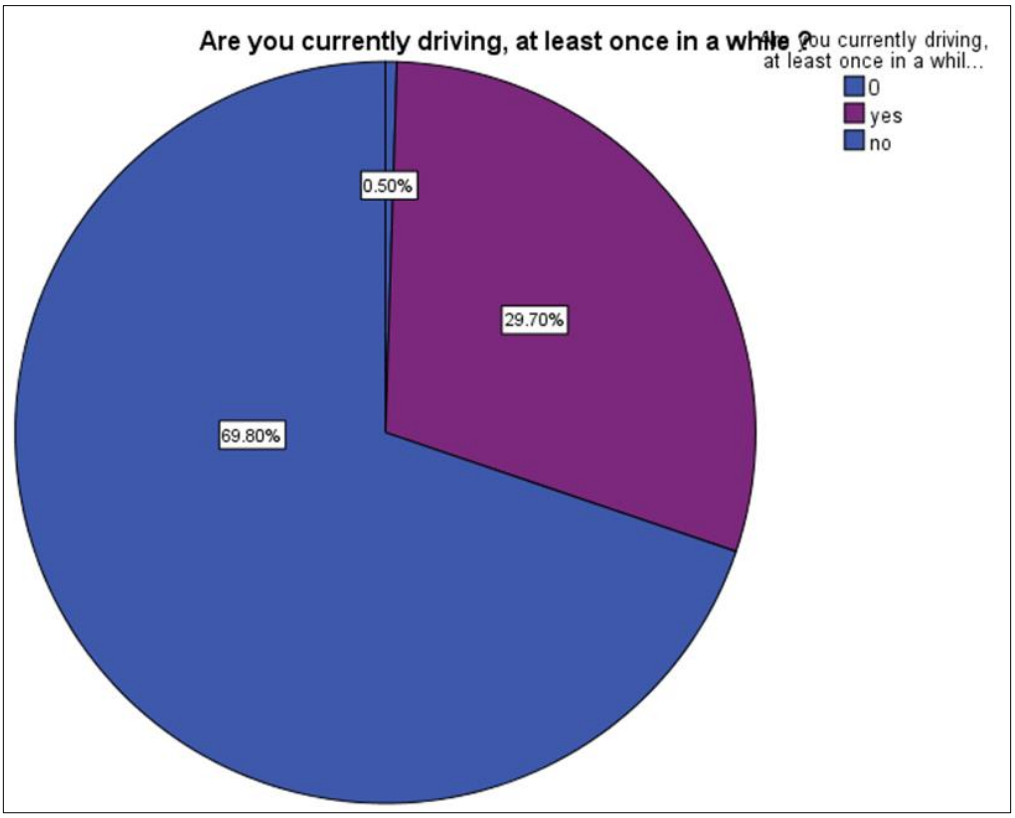

Figure 12 Who drive in al neelain medical university participants 2021 (n=201)

Most of the participants don't drive.

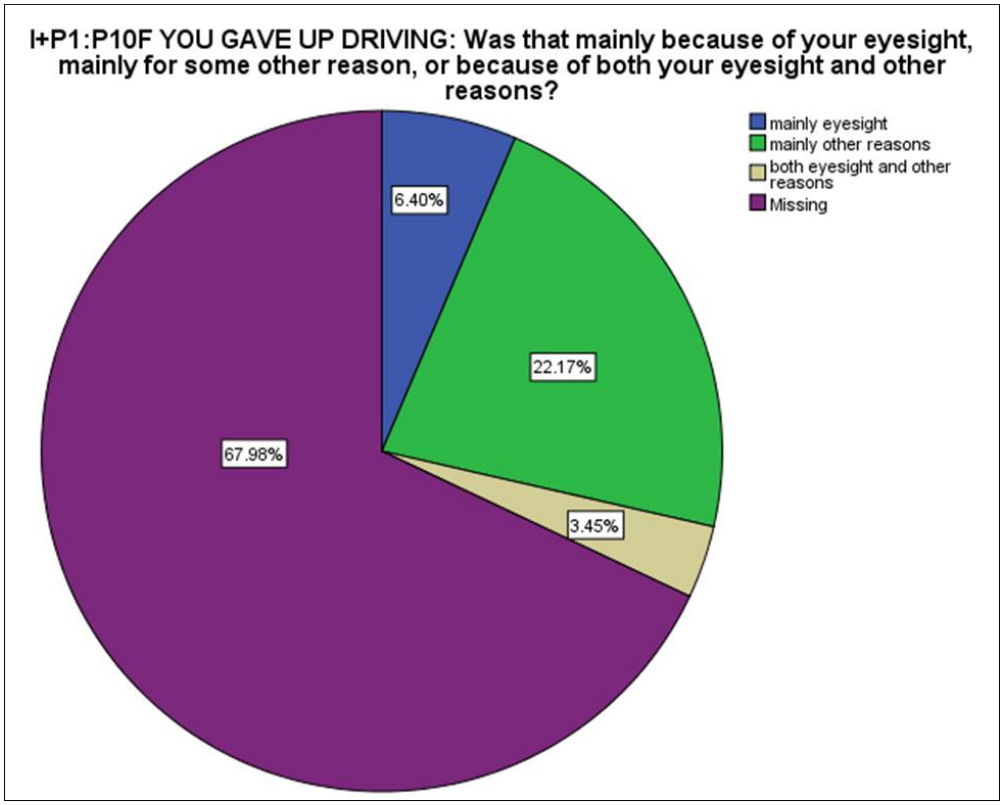

Figure 13 The reasons of giving up driving among al neelain medical university participants 2021 (n=201)

Most of the participants who give up driving was mainly because of other reasons than their eyesight.

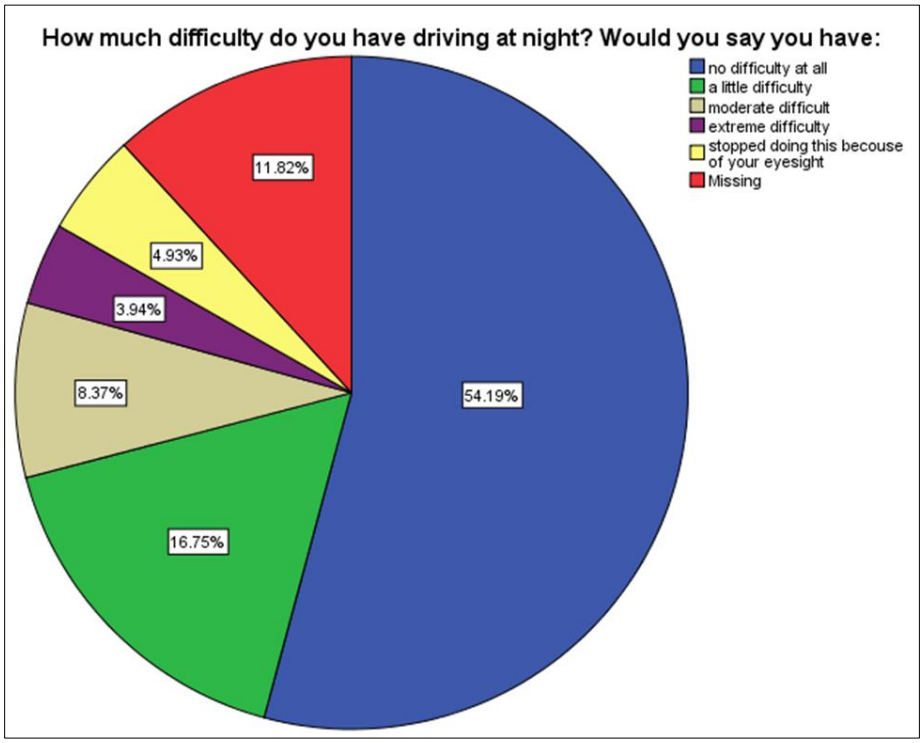

Figure 14 How have difficulty driving at night among al neelain medical university participants 2021 (n=201)

Most of the participants have no difficulty at all driving at night and some of them have little and moderate difficulty.

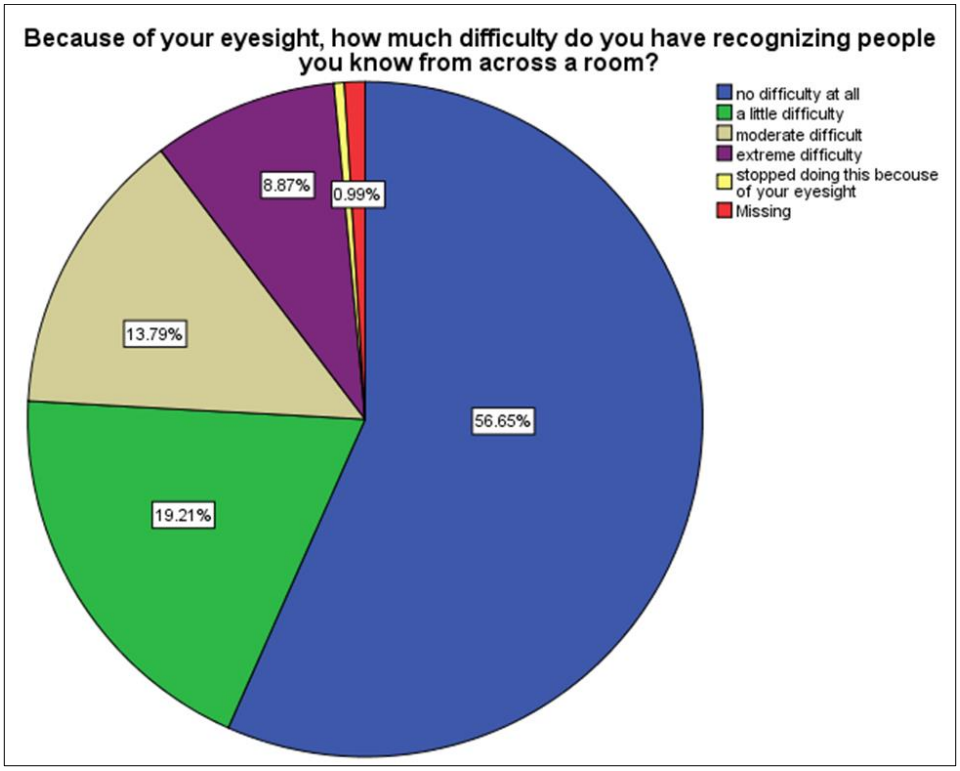

Figure 15 How much difficulty students have recognising people they know from across a room among al neelain medical university participants 2021 (n=201)

Most of the participants have no difficulty at all recognising people they know from across a room.

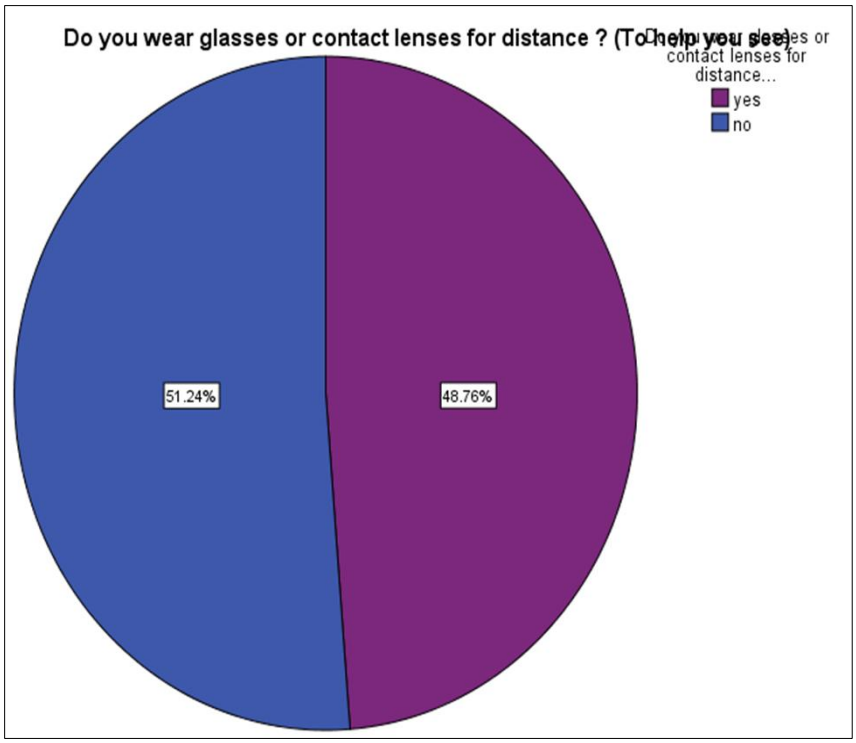

Figure 16 Who wear glasses and contact lenses among al neelain medical university participants 2021 (n=201)

Al most half of the participants wear glasses and contact lenses for distance

Table 4 Distribution of medical students who wear glasses or contact lenses according to academic level in al neelain medical university participants 2021 (n=201)

		Who wear glasses and contact lenses for distance		Total
		Yes	No	
Study year	batch 18	46	62	108
	Batch 19	16	13	29
	Batch 20	9	8	17
	Batch 21	7	4	11

Study year * Do you wear glasses or contact lenses for distance? (To help you see) Crosstabulation

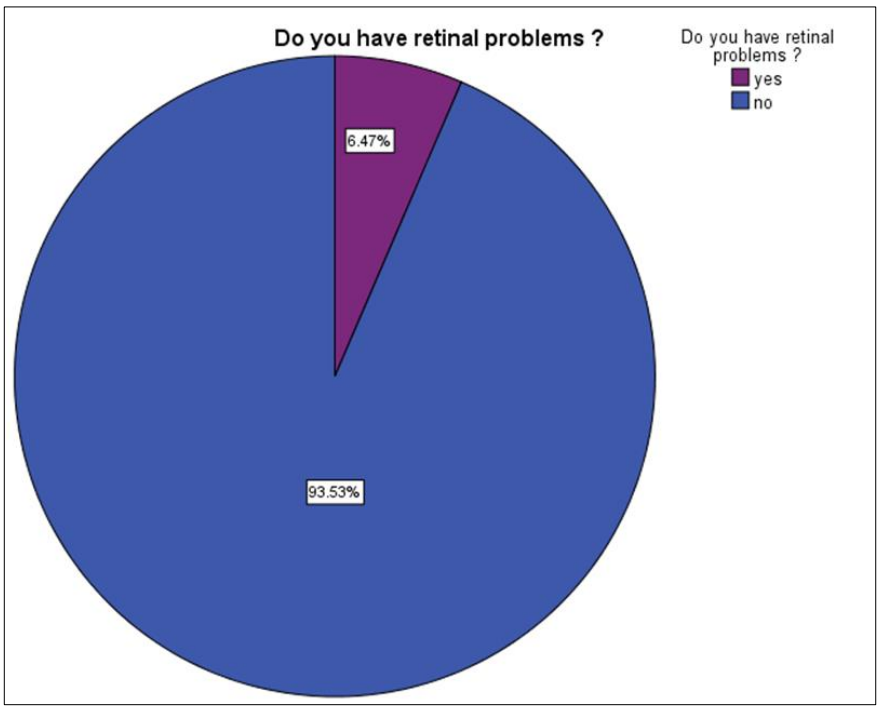

Figure 17 The percentage of students who have retinal problems al neelain medical university participants 2021 (n=201)

All most all of the participants have no retinal problems

Table 5 Correlation between age and students who have retinal problems

Crosstab				
Count				
		Do you have retinal problems?		**Total**
		yes	**no**	
Age	18-22	9	107	116
	23-27	4	79	83
	above 27	0	2	2
Total		13	188	201

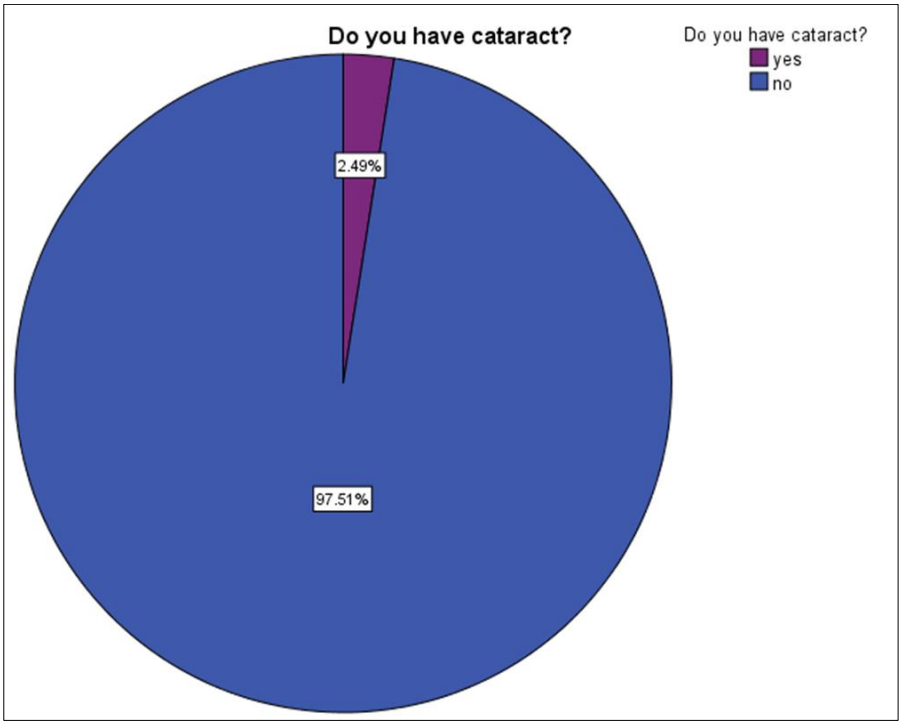

Figure 17 The percentage of students who have cataract in al neelain medical university participants 2021 (n=201)

Al most all of the of the participants don't have cataract.

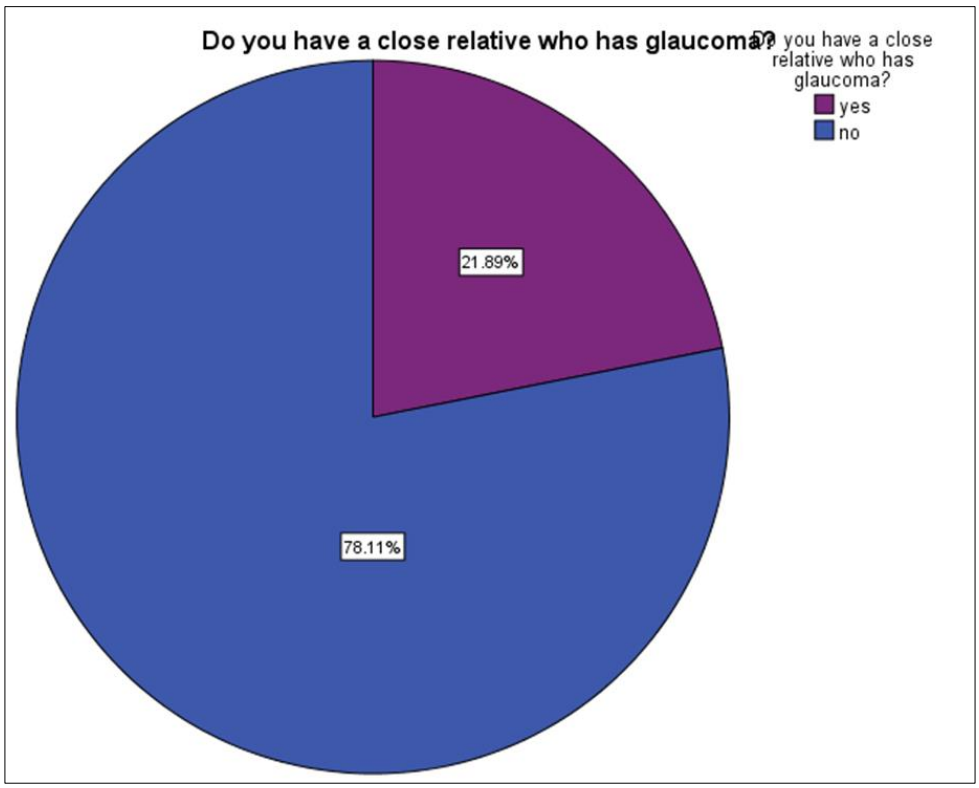

Figure 18 The percentage of students who have relative who has glaucoma inal neelain medical university participants 2021 (n=201)

Most of the participants have no relatives who have glaucoma

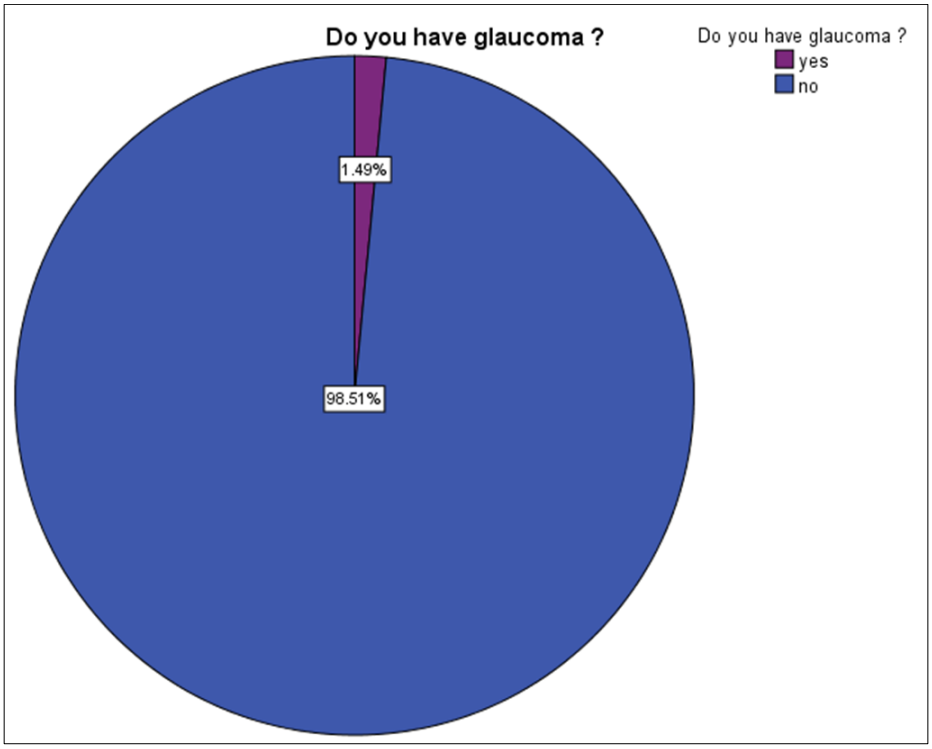

Figure 19 The percentage of students who have glaucoma in al neelain medical university participants 2021 (n=201)

Al most all of the participants have no glaucoma

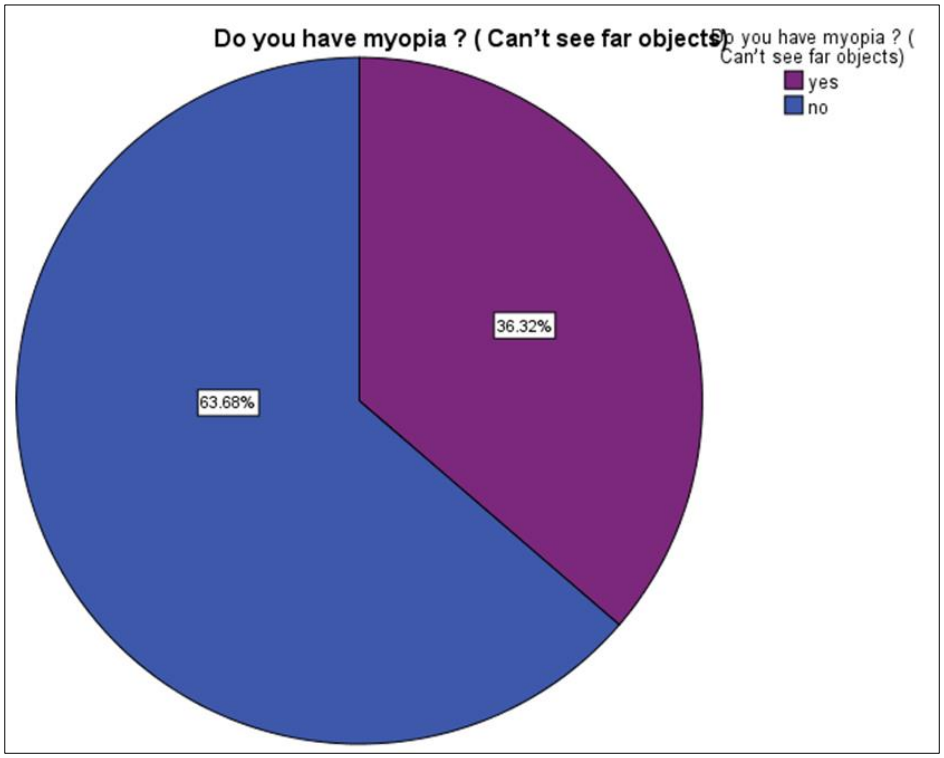

Figure 20 The percentage of students who have myopia in al neelain medical university participants 2021 (n=201)

Almost half of the participants don't have myopia.

Table 6 Correlations between age and students who have myopia in al neelain medical participants 2021 (n=201)

Crosstab				
Count				
		Students who have myopia		**Total**
		yes	**no**	
Age	18-22	48	68	116
	23-27	25	58	83
	above 27	0	2	2
Total		73	128	201

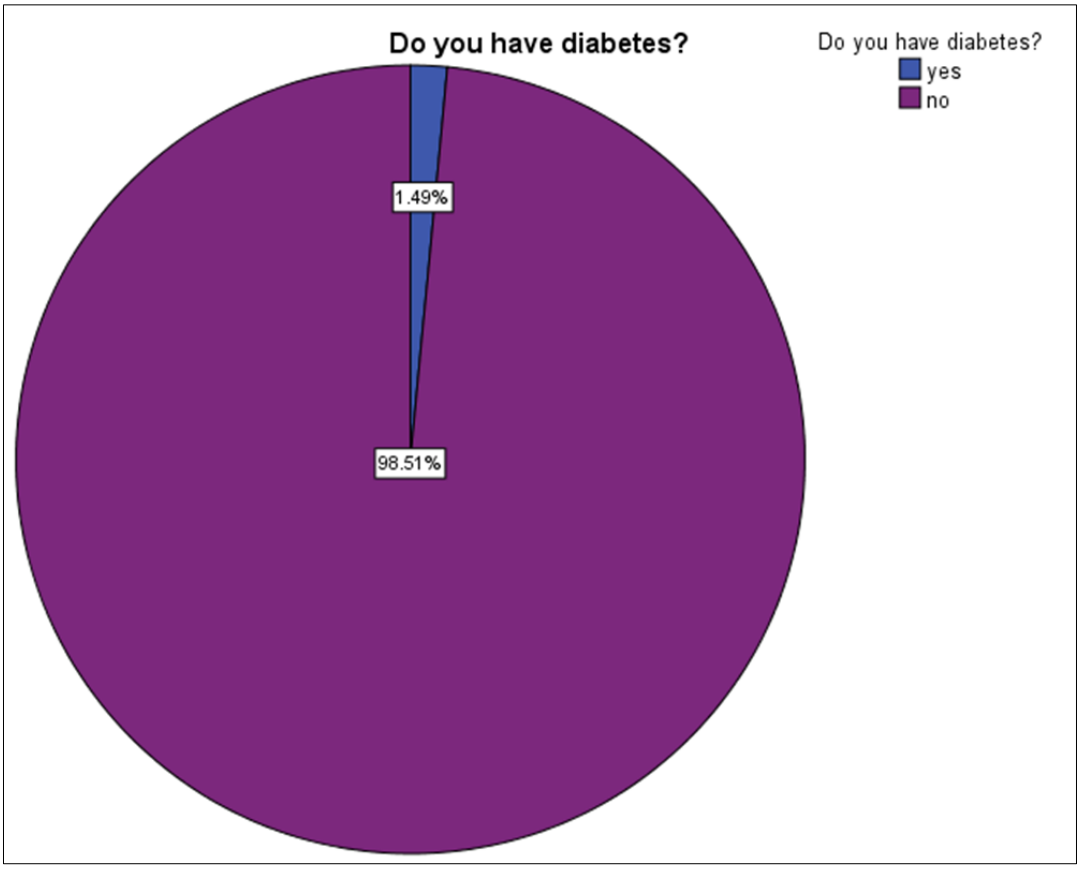

Figure 21 The percentage of students who have diabetes in al neelain medical university participants 2021 (n=201)

Al most all of the participants don't have diabetes

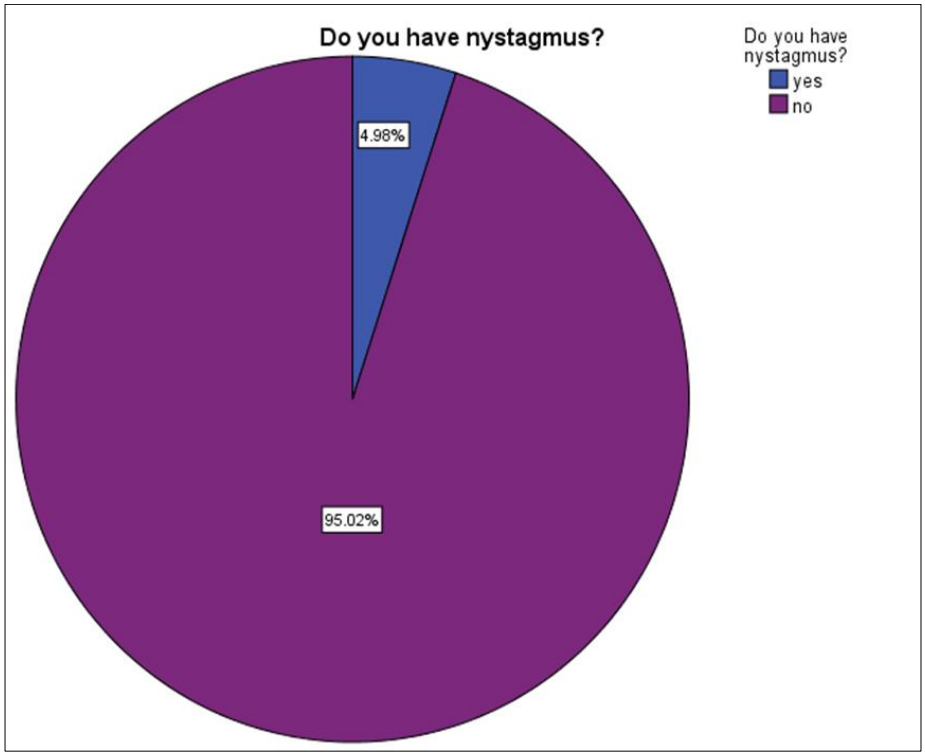

Figure 22 The percentage of students who have nystagmus in al neelain medical university participants 2021 (n=201)

Almost all of the participants don't have nystagmus

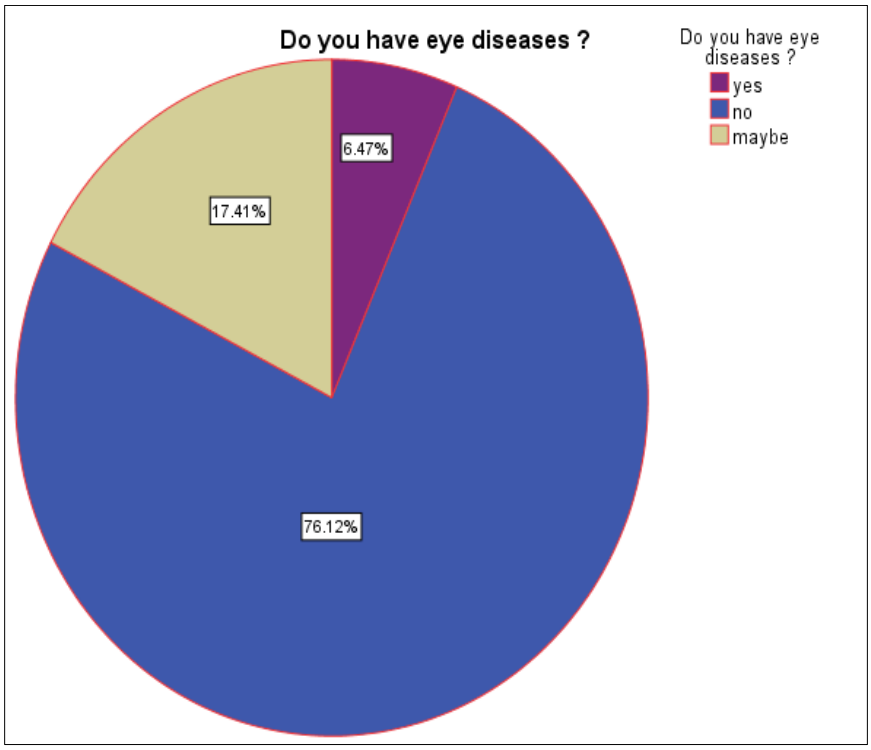

Figure 23 sThe percentage of students who have eye diseases in al neelain medical university participants 2021 (n=201)

Most of the participants don't have eye diseases.

5 Discussion

In this study we identified the prevalence and causes of decreased visual acuity among medical students in Al-neelain University,2021

Data were collected from medical students in Al-neelain University in all academic year level.

At total of 201 medical students participated in this study. Out of 201, 37 students (18.4%) male and 163 students (81.6%) female students participated in the study.

Among these students 108 (53.7%) were fifth year students, 29(14.4%) were fourth year students, 17(8.5%) were third year students, 35(17.4%) were second year students, 11(5.5%) were first year students.

Among these students (57.7%) 116 were students aged between (18-22),

- 83(41.3%) were students age between (23-27),
- 2 (1%) were students age above 27 years.

Out of 201 students, 76,1% had a low vision exam, and the result was ,43.5% good result ,20.4%. Ok, and 36.1% bad (had low vision).

Among these 201 students (23.9%) 18 students had there's last sight test Last months. 118 students. (58.7%) had last sight test last years,

and 35 students (17.4%) Didn't have sight test.

Among students who had sight test, 88 students (46.1%) had good vision result, 81 students (42.4%) had low vision results, and 22 (11.5%) students had other results.

In this study there were no correlation between the age of the students and the number of students who have low vision.

And there was no correlation between the academic level of the students and number of students who wear glasses and contact lenses for distance as shown in table 4.4

The results shows that the prevalence of students who wear glasses or contact lenses for distance vision (the prevalence of decreased visual acuity among medical students of al neelain university) was (48.8%), a total of 98 students out of 201 and its high percentage.

In similar previous study based on the vision screening which was conducted by optometrists at Enukweni and Mzuzu Foundation Primary Schools.in Malawi

Found that: The prevalence of decreased VA was found to be low in school-going population (4%, n=594). In my study the prevalence was higher (36.1%) maybe because the less sample size.

In this study there were questions about eye symptoms, we asked about their eyesight using both eyes' glasses or contact lenses, (if they wear them), 42% students reported that they have excellent vision, 35.8% students have good vision, 14.4% students have fair vision, 7.0% have poor vision, and only .5% very poor vision.

And the study revealed that the majority of students have moderate and mild pain and discomfort in and around their eyes by (34.3%) and (33.8%) respectively. And (20.4%) didn't't have symptoms at all, (10%) of the students have severe pain and discomfort and only (1.5%) have very severe pain.

(46.8%) of students don't have difficulty at all reading street signs or the names of stores, and (29.9%) have a little difficult, (14.9%) have moderate difficulty and (3.0%)

stopped doing this because of their eyesight.

(68.2%) of students don't have difficulty at all seeing how people react to thing they say, (13.9%) have a little difficult, (12.4%) have moderate difficulty, (3%) have extreme difficulty and only (2.5%) stopped doing this because of their eyesight.

The prevalence of students who drive was 29.7% and 0.5% quit driving. Among those who quit driving 13 students were mainly because of their eye sight, 45 students were mainly because of other reasons and 7 students because both eye sight and other reasons.

(61.5%) students don't have difficulty at all driving at night, (19%) have a little difficulty, (9.5%) have moderate difficulty, (4.5%) have extreme difficulty, and only (5.6%) stopped driving at night because of their eyesight.

The majority of the students (57.2%) don't have difficulty at all recognising people they know from across a room, (19.4%) have a little difficult, (13.9%) have moderate difficulty, and (9%) have extreme difficulty.

The principal causes of decreased visual acuity in this study were found to be myopia (refractive error) (36.6%) students have myopia. Other causes were found to be retinal problem (6.4%), nystagmus ((4.9%), cataract (2.4%), diabetes (1.4%) and glaucoma (1.4%).

The prevalence of students who have eye disease was found to be (6.4%) of students,

and (17.4%) reported they may have it.

In similar previous study based on the vision screening which was conducted by optometrists at Enukweni and Mzuzu Foundation Primary Schools.in Malawi

Found that, the principal causes of decreased VA in twere found to be amblyopia and uncorrected refractive errors, with myopia being the main cause than hyperopia. Which is similar to the results of this study.

6 Conclusion

In conclusion the results indicate that the prevalence of decreased visual acuity among medical students in al neelain university is 47.7%. And

There was no statistical effect of age, academic level, gender on the prevalence of reduced visual acuity.

And the major cause of decreased visual acuity was found to be myopia (36.3%). Other causes were found to be retinal problem, nystagmus, cataract, diabetes and glaucoma.

recommendations

For H.E.M

- The long-term goal of a population health approach for eye and vision health would be to transform vision impairment from an exceedingly common to a rare condition, at the same time reducing the associated health inequities.
- Achieving the twin goals of improving eye and vision health and increasing health equity will require progress along multiple fronts and, in particular, national and state efforts to ensure that resources and knowledge are available and communicated to help implement actions within communities.
- The public should have accessible, transparent, and easily understood information about eye and vision health prevalence, incidence, and impact (on both an individual and community level) and also information about the stakeholders that influence eye and vision health locally and nationally.
- Minimize the impact of chronic vision impairment, and Achieve eye and vision health equity by improving care in underserved populations.
- more vision screening at a large scale on medical school populations to reflect the real situation on the ground.

For universities

- It's important to have eye screening programs in the universities, so that students can regularly check their vision and to avoid eye vision declarations
- provide students with eye and vision health informations, and the symptoms of decreased visual acuity and eye diseases so they can maintain healthy vision.
- Eye health education.
- For medical students:
- Students should eat right. Foods that high in vitamins may help lower the risk of cataract and macular degeneration.
- They should wear sunglasses, take screen breaks from computer and cellphone to avoid eye strain and dry eyes
- take regular eye screening hence it's important to get vision checked on regular basis.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

Statement of ethical approval

The ethical approval has been obtained from department of medicine -Alneelein university - Research committee

Funding

No funds have been used in this research

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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