





# Knowledge, attitudes and practices towards refractive error amongst students



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**Background:** Uncorrected refractive error is one of the leading causes of visual impairment. Understanding of the barriers to spectacle usage and attitudes of students towards spectacle use and management strategies can help improve population knowledge and develop school-based programmes to address refractive error.

**Aim:** This study aimed to determine the knowledge, attitudes and practices of university students towards refractive error.

**Setting:** A large university in South Africa.

**Methods:** A quantitative descriptive study was performed via a validated self-administered questionnaire. The survey included questions regarding the knowledge of the participants current status of vision, knowledge on causes of poor vision, accessibility of eye healthcare facilities and attitudes towards spectacle use.

**Results:** Knowledge of participants with respect to the cause of poor vision amongst their peers revealed 63% ( $n = 189$ ) reporting that digital devices are the major cause of poor vision amongst students, followed by myopia ( $n = 166$ ) and lastly long-sightedness ( $n = 117$ ). The majority of participants had adequate knowledge regarding methods of correcting poor vision with 95% listing spectacles as a method of correction followed by contact lenses ( $n = 250$ ) and surgery ( $n = 203$ ). There were 29% of participants who reported using spectacles all the time and 22% who reported using spectacles some of the time.

**Conclusion:** The university students are knowledgeable about the causes of poor vision amongst students. Some students have refractive error but display poor attitude and practice towards spectacle wear because they do not wear spectacles as often as they should. Awareness around eye care and spectacle use must be created.

**Keywords:** uncorrected refractive error; visual impairment; spectacles; university students; knowledge; attitudes; perceptions.

## Introduction

The World Health Organization (WHO) estimates that 153 million people worldwide live with visual impairment because of uncorrected refractive errors.<sup>1</sup> Uncorrected refractive error holds the first position as a leading cause of visual impairment in South Africa.<sup>2</sup> Refractive error is the condition where the eye cannot clearly focus the images from the outside world resulting in blurred vision, which if severe, causes visual impairment. Refractive errors affect more than a third of the population and although the exact cause of refractive errors remain unknown, common risk factors include heredity, nutrition and the environment.<sup>3</sup> Refractive errors cannot be prevented but can be diagnosed by an eye examination and treated with corrective spectacles, contact lenses or refractive surgery. If corrected timeously by eye-care professionals, the full development of good visual function is not impeded (World Health Organization<sup>1</sup>).

Uncorrected refractive error can lead to a decreased quality of life, which results in difficulties to perform daily life tasks. This hampers the possibility of an individual living a completely independent life and can have psychological implications. Therefore, uncorrected refractive error has a huge potential of hindering performance of university students, which may subsequently impact social, educational and economic prospects of an individual later in life.<sup>4</sup>

Some reasons for uncorrected refractive errors remaining unaddressed are poor awareness amongst those requiring care, low priority for eye care in life choices and poor access to care and affordable spectacles in some areas, thus reducing the number of those seeking care.<sup>5</sup> These factors are supplemented by erroneous beliefs and stigmas that are inbred in some communities towards

eye health and management procedures such as spectacles, contact lenses and surgery that results in underutilisation of services. Studies<sup>6,7,8,9</sup> have shown several misconceptions, myths and poor attitudes towards refractive error within the context of Africa. This includes the misconception that children do not need regular eye check-ups, short-sightedness is worse than long-sightedness and squints cannot be cured in children.<sup>6</sup> A study conducted by Sukati et al.<sup>7</sup> to determine the knowledge and practices about child eye healthcare in the public sector in Swaziland reported that 60.1% of parents had never taken their child for an eye examination and 53.0% of parents reported having no knowledge of eye conditions affecting children. The study revealed the need for parents to be well informed about basic child eye health in order to seek care if needed. The researchers recommended that awareness campaigns to inform the public about the importance of eye examination need to be conducted.<sup>7</sup>

There is a perception by some that visual impairment or refractive error is religious punishment.<sup>10</sup> This highlights the importance of knowledge and positive attitudes towards eye care. Members of the eye care team need to be aware of patients' current knowledge and attitude towards eye care. A study was conducted in Sao Paulo, Brazil to assess the level of awareness of participants, concerning their own refractive errors and the use of corrective lenses found that 73% of the participants were using corrective lenses for over five years and 59% did not know what type of lenses they used. The most prevalent ametropia from the account of participants, which was later checked was near-sightedness (17%) and 68% did not know what type of ametropia they had. Out of this 68%, 38% reported that they did not know what type of refractive error they had because their doctor had not explained it to them. Another relevant fact raised by the study is that the vast majority of the participants (95%) had their spectacles prescribed by an ophthalmologist: a general practitioner had prescribed 3% and only 2% by an optometrist. The participants of this study showed a low level of knowledge regarding their refractive error and corrective lenses. Low level of education and lack of interest were the main causes for the high number of uninformed patients. The researchers highlighted that clarity regarding the condition is not only important but also a human right of every patient. It is advisable that all eye care practitioners dedicate a portion of the eye exam to explain to the patient the process of examination, as well as the results found and ways to treat the condition.<sup>11</sup>

This study was conducted to gather knowledge regarding eye care knowledge amongst university students. A study conducted to determine the knowledge, attitude and practice (KAP) towards refractive error amongst high school students,<sup>8</sup> reported that 39.0% of the students had never had an eye check-up, 30.1% of the students were not aware of whether they had normal vision or not and 22.7% did not know where to seek eye-health services. Many of the students believed that poor vision was because of inadequate nutrition. Approximately 10.5% of students who were previously advised to wear spectacles admitted to actually using them.

The reasons cited for students failing to wear spectacles to correct poor vision were the fear of being teased and the cost factor associated with spectacles.<sup>8</sup> Accessibility and affordability of eye-health services were the major reasons for non-correction of vision. Inadequate knowledge of refractive error as a cause of poor vision was observed, however overall attitudes towards spectacle use were positive.<sup>8</sup>

Another similar descriptive cross-sectional study was performed on undergraduate students from a Ghanaian university to determine their attitudes and beliefs about spectacle wear.<sup>9</sup> The results revealed that 75.8% of the student population had heard of refractive error before, 57.4% felt that spectacles could be used to correct refractive error and 61.0% agreed they would wear spectacles if they were prescribed by an eye doctor. The majority of the sample population did not know that spectacles could be used to relieve other forms of ocular discomfort such as headache and tearing. Approximately 54.2% of respondents saw people who wore eyeglasses as visually handicapped, whilst 14.6% believed that eyeglasses were only for old people and 27.8% of the respondents believed that they would be teased if they wore spectacles. Although spectacles are still the most commonly preferred modality for the correction of refractive errors in the world today, acceptance of spectacles for the correction of refractive errors amongst the undergraduates was not encouraging. The research found that certain misconceptions regarding refractive errors and the methods of correction still lingers in the minds of the educated population, which needs to be addressed.<sup>8</sup>

A cross-sectional survey by Ormsby et al.<sup>12</sup> was performed to investigate how knowledge and attitudes influence the access to eye-care services in Takeo Province, Cambodia. It was found that knowledge of eye diseases was highest for eye injury (97.0%). Knowledge regarding red eye was 15.0%, age-related macular degeneration was 12.0%, glaucoma knowledge was 12.0% and diabetic associated eye disease knowledge was 8.0%. Older people were less likely to know about different eye diseases compared with the younger ones and more women compared with men were likely to go for an eye examination when experiencing eye problems. More men than women reported using spectacles with 68.0% of spectacles being from the market, 26.0% from an optical shop, 16.0% from a relative and 10.0% from an eye hospital. Most of the participants (47.0%) reported that they did not know of conditions that could lead to blindness. Cataract treatment was unknown by 48.5% of participants and 19.0% reported surgery as the best treatment to restore blindness. Knowledge about cataract and refractive error was low amongst this population sample. This study reveals that poor knowledge of eye diseases could contribute to a higher occurrence of untreated cataracts and uncorrected refractive error.<sup>6</sup>

A study was performed to assess the psychosocial aspects of refractive errors and the effectiveness of health education in correcting stigmas related to spectacle use in high-school

students. Dhoble et al.<sup>13</sup> reported that the respondents did not use their prescribed spectacles, as they believed that spectacles were cosmetically unacceptable, feared rejection from the opposite sex and were afraid of being teased by colleagues. Following health education, there were statistically significant changes in the knowledge, attitude and care seeking behaviour of spectacle use.<sup>13</sup> In another cross-sectional school-based study based in Sudan to assess the attitudes and perceptions of high-school students and their parents towards spectacle wear, the results revealed that the students believed that wearing spectacles negatively affected their opportunities for education, employment and marriage. A total 36.4% of the students believed that wearing spectacles could lead to making the eyes weaker or could damage the eyes, resulting in early blindness, and 22.5% of the respondents believed that spectacles were only for older people. Overall, perceptions towards spectacle use differed between genders. Females reported to be more vulnerable to social and psychological distress when wearing spectacles compared with males. The study also showed that parents believed that their children had lost an important asset, the community looked at them as handicapped and their children would be blind in future. These results show that the fear and stigma related to spectacle use was widely experienced amongst students and their parents, particularly amongst females.<sup>3</sup>

The aim of this study was to determine the KAP of students towards refractive error. The specific objectives of the study were to assess university students' knowledge regarding causes and treatments of poor vision and to gain a better understanding of the barriers to spectacle usage and attitudes of students towards spectacle use and other management strategies via the administration of a structured online questionnaire. This study was a quantitative descriptive study conducted via a validated self-administered questionnaire placed on the online student notice system. The data were captured and analysed using the Statistical Package for Social Sciences (SPSS) version 25.

Randomised convenient sampling was used to determine study participants within the student body. The sample size determination formula used was:

$$n = Z^2 * P * Q / (d^2) \quad [\text{Eqn 1}]$$

where  $Z$  was the upper point of the standard normal distribution (1.96) and  $d$  was the margin of error which was 5.0%.  $P$  was the expected prevalence of knowledge towards refractive error amongst university students, which is 75.8%,  $Q = 1 - P$  and the target population was university students (50 000). The sample size was 281. Taking into consideration the possibility of dropouts and unforeseen circumstances, 10% non-response rate was added to the sample to target a maximum sample size of 309.

All the 2020 enrolled university students who were able to access the online notice system were able to take part in the survey excluding students studying optometry at the

university (level 1–4). Online informed consent was obtained before the survey was displayed. Data were collected via a questionnaire accessed online using Google forms from 8 June 2020 until 3 July 2020.

## Ethical considerations

The study received ethical clearance from the University of KwaZulu-Natal, Humanities and Social Sciences Research Ethics Committee (HSSREC/00001404/2020).

## Results

Figure 1 shows students' responses in terms of their knowledge with respect to the causes of poor vision amongst their peers. A total of 189 reported that digital devices are the major cause of poor vision amongst students followed by short-sightedness or myopia with 166 responses; long-sightedness taking the third position with 117 responses. These results signify that digital devices, hyperopia and myopia are commonly known causes of refractive error. Some respondents also included astigmatism ( $n = 96$  responses) and poor nutrition ( $n = 75$  responses). A value of 38 responded with unsureness as their responses were 'I don't know'. According to the results shown in Figure 1, most students seem to be aware of the causes of poor vision amongst students.

The response of participants in terms of their knowledge on methods of correcting poor vision are shown in Figure 2. A total of 288 students reported knowing spectacles as a method of correction followed by 250 students who reported knowing contact lenses as a method of correction and 203 students reported surgery. The results indicate that a high number of students are aware of the correct methods of correcting poor vision. A small percentage of the sample, ( $n = 6$ ), do not know methods of vision correction and 7 students still believe myths that earrings can correct poor vision.

Figure 3 shows responses to questions regarding the attitude towards refractive error. The results indicate that almost half the respondents wear spectacles (46.4% spectacle wearers and 53.6% non-spectacle wearers). A total of 54.6% of

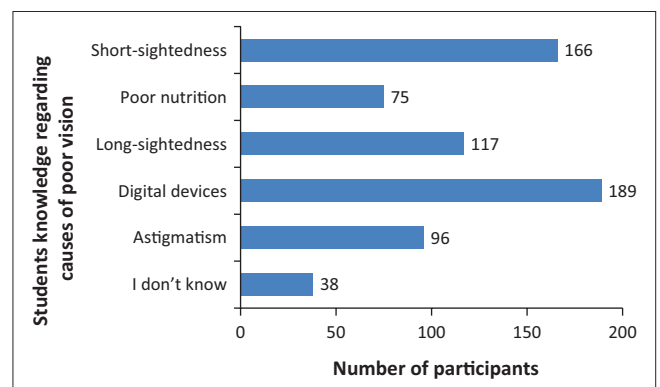


FIGURE 1: Participants perception regarding the causes of poor vision amongst students.

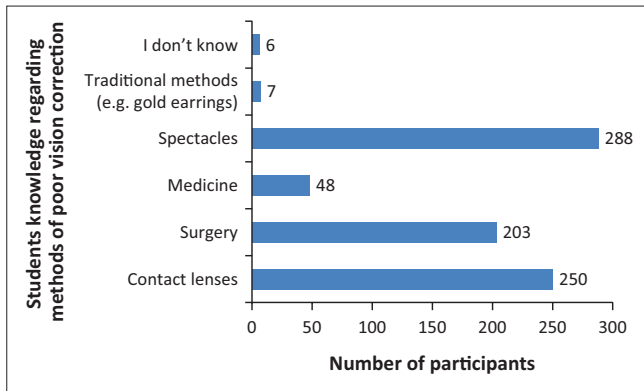


FIGURE 2: Participants perception regarding methods of vision correction.

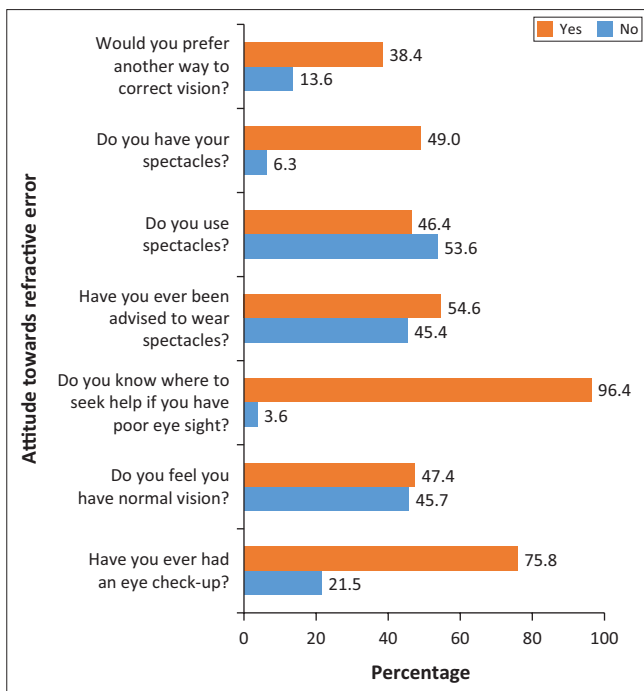


FIGURE 3: Participants' attitude towards refractive error.

participants had been advised to wear spectacles, whilst 45.4% have never been advised to wear spectacles. Of the 54.6% who were advised to wear spectacles, only 46.0% actually wear them.

The majority of participants know where to seek help if they needed it, 96.4% of participants knew where to seek help if they had poor eyesight, whilst 3.6% of participants did not know where to seek help. There is awareness regarding eye care and optometrists in 96.4% of the participants and the general student population is well informed regarding the optometry profession.

In terms of participants' perception regarding their vision, 47.4% of participants felt that their vision was normal, whilst 45.7% felt that their vision was not normal. Most students have been for an eye check-up previously. Approximately three quarter of the participants (75.8%) reported that they have had an eye check-up whilst 21.5% of participants did not have an eye check-up previously.

Participants were allowed multiple responses to express their opinion about what they think the barriers are to wearing spectacles for those with poor vision (Figure 4). A total of 142 students expressed an opinion that spectacles were cosmetically unappealing and embarrassing to wear in public, whilst 134 students reported that they thought cost was a barrier to spectacle use and 114 believed that the reason was the fear of being teased, whilst 46 reported that spectacles prevented the normalisation of eyesight. A total of 21 (6.95%) participants reported not having an opinion about the barriers associated with spectacle wear.

There were 88 participants who reported using spectacles all the time and 66 reported using spectacles some of the time. Participants who had been advised to wear spectacles were probed about why they do not have or wear spectacles. The following were their responses: 3.6% reported that they do not see an improvement in their vision, 3% think that it is expensive to get spectacles, 2.0% believe that spectacles make the vision worse, 2.0% have broken or lost their spectacles and 1.7% have a fear of being teased.

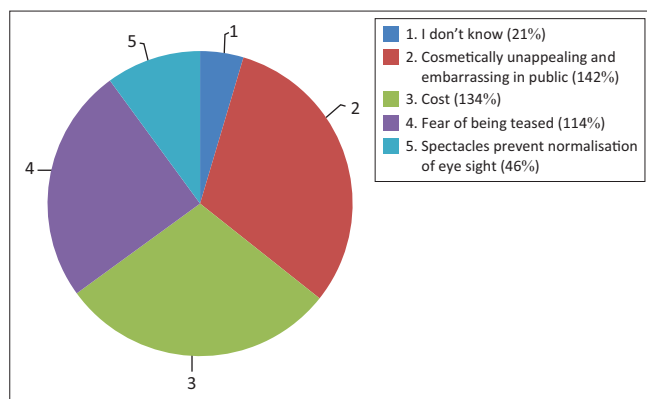
Figure 5 depicts the participants' responses regarding where they had their last eye examination. Out of  $n_{total} = 302$ , the majority ( $n = 209$ ) responded to having their eye examination at an optometrist. Ophthalmologist was chosen by 12, eye hospital had 6 and general hospital had 3.

## Discussion

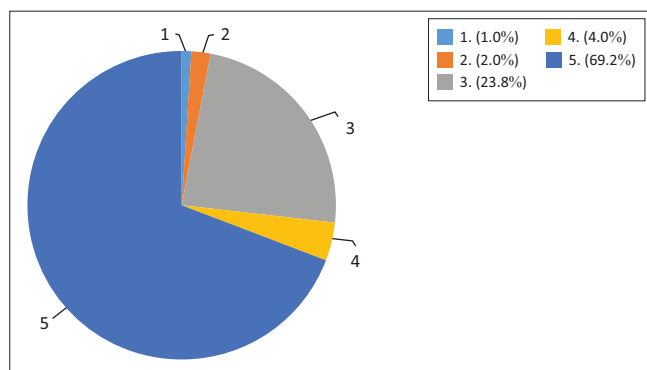
Refractive errors are one of the main reasons for poor vision that can be corrected easily using visual aids such as spectacles and contact lenses or invasively with surgery. Unfortunately, because of misinformation and stigmas attached with it, some people do not attempt to treat refractive errors, which results in decreased vision and a decreased quality of life.

When students were probed regarding their knowledge with respect to the causes of poor vision amongst their peers, they had varying responses. A total 189 students reported that digital devices are the major cause of poor vision amongst students, followed by refractive errors (such as short-sightedness/myopia, hyperopia and astigmatism) and malnutrition. These results were in contrast to that of Nyamai et al.<sup>8</sup> who reported poor nutrition as the main perceived cause (37.8%) of poor vision amongst students followed thereafter by refractive errors (30.9% short-sightedness, 12.8% long-sightedness and 7.9% astigmatism).<sup>8</sup> Another study reported by Aldebassi,<sup>14</sup> reported far-sightedness and short-sightedness as the most common reasons for poor vision. This indicates that myopia and hyperopia are known to be a common cause of poor vision amongst students.<sup>14</sup> These findings also acknowledge Aldebasi<sup>14</sup> findings that there is a direct correlation between educational levels and knowledge of symptoms of refractive error, however it was concluded that the general public is not aware of most conditions affecting their vision health.





**FIGURE 4:** Participants' opinion about the reasons why students with poor vision do not wear spectacles.



**FIGURE 5:** Participant responses about where they had their last eye examination.

In terms of participants' knowledge on methods of correcting poor vision, 288 reported knowing spectacles as a method of correction followed by 250 students who reported knowing contact lenses as a method of correction and 203 students reported surgery. The results regarding spectacles are in agreement with Desalegn et al.<sup>15</sup> who reported that 90.6% of their sample had adequate knowledge about spectacles but are in contrast with regard to knowledge regarding contact lens correction. Fifty nine per cent of the participants did not know that contact lenses are a method of correction<sup>15</sup> versus the current study in which 82.8% of university students responded positively regarding contact lenses. Mireku Felix and Ebenezer<sup>9</sup> reported different results regarding spectacles as a form of correction because only 57.4% of the participants recorded regarding spectacles.<sup>9</sup> The 82.8% of participants recorded in this study regarding contact lenses is much more than the 38.6% reported by Mireku Felix and Ebenezer.<sup>9</sup> In terms of refractive surgery, this study's results indicate that 67.0% of the participants' were aware that surgery could be an option, which contrasts with the results reported by Usgaonkar and Tambe<sup>16</sup> in which only 36.0% of the participants were aware of the possibility of refractive surgery.<sup>16</sup> The value of 23.0% regarding refractive surgery as a method of correction as reported by Mireku Felix and Ebenezer<sup>9</sup> contrasts even further from this study. Mireku Felix and Ebenezer<sup>9</sup> also listed that 21.8% felt that drugs could be used to correct refractive errors.<sup>9</sup> Overall, the results indicate that a high number of students are aware of the correct methods of correcting poor vision. A small percentage of the sample, ( $n = 6$ ), do not know methods of vision

correction and 7 students still believe myths that earrings can correct poor vision.

Approximately half of the respondents in this study wear spectacles (46.4% spectacle wearers and 53.6% non-spectacle wearers). About 54.6% of participants had been advised to wear spectacles but only 46% actually wear them. This result is higher than that of Nyamai et al.<sup>8</sup> who reported compliance in only 10.6% of their participants.<sup>8</sup> The majority of participants (96.4%) know where to seek help if they needed it. This informs us that there is awareness regarding eye care and optometrists in the general student population. In terms of participants' perception regarding their vision, 47.4% of participants felt that their vision was normal, whilst 45.7% felt that their vision was not normal. Most students have been for an eye check-up previously. Approximately three quarter of the participants, (75.8%) reported that they have had an eye check-up whilst 21.5% of participants did not have an eye check-up previously.

In this study, participants were allowed multiple responses to express their opinion about the barriers to wearing spectacles for those with poor vision. A barrier expressed by 142 students (47.0% of participants) was that spectacles were cosmetically unappealing and embarrassing to wear in public. The results regarding cosmesis as reported by Dhoble et al.<sup>13</sup> were in agreement with this study (62%). Cost was cited as a barrier to spectacle use by approximately 44.0% of the participants of this study whilst Nyamai et al.<sup>8</sup> reported a percentage of 35.1 with regard to cost being a barrier. The fear of being teased as a barrier was the opinion of 114 (37.7%) in this study. The fear of being teased was reported by other authors: Nyamai et al.<sup>8</sup> reported 38.1%,<sup>8</sup> Dhoble et al.<sup>12</sup> reported 36% and Mireku Felix and Ebenezer<sup>9</sup> reported 27.8%<sup>9</sup> all of which are in agreement with this study. In contrast to this, Ebeigbe (2018) reported that 56% of the participants believed that the fear of teasing was a barrier.<sup>17</sup> Some participants ( $n = 46$ ; 15.0%) believed that spectacles prevented the normalisation of eyesight. This result is much lower than that reported from a study in Sudan<sup>3</sup> in which 36.4% of participants believed that wearing spectacles could lead to making the eyes weaker or could damage the eyes. The value from this study was much higher than that reported by a study performed in China,<sup>3</sup> which stated that only 13.0% feared that wearing spectacles would worsen the eyes. Alrasheed, Naidoo and Clarke-Farr<sup>3</sup> also reported that 22.5% believed that spectacles were only for older people.

Some participants (29.0%) reported wearing spectacles all the time and 22.0% reported using spectacles some of the time. Of the participants who had been advised to wear spectacles but do not wear them, 3.6% reported that they do not see an improvement in their vision, 3% thought that it is expensive to get spectacles, 2.0% believe that spectacles make the vision worse, 2.0% have broken or lost their spectacles and 1.7% have a fear of being teased. These results contrast with that of a study performed in Nigeria,<sup>17</sup> which reported 56% of the participants fearing being teased for wearing spectacles.

Most of the participants (69%) responded that their last eye examination was at an optometrist. Ophthalmologist was chosen by 12, eye hospital had 6 and general hospital had 3. This indicates that the majority of the participants were aware of the role of an optometrist as a primary eye care practitioner.

## Strengths of this study

Accessibility was the main strength: Students were able to access the survey online and complete it in a few minutes.

An online survey reduces human error and pressure of being physically questioned, which may lead to more honest answering.

Students did not have as many academic responsibilities this year because of lockdown, so more people were able to take out time to do the survey.

## Limitations in this study

The time constraints to complete the data collection phase during the academic period can be listed as a limitation. Another limitation is that most students had network service constraints during the lockdown period and thus accessibility of the survey at certain times was challenging.

## Implications of this study

Understanding of the barriers to spectacle usage and attitudes of students towards spectacle use and other management strategies can help improve population knowledge and develop school-based programmes to address refractive error, signifying the importance of practitioner to patient education.

## Recommendations for future studies

Recommendations for future studies with knowledge regarding uncorrected refractive error, subjects' responses can be presented in a mutually exclusive format. In terms of alternatives to spectacles when correcting poor vision, more options may be included such as the use of traditional methods or pharmaceuticals. Expansion of time period of the study is also another factor to be considered with also an increase in population size. The structuring of the questionnaire can be altered by increasing the number of questions asked and allowing for more open-ended questions.

## Conclusion

Most students seem to be aware of the causes of poor vision amongst students. A high number of students have adequate knowledge about methods of correcting poor vision although about 2.0% of the students do not know and 2.3% know of incorrect methods (earings). In terms of preferable alternate of spectacles when correcting poor vision, most students opt

for none of the supplied alternatives, which were contact lenses and surgery.

Almost half of all the participants wear spectacles. According to accepted clinical standards, more people should be wearing spectacles, but they are currently not wearing spectacles. Awareness around the importance of wearing spectacles if prescribed needs to be emphasised when dispensing. Most students have been for an eye check-up previously and the majority of participants know where to seek help if they needed it. Awareness around eye care and optometrists has been created and the general student population is well informed regarding the optometry profession. There is a small percentage that is still unaware and further awareness needs to be created to educate this 3.6%.

Many students had their last eye examination at an optometrist. This implies that most students are aware of the importance of ocular health and regular check-ups. The small minority of students had their last eye check-up at an ophthalmologist, general hospital and eye hospital. Students do not use their prescribed spectacles as often as they should. The reasons for students failing to wear spectacles were fear of being teased and the cost factor associated with spectacles. Awareness around eye care and spectacle use must be created.

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## Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

## Authors' contributions

A.M.S.N., M.M., Z.M, Z.M., L.M. and G.N. contributed to the design and implementation of the research and the writing of the manuscript. N.E.K. supervised the overall project, assisted with results analysis and contributed to the manuscript writing.

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## Data availability

The data that support the findings of this study are available from the corresponding author, N.E.K., upon reasonable request.

## Disclaimer

The views expressed in the submitted article are that of the authors and not an official position of the institution.

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