Barriers and Perception Towards Spectacle Wear among Student Population of University of Buraimi, Oman

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Abstract

**Objectives:** The study aims to evaluate the barriers and perception towards spectacle wear among student population of University of Buraimi, Oman. **Methods:** This descriptive, questionnaire based, cross-sectional study was conducted between December 2017 and May 2018. To evaluate participant's barriers and perception towards spectacle wear, a self-designed, validated questionnaire prepared in English language, obtained responses from 170 a university student population within the Sultanate of Oman. Chi-square test was used to assess the association between the type of perception with the socio-demographic and refractive error related profiles of the participants. **Results:** All participants with inappropriate spectacle correction (61.82%) responded to the questionnaire. Majority of them (73.5%, n = 125) were having their eyes examined for the first time. Only 28 (16.5%) were wearing spectacles. Nearly half of the participants (54%, n = 91) had positive attitude towards spectacle wear, followed by negative (36%, n = 62) and neutral perception (10%, n = 17). Participants from a health science background had a higher positive perception towards spectacle wear compared to the non-medical study majors (P = 0.012). The difference in the perception scores between myopic and hypermetropic refractive error group was statistically insignificant (P = 0.882). **Conclusion:** A majority of the participants were having inappropriate spectacle corrections and did not undergo any prior ocular examinations. Very few participants were wearing spectacles, however, it was inappropriate concerning their
current refractive status. The other reasons for spectacle non-wear were, ordering of new spectacles, lost them, or were broken. Nearly half of the participants had positive perceptions towards spectacle wear. The positive perception was higher among students with health-related majors. The study stresses to extend the current school eye health initiative within the region to the university level. A holistic eye health promotional approach integrating students, teachers, and parents can help in improving spectacle wear within the population.

**Keywords:** Eyeglasses; Refractive errors; School eye health; Spectacle compliance; Patient compliance.

**Advances in Knowledge**
- The study findings identify that there is a positive perception of spectacle wear among the university student population in Oman.
- The positive perception is common among students from health science majors compared to others.
- Despite having a positive perception, compliance towards spectacle wear was poor.
- Noncompliance towards the uptake of ophthalmic services was found to be the main barrier of spectacle wear.

**Application to Patient Care**
- The study results stress the importance of extending the current school eye health initiative implemented in Oman to the university levels.
- The eye health promotions, integrating, students, teachers, and parents can improve the spectacle wear and reduce the burden of the avoidable blindness within the region.

**Introduction**

Worldwide prevalence of refractive error is estimated at around 2.3 billion and 90% of the uncorrected population reside in developing countries. (1) A recent systematic review on refractive errors among a population older than 15 years from the middle east region has observed the prevalence of myopia, hypermetropia and astigmatism as 30%, 21%, and 24% respectively. (2) Moreover, a study conducted among the medical student population in Saudi Arabia observed the refractive error prevalence of 58.7% and highlighted the concern of increasing incidence of refractive errors, especially myopia. (3) The increasing prevalence of uncorrected refractive errors in the middle east region is shaping as a main Public Health issue. Studies conducted among the low-income countries
have observed that disadvantaged groups such as specific ethnicity, lower socioeconomic or educational levels and communities having out of pocket expenditures on spectacles, are at a higher risk of having non-correction of refractive error. (4) However, the barriers of refractive corrections are not sufficiently studied among young adult population residing in a developing, high economic regions, such as Sultanates of Oman.

Spectacle compliance is referred to as the act of regularly wearing the spectacle correction prescribed to the individuals. A previous study among the school-going population in Oman (5) had observed the spectacle compliance as 62%. (5) In another study among the Omani school children, older students demonstrated a better compliance (79.1%) compared to lower grade students. Interestingly, compliance was higher among female students compared to male students. It was also higher among myopic group (72.5%) compared to the other types of refractive error. (5) Compliance with spectacle wear was affected by the individual or society’s beliefs about the spectacle wear by children or young adults. For instance, in developing countries such as Africa, spectacle wear is believed to have an adverse effect on ocular health reflecting poor spectacle wear among the group. (1)

The non-correction of refractive errors adversely impacts the affected individuals physically and mentally. Uncorrected refractive error can adversely affect the quality of life, educational status and career opportunities as well as the social interaction (4) (1) (2) (5). It subsequently forms an economic burden on the affected individual as well as on the National Health system. (2) Students wearing spectacles have an improved vision-related quality of life compared to the non-wearing group. (6) Spectacle related barriers such as social stigma, dependence need, cost, cosmesis (7), etc. have been observed in previous studies to prohibit the user from wearing spectacles. Discomfort, damaged or lost spectacles or low amount of myopia were also the other identified barriers stated in the previous studies. (8) (9) Females are at a higher risk of having psychological or social distress due to spectacle wear, compared to the male population. Despite the availability of simple corrective modality such as spectacles, it is less commonly utilized due to the existing misconceptions and negative perception towards the spectacle wear. (10) (11) Due to the higher income status compared to other low-income countries, the economic factor may not be a significant barrier to spectacle coverage within the Sultanate of Oman. The spectacle wear is proved to be directly associated with the level of understanding about refractive errors and the perception of the affected individuals towards spectacles. (1)
The regional studies on spectacle coverage are done in different age groups, but not for young adults. However, the lifestyle, visual needs, and priorities of university students are different from school students. The barriers observed in school children cannot be generalized to youngsters and hence is the main focus of this study. Uncorrected refractive errors within the population reflect the inadequacy of the eye health care system as a simple means of spectacle correction is available. The incidence of refractive errors is increasing at an alarming rate. Holden et al. estimated 50% of myopia prevalence by the year 2050. Correcting even a small amount of refractive error can significantly improve the quality of life and visual function. (12) World Health Organization recommends regular evaluation and the magnitude of the spectacle coverage within the population. It is also recommended to identify the barriers of spectacle coverage such as age, gender and socio-economic status for any other demographic variable. The study findings would support enhancing the refractive facilities provided within the region as well as the overall eye health system. (5)

Majority of the previous studies about spectacle wear are conducted among school children or teachers. On the other hand, the higher education student population is more mature and decision-makers than the school student population. Therefore their perception towards spectacle wear cannot be directly compared and needs to be explored separately. (1)

Spectacle wear is enhanced due to the wearer’s positive perception (13) (7). A study among a university student population in the Kingdom of Saudi Arabia observed that the students are unaware of the importance of spectacle wear and their responsibilities towards spectacle correction. (13) The study findings highlight the importance of educating the community towards refractive error and its correction. Ultimately this could support in reducing burden related to refractive error. The study findings can also help the university administration to design and implement an evidence-based Eye Care protocol for students. (13) Hence, the study focuses on evaluating the barriers and their perception towards spectacle wear among a university student population in Oman. This study is expected to support in obtaining baseline evidence on the barriers and perception of university student population towards spectacle wear, to forecast the future spectacle coverage and its compliance-related health promotional activities within the region.

Methods
This descriptive, questionnaire-based, cross-sectional study was conducted between December 2017 and May 2018. All the university student population, registered for the
spring 2017-18 semester (n = 1600) from different majors, gender, or socioeconomic regions were invited for study participation through their university email ID and also by sending messages in student groups, of which 275 participated in this study. Open Source Epidemiologic Statistics for Public Health Version 3.01 (Updated 06/04/2013), Centre for Disease Control and Prevention, United States, was used to calculate the sample size. It considered the confidence level of 95%, a hypothesized 10% spectacle compliance rate as observed in a previous study among a university student population. (12) The minimum required sample size was estimated as 128, however, this study included the higher sample with 170 participants.

All volunteering participants who had refractive error without any other ocular abnormality were included in the study. Equal preference was given to all the volunteering and eligible participants from different socio-demographic profiles. The eligibility of the study participants was confirmed through a thorough ophthalmic examination including slit-lamp examination. A standard spectacle prescription protocol as per the guidelines of the World Health Organization (5) was performed among 275 eligible participants. Among them, 170 (61.8 %) were observed to have inappropriate spectacle coverage and were further provided with the self-administered questionnaire to evaluate barriers related to spectacle wear.

The questionnaire was prepared using a thorough literature review. (9) (5) (11) It consisted of three components. The first component collected the information on the reason for spectacle non-wear at the time of study visit. The second and the third component collected the responses for perception towards spectacle wear related to utility and psychological factors respectively. The element of utility consisted, 5 and psychological components consisted of 7 questions. Responses to questions were collected using a 5-point Likert scale. The content of the questionnaire was validated with the help of a group of experts. (14) (15). The validators responded to their agreement related to the appropriateness of the included questions through a dichotomous response (0-unfavorable, +1-favourable) for each item. Validator responses were collected individually. The questionnaires were recirculated among the same experts post modifications. Minimum 80% of the subject expert’s agreement for each component ensured their validity.

The internal reliability of the survey was assessed using Cronbach's alpha (0.76). The first ten questionnaire responses for all the 12 questionnaire items were considered for internal reliability.
The test-retest validity of the questionnaire was assessed using Pearson correlation coefficient \(r = 0.83\). Ten study participants out of the total participants who filled the questionnaire during their first study visit were selected randomly and were again contacted after 15 days. They were further asked to resubmit their responses using the same questionnaire. However, these participants were blindfolded from their previous answers and were also kept unaware of the need for their repeated questionnaire responses after 15 days.

As the questionnaire had negative statements related to spectacle wear, and the participants needed to respond on the scale of strongly disagree (-2.00) to strongly agree (+2.00), barrier scores of more than 0 were considered to have negative and less than 0 as positive perception towards spectacle wear. The sum of these ordinal responses was noted as a barrier score. The maximum and minimum scores ranged from +24 to -24. Participants had scores ranging from 1 to 24 and ranging from -1 till -24, were categorized as negative and non-negative perceptions towards spectacle wear, respectively.

Shapiro-Wilk normality distribution tests were done to identify the normality of the barrier score rated by the participants on a Likert scale. The software IBM SPSS Statistics Version 21 was used for data analysis. The components of the questionnaire that included responses related to reasons for spectacle non-wear and components related to psychological aspects were analysed using descriptive statistics. A Chi-square test was used to assess the association between the type of perception with the socio-demographic and refractive error-related profiles of the participants. Mann Whitney U test was used to compare the perception scores between myopic and hypermetropic groups. Fisher's Exact Test was used to identify the association between the barrier score and one study variable -the responsibility for eye health expenditure.

The study obtained ethical permission from the Research and Ethics committee of the College of Health Sciences, University of Buraimi, Oman. The study followed the guidelines stated in the Declaration of Helsinki. The study details were explained to all the participants and were told of their right to withdraw from the study without any loss and explanation. It did not involve any participant from the vulnerable group such as having lower socio-economic status. No monetary or non-monetary benefits were given to the participants. All
the study related information were provided to the participants as a written document and a consent was obtained from each involved participant.

**Results**

**Reasons for spectacle non-wear during the study visit**

A significant number of total studied participants (61.8%; 170/275) were having inappropriate spectacle correction. However, out of 170 responses, the analysis was done only for 152 participants since one of them had mixed astigmatism and 17 had neutral perception. They were excluded from analysis as the number was small.

Figure 1, represent the reasons for spectacle non-wear during the study visit. Out of 170 participants who had inappropriate spectacle coverage, including the case of mixed astigmatism, majority of them (73.5%,) did not examine their eyes before. Though 28 (16.5%) of them were wearing spectacles, the correction was inappropriate considering their existing refractive status.

The pie chart (Figure 2) describes the perception of the participants with inappropriate spectacle coverage among the population. Out of 170 participants responded to the questionnaire, nearly half of them (54%, n = 91) had positive perception towards spectacle wear, followed by negative (36%, n = 62) and neutral perception (10%, n = 17).

Shapiro-Wilk normality distribution test indicated non-normal distribution (P < 0.001) of the barrier scores among the study population. Table 1, describes the association of the perception towards the spectacle wear among the participants with different study variables. Out of total 152, 62 participants (40.8%) had negative, whereas 90 participants (59.2 %) had a positive perception towards spectacle wear. Males (67.6%), rural population (65.2%), health science students (83.3%), people who spent out of their pockets for their eye health expenditure (81.3%), had a positive perception towards spectacle wear. Pearson’s chi-square test observed a significant relationship between the type of perception and the study major of participants (P =0.012). Further, Mann Whitney U test concluded that there is no statistically significant difference in the perception scores between myopic and hypermetropic groups (U = 881, P = .882).
Discussion
This study aimed to identify the barriers and perceptions of the university student population towards spectacle wear. Nearly 2/3rd of (61.8%) of the total participants were having inappropriate spectacle corrections. Most of the participants with inappropriate spectacle coverage did not undergo ocular examinations (73.5%) before, except for their routine school eye health screening program. 16.5% of these participants were wearing spectacles, however, it was inappropriate concerning their current refractive status. The other reasons for spectacle non-wear were, ordered for new spectacles (1.8%), lost them (0.6 %), or were broken (1.2%). These findings are similar to the study observations of Gogate et al. (2013) conducted among the school student population in India. (11). In a prior study among school children within the Sultanate of Oman, observed increased prevalence of myopia and astigmatism, and was unnoticed by the parents or the school authorities due to its lower magnitude. The lower uptake of spectacle wear among mild myopic cases could be because of the asymptomatic nature of the condition. (8) Also, Megbelayin (2013) found that only around 10% of the student population who had refractive error wore spectacles of which 18.2% did not wear because of the cost issue and 56.4 % were ignorant towards their refractive error. A study conducted among undergraduate students of Ghana observed that 66% of the population did not know the use of spectacles in relieving the ocular symptoms. Around half of the population (54.2 %) believed that wearing spectacles would create an impression of visually handicapped. (1) In contrast to this, Halim et al. (2020) found the refractive error prevalence among the school students as 15.9%, of which only 12.1% were not using any kind of correction. (16). This highlights the higher prevalence of uncorrected refractive error within our study.

The lesser spectacle compliance rate observed in this study is a matter of concern, especially a prior study among Omani school children who had refractive errors observed a higher spectacle compliance rate of more than 60%. (5) (8) Interestingly, no study participant of this study was observed or reported to have undergone, and refractive surgeries and only 1.8% of the participants reported to wear contact lenses.

Moreover, most of the participants (54%), have positive perceptions towards spectacle wear and only 36% had a negative perception. In another study having a similar refractive error prevalence but higher spectacle wear (80%) among the undergraduate student population in the middle east region found that 42.2 % of the participants believed that spectacle wear may
cause further visual impairment or increases spectacle dependency. (13) Teasing by peers to the spectacle wear was one of the common reasons for not wearing them among the population less than 30 years of age. (5) A study done by Felix & Ebenezer (2017), observed 53.4% study population believed that spectacle usage may sunken their eyes and 67 % felt the spectacle usage as inconvenient. (1) A study within the African student population stated that the misbeliefs of the students or their parents related to spectacle wear were associated with spectacle non-wear among the students' population. (10). In contrast to these negative perceptions observed in these studies, a study conducted among adult African population, 8.8% of the participants with refractive error preferred using them because of providing an intelligent impression among peers. The current fashion trends were also observed to be responsible for spectacle wear. (5) 57.2% of the population believed that spectacles improve their professional appearance. (1) As expected, in this study, students from the health major has a positive perception of spectacle wear \((P =0.012)\). A pilot study within a clinic at a university hospital in Oman observed an average level of awareness towards the common ocular condition. Interestingly, most of the participants (96%) had a positive perception towards the uptake of eye care services. (5) Hence, stressing the importance of spectacle correction and ensuring spectacle compliance should not be an issue.

The change in the compliance pattern and observed lower positive perception towards spectacle wear among females in our study compared to the younger school-going population in a previous study within the Sultanate of Oman (5), reflect a negative shift in perception towards spectacle wear. This study uncovered the gender-wise and age-wise change in the behavioural pattern concerning spectacle wear. One of the peculiar facts observed in the study was that the mother's literacy level was associated with appropriate spectacle wear. In a study done by Halim et al. (2020), found that the level of education positively influences the spectacle wear within the community. However, the study was unable to conclude the relationship between the parent’s education as a determinant for uncorrected refractive error. Moreover, the latter study also stated that the lower economic status of the parent was associated with lower uptake of refractive correction among the population(16) which could be sublimated in our study due to the higher socioeconomic status of this study population. This study findings trigger the need for robust Eye health surveillance focusing on young adults of the Sultanate of Oman. However, the proportional inclusion of students in future studies from different study majors and different universities within the region can support these study findings. The other reasons for non-compliance towards the uptake of ophthalmic
services among the participants as observed in this study (73.5%) also need to be explored separately through a qualitative study approach. Such studies could also be helpful for eye healthcare, industry involved in refractive modalities such as ophthalmic lenses, refractive surgeries, or contact lenses. The parameter of appropriate spectacle wear used in this study could be used as an indicator and suggested to be applied in monitoring the eye health program at a regional and national level. It is further important to explore the underlying barriers of spectacle wear. Etim et al. (2018) observed inconvenience towards spectacle wear was one of the reasons reducing the quality of life among the population having a refractive error compared to the other modalities such as contact lenses or refractive surgeries. (17) As the eye healthcare system is evolving towards a holistic approach rather than alleviating the patient's symptoms, a similar approach needs to be implemented while providing spectacle prescription addressing the patient's concerns. (5) (18)

In line with the national goal of ‘Vision 2050’ set by Oman, and due to change is ocular disease scenario from earlier infectious (5)(10)(11)(19) to non-infectious over the last few decades, revisions in the health system are needed. (5) Also, as a member of Global eye health action plan 2014-19, of World Health Organization, (20) there is a need to generate the evidence for prevalence and the reasons of visual impairment and apply the cost-effective strategies to achieve the goal of reduction in avoidable blindness by 25%, at the end of 2019. (5) As observed from our study results, though the higher percentage of the current study population was found to have a positive perception towards spectacle wear, there is a scope for exploring and rectifying the factors contributing to having a negative perception. Prior study within the Sultanate of Oman has observed inadequate knowledge about the common ocular condition causing visual impairment among the Omani adult population and holistic approach is recommended to improve the national eye health care system output. (5) Improving the knowledge level can positively change the perception of the community towards spectacle wear. Also, the eye health promotion activities (10) focusing on spectacle compliance should also integrate the parent and teacher's role in increasing spectacle compliance. (11) Based on this study findings, it is recommended to extend, the current school eye screening programs to the university level as well.

**Conclusion**
A majority of the participants were having inappropriate spectacle corrections and did not undergo any prior ocular examinations. Very few participants were wearing spectacles,
however, it was inappropriate concerning their current refractive status. The other reasons for spectacle non-wear were, ordering of new spectacles, lost them, or were broken. Nearly half of the participants had positive perceptions towards spectacle wear. The positive perception was higher among students with health-related majors. The study stresses to extend the current school eye health initiative within the region to the university level. A holistic eye health promotional approach integrating students, teachers, and parents can help in improving spectacle wear within the population.

**Conflict of Interest**
The authors declare no conflicts of interest.

**Funding**
No funding was received for this study.

**References**
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**Figure 1:** Reasons for spectacle non-wear during study visit among the participants having the refractive errors (In percentages)
Figure 2: Percentile distribution of the participant's perception towards spectacle wear having inadequate spectacle wear

Table 1: Association of sociodemographic and refractive error profile with participant perception towards spectacle wear

<table>
<thead>
<tr>
<th>Participant’s profile</th>
<th>Category</th>
<th>Type of perception</th>
<th>P-value</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Negative n (%)</td>
<td>Positive n (%)</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>12 (32.4)</td>
<td>25 (67.6)</td>
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<tr>
<td></td>
<td>Female</td>
<td>50 (43.5)</td>
<td>65 (56.5)</td>
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<tr>
<td>Major</td>
<td>Optometry</td>
<td>17 (44.7)</td>
<td>21 (55.3)</td>
</tr>
<tr>
<td></td>
<td>Nursing</td>
<td>5 (16.7)</td>
<td>25 (83.3)</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>23 (54.8)</td>
<td>19 (45.2)</td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td>17 (40.5)</td>
<td>25 (59.5)</td>
</tr>
<tr>
<td>Location</td>
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<td>46 (43.4)</td>
<td>60 (56.6)</td>
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<tr>
<td></td>
<td>Rural</td>
<td>16 (34.8)</td>
<td>30 (65.2)</td>
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<tr>
<td>Fathers literacy</td>
<td>University level</td>
<td>15 (40.5)</td>
<td>22 (59.5)</td>
</tr>
<tr>
<td></td>
<td>High school level</td>
<td>26 (44.8)</td>
<td>32 (55.2)</td>
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<td></td>
<td>Elementary level</td>
<td>21 (36.8)</td>
<td>36 (63.2)</td>
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<td>Mothers literacy</td>
<td>University level</td>
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<td>12 (70.6)</td>
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<td>High school level</td>
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<td>32 (60.4)</td>
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<td>Elementary level</td>
<td>36 (43.9)</td>
<td>46 (56.1)</td>
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<td>Parent related to the medical field</td>
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<td>37 (45.7)</td>
<td>44 (54.3)</td>
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<tr>
<td></td>
<td>No</td>
<td>25 (35.2)</td>
<td>46 (64.8)</td>
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<td>Eye health expenditure responsibility</td>
<td>Government/Insurance</td>
<td>59 (43.4)</td>
<td>77 (56.6)</td>
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<td>Self</td>
<td>3 (18.8)</td>
<td>13 (81.3)</td>
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<td>Refractive error status</td>
<td>Myopia</td>
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<td></td>
<td>Hypermetropia</td>
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<td>8 (61.5)</td>
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<td>Total</td>
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<td>62 (40.8)</td>
<td>90 (59.2)</td>
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