



Association of Neck Pain with Eyeglasses, in Students with Poor Eyesight (A Comparative Study Between Glass Wearer and Non-Glass Wearer)

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Abstract: Background: Place the question addressed in a broad context and highlight the purpose of the study; **Methods:** briefly describe the main methods or treatments applied; **Results:** summarize the article's main findings; **Conclusions:** indicate the main conclusions or interpretations. The abstract should be an objective representation of the article and it must not contain results that are not presented and substantiated in the main text and should not exaggerate the main conclusions. Neck pain is most common among musculoskeletal complaints in the general population, especially among populations with vision impairment. **Objective:** The objective of this research was to report the association of neck pain with eyeglasses among people with vision impairment. **Method:** A comparative study in which two groups consisting of 51 samples in each group are compared. The first group consists of eyeglass wearers and the second group consists of non-eyeglass wearers. The eyesight of both groups was poor and was checked using the standard Snellen chart and confirmed by an ophthalmologist. **Results:** In group 1, 36(70.6%) students were experiencing neck pain while in group 2, 25(49%) students were experiencing neck pain. The mean value of the final score of Group 1 which was calculated by the formula given by Bournemouth is 35.01 and that of Group 2 is 32.74. The normality of data was calculated by the Kolmogorov-Smirnov test, group 1 has $p=0.2$, and group 2 has a $p=0.16$ probability value. The probability value of the student t-test was $p=0.584$. The probability value of the chi-square test was $p=0.026$. **Conclusion:** We concluded that the students who are not using eyeglasses are experiencing more neck pain than those who are using eyeglasses. And there is an association of neck pain with eyeglasses.

Keywords: Neck pain, Eyeglasses, Eyesight.



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1. Introduction

People of all ages frequently use eyeglasses to remedy vision issues. For both near and far vision, they can have either a single lens (unifocal) or two lenses (bifocal), with bifocals being more popular among middle-aged and older people who have presbyopia, a loss of near-focusing ability brought on by the eye's lens losing elasticity with age.(Pawalia et al., 2019)

Research indicates that headaches and neck discomfort are prevalent musculoskeletal issues, particularly among individuals with vision impairment, a trend notably observed in teenagers. Contrary to the assumption that poor eyesight alone triggers these complaints, the study suggests that individuals who do not wear glasses may experience intensified neck pain and headaches. Additionally, children who engage in frequent reading or digital device use are more prone to headaches and musculoskeletal pain. Even minor visual impairments can contribute to these symptoms. The study delves into the association between headaches, head pain, visual difficulties, and the need for glasses in children. (Thorud et al., 2021)

Neck pain is characterized as discomfort within a defined region delineated by an imaginary line at the bottom, crossing the first thoracic vertebrae, extending laterally to the outer edges of the neck, and bounded at the top by another line. This definition neither implies nor presupposes the

specific origin of the pain, emphasizing that merely identifying the location of discomfort is sufficient for defining neck pain. The objectives of professional practice in addressing neck pain involve precisely identifying its causes and taking appropriate measures to alleviate and prevent it. (Bogduk, 2011)

Based on studies examining the incidence of vision impairment among the elderly and its profound impact on their physical and mental health, along with their support and care needs in later stages of life, there is a recommendation for comprehensive vision therapy programs. These programs aim to enhance both the physical and psychological well-being of seniors grappling with visual impairment. (Horowitz, 2004)

Approximately 70% of individuals are expected to encounter neck discomfort at some stage in their lives, with a prevalence of debilitating neck pain ranging from five to 10 percent among adults. (Treleaven & Takasaki, 2014) Individuals with neck discomfort typically report experiencing blurred vision. This research aimed to report the association of neck pain with eyeglasses among people with vision impairment. Moreover, this study was to describe how common and problematic visual disturbances are in people who have neck discomfort, particularly in those who don't have glasses despite their visual disabilities.

Students should go to an ophthalmologist every 6 months to assess their vision status. The minor difference in vision status affects the posture of the neck which ultimately leads to neck deformity. Students must properly use eyeglasses for vision correction because poor vision status has a psychometric effect.

2. Materials and Methods

2.1. study design

A comparative study was performed at Gulab Devi Teaching Hospital after the approval of the DRC committee of Gulab Devi Educational Complex.

2.2. study duration

The study duration of this study was 3 months, from 01/10/2022 to 01/12/2022.

2.3. study setting

The study was performed in different departments of the Gulab Devi Educational Complex.

2.4. sample size

For this comparative study sample size was calculated by using G-Power software with $\alpha=5\%$ (Margin of error) $1-\beta=0.80$ (power of test) and effect size $D=0.5$. The estimated sample size was 102 consisting of two groups.

- Group 1 consists of 51 students who were not wearing eyeglasses despite their poor eyesight
- Group 2 consists of 51 students who wear eyeglasses.

The cross-sectional study was conducted in the Gulab Devi Educational Complex in Lahore.

2.5. Data Collection Tools/Procedure

Data was collected through a specially designed Performa/Questionnaire by using The Bournemouth Questionnaire. It is a comprehensive multi-dimensional, short, self-report questionnaire, developed by J. Bolton. It was developed to assess pain in patients suffering from non-specific neck pain.

The Snellen chart was used to check the eyesight of the students who were not using glasses but had visual impairment. The eyesight of the student was confirmed by an ophthalmologist.

3. Results

The study encompassed a total of 102 students, who were categorized into two distinct groups. Group 1 comprised 51 students with vision impairment who did not use eyeglasses, while Group 2 consisted of 51 students with vision impairment who actively used eyeglasses. The age range of the students in both groups was between 18 and 28 years. Visual acuity assessment was conducted using the Snellen chart, a standardized tool employed by ophthalmologists to measure visual clarity. The chart displays letters of diminishing size, and the score is expressed as a fraction, with the numerator indicating the test distance and the denominator representing the distance at which a person with normal vision could read the same line.

In Group 1, where students did not use eyeglasses, the distribution of Snellen scores revealed that only 2% achieved a score of 6/3, while 18% scored 6/24, 10% scored 6/18, 22% scored 6/12, and a significant 47% attained a score of 6/9. For Group 2, which actively used eyeglasses, 6% scored 6/60, 14% scored 6/36, 24% scored 6/24, 18% scored 6/18, 10% scored 6/12, and 47%

achieved a score of 6/9. In Group 1, 71% of students reported experiencing neck pain, while 29% did not. In Group 2, 49% of students indicated neck pain, with 51% reporting no neck pain. The confirmation of students' eyesight by an ophthalmologist added credibility to the study's findings.

Table 1: Demographic variables of Sample (N=102)

Group 1 (non-Eyeglass wearer)			Group 2 (Eyeglass wearer)	
Characteristics	f (%)	M±SD	f (%)	M±SD
Age	-	21.67±2.24		21.47±2.01
Gender				
Male	13(25.5)	-	16(31.4%)	-
Female	38(74.5)	-	35(68.6%)	-
Duration of Eyeglasses (years)		-	-	5.61±4.11
Score on Snellen Chart				
6/60	-	-	3(5.9)	-
6/36	2(3.9)	-	7(13.7)	-
6/24	9(17.6)	-	12(23.5)	-
6/18	5(9.8)	-	9(17.6)	-
6/12	11(21.6)	-	5(9.8)	-
6/9	24(47.1)	-	15(29.4)	-
Neck Discomfort Inquiry				
YES	36(70.59)	-	25(49)	-
NO	15(29.41)	-	26(51)	-
<i>f</i> =frequency	<i>%</i> =percentage	<i>M</i> =Mean	<i>SD</i> =Standard deviation	

Table 2: Assessment of Neck Pain & its Psychometrics Effects.

Questions	Group1 (Non-Eyeglasses wearer)	Group 2 (Eyeglasses wearer)
	M±S.D	M±S.D
Over the past week, on average how would you rate your neck pain?	4±3	3±3
Over the past week, how much has your neck pain interfered with daily activities (housework, washing, dressing, lifting, reading, and driving)	3±3	2±3
Over the past week, how much has your neck pain interfered with your ability to take part in recreational, social, and family activities?	3±3	2±3
Over the past week, how anxious (tense, uptight, irritable, difficulty in concentrating/relaxing) have you been feeling?	4±3	4±3
Over the past week, how depressed (down-in-the-dumps, sad, in low spirits, pessimistic, unhappy) have you been feeling?	3±3	4±4
Over the past week, how have you felt work (both inside and outside the home) has affected (or would affect) your neck pain?	4±3	4±3
Over the past week, how much have you been able to control (reduce/help) your neck pain on your own?	4±3	4±4

The above table shows the statistics of seven questions of groups 1 & and 2. The score was calculated by following the steps given in the NECK BOURNEMOUTH QUESTIONNAIRE, used mainly for comparative purposes, as given below:

Comparison of the Baseline Score with a Subsequent Score

Step 1: Sum up the 7 individual scores (total maximum score of 70)

Step 2: Divide the raw change score by the Baseline Score and then multiply by 100.

(Raw change score/baseline score) x 100

Interpretation: According to NECK BOURNEMOUTH QUESTIONNAIRE, 34% is estimated to be a clinically significant change for the neck.

For group 1: The mean score was 35.01, and the standard deviation was 20.51. For group 2: The mean score was 32.74, and the standard deviation was 21.20. The sample size of the research was 102, so the Kolmogorov-Smirnov test was applied to the final mean scores of the two groups to check the normality of the data.

Table 3: Tests of normality

Final Score	Kolmogorov-Smirnov		
	Statistic	DF	Sig.
Group 1	.083	51	.200*
Group 2	.111	51	.162

Table 3 reveals the outcomes of normality tests for Group 1 and Group 2, using the Kolmogorov-Smirnov statistic on their final scores. Both groups exhibit non-significant p-values, with Group 1 having a p-value of 0.200 and Group 2 with a p-value of 0.162. These results suggest that there is insufficient evidence to reject the null hypothesis of normality in the distribution of final scores for both groups, implying that the data can be reasonably assumed to follow a normal distribution, so it is interpreted that both groups are affected by neck pain. But the p-value of Group 1 is greater than that of Group 2 depicting that 1st group was more affected with neck pain.

Table 4: independent samples test

	t	d.f	t-test for Equality of Means				
			Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Equal variances assumed	.549	100	.584	2.26891	4.13095	5.92679	10.46460

In Table 4, the independent samples t-test results indicate a non-significant difference between the means of Group 1 (non-eyeglass wearers) and Group 2 (eyeglass wearers) for their final scores. The t-value is 0.549 with a two-tailed significance value (p-value) of 0.584. The mean difference between the groups is 2.26891, and the 95% confidence interval for this difference ranges from 5.92679 to 10.46460. The non-significant p-value of 0.584 implies that there is no statistically significant distinction in the means of the two groups, suggesting that wearing eyeglasses is not associated with a significant change in the final scores.

Table 5: Descriptive of Neck pain with Eyeglasses

	Status of wearing glasses		Total
	No	Yes	
Status of neck pain	15 (29.4%)	26 (50.9%)	41 (40.1%)
	36 (70.5%)	25 (49.01%)	61 (59.8%)
Total	51	51	102

The above table describes the students who were in group 1 and said that they did not wear eyeglasses, among these students, 15 (29.4%) students did not experience any neck pain, and 36 (70.5%) were experiencing neck pain. In group 2, who wore eyeglasses, 26 (50.9%) students said that they were not experiencing neck pain, and 25 (49.01%) said that they were experiencing neck pain.

Table 6: Association of Neck pain with Eyeglasses Chi-Square Tests

Table 6: Association of Neck pain with Eyeglasses Chi-Square Tests		
Value	DF	Asymp. Sig. (2-sided)

Pearson Chi-Square	4.935a	1	.026
Likelihood Ratio	4.078	1	.043
Linear-by-Linear Association	4.982	1	.026

The table displays the results of chi-square tests investigating the connection between neck pain and the use of eyeglasses. The Pearson Chi-Square, Likelihood Ratio, and Linear-by-Linear Association tests all reveal statistically significant associations, as evidenced by p-values below 0.05. This indicates a noteworthy link between neck pain and wearing eyeglasses, suggesting that individuals who wear eyeglasses may be more prone to experiencing neck pain. The results imply that the variables are not independent, and further investigation or consideration of potential factors influencing this association may be warranted.

4. Discussion

In this comparative study, it was investigated that students who were not using eyeglasses despite their poor eyesight experienced more neck pain than those who were using eyeglasses. This neck pain hurts the lives of students. They were experiencing problems in their social life and study. As per the study's results, individuals with neck discomfort encounter visual sensations more frequently and encounter greater difficulty in comparison to respondents without symptoms. A minimum of 50% of individuals who reported neck pain expressed experiencing intense symptoms such as the necessity to focus while reading, visual fatigue, sensitivity to light, eye strain, and a sensation of heaviness in the eyes (Treleaven & Takasaki, 2014). This research indicated that students who had poor eyesight whether they used eyeglasses or not, both types of students were experienced neck pain. This neck pain also affects their posture and general body shape. Individuals who wear glasses exhibit a noteworthy occurrence of forward head position, and this prevalence varies based on the duration of glasses usage. Therefore, the study emphasizes the importance of recognizing the adverse impact of wearing glasses on head and neck posture, highlighting the need to consider visual aids when addressing patient complaints of neck pain and impairment. (M & Sageer, 1072) The impact of different lenses on both visual and musculoskeletal comfort shows no significant differences. It is recommended to tailor lens adjustments according to the individual's habits and specific tasks for optimal comfort. (Cagnie et al., 2017). Appropriate neck exercises, corrective postures, and early guidance for the right glasses could preserve deep neck flex endurance and subsequently stop improper neck postures and related pain (Pawalia et al., 2019). Wearing eyeglasses could affect the head and neck status and cause neck pain, similarly, another research depicted individuals who wear contact lenses have a smaller craniovertebral angle than those who do not wear glasses, which causes them to exhibit a forward head posture. Contact lens use over time decreases DNF endurance and promotes a forward head posture. (Malpani et al., 2022). Not only eyeglasses but many other factors affect the neck. Tiger successfully recognizes screen viewing events and is resilient to variations in screen kinds, contents, and ambient light, according to our evaluation. (Min et al., 2019).

5. Conclusions

The study revealed that students in Group 1, who did not use eyeglasses despite having poor eyesight, were more prone to experiencing neck pain compared to their counterparts in Group 2, who utilized eyeglasses to correct their vision. The chi-square test indicated a significant association between the presence of eyeglasses and neck pain ($p=0.026$). Specifically, 51.9% of students reported experiencing neck pain, while 40.1% did not encounter such discomfort. 51.9% of students were experiencing neck pain while 40.1% of students were not experiencing neck pain.

5.1. Limitations and Recommendations

There was a restricted period for the study. The sample size was limited and this research was done only on medical students of Gulab Devi Educational Complex. The medical students were mostly book readers and most students were experiencing neck pain due to their poor posture. To check the eyesight of students was also challenging because different departments had different light systems which affected the vision of students. Students should go to an ophthalmologist every 6 months to assess their vision status. The minor difference in vision status affects the posture of the neck which ultimately leads to neck deformity. Students must properly use eyeglasses for vision correction because poor vision status has a psychometric effect.

Supplementary Materials: Supplementary materials that provide additional insight to the methods and results could be added in this section. Data collection tools and additional tables, figures and graphs could be presented in this section.

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Informed Consent Statement: Informed consent was taken from all participants.

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Conflicts of Interest: The authors declare no conflict of interest.

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