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USER SATISFACTION AND VISUAL CHALLENGES ASSOCIATED WITH PROGRESSIVE ADDITION LENSES (PALS): A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Progressive Addition Lenses (PALs) are widely used to correct presbyopia, myopia, and other accommodation disorders, offering a solution for presbyopic patients who require vision correction at multiple distances. However, visual satisfaction and associated complaints among PAL wearers remain a significant focus for improving user experience. ***Objective:*** This study aimed to evaluate visual satisfaction and complaints related to PAL use among wearers, with a focus on understanding the impact of different visual tasks and the relationship between usage duration and overall satisfaction. ***Methods****:* This cross-sectional study involved 138 participants (response rate: 85.2%) who were surveyed regarding their experience with PALs. Participants were asked to report their satisfaction levels, visual complaints (e.g., eye strain, blurry vision), and the quality of vision across different tasks, including near, intermediate, and distant activities. Data on the duration of PAL use and its correlation with satisfaction were also collected. Statistical analysis, including chi-squared tests, was used to examine associations between visual satisfaction, complaints, and the length of time participants had worn PALs. ***Results:*** The results revealed that 50% of participants were satisfied or very satisfied with their PALs. Visual satisfaction was positively correlated with the quality of vision in near and intermediate tasks, such as reading and shopping, while distant tasks, such as driving, showed the lowest satisfaction. Eye strain was the most significant complaint affecting satisfaction, followed by blurry vision. A significant positive association was found between the length of time using PALs and overall satisfaction, with longer usage resulting in better adaptation and comfort. ***Conclusion****:* PALs provide effective presbyopia correction, but user satisfaction is influenced by factors such as visual task type, adaptation time, and proper fitting. The study highlights the importance of proper lens fitting, patient education, and adaptation support to improve satisfaction.

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INTRODUCTION

Progressive lenses, also known as Progressive Addition Lenses (PALs) or Progressive Power Lenses (PPLs), are designed to address refractive errors associated with presbyopia, myopia control, and other accommodation disorders. [1] Presbyopia, an age-related decline in ocular accommodation, results in reduced ability to focus on close objects, affecting the daily lives of those affected. [2,3,4,5,6] Previous studies have shown that PALs are considered the most effective and acceptable solution for managing presbyopia.[7,8,9,10] These lenses provide a continuous range of vision, offering clear focus at multiple distances—distance, intermediate, and near—without visible lines of demarcation, ensuring smooth, uninterrupted vision. [11] However, eccentric viewing through PALs can lead to visual distortions, often referred to as "swimming effects," which cause blurred vision and can increase the risk of falls. [12,13] Additionally, wearers may experience dizziness, vertigo, and difficulties in reading at intermediate and near distances, particularly when shifting gaze horizontally, due to the restricted optical zones. These issues may require compensatory head movements for clearer vision, but they can be alleviated with proper eye and head coordination and accurate lens centration within the spectacle frame. [14,15]. Modern PAL designs are personalized to the user's prescription and visual needs, leading to improved visual performance and overall satisfaction.[16] New technologies, such as free-form and wave aberration designs, have enabled the development of advanced PALs that provide natural, high-quality vision while maintaining cosmetic appeal.[17] Specialized PALs, such as computer progressive lenses and occupational progressives, cater to specific visual demands, including intermediate and near-distance tasks like computer work and reading. [18] These innovations have contributed to higher wearer satisfaction by enhancing clarity and comfort. Despite the benefits, spectacle intolerance remains a significant challenge in optometry, particularly with PALs. Errors in dispensing, refractive measurement, and adaptation issues often lead to

dissatisfaction. [15,19,20] Communication between optometrists and patients is vital to managing these challenges and ensuring that users receive the optimal visual correction. Studies indicate that appropriate fitting, prescription interpretation, and education on lens limitations are key to minimizing dissatisfaction. [21,22,23,24,25] However, to date, no study has specifically investigated visual satisfaction among PAL wearers in north India. Thus, this study aims to evaluate the level of vision satisfaction and identify any associated problems among PAL users.

METHODOLOGY

Study Design: This study conducted in Department of Optometry, Era University, Lucknow, between January 2024 and June 2024, this **cross-sectional** design to assess the satisfaction and visual challenges experienced by wearers of Progressive Addition Lenses (PALs). Participants were recruited from a group of individuals who had been prescribed PALs at a local optometry clinic. The study aimed to evaluate factors such as user satisfaction, the prevalence of visual complaints, and the impact of demographic factors like age and gender on the overall experience.

Data Collection: Data were collected through self-administered questionnaires that assessed participants' satisfaction with their PALs and any visual challenges they faced in daily activities. The questionnaire included questions about:

- **Satisfaction with PALs**: Participants rated their satisfaction on a 5-point Likert scale (1 = very dissatisfied to 5 = very satisfied) for tasks such as reading, driving, shopping, using computers, and viewing mobile phones.
- **Visual Complaints**: Participants reported any difficulties or complaints such as eye strain, headaches, blurring of vision, and vertigo, also using a 5-point Likert scale (1 = no complaints to 5 = severe complaints).
- **Duration of PAL Use**: The length of time since the participant first began using PALs was categorized into three groups: 6 months to 1 year, 1–2 years, and more than 2 years.

Statistical Analysis: Descriptive statistics were used to summarize the demographic characteristics and responses. *Pearson's chi-squared* ***test*** was employed to examine associations between gender, age, and overall satisfaction or symptoms. To assess the relationship between the length of PAL use and satisfaction/symptoms, the chi-squared test was also used. Spearman's correlation was applied to evaluate the relationship between specific tasks (e.g., reading, driving) and overall satisfaction, as well as between symptoms (e.g., eye strain) and satisfaction.The significance level was set at $p < 0.05$ for all tests.

Ethical Considerations: Ethical approval for the study was obtained from the institutional review board (IRB) of the participating optometry clinic. Informed consent was obtained from all participants, ensuring that they understood the purpose of the study and the voluntary nature of their participation.

RESULTS

Participant Demographics: A total of 138 participants were enrolled in the study, with a response rate of 85.2%. The demographic characteristics of the participants are summarized in Table 1 below.

Table 1. Participant Demographics

Characteristic	Category	Percentage (%)	Frequency (n)
Age Group	Under 50 years	67.0%	92
	Over 50 years	33.0%	46
Gender	Men	63.0%	87
	Women	37.0%	51

Time Since Starting PAL Use: The duration of PAL use among participants is shown in Table 2.

Table 2. Duration of PAL Use

Time Since Starting Use	Percentage (%)	Frequency (n)
6 months to 1 year	39.8%	55
1–2 years	49.3%	68
More than 2 years	10.9%	15

Satisfaction with PALs: In terms of satisfaction, 50.0% of participants reported being "very satisfied" or "satisfied" with their PALs. Another 28.4% were "fairly satisfied," while the remainder expressed varying levels of dissatisfaction. The tasks for which satisfaction was measured included driving, shopping (grocery shelves), using computers, reading, and viewing mobile phones, as shown in Table 3.

Table 3. Satisfaction with PALs in Daily Activities

Activity	Median Satisfaction Score (1–5)	Correlation (ρ)
Reading	4	0.77
Shopping (grocery shelves)	4	0.76
Driving	4	0.76
Viewing computer monitor	4	0.75
Viewing mobile phones	4	0.74
Viewing advertisement boards	3	0.68

Symptoms and Complaints: The proportion of PAL wearers reporting high or very high complaints (e.g., headache, eye strain, blurring vision, vertigo) was approximately **30%** (41 respondents), while the majority, **70%** (97 respondents), reported only mild or moderate issues. The overall median symptom severity was 3, as detailed in Table 4.

Table 4: Symptom Complaints Among PAL Wearers

Symptom	Median Symptom Severity (1–5)	Frequency (n)	Percentage (%)
Eye strain	3	41	30%
Blurring vision	3	41	30%
Headache	3	41	30%
Vertigo	3	41	30%

Statistical Analyses: Pearson's chi-squared test was used to assess associations between various factors, including gender, age, and PAL usage. No significant associations were found between gender and visual satisfaction ($\chi^2 = 24.6$, $p = 0.264$) or gender and symptoms ($\chi^2 = 17.409$, $p = 0.235$). Similarly, no significant associations were observed between age and visual satisfaction ($\chi^2 = 17.415$, $p = 0.680$) or age and symptoms ($\chi^2 = 7.543$, $p = 0.912$).

However, a highly significant association was found between the length of time using PALs and both overall satisfaction ($\chi^2 = 75.088$, $p = 0.001$) and symptoms ($\chi^2 = 59.477$, $p = 0.001$).

Correlation Analysis: Spearman's correlations showed that overall satisfaction was strongly influenced by satisfaction with reading ($\rho = 0.77$), shopping ($\rho = 0.76$), and driving ($\rho = 0.76$), among other activities (Table 3). Conversely, complaints such as eye strain ($\rho = -0.46$), blurring vision ($\rho = -0.45$), headache ($\rho = -0.36$), and vertigo ($\rho = -0.33$) inversely affected overall satisfaction, as shown in Table 5.

Table 5. Correlation of Complaints with Overall Satisfaction

Complaint	Spearman's Correlation (ρ)	p-value
Eye strain	−0.46	0.001
Blurring vision	−0.45	0.001
Headache	−0.36	0.001
Vertigo	−0.33	0.001

Further, Spearman's correlation analysis revealed strong associations between quality of vision and overall satisfaction across different viewing distances (e.g., driving, viewing signboards, and reading), with correlation coefficients ranging from 0.74 to 0.91.

DISCUSSION

This study aimed to evaluate visual satisfaction and associated complaints among wearers of Progressive Addition Lenses (PALs). The findings suggest that while PALs provide an effective solution for presbyopia correction, several factors, including fitting, adaptation, and task-specific visual performance, significantly influence user satisfaction. [13,14] Ensuring proper refraction, accurate fitting of the frame, and the wearer's understanding of the lenses' limitations are crucial for achieving optimal satisfaction.[24] Educating both prescribers and patients about the functionality of PALs is essential to maximize the benefits of these lenses and reduce dissatisfaction. Misfitting or inappropriate prescription of PALs has been linked to decreased satisfaction and higher non-tolerance rates, a finding consistent with prior research. [25] The present study showed that the quality of vision was positively correlated with overall satisfaction, and complaints, particularly related to blurry vision and eye strain, had an inverse relationship with satisfaction. Najmee et al.26 also reported that visual quality was a key determinant of satisfaction, with complaints like blurred vision negatively affecting overall satisfaction. In this study, eye strain emerged as the primary complaint that reduced satisfaction, contrasting with Najmee et al.'s finding where blurred vision was the most common issue. This difference could be attributed to variations in PAL design, usage patterns, or participant characteristics. Task-specific visual performance varied significantly. The highest quality of vision and satisfaction was observed in near tasks, such as reading and shopping, indicating that wearers adapted well to these activities. This supports the notion that modern PAL designs are optimized for near vision tasks. Conversely, tasks requiring distant vision, such as driving, showed the lowest satisfaction, consistent with previous studies. [27,28] The peripheral distortion common in PALs affects distant tasks, where the wearer experiences impaired visual clarity due to the lens' design. These findings underscore the importance of measuring vision quality across different distances, as this significantly impacts user satisfaction, a point emphasized by Sheedy et al. [28] Interestingly, our study revealed that vision quality at intermediate distances, such as seeing grocery shelves, correlated most strongly with overall satisfaction. This aligns with the findings of Gispets et al.29 and Selenow et al.11, who suggested that an appropriately designed intermediate corridor is essential for clear and comfortable viewing. Additionally, near tasks like reading and viewing mobile phones were associated with high satisfaction, further supporting the importance of optimal lens design in near vision. Lynn [30] also highlighted the significance of using the clearest portion of the lens for reading, which our findings corroborate.

In contrast, some studies, such as that by Ellison,[31] found that distant vision tasks yielded the highest satisfaction, while near tasks were more challenging. These discrepancies may reflect differences in sample characteristics, such as age or visual needs, or variations in PAL designs. Our study's findings show that different visual tasks contribute differently to overall satisfaction, suggesting that lens designs should be tailored to meet the specific needs of the wearer, particularly for near and intermediate tasks. The present study also found that 50% of respondents were either satisfied or very satisfied with their PALs, a rate lower than that reported by Bonnin et al.,32 where 84% of respondents expressed satisfaction. This discrepancy could be due to differences in study populations, methodologies, or the specific types and designs of PALs used. Odjimogho et al. [33] reported a higher satisfaction rate (69.8%) than in our study, further suggesting that adaptation and satisfaction with PALs can vary depending on several factors, including the wearer's experience with the lenses. The length of time using PALs was found to be a significant factor in adaptation, with longer usage correlating with improved satisfaction. As wearers become more accustomed to the lenses, their ability to compensate for peripheral blur and magnification-related distortions improves, leading to higher satisfaction. [34,35,36,37,38] This finding highlights the importance of an adaptation period and ongoing support for new PAL wearers, as well as the need for proper education on lens functionality and use. In line with previous research, our findings suggest that PALs provide a valuable solution for presbyopia correction, improving users' quality of life despite some moderate difficulties. Goertz et al. [38] and Fafiolu et al. [39] have emphasized the importance of presbyopic correction and its positive impact on life quality. However, the study had some limitations, including the lack of detailed information on the specific reasons for PAL use, the power of additions, and whether participants were first-time users. Future studies should address these gaps by examining the knowledge and skills of optometrists and dispensing opticians, as well as the factors influencing PAL wearers' satisfaction in a more comprehensive manner.

CONCLUSION

This study found that most PAL users (78.4%) were satisfied, particularly with activities like reading, driving, and shopping. However, 30% of users reported issues such as eye strain and blurring vision, which negatively impacted overall satisfaction. The length of time using PALs was a key factor influencing both satisfaction and complaints, with longer use generally leading to higher satisfaction and fewer problems. There were no significant differences in satisfaction or symptoms based on age or gender. While PALs are generally well-received, addressing common complaints like eye strain could further enhance user experience.

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