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# Assessment of Parental Barriers Affecting Follow-Up in Amblyopia Treatment

Dr. Muhammad Asmat Rasheed[*1], Uqba Ahmad[2], Ayesha Zahid [3], Tahira Khan[4], Sidra Naz [5], Nimra Ibrahim [6]

[1] Lecturer, Faculty of Allied Health Sciences, The University of Lahore Email: asmatrasheed738@gmail.com
[2] Email: uqbaahmad964@gmail.com LinkedIn: [www.linkedin.com/in/uqba-ahmad](http://www.linkedin.com/in/uqba-ahmad)
[3] Email: ayeshazahid8225@gmail.com LinkedIn: https://www.linkedin.com/in/ayesha-zahid82
[4] Email: kashafkhanu5@gmail.com LinkedIn: [www.linkedin.com/in/tahira-khan-i](http://www.linkedin.com/in/tahira-khan-i)
[5] Email: sn3290820@gmail.com LinkedIn: https://www.linkedin.com/in/sidra-naz0
[6] Email: drnimra280@gmail.com LinkedIn: https://www.linkedin.com/in/nimra-ibrahim357900
*Dr. Muhammad Asmat Rasheed* (Corresponding Author)

**Abstract**

Background: Amblyopia is one of the leading causes of preventable visual impairment in children. Successful treatment requires regular follow-up visits; however, various parental barriers may affect compliance and influence treatment outcomes. **Objective**: To assess the parental barriers affecting follow-up in amblyopia treatment. **Methodology**: A cross-sectional study was conducted over a period of four months at hospitals affiliated with The University of Lahore. A total of 125 parents of children undergoing amblyopia treatment were recruited through purposive sampling. Data were collected using a self-generated questionnaire assessing demographic characteristics, perceived barriers, and strategies influencing follow-up compliance. Data were analysed using SPSS version 26, and results were presented as frequencies and percentages. **Results**: Among the 125 participants, 58.4% were male and 41.6% were female. Most respondents (80.0%) were aged 23–43 years, while 56.0% were mothers. Optical correction with glasses was the most common treatment modality (42.4%). The major barriers affecting follow-up compliance were long distance to the clinic (28.0%), child school schedule (27.2%), long waiting time (18.4%), lack of transportation facilities (15.2%), and inadequate counselling (11.2%). Regarding strategies to improve follow-up compliance, proper consultation time was identified by 58.4% of participants, followed by proper counselling (32.0%) and written instructions (9.6%). No significant. associations were observed with gender, parental relationship, or treatment modality ($p > 0.05$). **Conclusion**: The study concluded that long distance to the clinic and the child's school schedule were the major barriers affecting follow-up compliance among children undergoing amblyopia treatment. Proper consultation time and counselling were perceived as important strategies for improving follow-up adherence. Addressing these barriers may help improve treatment compliance and visual outcomes in children with amblyopia.

Keywords: Amblyopia, Follow-up Compliance, Parental Barriers, Counselling, Pediatric Ophthalmology, Treatment Adherence.

## Introduction

Amblyopia, which is known as "lazy eye," is a neuro-developmental visual condition characterized by reduced best corrected visual acuity (BCVA) in one or both eyes without detectable structural abnormalities of the ocular media or visual pathway. It develops during early childhood, particularly during the critical period of visual maturation. Disrupted visual input caused by strabismus, anisometropia, or visual deprivation interferes with normal cortical development, resulting in decreased vision in the affected eye[1].

One of the main causes of visual impairment in children and young adults is amblyopia. Based on my research with millions of participants, meta-analyses show that the global prevalence in children is 1.36-1.44% [2]. Amblyopia is a common childhood visual disorder, with a global prevalence ranging from 1.6% to 3.6% [3]. Recent studies show that amblyopia is still widely observed in children, with prevalence varying geographically. A large observational study was conducted in South Pakistan in 2024, involving around 1350 school-age children between the ages of 5-15 years, reported a total amblyopia prevalence of 3.3% (mostly anisometropic) among the examined children, highlighting a notable impact in this population. Likewise, a paediatric study from Sri Lanka found a prevalence of 2.9% in school-going children, with anisometropia considered as the most common type of amblyopia found [4].

Amblyopia is the common cause of monocular visual impairment among children and young adults globally. Amblyogenic factors interfere with normal development of the visual pathways during a critical period of maturation. The result is structural and functional impairment of the visual cortex, and impaired form vision. Strabismus and anisometropia are the principal etiologist. Anisometropic amblyopia results from unequal refractive errors that produce a chronically blurred image in one eye, while strabismic amblyopia arises from cortical suppression of a misaligned eye to avoid diplopia. Stimulus deprivation, such as congenital cataract or ptosis, is less common but often more severe [5].

From a preventive perspective, amblyopia can be effectively managed through early diagnosis and timely intervention. Standard treatment typically starts with correcting refractive errors with spectacles and contact lenses. This is often followed by occlusion (patching) therapy or penalization which includes atropine and cyclopentolate used in the fellow eye to stimulate the amblyopic eye. The success of treatment depends on consistent follow-up and patient compliance [6].

Socioeconomic inequalities play a major role in consistent treatment, mostly affected by parental limitations. Children from poor households are more likely to miss the follow-up visits due to financial difficulties, limited access to specialized eye care services, and transportation problems. In addition, parental factors such as insufficient knowledge, false beliefs about amblyopia treatment, discomfort with patching therapy, and concerns about social stigma further decrease compliance. These combined factors highlight the crucial role of parents in ensuring successful follow-up and treatment compliance [7-8].

Accurate refraction is crucial for both diagnosing and treating amblyopia in children. A measurement with sufficient cycloplegia (the pupil dilated to its maximum) is necessary to determine the refractive error. One of the research questions PEDIG investigated was the function of glasses alone in treating amblyopia. 30-week research involved 84 patients ranging in age range from 3 to 7. The results showed that applying optical correction alone improved 77% of amblyopic eyes by two or more lines of vision. With just glasses, 27% of these patients had their amblyopia completely resolved. This highlights the necessity of precise refraction and the enhancement of eyesight using glasses alone [9].

In addition, unilateral or bilateral media opacities, congenital cataract, severe ptosis, lens dislocation, persistent hyperplastic primary vitreous, congenital glaucoma, and persistent pupillary membrane further contribute to the development of amblyopia by disrupting normal visual input during the critical period. Socioeconomic factors such as low parental education level and low socioeconomic status, along with maternal substance abuse and maternal smoking during pregnancy, also play an important role in increasing the risk of amblyopia [10].

The size and clinical profile of amblyopia among children who presented to the Paediatric ophthalmology clinic of Menelik II Referral Hospital in Addis Ababa were assessed in this study, Profile of Amblyopia at the Paediatric Ophthalmology Clinic of Menelik II Hospital. Every patient who visited the clinic had their visual acuity, refractive status, and fixation pattern recorded during a five-month period. 183 (9.1%) of the 1,660 children who were evaluated had amblyopia, with roughly equal distribution across the sexes. At 39.3%, strabismic amblyopia was the most prevalent subtype, with a mean presentation age of 6.9 years. 72.1% of children in the region resided in Addis Ababa, the capital, while the remaining 27.9% came from other regions of Ethiopia. The average age at which amblyopia first manifested was 7.4 years for anisometropic amblyopia, 6.8 years for strabismic amblyopia, and 6.2 years for combined mechanism amblyopia. 69.4% of the children had amblyopia when being evaluated for strabismus [10].

Strabismus and anisometropia are the principal aetiologies. Anisometropic amblyopia results from unequal refractive errors that produce a chronically blurred image in one eye, while strabismic amblyopia arises from cortical suppression of a misaligned eye to avoid diplopia. Stimulus deprivation, such as congenital cataract or ptosis, is less common but often more severe [11].

Abuallut et al. (2023) assessed parental awareness, knowledge, and perception of amblyopia in children in the Jazan region of Saudi Arabia. Their study highlighted that many parents had a limited understanding of amblyopia as a condition and lacked adequate knowledge regarding its causes, consequences, and management. The results suggest that a lack of awareness on the part of the parents may delay early diagnosis and treatment, which eventually affects visual outcomes. The need to improve parental education and awareness concerning early diagnosis, compliance, and follow-up in amblyopic children was highlighted [12].

## Rationale

Therefore, evaluating parental barriers that affect the follow-up in management of amblyopia is key to improving compliance and visual outcomes in paediatric patients. This study seeks to assess the challenges faced by parents that delay the regular follow-ups and successful management. Detecting these factors will help in developing strategies to increase parental involvement and support continuity in amblyopic management.

## Material and Methods

**Study Design:**
Cross-sectional study
**Settings:**
The study was conducted at hospitals affiliated with ‘The University of Lahore”.
**Duration of Study:**
4 months
**Sample Size:**
125 participants calculated using a 95% confidence level.
**Sampling Technique:**
Purposive sampling technique

**Inclusion Criteria:**
• Both genders (Male & Female)
• Parents of amblyopic patients
• Amblyopic patients who are willing to participate
**Exclusion Criteria:**
• Parents of children who have completed treatment or no longer require follow-up
• Parents of children who are not under active amblyopia management
**Equipment:**
Data were collected with the help of a structured questionnaire.

**Data Collection Procedure**

Data were collected from parents of children undergoing amblyopia treatment at UOLTH and hospitals affiliated with the University of Lahore. Participants were selected through purposive sampling during hospital visits. The purpose of the study was explained, and informed consent was obtained from participants. A self- generated questionnaire was administered to assess socio-demographic factors, knowledge regarding amblyopia management, and parental barriers affecting follow-up.

**Data Analysis Procedure**

The data analysis will be conducted using SPSS-27 Statistics. Descriptive statistics, including means, standard deviations, frequencies, and percentages, will be used to summarize the demographic and key variables. For inferential analysis, hypothesis testing will be performed with a significance level set at $p \leq 0.05$.

**Ethical Considerations**

The rules and regulations set by the ethical committee of the University of Lahore were followed while conducting the research, and the rights of the research participants were respected.
• Written informed consent (attached) was taken from all the participants.
• All information and data collection were kept confidential.
• Participants remained anonymous throughout the study.
• The subjects were informed that there were no disadvantages or risks associated with the procedure of the study.
• They were also informed that they were free to withdraw at any time during the process of the study.
• Data were kept under key and lock. In a laptop, it was kept under a password

**Results**

This chapter presented the findings of the study conducted to assess parental perceptions regarding barriers and strategies influencing follow-up compliance among children undergoing amblyopia treatment. Data were collected from 125 participants and were analysed using the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics, including frequencies and percentages, were used to summarize demographic characteristics, treatment-related factors, perceived barriers, and strategies to improve follow-up compliance. Inferential statistics were performed using the Chi-square test to evaluate the distribution of responses and examine

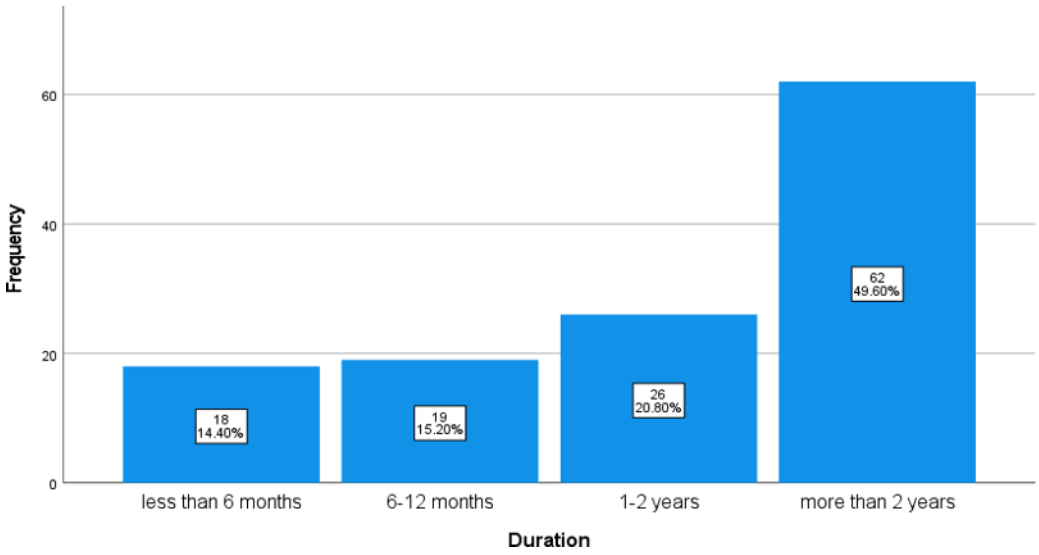
associations between selected variables. The results were presented in the following tables according to the study objectives.

Demographic Characteristics of Participants (N=125)

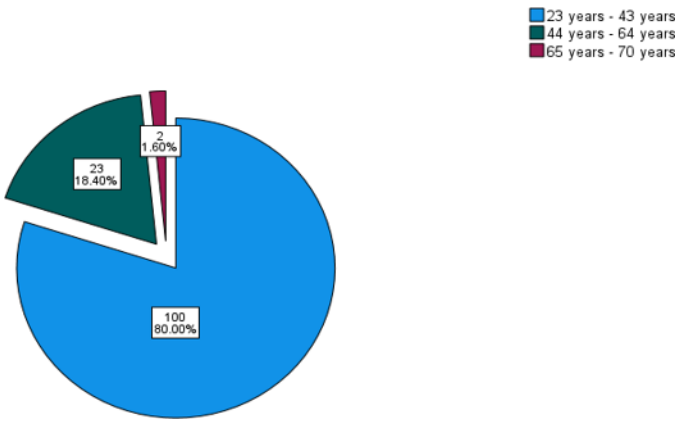
| Variable | Category | Frequency(n) | Percenta % |
|---|---|---|---|
| **Gender** | Male | 73 | (58.4) |
| | Female | 52 | (41.6) |
| **Age** | 23–43 years | 100 | (80.0) |
| | 44–64 years | 23 | (18.4) |
| | 65–70 years | 2 | (1.6) |
| **Relationship** | Mother | 70 | (56.0) |
| | Father | 55 | (44.0) |
| **Duration of Treatment** | Less than 6 months | 18 | (14.4) |
| | 6–12 months | 19 | (15.2) |
| | 1–2 years | 26 | (20.8) |
| | More than 2 years | 62 | (49.6) |
| **Treatment Type** | Patching | 32 | (25.6) |
| | Optical (glasses only) | 53 | (42.4) |
| | Combination therapy | 40 | (32.0) |

The demographic characteristics of the participants are presented in Table 5.1. Among the 125 respondents, 73 (58.4%) were male and 52 (41.6%) were female. Most participants (80.0%) were aged between 23 and 43 years, while 18.4% were aged 44–64 years and only 1.6% were aged 65–70 years. Regarding the relationship with the child, Mothers constituted 56.0% of respondents, whereas fathers accounted for 44.0%. Nearly half of the participants (49.6%) had been receiving treatment for more than two years, followed by 20.8% receiving treatment for 1–2 years. Optical correction with glasses was the most common treatment modality (42.4%), followed by combination therapy (32.0%) and patching (25.6%).

**Duration of amblyopia treatment among participants**




Distribution of age among study participants




**Responses to Follow-Up Compliance Questionnaire (N=125)**

| Questionnaire Item | Agree frequency(n) percentage (%) | Neutral frequency(n) percentage (%) | Disagree frequency(n) percentage (%) | Strongly Disagree frequency(n) percentage (%) |
|---|---|---|---|---|
| **Long distance to clinic affects follow-up plan** | 77 (61.6) | 26 (20.8) | 15 (12.0) | 7(5.6) |

| | | | | |
|---|---|---|---|---|
| **No transport facility affects appointment** | 59 (47.2) | 45 (36.0) | 12 (9.6) | 9 (7.2) |
| **Long waiting time discourages parents** | 69 (55.2) | 31 (24.8) | 20 (16.0) | 5 (4.0) |
| **Parents do not understand importance of follow-up** | 21 (16.8) | 13 (10.4) | 76 (60.8) | 15(12.0) |
| **Parents thought treatment should stop once vision. improved** | 7 (5.6) | 6 (4.8) | 83 (66.4) | 29 (23.2) |
| **Child school schedule interferes with appointments** | 72 (57.6) | 21 (16.8) | 11 (8.8) | 21 (16.8) |
| **Slow improvement in vision reduces motivation** | 42 (33.6) | 25 (20.0) | 52 (41.6) | 6 (4.8) |
| **Cultural beliefs delay follow-up** | 25 (20.0) | 8 (6.4) | 66 (52.8) | 26 (20.8) |
| **Parents do not understand follow-up plans** | 18(14.4) | 23 (18.4) | 70 (56.0) | 14 (11.2) |
| **Written instructions improve follow-up compliance** | 95 (76.0) | 16 (12.8) | 14 (11.2) | 0 |
| **Irregular monitoring reduces treatment effectiveness** | 90 (72.0) | 18 (14.4) | 17 (13.6) | 0 |
| **Lack of parental education significantly affects treatment plan** | 52 (41.6) | 12 (9.6) | 33 (26.4) | 28 (22.4) |

that the most reported barriers to follow-up compliance were long distance to the clinic (61.6%), long waiting times (55.2%), and interference from the child's school schedule (57.6%). Most participants disagreed that lack of parental understanding, cultural beliefs, or stopping treatment after vision improvement were major reasons for poor follow-up. A large majority agreed that written instructions (76.0%) and regular monitoring (72.0%) are important for improving treatment compliance and effectiveness. Overall, logistical factors were the main barriers affecting follow-up attendance.

**Perceived Strategies to Improve Follow-Up Compliance**

| Strategy | Frequency (n) Percentage (%) |
|---|---|
| **Proper counselling** | 40 (32.0) |
| **Proper consulting time** | 73 (58.4) |
| **Written instructions** | 12 (9.6) |

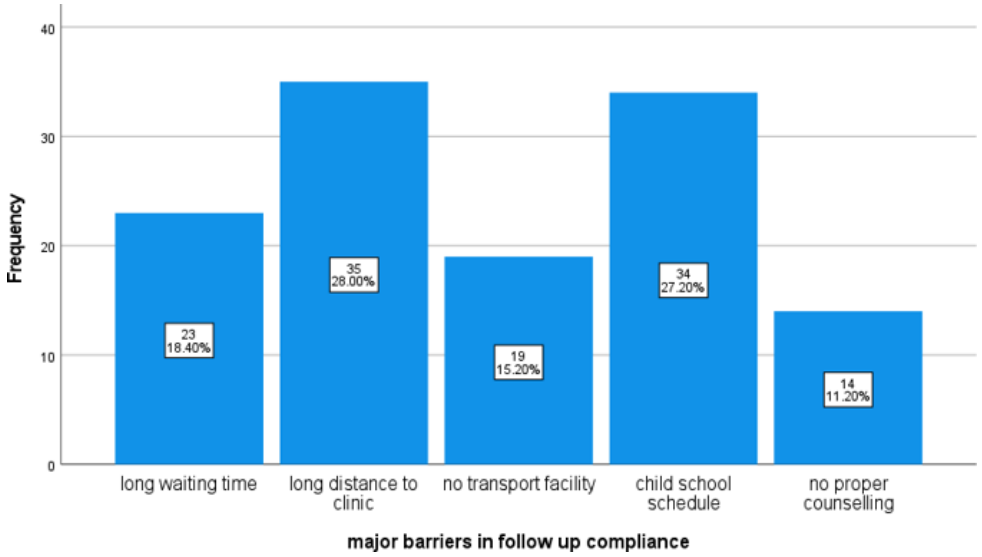
This table presents the strategies perceived to improve follow-up compliance among participants. Most respondents (58.4%) identified proper consulting time as the most effective strategy for improving follow-up compliance. Proper counselling was reported by 32.0% of participants, whereas only 9.6% considered written instructions to be the most effective strategy

**Major Barriers to Follow-Up Compliance (N = 125)**

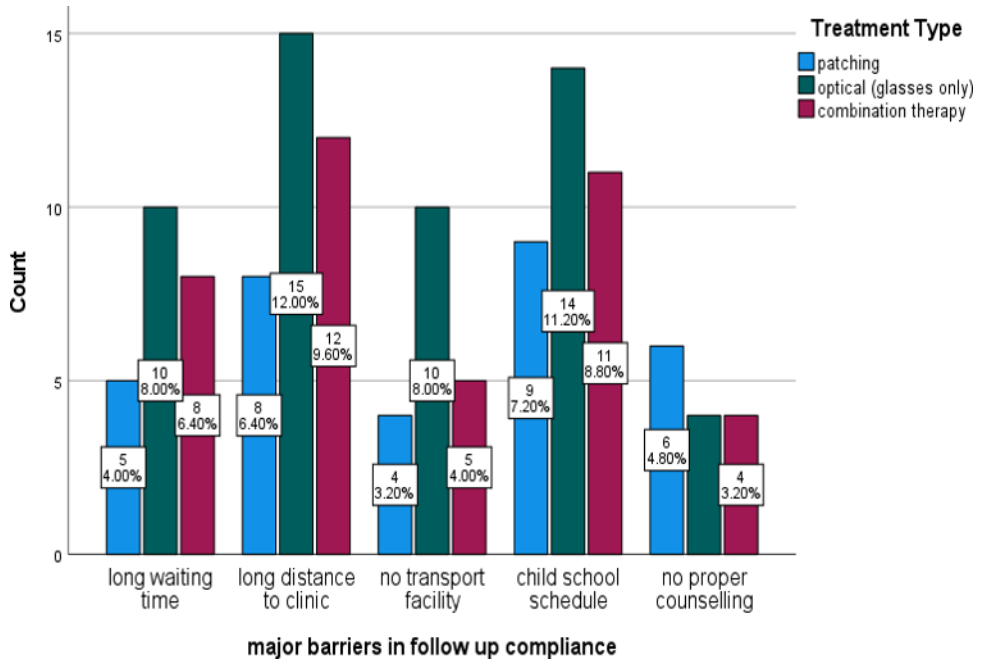
| Barrier | Frequency (n) | Percentage (%) |
|---|---|---|
| **Long waiting time** | 23 | 18.4 |
| **Long distance to clinic** | 35 | 28.0 |
| **No transport facility** | 19 | 15.2 |
| **Child school schedule** | 34 | 27.2 |
| **No proper counselling** | 14 | 11.2 |
| **Total** | **125** | **100.0** |

The main obstacles to follow-up compliance that participants mentioned are shown in Table. The most common barrier was the distance to the clinic (28.0%), which was closely followed by the child's school schedule (27.2%). 18.4% of respondents mentioned lengthy wait times, and 15.2% and 11.2% of participants, respectively, mentioned a lack of transportation options and insufficient counselling. These findings suggest that scheduling issues and accessibility are significant barriers to sustaining routine follow-up appointments.

**Distribution of major barriers affecting follow up compliance among participants.**




**Distribution of major barriers to follow-up compliance according to treatment modality**




## Discussion

This study was conducted to assess parental awareness affecting follow-up compliance among children undergoing amblyopia treatment. A total of 125 parents participated in the study. Many respondents were male (58.4%), aged 23–43 years (80.0%), and mothers represented 56.0% of participants. Most participants reported that proper consulting time (58.4%) and counselling (32.0%) were the most effective strategies for improving compliance. The most frequently

reported barriers were long distance to the clinic (28.0%) and the child's school schedule (27.2%), indicating that accessibility and scheduling difficulties remain important challenges.

Statistical analysis revealed significant associations between age and parents' understanding of follow-up plans ($\chi^2 = 13.568$, $p = 0.035$), as well as the effect of parental education on treatment plans ($\chi^2 = 12.748$, $p = 0.047$). These findings suggest that older respondents may differ in their awareness and understanding of treatment requirements. Duration of treatment was also significantly associated with school schedule interference ($\chi^2 = 22.556$, $p = 0.007$) and cultural beliefs affecting follow-up attendance ($\chi^2 = 17.985$, $p = 0.035$). This indicates that barriers to compliance may vary according to the length of treatment. No significant associations were found between gender, parental relationship (mother/father), or treatment modality and follow-up compliance factors ($p > 0.05$). Therefore, demographic characteristics had limited influence on perceptions regarding follow-up adherence.

The results of the present study also agree with those of Magalhães et al. (2025), who reported that travel difficulties, appointment-related problems, and socioeconomic factors negatively influenced adherence to amblyopia treatment. Similarly, long distance to the clinic and school-related commitments were the most frequently reported barriers among participants in the current study [13]. Furthermore, proper counselling and adequate consultation time were identified by participants as important strategies to improve follow-up compliance. Comparable findings were reported by Xing et al. (2026), who found that poor caregiver understanding and inadequate parental education contributed to loss to follow-up and recommended enhanced counselling and parental education to improve adherence [14]. Similarly, Mekonnen (2016) reported that parental education and counselling were significantly associated with better adherence to amblyopia treatment. The study emphasized that improved parental understanding can positively influence treatment compliance and visual outcomes, supporting the findings of the present study [15]. Education did not considerably increase compliance with the comprehensive test, even if parents' evaluation ratings improved following the educational session. The most common excuses for noncompliance were insurance issues and a lack of time [16].

## Conclusion

The study concluded that follow-up compliance in amblyopia treatment is mainly affected by logistical and educational factors. Distance to the clinic and school schedules were the most common barriers, while proper counselling and adequate consultation time were perceived to improve compliance. Strengthening parental awareness and addressing these barriers may enhance treatment adherence and improve visual outcomes in children with amblyopia.

## Limitations

- The study was conducted in hospitals affiliated with The University of Lahore, Department of optometry and vision sciences; therefore, the findings may not be generalizable to all populations.
- The sample size was limited to 125 participants.
- The study was based on parents' self-reported responses, which may have introduced response bias.
- The study used a cross-sectional design and did not assess changes in parental perceptions over time.
- Only selected barriers to follow-up compliance were assessed; other factors may also influence adherence to amblyopia treatment

**Recommendations**

- Healthcare providers should provide adequate counselling to parents regarding the importance of regular follow-up visits during amblyopia treatment.
- Appointment schedules should be made more flexible to accommodate children's school timings and parents' availability.
- Efforts should be made to reduce waiting times in ophthalmology clinics to improve follow-up compliance.
- Educational materials and awareness programs should be developed to enhance parental understanding of amblyopia and its management.
- Further studies with larger sample sizes and in multiple healthcare settings should be conducted to explore additional barriers affecting follow-up compliance

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