Original Article

Comparing the Practice Patterns of Pakistani Optometrists with Evidence-Based Guidelines for Correction of Refractive Errors in Children

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ABSTRACT

Aim: To evaluate the trends regarding the management of pediatric refractive errors by optometrists in Pakistan.

Study Design: Cross-sectional study.

Duration and Settings of the Study: This study was conducted from September 2023 to December 2023 using an online survey among Pakistani optometrists.

Methods: A Cross-sectional survey was conducted on 94 optometrists. Sample size of 94 was calculated using the values of percentage of clinical skills of optometrists (0.43) with a confidence interval of 95%. A questionnaire was taken from international research to collect data. Online google forms were distributed among optometrists in different regions of Pakistan. The data was then analyzed and Kruskal-Wallis test was applied to compare responses with province of practice, years of experience or percentage of pediatric patients dealt with. The study was approved for ethical consideration by the Ethical Review Board of College of Ophthalmology. Non probability convenient sampling technique was taken.

Results: Inconsistency was found between practice patterns of optometrists and evidence-based guidelines. The areas of the highest discordance were pseudo myopia, astigmatic correction and prescribing for school-age asymptomatic patients. There was no statistically significant association of frequency of correct responses to pediatric clientele percentage and province of practice ($p>0.05$). The number of correct responses increased with the years of experience ($p<0.05$)

Conclusion: The survey reveals there were variations in prescribing patterns, there were no significant differences based on practice province or pediatric clientele. However, there were areas where clinical expertise may be lacking, such as diagnosing and managing conditions like accommodative spasm and anisometropia.

Key Words: Optometrists, Amblyopia, Hyperopia, Myopia, Pediatrics.

INTRODUCTION

Pediatric refractive errors impose a significant burden on public health, children's quality of life and overall development. According to recent studies, the prevalence of refractive errors in children has been on the rise, with estimates ranging from 5% to 20% globally, with the number being greater in the developing and underdeveloped countries.[1] According to the World Health Organization (WHO), approximately 19 million children and adolescents 5 to 15 years of age suffer from Visual Impairment (VI), among which, approximately 12.8 million cases (67%) are due to uncorrected refractive error.[2]

In Pakistan, 24% out of 1000 children were found to have an uncorrected refractive error in an institution-based survey.[3] Along with compromising social, psychological and physical aspect of a child's life, refractive errors increase global burden of disease and result in economic loss.[4] Left uncorrected or inadequately corrected, these refractive errors can lead to a cascade of consequences, including reduced educational attainment, impaired psychosocial well-being, and impaired motor and cognitive skills. Moreover, abnormal visual stimuli due to uncorrected refractive errors reaching the visual cortex may lead to developmental disorder in the cortex, commonly called amblyopia. Amblyopia is the biggest cause of unilateral blindness worldwide.[5] Refractive errors, especially

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blindness worldwide.[5] Refractive errors, especially hyperopia, are also enlisted among the risk factors for strabismus.[6] Though inadequately corrected refractive errors may cause amblyopia, caution must be taken before giving full correction as it may disrupt the emmetropization process and normal growth of the eyeball. [7]

Despite the growing prevalence of refractive error among Pakistani pediatric population, a comprehensive assessment of refractive management methods in Pakistan is lacking. This research aims to assess real-world optometric practices in pediatric spectacle prescriptions and contrasting them with established evidence-based recommendations.[8] By identifying areas of concordance and discordance, this study seeks to highlight areas of shortcomings in local optometric practice and establish areas where more appropriate teachings about pediatric refractive development and errors are required. Such insights are crucial for optimizing visual outcomes and ensuring the holistic well-being of children with refractive errors.

METHODS

Research was approved for ethical consideration by the Ethical Review Board Committee of College of Ophthalmology. Research was held in College of Ophthalmology from September to December 2023. A questionnaire comprising of clinical scenarios was formulated based on previous research. Forms were distributed via Google Forms (Google. Inc) to optometrists practicing all over Pakistan. Sample size of 94 was calculated using a confidence interval of 95%, absolute precision required of 0.10 and anticipated population proportion of 0.43.[9] Optometrists practicing in Pakistan were included in the study. A total of 94 responses were collected and then analyzed. The data was entered in Microsoft Excel and then analyzed by non-parametric Kruskal-Wallis Test using Statistical Package for Social Sciences (SPSS Version 25.00). The responses were compared to the Evidence-Based guidelines set by Leat et al.[8]

Chi-square tests was applied to assess the correlation between province of practice, years of experience and percentage of pediatric patients and frequency of correct responses given. The p-value of less than 0.05 was taken as significant. Furthermore, independent samples non parametric Kruskal-Wallis test was done to test any association of total score with the above-mentioned factors

RESULTS

Years of experience was the only factor to have a significant association with the total score ($p<0.05$). The survey also highlighted areas where clinical expertise may be lacking, such as in diagnosing and managing conditions like accommodative spasm and anisometropia. Furthermore, there was some divergence in opinion regarding the management of astigmatism and hyperopia in school-age children, indicating areas where further education and standardization may be beneficial.

TABLE 1: Respondents' demographic information

Variables	Subgroups	Total number of respondents	Percentage %
Gender	Male	37	39.4
	Female	57	60.6
Years of Experience	Less than 1 year	28	29.8
	1-5 years	52	55.3
	More than 5 years	14	14.9
Percentage of pediatric clientele	Less than 25%	28	29.8
	25% to 40%	46	48.9
	40% to 60%	11	11.7
	More than 60%	9	9.6
Province of Practice	Punjab	41	43.6
	Sindh	15	16
	KPK	15	16
	Baluchistan	6	6.4
	Kashmir	9	9.6
	Gilgit Baltistan	8	8.5

KPK=Khyber Pakhtunkhwa

TABLE 2: Frequency of correct responses

Questions	Correct response	No. of correct responses n (%)
Q1. Material and design of the child's spectacles	Writing specifications in prescription	56(59.6%)
Q2. How do you monitor a child with refractive error	Visual acuity, binocular vision status, alignment	91(96.8%)
Q3. Age for the first refractive screening in asymptomatic child	3 years of age	43(45.8%)
Q4. Managing refractive error of +1.5 /-0.5 x 180 OU in a 3year old child	Reassure, repeat refraction in 6-8 months.	40 (42.6%)
Q5. Managing 8-year old with blurred vision for a week, with unaided vision 6/36 OD and 6/18 OS, dry acceptance: OD-4.50 (6/12) and OS -2.50 (6/9), and cycloplegic refraction: + 0.25 OU.	Consider cycloplegics and bifocals	18(19.1%)
Q6. A 6-year-old girl has unaided vision of 6/36 OU. Cycloplegic refraction +5.00 4.50 x180 OU. Subjective refraction is +2.00 2.50 x180 OU (improving to 6/18 OU).	Prescribe + 5.00 4.50 x 180 (BCVA 6/18).	25(26.6%)
Q7. A 2-year-old girl with pseudo strabismus had cycloplegic refraction +4.50 OD, +1.50 OS. .	Prescribe spectacles and consider amblyopia therapy.	46(48.9%)
Q8.6-year-old child with hyperopia of +2.00 .	Prescribe full correction	52(55.3%)
Q9. 3 years old child; at a first-time visit has a cycloplegic refraction : -1.00 Dcyl/57 OU.	Prescribe partially	23(24.5%)

n=number, %=Percentage

TABLE 3: Years of experience and total score correlation

	Less than 1 year	1-5 Years	More than 5 years	p-value (Kruskal Wallis)
Total score	3.78 ± 1.54	4.86± 2.00	5.57± 1.99	0.013

The number of total correct responses increases significantly with years of experience. This shows that the more experienced an optometrist is, the more he or she is likely to incline towards evidence-based practice.

DISCUSSION

There has not been previous research conducted in Pakistan regarding spectacle prescription trends in children. This was a one-of-a-kind attempt to understand how optometrists prefer to prescribe under different clinical scenarios in the pediatric age group.

The responses were analyzed according to province of practice, number of pediatric clientele and years of experience. There was no significant difference between the prescribing patterns of optometrists according to number of exposure to children or province of practice. There was an increasing number of correct responses with an increased year of experience.

According to results of Q1, it's encouraging that 56% of responders actively participated in the spectacle making process, indicating their preferences for lenses and frames. Knowledge about these aspects is deemed essential for optometrists since pediatric frame and lens material and design requirements differ from adults as mentioned by Kaiti R. Pediatric spectacle dispensing.[10]

In Q2, an overwhelming number of optometrists (94.6%) chose to monitor a child's refractive status by examining alignment, binocularity and visual acuity. This is in concordance with the American Academy of Pediatrics.[11]

In Q3, 60% of respondents advocated for age-based refractive error screening, with 23% preferring screening at 6 months and 43% at 3 years. Early vision screening has recognized benefits, but there is a debate

on whether it mainly identifies moderate to high refractive errors. Combining refractive error screening with vision screening is considered a more comprehensive approach.[12]

In Q4, knowledge about emmetropization was judged among Pakistani optometrists. It is typically advised to monitor the refractive error if it is in the normal range for the age of the child.[13] But, only 46.8% of optometrists chose to repeat refraction in 6 or 8 months. This shows that optometrists are not confident in their ability to cautiously handle refractive errors considering age norms.

Q5 in the survey [Table 2] emphasized the issue of accommodative spasm leading to pseudo myopia. This is a well-documented aspect of the spasm of the near reflex, where recent-onset myopia occurs with a notable difference in dry and wet refractions. The prevalence of this condition is on the rise, likely due to increased screen time. Cycloplegic therapy (often involving atropine 1% for a few weeks) and temporary use of bifocal spectacles are beneficial in such cases. However, only around 19.1% of survey respondents opted for this recommended approach. This shows severe lack of clinical expertise in diagnosing and managing pseudo myopia which may lead to increased asthenopia symptoms in children.[14]

Question 6 explored the debate between under-corrected astigmatism (65% of respondents) and fully corrected astigmatic prescription (35% of respondents). It's crucial to understand that astigmatism (>2 D) is a potent factor for amblyopia, and full correction of both meridians is necessary for amblyopia improvement. Interestingly, children are more receptive to high astigmatic errors compared to adults, possibly because they are already amblyopic. Cases with high astigmatic errors should be carefully evaluated to rule out corneal ectasia.[15,16]

Regarding anisometropia [Q7, Table 2], approximately 41% favored conservative management, waiting for a reliable visual response or prescribing only if squint develops, while 48.9% agreed on monitoring cases during follow-up visits. However, it's essential to understand that anisometropia, especially aniso-hypermetropia, is a significant factor for amblyopia, and timely intervention is crucial.[17]

Regarding school age asymptomatic hyperopia in Q8, it is noted that this magnitude of error also impacts visual functions and near vision.[18] It is highly recommended to prescribe full correction to increase academic and visual performance of the child. Only 52% of the optometrists chose to prescribe fully. Under correction of hyperopia may lead to unsatisfactory results.

It is recommended that a partial to full correction be prescribed to moderately astigmatic children even during age of active emmetropization as blurred image might lead to the development of meridional amblyopia.[19] Moreover, oblique astigmatism is also a risk factor for amblyopia.[20] In Q9 50% of the participants chose to either prescribe fully or partially. This is in agreement with the guidelines.

Despite study limitations, including potential biases inherent in online surveys, the study provides valuable insights into the practice patterns of Pakistani optometrists in pediatric refraction. The geographical diversity of responses enhances the credibility of the findings, and future research efforts with increased participation could further contribute to understanding and awareness in this important field.

The limitations of the online survey, including lack of reliability of responses and biasness, are acknowledged.[21] While there were drawbacks, the survey provided valuable insights into the practice patterns of Pakistani optometrists regarding pediatric refraction, and it could serve as a teaching module to raise awareness on the subject. The geographical diversity of the survey responses adds credibility, and future efforts with increased participation may enhance understanding and awareness.

CONCLUSION

In conclusion, the survey findings shed light on the current practices and preferences of Pakistani optometrists regarding pediatric refraction. The results revealed that while there were some variations in prescribing patterns based on years of experience, there were no significant differences according to the

Province of practice or exposure to pediatric clientele.

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