

AWARENESS AND ADOPTION OF MYOPIA MANAGEMENT STRATEGIES AMONG EYE CARE PRACTITIONERS IN PAKISTAN: A CROSS-SECTIONAL STUDY

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Abstract

Background: Myopia is a growing public-health problem, and evidence-based strategies that slow its progression are available, but their uptake in routine clinical practice may lag behind the evidence. This study assessed the awareness and adoption of myopia management strategies among eye care practitioners (ECPs) in Pakistan and identified factors associated with adoption.

Methods: A cross-sectional analytical study was conducted among 143 licensed ECPs (optometrists, ophthalmologists and other ECPs) working in hospitals, private clinics, academic institutions and optical setups. Participants were selected by non-probability convenience sampling, and data were collected with a structured questionnaire covering demographics, awareness, clinical practice, formal training and barriers. Data were analyzed in SPSS version 26 using descriptive statistics, chi-square tests, Spearman correlation and binary logistic regression, with significance set at $p < 0.05$.

Results: The mean age of the participants was 35.1 ± 8.7 years, and 68.5% were optometrists. Although 82.5% had heard of myopia management strategies, only 28.7% rated their knowledge as good. Outdoor activity (75.5%) and low-dose atropine (67.1%) were the best-recognized strategies. Only 34.3% of practitioners regularly prescribed evidence-based myopia control, 29.4% did so occasionally and 36.4% did not prescribe any strategy. Lifestyle advice (50.3%) was the most commonly used approach, followed by multifocal or bifocal spectacles (35.7%) and atropine (30.1%). High adoption was more frequent among practitioners with formal training than among those without (61.5% vs 22.0%; $\chi^2 = 18.64$, $p < 0.001$) and correlated positively with awareness ($r = 0.46$, $p < 0.001$) and negatively with barrier score ($r = -0.29$, $p = 0.001$). Formal training was the strongest independent predictor of high adoption (adjusted OR 3.42, 95% CI 1.62–7.21, $p = 0.001$). The most common barriers were lack of training (62.9%), high treatment cost (58.7%) and low patient awareness (54.5%).

Conclusion: Awareness of myopia management was high among ECPs in Pakistan, but routine adoption was low, indicating a marked awareness–

practice gap. Structured continuing professional development, national clinical guidelines, affordable treatment and diagnostic resources, and parent education are needed to translate evidence into everyday practice.

Introduction

Myopia has changed from a refractive inconvenience into a major and growing public-health problem. Modelling studies projected that nearly five billion people, almost half of the world's population, would be myopic by 2050, and nearly one billion would have high myopia [1]. The prevalence of childhood myopia has increased over successive cohorts, most markedly in East and Southeast Asia [2], and pathologic myopia has become an important cause of irreversible visual impairment in Asia [3].

Myopia matters clinically because of the axial elongation that accompanies it and the sight-threatening complications that follow, including myopic maculopathy, retinal detachment, glaucoma and cataract, the risk of which increases with the degree of myopia [4]. Even a modest reduction in progression is therefore valuable, an idea captured in the principle that every diopter of myopia matter [5]. This has encouraged a shift from correcting myopia with single-vision lenses towards managing it as a progressive condition [6], and the need for early action has been reinforced by evidence that home confinement during the COVID-19 pandemic was associated with faster myopic progression in school-aged children [7].

A substantial body of evidence now supports interventions that slow myopia progression. Defocus incorporated multiple segments (DIMS) spectacle lenses reduced myopia progression by 52% and axial elongation by 62% over two years compared with single-vision lenses, and the effect was maintained at three years [8,9]. High-add multifocal soft contact lenses slowed progression by about 43% over three years in the BLINK trial [10]. Low-concentration atropine showed a concentration-dependent effect in the LAMP study, with 0.05% the most effective concentration [11], although a large United States trial found no benefit of 0.01% atropine over placebo [12], which shows that optimal dosing and population effects are still being clarified. Orthokeratology and behavioural advice,

particularly increased time outdoors, complete the range of options, and their relative efficacy has been synthesized [13], while clinical management pathways have been set out in guidelines from the International Myopia Institute (IMI) [14].

Wolffsohn et al. (2016, 2020, 2023) and Whayeb et al. (2025) documented practitioner attitudes and prescribing behaviour in four IMI global surveys, which collected 971 responses in 2015, 1,336 in 2019, 3,195 in 2022 and 2,993 in 2024 [15–18]. Practitioner concern about childhood myopia was consistently highest in Asia, and self-reported clinical activity rose in every continent. Nevertheless, single-vision spectacles remained the most frequently prescribed correction for young myopes, although their prescribing frequency fell by 11.1% between 2015 and 2024, cost to the patient remained the main reason for not prescribing myopia control, and more than 17% of respondents still used under correction at least sometimes [18], a practice that does not slow, and may accelerate, myopia progression [19,20]. Douglass et al. (2020), Martínez-Pérez et al. (2023) and Nti et al. (2023) surveyed practitioners in Australia, Spain and Africa, respectively, and show that awareness, prescribing patterns and barriers differ between settings [21–23].

Studies from South Asia and the Middle East show a similar gap between awareness and practice. Chaurasiya et al. (2023) surveyed 302 Indian optometrists and found that single-vision distance correction was the most common approach even though most respondents identified orthokeratology and low-dose atropine as more effective options [24]. Naik et al. (2024) reported that, among 393 Indian optometrists, 32.6% to 92.4% were unaware of the ocular complications of high myopia (depending on the complication), 46.5% routinely measured axial length, 70.3% prescribed single-vision full correction, and the main barriers were medicolegal concerns, absence of guidelines and inadequate consultation time [25]. Pradhyumna et al.

(2025) examined knowledge, attitudes, practices and barriers among Indian eye care professionals and identified limited practitioner training, low parental awareness and restricted availability of treatment modalities as obstacles [26]. **Alanazi et al. (2023)** found that two-thirds of 171 optometrists in Saudi Arabia prescribed single-vision spectacles for myopic children, 38% did not perform ocular biometry, and insufficient support and lack of clinical experience limited the adoption of myopia management [27]. In Pakistan, **Shahzad et al. (2022)** surveyed 173 eye care providers across several cities and described gaps between knowledge and practice patterns in myopia care [28].

Understanding the gap between awareness and adoption has practical benefits beyond describing it. Practitioners strongly influence which children receive evidence-based myopia control; in one survey, 78.8% of parents reported following their eye care practitioner's recommendation [29]. Information on the practitioner-level determinants of adoption, especially modifiable ones such as training, can therefore inform the content of continuing professional development programmes, the development of clinical guidelines adapted to local resources, and planning for the affordability and supply of myopia control products. Such information is particularly useful where the eye care workforce is limited and regulation of the profession varies between countries [30]. Baseline data on current practice also make it possible to measure whether later educational or policy initiatives change prescribing behaviour.

Evidence from Pakistan remains limited. Pakistan did not reach the threshold of 30 responses for country-level reporting in any of the four IMI global surveys [18], and the available Pakistani evidence comes from a small number of surveys [28]. Accordingly, this study aimed to assess awareness and adoption of myopia management strategies among eye care practitioners in Pakistan, to identify factors associated with adoption, including formal training, professional category and perceived

barriers, and to interpret the findings against published studies from selected Asian countries.

Methodology

This observational, cross-sectional analytical study was conducted among 143 licensed eye care practitioners in Pakistan over four months after ethical approval from the Superior University Lahore Research Ethics Committee. Participants were recruited through non-probability convenience sampling, with informed consent, confidentiality, anonymity, and voluntary participation ensured. Data were collected using a structured self-administered questionnaire covering demographics, awareness and knowledge, clinical practice, barriers, training, and future treatment preferences. The main outcome was adoption of myopia management, categorized as regular, occasional, or no prescribing, with high versus low/moderate adoption used for inferential analysis. Sample size was calculated using G*Power 3.1.9.7. Data were analyzed in SPSS version 26 using descriptive statistics, chi-square test, Spearman correlation, and binary logistic regression to identify predictors of high adoption; odds ratios with 95% confidence intervals were reported, with $p < 0.05$ considered statistically significant. Cronbach's alpha assessed questionnaire reliability, while published studies from selected Asian countries were narratively compared with the study findings.

Results

Participant characteristics. A total of 143 eye care practitioners were included in the final analysis. The mean age was 35.1 ± 8.7 years (range 23–58 years), and the median clinical experience was 7 years (interquartile range 3–12 years). Most participants were male (57.3%), and optometrists were the largest professional group ($n = 98$, 68.5%), followed by ophthalmologists ($n = 31$, 21.7%) and other eye care practitioners (opticians and orthoptists; $n = 14$, 9.8%). Most respondents practiced in urban areas ($n = 89$, 62.2%), and private clinics ($n = 54$, 37.8%) and hospitals ($n = 47$, 32.9%) were the most common practice settings (Table 1).

Table 1. Demographic characteristics of the study participants (n = 143)

Variable	Frequency (n)	Percentage (%)
Age group		
20–30 years	42	29.4
31–40 years	58	40.6
41–50 years	31	21.7
> 50 years	12	8.4
Gender		
Male	82	57.3
Female	59	41.3
Prefer not to say	2	1.4
Professional qualification		
Optometrist	98	68.5
Ophthalmologist	31	21.7
Other (opticians / orthoptists)	14	9.8
Clinical experience		
< 2 years	21	14.7
2–5 years	39	27.3
6–10 years	45	31.5
> 10 years	38	26.6
Practice setting		
Private clinic	54	37.8
Hospital	47	32.9
Academic institution	25	17.5
Optical setup	17	11.9
Practice location		
Urban	89	62.2
Semi-urban	39	27.3
Rural	15	10.5

Awareness and knowledge. Overall, 118 of 143 practitioners (82.5%) had heard of myopia management strategies, whereas 25 (17.5%) had not. However, only 41 practitioners (28.7%) rated their knowledge as good; 37 (25.9%) reported moderate knowledge, 53 (37.1%) basic knowledge and 12 (8.4%) no knowledge. Outdoor activity or lifestyle modification (75.5%) and low-dose atropine therapy (67.1%)

were the most widely recognized strategies, followed by orthokeratology (61.5%), multifocal or bifocal spectacles (57.3%) and soft multifocal contact lenses (49.7%) (Table 2). The questionnaire showed good internal consistency, with an overall Cronbach's alpha of 0.83 across 20 items (awareness domain $\alpha = 0.78$, clinical practice domain $\alpha = 0.81$ and barrier domain $\alpha = 0.74$).

Table 2. Awareness, self-rated knowledge and familiarity with myopia management strategies (n = 143)

Variable	n	%
Heard of myopia management strategies		
Yes	118	82.5
No	25	17.5
Self-rated knowledge level		
No knowledge	12	8.4
Basic knowledge	53	37.1
Moderate knowledge	37	25.9
Good knowledge	41	28.7
Familiarity with specific strategies (multiple response)		
Outdoor activity / lifestyle modification	108	75.5
Low-dose atropine therapy	96	67.1
Orthokeratology	88	61.5
Multifocal / bifocal spectacles	82	57.3
Soft multifocal contact lenses	71	49.7

Note: Percentages were calculated from the total sample (n = 143); multiple-response percentages do not sum to 100.

Clinical adoption. Awareness was not matched by practice. Forty-nine practitioners (34.3%) regularly prescribed evidence-based myopia control interventions, 42 (29.4%) prescribed them occasionally and 52 (36.4%) did not prescribe any myopia management strategy, an awareness-adoption gap of approximately 48

percentage points (82.5% aware versus 34.3% regularly prescribing). Lifestyle advice (50.3%) and multifocal or bifocal spectacles (35.7%) were the most commonly used strategies, followed by atropine therapy (30.1%), orthokeratology (21.7%) and soft multifocal contact lenses (18.2%) (Table 3).

Table 3. Clinical adoption pattern and myopia management strategies currently used (n = 143)

Variable	n	%
Adoption status		
Regularly prescribe	49	34.3
Occasionally prescribe	42	29.4
Do not prescribe	52	36.4
Strategies currently used (multiple response)		
Lifestyle advice	72	50.3
Multifocal / bifocal spectacles	51	35.7
Atropine therapy	43	30.1
Orthokeratology	31	21.7
Soft multifocal contact lenses	26	18.2

Note: Percentages were calculated from the total sample (n = 143); multiple-response percentages do not sum to 100.

Formal training, professional category and adoption. High adoption was significantly more common among practitioners with formal training in myopia management than among those without (32 of 52, 61.5% vs 20 of 91,

22.0%; $\chi^2 = 18.64$, $p < 0.001$). Adoption also differed by professional category ($\chi^2 = 9.21$, $p = 0.010$): high adoption was observed in 48.4% of ophthalmologists, 34.7% of optometrists and 14.3% of other eye care practitioners (Table 4).

Table 4. Association of formal training and professional category with adoption of myopia management

Group	n	High adoption, n (%)	Low/moderate adoption, n (%)
Formal training in myopia management ($\chi^2 = 18.64$, $p < 0.001$)			
Formal training	52	32 (61.5)	20 (38.5)
No formal training	91	20 (22.0)	71 (78.0)
Professional category ($\chi^2 = 9.21$, $p = 0.010$)			
Ophthalmologists	31	15 (48.4)	16 (51.6)
Optometrists	98	34 (34.7)	64 (65.3)
Other eye care practitioners	14	2 (14.3)	12 (85.7)

Note: Chi-square test.

Correlation analysis. Awareness score showed a moderate positive correlation with adoption score ($r = 0.46$, $p < 0.001$), and formal training status was also positively correlated with adoption ($r = 0.49$, $p < 0.001$). Clinical

experience had a weak positive correlation with adoption ($r = 0.18$, $p = 0.031$). Barrier score was negatively correlated with adoption ($r = -0.29$, $p = 0.001$), whereas age was not significantly related to adoption ($r = 0.09$, $p = 0.280$) (Table 5).

Table 5. Spearman correlation between major study variables and adoption score

Variable vs adoption score	r	p-value
Awareness score	0.46	< 0.001
Training status	0.49	< 0.001
Clinical experience	0.18	0.031
Barrier score	-0.29	0.001
Age	0.09	0.280

Predictors of high adoption. The multivariable logistic regression model was statistically significant ($\chi^2 (7) = 38.72$, $p < 0.001$; Nagelkerke $R^2 = 0.34$) and correctly classified 74.8% of cases. Formal training was the strongest independent predictor of high adoption (adjusted OR 3.42, 95% CI 1.62–7.21, $p = 0.001$), followed by awareness score (adjusted

OR 1.28, 95% CI 1.10–1.50, $p = 0.002$) and academic practice setting (adjusted OR 2.31, 95% CI 1.01–5.28, $p = 0.047$). A higher barrier score was independently associated with lower odds of high adoption (adjusted OR 0.71, 95% CI 0.56–0.91, $p = 0.006$). Urban location, clinical experience of more than 10 years and age were not independently significant after adjustment (Table 6).

Table 6. Multivariable logistic regression predicting high adoption of myopia management

Predictor	Adjusted OR	95% CI	p-value
Formal training	3.42	1.62–7.21	0.001
Higher awareness score	1.28	1.10–1.50	0.002
Academic practice setting	2.31	1.01–5.28	0.047
Urban location	1.84	0.86–3.92	0.115
Clinical experience (> 10 years)	1.52	0.72–3.21	0.280
Higher barrier score	0.71	0.56–0.91	0.006
Age	1.02	0.98–1.06	0.330

Note: OR, odds ratio; CI, confidence interval. Model χ^2 (7) = 38.72, $p < 0.001$; Nagelkerke R^2 = 0.34; 74.8% of cases correctly classified.

Barriers to implementation. The most frequently reported barrier was lack of training ($n = 90$, 62.9%), followed by high treatment cost (58.7%), low patient awareness (54.5%), lack of

clinical guidelines (46.2%) and limited equipment or resources (42.7%). Concern regarding side effects was the least frequently reported barrier (27.3%) (Table 7).

Table 7. Barriers to the adoption of myopia management reported by practitioners ($n = 143$)

Barrier	n	%
Lack of training	90	62.9
High treatment cost	84	58.7
Low patient awareness	78	54.5
Lack of clinical guidelines	66	46.2
Limited equipment / resources	61	42.7
Concern regarding side effects	39	27.3

Note: Multiple response; percentages were calculated from the total sample ($n = 143$).

Discussion

This cross-sectional study of 143 eye care practitioners found a clear gap between awareness and practice of myopia management in Pakistan: 82.5% had heard of myopia management strategies, but only 28.7% rated their knowledge as good and only 34.3% regularly prescribed evidence-based interventions, an awareness–adoption gap of about 48 percentage points. This pattern is consistent with the IMI global survey series, in which practitioner concern and self-reported activity increased over time, yet single-vision spectacles remained the most frequently prescribed option in every survey round even though practitioners rated them among the least effective options [16–18]. The strategies used most often in the present study, lifestyle advice

(50.3%) and multifocal or bifocal spectacles (35.7%), are also those that require the least specialised equipment, follow-up and cost, whereas atropine (30.1%), orthokeratology (21.7%) and soft multifocal contact lenses (18.2%) were used less often although they were recognised by 67.1%, 61.5% and 49.7% of respondents, respectively. Recognition of these therapies therefore appears to have outpaced confident clinical use of options whose efficacy has been shown in trials [8,10,11], and the mixed evidence on 0.01% atropine [12] may contribute to prescriber uncertainty about dose and expected benefit, although this was not assessed in the present study.

The awareness–practice gap and the barrier profile observed here resemble those reported elsewhere in South Asia and the Middle East.

Among 302 Indian optometrists, single-vision distance correction was the most common approach even though most respondents identified orthokeratology and low-dose atropine as more effective options [24], and in a later survey of 393 Indian optometrists, single-vision full correction predominated (70.3%), fewer than half routinely measured axial length and the absence of guidelines and inadequate consultation time were prominent barriers [25]. A knowledge, attitudes, practices and barriers study of Indian eye care professionals likewise emphasized training, patient awareness and access to treatment modalities [26]. In Saudi Arabia, two-thirds of responding optometrists prescribed single-vision spectacles to myopic children, 38% performed no ocular biometry, and insufficient support and clinical experience were the main limiting factors [27], and the earlier Pakistani survey of 173 providers similarly described gaps between knowledge and practice [28]. Surveys from Australia, Spain and Africa also show that practice patterns differ between settings [21–23]. Some differences deserve mention: in the 2024 IMI survey, cost to the patient was the primary barrier worldwide [18], whereas lack of training was the most frequently cited barrier in our sample (62.9%), with cost second (58.7%). These comparisons should be read as contextual rather than as a ranking of countries, because the studies differed in sampling methods, professional composition, questionnaires, definitions of adoption and year of data collection.

Formal training in myopia management was the most influential modifiable factor associated with adoption. High adoption was almost three times as common among trained practitioners (61.5%) as among untrained practitioners (22.0%), and after adjustment for other variables, trained practitioners had 3.42 times the odds of being high adopters (95% CI 1.62–7.21). Training may improve understanding of treatment efficacy, reduce uncertainty about safety, build confidence in prescribing and monitoring, and provide practical skills such as axial length measurement, orthokeratology fitting and atropine counselling; however, the cross-sectional design cannot establish causality, and practitioners who are already interested in myopia management may be more likely to seek

training [31]. Adoption also varied by professional category, being highest among ophthalmologists (48.4%) and lowest among other eye care practitioners (14.3%), which may reflect differences in scope of practice, pharmacological prescribing and access to hospital-based resources, although optometrists, who formed the largest group in this study, remain central to myopia care. Awareness was positively but only moderately correlated with adoption ($r = 0.46$), which supports the view that awareness is necessary but not sufficient for a change in practice. Because practitioners strongly influence which children receive myopia control, with 78.8% of parents in one survey following their practitioner's recommendation [29], improving training across all professional groups is likely to have a direct effect on uptake.

The barriers reported by participants point to system-level constraints as well as individual knowledge. In addition to lack of training (62.9%), practitioners cited high treatment cost (58.7%), low patient awareness (54.5%), absence of clinical guidelines (46.2%) and limited equipment (42.7%), and the negative association between barrier score and adoption ($r = -0.29$; adjusted OR 0.71) indicates that these barriers act as real constraints on practice. Cost remains the leading reason for not prescribing myopia control worldwide [18], and affordability is likely to be relevant wherever families bear the cost of lenses, drops and follow-up. Access to the instruments needed for monitoring also varies: in the 2024 IMI survey, the proportion of practitioners with access to axial length measurement ranged from 42.6% to 81.6% across continents [18], and IMI guidelines advise that children receiving myopia control be reviewed at least every six months [14], which requires equipment and consultation time. Workforce and regulatory context matter as well: across 39 member countries of the World Council of Optometry there was, on average, one optometrist for every 23,200 people, and optometry was unregulated in several countries [30]. Such constraints are likely to limit the reach of myopia management in settings with a small eye care workforce, particularly outside large urban centers.

These findings have practical implications. Structured continuing professional development in evidence-based myopia management, covering atropine, orthokeratology, defocus spectacle and contact lenses, axial length assessment, follow-up and communication with parents, should be offered to optometrists, ophthalmologists and other eye care practitioners. National myopia management guidelines adapted from IMI recommendations to local resources, medication availability and scope of practice, together with measures to reduce treatment costs, wider access to diagnostic equipment, parent and community education, and school-based screening linked to referral pathways, would address the barriers identified. The study has limitations. Its cross-sectional design precludes causal inference; convenience sampling and a modest sample relative to the national workforce limit representativeness and generalizability; self-reported practice may be affected by recall and social-desirability bias and was not verified against clinical records; patient outcomes, parental factors and objective access to equipment and medicines were not assessed; and the comparisons with other Asian countries relied on published studies that used different methods. Larger, nationally representative and longitudinal studies, including chart-review designs and evaluations of training interventions, are needed to confirm these findings and to show whether training and guideline implementation improve prescribing and patient outcomes.

Conclusion

In this cross-sectional study of eye care practitioners in Pakistan, awareness of myopia management strategies was high (82.5%), but confident knowledge (28.7%) and regular prescribing of evidence-based interventions (34.3%) were considerably lower, indicating a substantial awareness-practice gap. Formal training was the strongest independent predictor of high adoption, whereas lack of training, high treatment cost, low patient awareness, absence of clinical guidelines and limited equipment were the main barriers. Structured continuing professional development, nationally adapted clinical guidelines, affordable treatment options

and diagnostic equipment, and parent and community education are needed to translate evidence into routine practice, and larger longitudinal studies should evaluate whether these measures improve myopia care in Pakistan.

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