

Spectacle prescription in children: Understanding practical approach of Indian ophthalmologists

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Purpose: The aim of this study is to survey the management approach, regarding spectacle prescription in children, among Indian ophthalmologists. **Methods:** A web-based, anonymous questionnaire (multiple choice questions dealing with practical aspects of pediatric refraction), was sent to available database of Indian ophthalmologists. The survey responses (depicted in %) were compared using the amount of pediatric clientele in one's practice (Group A: <25%, Group B: 25% or more). The responses were also analyzed in relation to the published concepts from literature. **Results:** Two hundred and ten ophthalmologists (2.74% response rate; 48% in Group A), from all over India, responded to the survey. There were wide discrepancies in the responses (both, in and among, Groups A and B; $P > 0.05$, Chi-square test), as to when and how much refractive error to prescribe in children, for a given situation. **Conclusion:** A wide gap exists between pediatric spectacle prescription patterns of Indian ophthalmologists, as compared to the recommended pediatric ophthalmology protocols. The management approach, for certain situations concerning the pediatric refraction, was better among those with higher pediatric clientele.

Key words: Children, glass prescription, spectacle prescription

Pediatric refraction has its unique challenges, namely, limited cooperation of children, variable refraction readings, associated amblyopia risk factors, etc., Another factor, which complicates the issue, is the different interpretations of the same refractive errors while prescribing in children by the ophthalmologists. This article focuses on the latter issue. Since spectacles, for children, are prescribed universally by all ophthalmologists, we thought that it was imperative to take their viewpoint by means of a web-based, anonymous survey. The survey was an attempt to understand the management approach of Indian ophthalmologists to some of the practical situations concerning pediatric refraction.

Methods

A web-based, anonymous questionnaire was sent to the available database of the All India Ophthalmological Society members through their E-mail IDs/social media (survey open from November 29, 2016, to June 30, 2017). The study was approved by the institutional review board. The questionnaire was posted on a website meant for hosting surveys (<https://www.surveymonkey.com/r/7NFQNV3>) and the web-link was shared with the ophthalmologists, along with an invitation to participate in the anonymous survey. Gentle reminders to respond to the survey were also sent twice. The survey was an open one, with no password protection. The Internet protocol (IP) addresses, as obtained from the survey website (www.surveymonkey.com), were used to ascertain the geolocation of the respondent (as assessed by the website www.mapcustomizer.com) and the same was charted on the Indian map, using the same website's software. This survey included

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practical, commonly encountered situations, concerning pediatric refraction. All ten questions of the survey had to be compulsorily answered by the respondent, before submission. Each question was a multiple choice type, with one of four responses, to be compulsorily chosen. The survey assumes that reliable refraction, using appropriate cycloplegic, has been done. The thrust was on decision-making approach: when and how do you prescribe for children, for a particular given refractive error? The responses (depicted in %) concerning the management of a particular refractive error were noted. The appropriateness of the responses to case-based situation (Q3–Q9) was analyzed, in relation to the recommended protocols, as per published literature. The responses were also segregated according to the amount of pediatric clientele in one's practice (Group A: <25%, Group B: 25% or more) and compared, using Chi-square test.

Results

Till the last date of compilation of data, 210 ophthalmologists responded to the survey (2.74% response rate, in spite of reminders). Of the respondents, 48% were in Group A (pediatric clientele <25%), possibly indicating general ophthalmology practice. The rest (Group B) had varying pediatric patient clientele percentages (25%–40% pediatric patients: 30% of respondents, 40%–60% pediatric patients: 6% of respondents, and > 60% pediatric patients: 16% of respondents). The synopsis of the responses to the survey questions is depicted in Table 1.

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The “desirable response” to a given specific case-based situation (for survey Q3–Q9), as per concepts in published literature, is also highlighted alongside^[1-5] [Table 1]. For the majority of pertinent issues, concerning pediatric refraction, there were discrepancies between the survey responses and the “desirable” responses^[1-5] [Table 2]. The management approach on certain issues (moderate hyperopia, pseudomyopia, high astigmatism, and the first screening in asymptomatic child) in the survey differed significantly between Group A and B while it did not significantly vary for others [prescription of refractive error in normal range for a particular age, anisometropic management, and refractive error monitoring; Table 2]. Interestingly, almost two-third of the responders (67%) participated in the spectacle-making process, by indicating the material of lenses and frame to be made, in the spectacle prescription [Table 1]. The geolocation of the responders, as assessed by the website (<https://www.mapcustomizer.com>), was charted out on the Indian map (<https://www.mapcustomizer.com/map/Distribution%20of%20survey%20>

responses%20on%20India%20Map). Although the survey responses were received from across the country, majority of responses (74%) were from the metropolitan areas.

Discussion

To the best of our knowledge, this is the first cross-sectional study highlighting descriptive data about the management approach of spectacle prescription in children, among Indian ophthalmologists. This survey was a unique attempt to understand the prevalent practice patterns, regarding practical situations concerning pediatric refraction.

The number of pediatric patients in one’s practice was used as a criterion to segregate responses, as the label of “pediatric ophthalmologist” is still vague in India, due to lack of recognized/standardized specialty fellowship/training programs and the mixed nature of ophthalmic practice, often tilting in favor of general ophthalmology. As is apparent from the survey, pediatric refraction was handled by ophthalmologists, with varying degrees

Table 1: Summary of responses to individual survey questions

Survey question/situation	Summary of survey responses	Desired response, as per literature
Q1: What % of your practice are pediatric patients (overall)?	Answer 1: Almost half (48%) had pediatric clientele <25%, Group A, Group B (52%)	NA
Q2: How are glasses, in children, prescribed at your setup?	Answer 2: Optometrist refracted and ophthalmologist prescribed (53%); ophthalmologist only (32%); optometrist only (8%); 7% would refer to PO	NA
Q3: 3-year-old child, CR+1.5 Dsph/–0.5 Dcyl/180° OU. Aligned eyes, AS and PS ur. What would you do?	Answer 3: About 39% would prescribe as per PMT. Others (61%) would reassure	Answer 3: Reassure at present (conservative management) ^[1]
Q4: 5-year-old; unaided vision of 6/18p OD and 6/12p OS; aligned eyes (on torchlight), full ocular movements; AS and PS ur. CR reveals +4.5/–1.0/180° OU, PMT: +2.0/–0.5/180 OU (BCVA 6/12p OD, 6/9p OS). How much would you prescribe?	Answer 4: 88% prescribe as per PMT; One-third would also start patching; only 12% would consider PO referral (detailed orthoptic and amblyopia review)	Answer 4: Detailed PO review (orthoptic and amblyopia review required) ^[2]
Q5: 8-year-old comes with blurred vision OU for 1 week. Unaided vision 6/36 OD, 6/18p OS; Dry acceptance: OD -4.5 Dsph (6/12); OS 2.5 Dsph (6/9). AS and PS ur; Aligned eyes (torchlight); CR show +0.25 Dsph OU. What would you do next?	Answer 5: Majority (72%) would prescribe myopia as per PMT/under-corrected dry acceptance; 28% would consider cycloplegia and transient bifocals	Answer 5: Cycloplegia and transient bifocals (case of pseudomyopia) ^[3]
Q6: 6-year-old girl; Unaided vision 6/36 OU aligned eyes, AS, and PS ur; CR: +5.0 Dsph/–4.5 D cyl/180° OU. PMT: +2.0 Dsph/–2.5 D cyl/180° OU (BCVA 6/18p OU). Which of the following prescriptions would you agree with?	Answer 6: About two-third would consider under-corrected cylindrical correction	Answer 6: +4.0/–4.5 Dcyl/180° (full cylindrical correction required) ^[4]
Q7: 2-year-old boy with pseudostrabismus, CR (atropine 1%): OD +4.5 Dsph; OS + 1.5 Dsph. AS and PS ur. What would you do?	Answer 7: About one-third would conservatively manage	Answer 7: Early spectacle prescription, in view of possible anisometropic amblyopia and amblyopia review ^[5,6]
Q8: How do you monitor a child with REs?	Answer 8: 99% would monitor vision, alignment, and stereoacuity in follow-ups	Answer 8: Visual acuity, alignment check, and stereoacuity, all are required ^[5]
Q9: When should the first screening of REs be done, in an asymptomatic child?	Answer 9: 60% favor age-based RE screening; 40% favor screening only when a child can read letters or if there is misalignment of eyes	Answer 9: Screening of asymptomatic children at 3 years (school joining age) ^[7]
Q10: Who decides about the material and design of spectacles, in a child?	Answer 10: two-third ophthalmologists (67%) participate in choosing the specifications	NA

PO: Pediatric ophthalmology, CR: Cycloplegic refraction, OU: Both eyes, AS: Anterior segment, PS: Posterior segment, PMT: Postmydriatic test, BCVA: Best-corrected visual acuity, ur: Unremarkable, NA: Not applicable, REs: Refractive errors, OD: Right eye, OS: Left eye

of pediatric clientele. In fact, almost half (48%) were presumably general ophthalmologists (Group A, <25% practice) and only a minority (16%) had major pediatric clientele (>60% practice). Understandably, the responses of Group B were better than Group A, on some issues of pediatric refraction [management of pseudomyopia, high astigmatism, and the first screening of refractive error; Table 2]. However, in both the groups, there were wide variations in the responses [Table 2]. The latter suggests that there is a dire need to spread awareness on issues concerning pediatric refraction, among all group of ophthalmologists, irrespective of the amount of pediatric clientele in their practice.

In the survey, Q3 [Table 1] was included to judge the concept of emmetropization. However, only less than two-third (61%) the responders were confident of conservatively managing the refractive error, which was normal for a particular age [Answer 3, Table 1]. The learning pearl that needs to be propagated is that refractive error needs to be prescribed in children, only if amblyogenic enough.^[1] A ready reference, for the spectacle prescription protocols for young children, can be obtained from the consensus-based guidelines by the American Academy of Pediatric Ophthalmology and Strabismus.^[1]

As regards to the management of moderate hyperopia [Q4, Table 1], the majority (85%) opined about prescribing according to subjective acceptance, and one-third (30%) would start additional occlusion therapy for amblyopia, based on the documented asymmetric visual responses. It is well known, that while prescribing hyperopic refractive errors, apart from subjective acceptance, we also need to take into account parameters like accommodation, alignment status, fixation preference and binocularity.^[2] These evaluations might require the help of a trained pediatric ophthalmologist though only 13% had indicated in the survey that they would do so [Table 1].

The issue of accommodative spasm, leading to pseudomyopia, was highlighted in Q5 of the survey [Table 1]. The former is a well-documented component of spasm of near reflex, where recent onset myopia develops, with a significant disparity in dry and wet refractions.^[3] With the increasing use

of screen-based devices for long hours, this entity is surely showing an increasing trend.^[3] These cases indeed benefit with cycloplegic therapy (often require atropine 1% for few weeks) along with bifocal spectacles for temporary use.^[3] The desirable option was, however, chosen by about one-third (31%) of responders in the survey [Answer 5, Table 1].

Question number 6 of the survey debated the utility of under-corrected astigmatism (65% of respondents) versus full-corrected astigmatic prescription (35% of respondents). It is imperative to understand that astigmatism (>2 D) is a potent stimulus for amblyopia, as unlike spherical errors, it is not neutralized enough by accommodation.^[4] Hence, unless we fully correct both meridians in astigmatism, we would not be able to achieve the amelioration of amblyopia.^[4] Interestingly, children are easily receptive to high astigmatic errors (up to 4.5–5.0 D) compared to adults, probably because children with such refractive errors are already amblyopic to begin with.^[5] If the child has symmetrical meridional amblyopia (no preferential fixation), they tend to catch up over time with just appropriate spectacles (alternate patching may not be required).^[4] Needless to say, that the cases with high astigmatic errors also need to be evaluated to rule out corneal ectasia.

On the issue of tackling anisometropia [Q7, Table 1], about one-third (35%) opted for conservative management (would wait either for the child to give a reliable visual response or would prescribe only if squint develops or would just watch for the stability of refraction over time). It needs to be understood that anisometropia (especially anisohypermetropia) is another potent stimulus for amblyopia.^[5] The cut off limits, for prescription of anisometropic refractive errors, are lower than those for symmetrical, isometropic refractive errors.^[1] Furthermore, there are objective methods to evaluate amblyopia (like the vertical prism fixation test) in preverbal children.^[6] One need not necessarily wait for child’s visual responses alone; otherwise, the unwarranted delay would lead to dense amblyopia, which would be tough to tackle at a higher age.

Table 2: Congruity of survey responses with desirable response and comparison of responses according to pediatric clientele in practice

Survey question number	Issue/concept	Desired response	Congruity of survey responses with desirable response (%)	Group A	Group B	P (Chi-square test)
3	RE within NR for age	Observe	61	55/101	67/109	0.303
4	Moderate hyperopia	PO review	12	15/101	5/109	0.011
5	Pseudomyopia	Cycloplegia and bifocals	28	16/101	36/109	0.004
6	High astigmatism	Full cylindrical correction	35	27/101	45/109	0.026
7	Anisometropia	Prescribe and patch	65	62/101	73/109	0.399
8	RE monitoring	Visual acuity, alignment, and binocularity	99	98/101	104/109	0.541
9	First RE screening in asymptomatic child	School joining age (3-5 years)	48	28/101	52/109	0.004

RE: Refractive error, NR: Normal range, PO: Pediatric ophthalmology

In the survey, it was reported that an overwhelming (99.9%) would monitor their cases of refractive error, at follow-up visits, with visual acuity, alignment evaluation, and by checking their stereo vision [Answer 8, Table 1]. The previous statement is indeed an ideal scenario. But going by the wide discrepancy between the chosen and “desirable” responses, in the survey, presumably, the situation is otherwise.

In the survey, however, 60% of the respondents favor an age-based refractive error screening [23% would prefer at 6 months while 37% would screen at 3 years of age; Q9, Table 1]. A significant group (40%) would screen for refractive errors only when a child is able to give a verbal response or if strabismus develops. The benefits of vision screening at an early age has been well recognized.^[7] However, many debates that a vision screening module tends to pick up children with only moderate or high refractive errors.^[7] An integrated approach of refractive error screening with vision screening is obviously better.^[7]

It was heartening to note that almost two-third of the responders (64%) participated in the spectacle making process, by indicating the nature of lenses and frame, to be made. In fact, all prescribing ophthalmologists should have a working knowledge about the same.^[5] CR39 lenses are the universally preferred lenses, due to the fact that they have lightweight and have less traumatic potential. In case of one eye status of a child or a specific requirement for eye protection (e.g., contact sports), polycarbonate lenses are preferred (although they are costlier). Large aperture frames are preferable to avoid looking “over or under the frame.” Appropriate fitting and optical centration is extremely important in children, especially for astigmatism. Adjustable nose pads and elastic self-retainers (headbands) may be used. Rimless frames need to be avoided in children (again especially for astigmatism). Special situations require modifications, for example, the use of high-index lenses for high refractive errors, use of bifocal lenses in a case of high AC/A ratio, and use of tinted lenses in cone dystrophies.^[5]

The limitations of an online survey are well known.^[8] The poor participation and small sample size, which is what we saw in our series, limits the understanding of practice patterns of the community. In multiple choice formats, the self-reported responses may vary from true practice patterns of the respondents. However, there were many positives too that this amateur exercise (survey) elicited. To the best of our knowledge, this is the first attempt, in India, to gather information on the important subject of pediatric refraction. Second, the model of the survey, using practical examples of

pediatric refraction, helped us in gaining insights on practice patterns of Indian ophthalmologists and the same approach can, perhaps, be used as a teaching module to spread awareness on the subject. Moreover, the wide geographical distribution of the survey responses, from all over the country, possibly adds more credibility to the survey, in spite of the lower number of respondents, *per se*. Probably, more extensive survey/workshops, promoted by national- and state-level ophthalmic societies, will improve participation rates and help in spreading awareness on the pertinent subject.

Conclusion

There is a wide variance in practice patterns, while prescribing spectacles in children, among Indian ophthalmologists, irrespective of the magnitude of their pediatric clientele. There is a dire need to spread awareness about incorporating the concepts of amblyopic potential, ocular alignment, binocularity, accommodation, etc., along with subjective visual acuity response, while prescribing spectacles in children.

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Conflicts of interest

There are no conflicts of interest.

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