Quality of spectacles in school going children in urban India

Dear Editor, Recently, Gogate et al. reported a poor compliance (300 out of 1018 [30%]) of spectacle wear amongst rural secondary school children.[1] About 17.4% of children in the same study reported “broken spectacles” as the cause of non-wear. In a fresh report, Mohan[2] stated that about 22% of spherocylinders in adults “had normal vision” and in children, the same percentage was 22%. In a recent report, 22% of spectacles were not worn in adults and 22% of the spectacles were not worn in children.

We feel the issue of dispensing spectacle frames and lenses need further evaluation especially in young children. Incorrect frame fitting may have far-reaching consequences on the quality of spectacles. Inappropriate lenses would have an additional negative impact on the vision of the patient.

We evaluated the spectacles (frames and lenses) of 54 consecutive children based on predefined criteria [Table 1]. The age group was 5-15 years of which 31 were males and the average duration of spectacle wear was 9.4 months (±2.7, range: 5-15 months).

We required a sample size of 51 patients for group comparison and performed Chi-square test to derive the P value. (n = 2 [Z1−α/2 − Z1 − B] 2Xp[1 − p]d2, 80% power, 5% significance, 10% effect size).

About 61.1% children used plastic frames, 14.1% used metal frames and 24.1% used combination frames (hybrids). Evaluation of frame fitting revealed good four point touch in 55.6%, fair in 18.5% and poor in 26%. The eye wire was optimal in 62.9% and suboptimal in 38.1%. The nose bridge was graded as not good in 66.7%. The temple parallelism was ideal in 53.7%. The temple length was adequate in 48% and inadequate in 51.8%.

The spectacle lens evaluation revealed a mean decentration of 3.5 mm (SD ± 1.4, range: 1-6). Plastic lenses were used in 94.4% and glass lenses in 5.6%. The lens surface was graded good in 16.6%, fair in 37% and poor in 46.3%. The mean error in cylinder axis was 4.4° (SD ± 11.0, range: 0-90).

We concluded that the optical dispensing (frames as well as lenses in its entirety) in children was poor irrespective of the gender, age, type/material of the frame or duration of wear [Fig. 1]. More patient (parent) education and responsiveness in the lens power was 0.02D (SD ± 0.5D range: −4.0D to + 1.0D). The mean error in cylinder axis was 4.4° (SD ± 11.0, range: 0-90).

Overall, quality of spectacle fitting was 1.25 on a scale of 0-3 (0 = worst, 3 best) and quality-of-lenses was 1.67 on a scale of 1-3 (1 = poor, 2 = fair, 3 = good).

No statistically significant differences [Table 2] were found in the overall quality of frame fitting or quality of lenses between the age group (less than or more than 7 years [P = 0.7,1,0]), gender (male or female [P = 0.3,0,2]), type of frame (metal or plastic [P = 1.0]) and type of lenses (plastic or glass [P = 0.9]) and duration of wear (less than 6 months or more than 6 months [P = 0.5,0,2]).

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| Table 1: Criteria used for spectacle frame and spectacle lens evaluation |
|-----------------------------|---------|---------|------|
| Spectacle frame criteria    | Good    | Fair    | Poor |
| Four point touch test       | Good    | Fair    | Poor |
| Eye wire                    | Optimal | Suboptimal |
| Nose pads                   | Good    | Not good |
| Temple                      | Parallelism |
| Pressure                    | Ideal   | Suboptimal |
| Length                      | Adequate | Inadequate |
| Spectacle lens criteria     | Centration error in millimeters (mm) |
|                            | Power error in diopters (D) |
|                            | Axis error in degrees |
|                            | Surface quality |
|                            | Good    | Fair    | Poor |

| Table 2: Criteria for ideal spectacle frame and spectacle lens in children |
|-----------------------------|---------|---------|------|
| Spectacle frame criteria    | All four points on the spectacle frame (two points from each side of eye wire and one each from temple) should touch the flat surface simultaneously when placed as shown in Fig. 1b |
| Eye wire                    | Should cover both the eyes completely all around permitting the patient to view from the spectacle in various ocular positions and head positions without coming in contact of periocular skin |
| Nose pads                   | They should sit symmetrically on the lateral side of the nose bridge and should be angled in a manner that prevent repeated slippage or excessively close placement of spectacle lens resulting in eyelash brushing the lens or repeated oil/sweat drop-lets from eye brow fogging/smudging the lens |
| Temple                      | The temples should be parallel to each other |
| Parallelism                 | There should be mild, uniform and symmetric pressure of the temples on the forehead without causing serious imprinting on the skin. A metallic component of the frame should not come in contact of skin |
| Pressure                    | The temple should not project more than 2 mm out beyond the mastoid bone |
| Length                      | The optical center should be within 2 mm of visual axis |
| Spectacle lens criteria     | The surface should have to fractures/pitting/scratches in the center of the lens |
| Centration error in mm      | ≤0.25D  |
| Power error in D            | ≤5°     |
| Axis error in degrees       |         |
| Surface quality             |         |
of the opticians is needed to improve the quality of spectacle dispensing. Both, the frame evaluation and lens evaluation are necessary.

It may be advisable that the patient come back with the newly dispensed spectacle for a quality check to the ophthalmologist soon after they are dispensed. The ophthalmologists must refer to ideal fitting and quality criteria [Table 2] to ensure an optimum lens and frame dispensing.

Further studies are needed to assess the impact of improved spectacle fitting and quality of lenses on the compliance of spectacle wear in children, which in turn may translate in the better and faster visual rehabilitation.

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