

Unmet Need For Refractive Correction And Its Associated Factors Among Secondary School Children In Attock , Pakistan

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Abstract

Purpose: To determine the need for refractive correction, unmet need and met need for refractive correction among secondary school children of district Attock, Pakistan.

Methods: This descriptive cross-sectional study was carried out at four secondary schools in the district of Attock. Two schools were chosen from urban area including one boy's school and one girl's school, similarly two schools were chosen from rural area. Visual acuity (VA) was assessed by using Snellen visual acuity chart at the distance of 6 meters. Need for refractive correction was defined as uncorrected VA of $\leq 6/12$ at least in one eye which can improve with pinhole. A measure of met need was defined as the percentage of children who were previously refracted and wearing glasses. The unmet need was defined as the percentage of children who require refractive correction but had never got refractive glasses.

Results: Vision screening of 1741 students with age range 11-16 years was carried out. Among the total screened children the need for refractive correction was determined to be 15.68%, of which 11.66% was estimated as unmet need and just 4.02% was estimated as met need. The need for refractive correction among boys was found as 14.09% while it was estimated as 17.04 % among girls. According to estimates, there was 16.11% need for refractive correction in urban area, of which 11.18% was unmet needs and 4.92% was met need. In Rural area the need for refractive correction was found 15.01% out of this 12.39% was calculated as unmet need and 2.62% was calculated as met need.

Conclusion: Unmet need was found higher and risk factors for unmet need includes accessibility and affordability issues along with rural residence. This unmet need could be addressed by ensuring that reasonably priced refractive and dispensing services are available locally.

Keywords: Need for refractive correction, unmet need, Met need, and Spectacle coverage.

Introduction

Estimates reported by the World Health Organization, shows that around 19 million children under the age of 15 worldwide have some form of visual impairment. Uncorrected refractive errors are regarded as one of the main contributors of preventable vision impairment.¹ It is estimated that more than 12 million visually impaired children are living with uncorrected refractive errors.² School children having need for refractive correction may experience negative effects on their academic achievement, social interactions, and school performance.³ Refractive errors can adversely and even permanently impact people's quality of life if they are not addressed which could adversely impact children's professional future opportunities.⁴

Studies reported that the most frequent cause of avoidable visual impairment is refractive errors, and, simultaneously, the most easily manageable in children.^{5,6,7} Despite the fact that they may be detected and corrected easily with the right glasses, uncorrected refractive errors contribute a large to avoidable visual impairment.^{8,9}

Uncorrected refractive errors were considered as a major public health issue by WHO and included among the five priority areas of Vision 2020 Initiative. This initiative was also known as 'The Right to Sight' launched by World Health Organization with partnership of nongovernmental organisations.¹⁰

Children with met need for refractive correction attain better academic results on comparison with children having unmet need for refractive correction.¹¹ Unfortunately unmet need for refractive correction was reported very high such as 93% and 92% in rural areas of Nepal¹² and India¹⁰ respectively. Unmet need was also reported high in some other countries including Durban South Africa¹³ and La Florida¹⁴ where it was estimated as 83% and 76% respectively. The estimated unmet need for spectacles in the children of secondary schools in Islamabad was

also found high and reported as 73%.¹⁵

Accurate estimations of unmet need for refractive correction are required in order to overcome the effects that they could have on school performance and future opportunities of students.⁴ The need of the time is to conduct comprehensive surveys for estimation of unmet need for refractive correction and spectacles coverage rate among school age children. The aim of the present survey was to find out need for refractive correction, unmet need for refractive correction and spectacle coverage among secondary school children of district Attock, Pakistan.

Material & Method

Study Design

This descriptive cross-sectional study was carried out at four secondary schools in the district of Attock.

Sampling Method

Girls' and boys' schools from rural and urban areas of district Attock were chosen to create a truly representative sample of the district. Stratified random sampling was used to choose the schools. For the aim of screening, universal sampling technique was applied.

Procedures:

The study's primary investigator went to the participating schools to inform the school administrators about the study protocol. Additionally, an information sheet and a letter of permission from district education officer (DEO) were provided by the principal investigator to each school's head of administration. The school administrators gave their freely informed approval to have children's vision screened. A qualified optometrist measured the un-aided VA with standard Snellen's vision chart at the distance of six meters. Students having VA of $\leq 6/12$ undergone vision assessment with pinhole.

Students were classified as having refractive error if their visual acuity improved with pinhole. Students with VA of $\leq 6/12$ who did not improve with a pinhole examination were referred to an ophthalmologist. Uncorrected VA of $\leq 6/12$ that improves two lines or more on the pinhole test was considered to be in need of refractive correction. Met need was determined by the percentage of children who were previously refracted and wearing glasses. Unmet need was considered as the percentage of children who need refractive correction but had never tested for eyesight.

Data Analysis

The Statistical Package for Social Sciences (SPSS) version 21 was used to evaluate the data after it had undergone data editing. Need for refractive correction, met need, and unmet need for correction were reported as percentages. Associations were found using the chi-square test of significance and a P-value of 0.05 was considered statistically significant.

Results

Vision screening was conducted in four secondary schools of the district Attock and 1741 children were assessed for VA. Two schools were chosen from urban area including one boy's school and one girl's school. Similarly, two schools were chosen from rural area.

Screening of 1055 children was carried out in urban schools which is 60.59% of all the screened children. Out of screened urban children 492 were boys and 563 were girls that is 28.26% and 32.34% of all the screened children respectively. Children screened in the rural schools were 686 which is 39.40 % of all the screened children. Children screened in the rural schools include 310 boys and 376 girls that is 17.80% and 21.60% of all the screened children.

Need for refractive correction

A total of 1741 students were examined for this

study; of those, 273 had unaided VA of $\leq 6/12$, which might be improved with pinhole, these were identified as the cases that need refractive correction. Prevalence of need for refractive correction was calculated as 15.68% of the total screened students. The need for refractive correction among the children of urban area was estimated as 16.11% whereas among the children from rural area this need was estimated as 15.01%. The need for refractive correction among boys was found as 14.09% while it was estimated as 17.04 % among girls.

Met & Unmet Need for refractive correction

Following two methods were used to determine the unmet need for refractive correction:

- Unmet need for refractive correction among total screened (1741) children
- Unmet need for refractive correction among children (273) with refractive error.

Met & Unmet need for refractive correction among total screened students:

Among the 1741 students that underwent screening, the need for refractive correction was determined to be 15.68%, of which 11.66% was estimated as unmet need and just 4.02% was estimated as met need. According to estimates, there was 16.11% need for refractive correction in urban area, of which 11.18% was unmet needs and 4.92% was met need. In Rural area the need for refractive correction was found 15.01% out of this 12.39% was calculated as an unmet need and 2.62% was calculated as met need.

The need for refractive correction among screened boys was calculated as 14.09%. The met need among total screened boys was estimated as 3.74%, whereas unmet need among these boys was estimated as 10.34%. On the other hand the need for refractive correction among screened

girls was found as 17.04%, out of these screened girls 12.78% of need for refractive correction was

observed unmet need while 4.26% was observed as met need.

Table1: Distribution of need, unmet and met need for refractive correction by residence and gender.

| Refractive Needs | Urban | | | Rural | | | Total |
|--------------------------------------|--------------|---------------|-------------|--------------|---------------|-------------|------------|
| | Boys No. (%) | Girls No. (%) | All No. (%) | Boys No. (%) | Girls No. (%) | All No. (%) | |
| Need for refractive correction | 72(14.63) | 98(17.41) | 170 (16.11) | 41(13.22) | 62(16.48) | 103 (15.01) | 273(15.68) |
| Met need for refractive correction | 23(4.67) | 29(5.15) | 52(4.92) | 7(2.26) | 11(2.93) | 18(2.62) | 70(4.02.) |
| Unmet need for refractive correction | 49(9.96) | 69(12.26) | 118 (11.18) | 34(10.97) | 51(13.56) | 85(12.39) | 203(11.66) |

According to Table 1, of the urban boys who were screened, 72 boys (14.63% of the total screened boys) needed refractive correction. Among these 72 boys having the need for refractive correction, only 44 boys were refracted and advised spectacles before. Among these refracted boys 21 were not using spectacles and were considered as having an unmet need whereas 23 were using spectacles and considered as boys with a met need for refractive correction. Met need for refractive correction among urban boys was calculated as 4.67% of the screened urban boys (492). As only 44 students were refracted before and the remaining 28 boys were never refracted before, these 28 boys and 21 boys who were refracted and given spectacles before but were not using collectively (49 boys) are considered as boys with unmet needs. Therefore unmet need for refractive correction among urban boys was calculated as 9.96 % of the screened urban boys (492).

In urban areas, refractive error was detected in 98 girls which represents 17.41% of screened urban girls (563). Of these 56 were advised spectacles before but only 29 were using spectacles and were considered as met need. The

met need among screened urban girls (563) was calculated as 5.15%. The unmet need was calculated by considering those girls who were not refracted before (42) plus the girls (27) who were not using spectacles even after getting a prescription or spectacles before. Therefore the unmet need among screened urban girls was calculated as 12.26%.

In the rural area, 41 boys were identified with a need for refractive correction which is 13.22% of all screened boys (310) in the rural area. Only 13 rural boys (31.71% of the prevalent cases) received spectacles before. Among the rural boys who got spectacles before only 7 boys were using spectacles whereas 6 boys were not using and these were considered as having unmet need for refractive correction. The rural boys who never got spectacles before (28) were also representing the unmet need for refractive correction among rural boys. The calculated met the need and unmet needs among screened rural boys were estimated as 2.26 and 10.97% respectively..

Refractive correction was needed in 62 rural girls (16.48% of those tested) of them, 18 (29.03% of the prevalent cases among rural girls) received spectacles, and only 11 were using them. The met

need for refractive correction among screened rural girls was estimated as 2.93%. The remaining 7 girls who got spectacles before and were not using along with those girls who never got spectacles before (44) were considered as having unmet need. The rate of unmet need for refractive correction among screened rural girls was estimated as 13.56%.

Prevalence of need, unmet need, and met the need for refractive correction can be best compared among residence and gender through a bar graph. It is shown in Figure 1 that unmet need is comparatively more in girls than boys but this is not a statistically significant difference on the chi-square test. There is also an observable difference in the unmet need among rural areas and urban areas and this difference is statistically significant on the chi-square test with p-values $.01 < 0.05$ and OR 1.1 (CI: 1.04 – 1.36).

Figure 1: Comparison of need, met need and unmet need among gender and residence.

Met & Unmet need for refractive correction among the 273 students with refractive error:

After the screening of 1741 students 273 students were found who need refractive correction, 131 of these children had their vision corrected and were previously fitted with glasses, making up 47.99% of all cases. Whereas 142 children never got their vision checked before and constitute 52.01 % of the prevalent cases. There were 70 children who had received spectacles previously and were still wearing them, making up 53.44% of the total. The remaining 61 children who received spectacles previously and were not using them represent 46.56% of the children who got spectacles before.

It was calculated that 25.64 percent of children with visual acuity $\leq 6/12$ had met their needs. This met need was calculated by considering 70 children who were using

previously prescribed spectacles. The unmet need was calculated by adding 142 children who never got their vision checked before and 61 children who were refracted before but were not using spectacle at the time of vision assessment. Therefore the unmet need for refractive correction among the children having need for refractive correction was estimated as 74.36%.

Spectacle coverage rate

The spectacle coverage rate in this study was calculated as following :

$$\text{Spectacle coverage} = \frac{\text{Met Need}}{\text{Met Need} + \text{Unmet Need}} \times 100$$

The calculated spectacle coverage rate among the secondary school children in Attock was found as 25.64% of the prevalent cases. In urban areas, the spectacle coverage rate was estimated as 30.59% whereas it was estimated as 17.48% in rural areas. Among boys who need refractive correction spectacle coverage was estimated as 26.54% whereas among girls it was estimated as 25%.

Fig: 2 Spectacle coverage rate among residence and gender

Figure 2 shows that the spectacle coverage rate is higher in urban areas as compared with the spectacle coverage rate in rural areas. This is in accordance with the association between unmet need and residence which is statistically significant found by the chi-square test. The difference in spectacle coverage rate among boys and girls is not observable and is not statistically significant on the chi-square test.

Factors Associated with Unmet Need

Residence:

In the current study, it was found that 85.5% of children from rural areas were facing the problem

of unmet needs. Association between residence and unmet need was found and was statistically significant on the chi-square test with p- a value as $.01 < 0.05$.

Affordability:

It was also discovered that affordability was a significant factor in unmet refractive needs and this issue affected 67.2% of the participants. Association between unmet need and affordability was found significant on the chi-square test where the p-value was 0.00 which is less than 0.05.

Accessibility:

In this study 34.42% of respondents reported having a general accessibility issue. This was a

significant problem for rural areas, which made up 21.3% of the study's participants, and respondents from urban areas also mentioned it. Association among unmet need and accessibility was found significant on the chi-square test where the p-value was obtained as 0.01 which is less than 0.05.

Fig:3 Comparison of factors associated with unmet -need.

The association of different factors with unmet needs was measured with the help of a chi-square test. A summary of all the findings of the statistical test including the value of chi-square, p-value, Odds Ratio (OR), and Confidence Interval (CI) is presented in Table 2.

Table 2: Association of different factors with unmet need for refractive correction.

| Factors | Chi-square | P-value | Odds Ratio | CI |
|---------------|------------|---------|------------|-------------|
| Residence | 5.78 | .01 | 1.1 | 1.04 - 1.36 |
| Affordability | 28.32 | .00 | 4.5 | 2.53 - 8.01 |
| Accessibility | 5.5 | .02 | 2.1 | 1.12 - 3.93 |

OR = Odds Ratio, CI = Confidence Interval

DISCUSSION

I Prevalent need for Refractive correction (Need for spectacles):

The first objective of this study was to find out the need for refractive correction and this objective found a 15.68% prevalence of refractive correction need. The prevalence rate found in this study is in accordance with a prevalence rate of 16.78% estimated in secondary school children of Islamabad Pakistan.¹⁵ This prevalence rate is also similar to 17.1% and 17.24% found in studies from Malaysia and Pakistan¹⁶ Prevalence found in the present study is also lower than 19.8%¹⁷, 20.07 %¹⁸ and 20.43 %¹⁹ reported by similar studies from Pakistan. The present prevalence is less than 22% reported in a study conducted by Abdullah et al. (2015) on the adult Pakistani population above 30 years

of age.²⁰ Similar results 25.2% were reported by Rudnicka et al., (2016) among South Asian children in England.²¹

The need for refractive correction found in the present study is more than 8.9% ²²and 10%²³ prevalence was reported by studies from Pakistan. The mean age of the students in the previous studies was less than 10 years whereas the mean age in the present study is 13.72 years due to which chances of myopic refractive error increases in the present study.

2 Met and Un-met needs for refractive correction:

Met need for spectacles among the 11-16-year-old children having visual acuity $\leq 6/12$ was found as 25.64% which is similar to the findings of a study conducted on secondary school children of Islamabad that reported met need for

refractive correction as 26.25%.²⁴ Met need estimated in this study was also similar to the findings of a study conducted on an adult population of Bangladesh which calculated met need as 25.2%.²⁵ Whereas the present met need is higher than 15.1% among the adult population above 30 years, as found in the national blindness and visual impairment survey.²⁶ Met need found in the present study is less than 51.4% reported in a study on school children from Iran.²⁷ Present met need is also less than 66% estimated in a study from Tehran which uses a study population 5 years of age and above.²⁸

The unmet need for refractive correction in the present study is estimated as 74.36% which is in accordance with the unmet need 73.75% reported in a study from Pakistan.²⁴ Present unmet need is also in accordance with 76%, 73%, and 72% reported in studies from La Florida¹⁴, Shunyi District²⁹ and New Delhi respectively.⁶ Present unmet need is greater than 45% and 55% estimated by studies conducted in Guangzhou³⁰ and Malaysia.¹⁶ Estimated unmet need in the present study is less than 93%, 92%, and 83% reported in studies from rural Nepal¹², rural India¹⁰, and Durban South Africa¹³ respectively.

Unmet need for refractive correction among (1741) the total screened students was calculated as 11.66% which is in accordance with 12.4% reported in Pakistan²⁴ and 11.23% reported in Iran.⁴ Estimated unmet need is more than 9.1% and 10.8% reported by Nigerian³¹ and Indian³² studies respectively.

3. Spectacle Coverage Rate:

In this study spectacle coverage rate among secondary school children was found as 25.64% of the students having need for refractive correction. Similar results as 25.2% of spectacle coverage rate were reported by a study conducted in Bangladesh.²⁵ Although the present study included children of age group 11-16 years and the study from Bangladesh included participants more than 30 years of age. The present estimated

spectacle coverage rate is less than the 33.3% reported in a study from neighboring country Iran⁴ that involves 7-year-old children. This spectacle coverage rate is also less than 29.3% found by a study from North India.³³

The spectacle coverage rate in this study is higher than the 15.1% reported by a study in Pakistan.²⁶

Conclusion:

Overall unmet need for refractive correction was found higher, the unmet need in rural areas was more than in urban areas. Unmet need was found associated with residence, affordability, and accessibility. Both the availability of more reasonably priced refractive services and the standard of currently offered services must be improved. In order to address unmet needs, it is important to raise awareness and make sure that reasonable refractive and dispensing services are offered locally. The provision of refractive services in rural areas can reduce the unmet need for refractive correction in rural areas.

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