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Original Research Article

Assessment of visual acuity defects among rural adolescent students of tribal Bastar Chhattisgarh (India)

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ABSTRACT

Background: Defective visual acuity is the most common problem among adolescents which, if remains uncorrected may cause refractive errors and may lead to blindness. Defective visual acuity can be tested early and corrected by spectacles**.** The objectives of the study were assessment of visual acuity defects among adolescent students.
Methods: Present study design is cross sectional community based study. Conducted during July to September 2017 in Higher Secondary School, Pandripani. Predesigned KAP questionnaires were used to collect information and visual acuity was measured by using Snellen's chart. Students with spectacles were tested for uncorrected and corrected visual acuity. Data was analyzed on MS Excel 2016.
Results: Visual acuity defect prevalence rises with age and maximum is seen in age group 19-20 years (85%).Male to female ratio in students with defects was 52:48 Maximum defect is seen in class 12th students (34%)**.**83% students never got their eyes checked out of which 25% had defective visual acuity. Positive attitude toward spectacles preventing normalization of eyes and spectacles leading to dependence and worsening of vision were elicited. Students whose parents have eye related problem have prevalence of 64%.83% of students advised to wear spectacles who don't have, cost of spectacle is most common cause (80%) and is preceded by not much difference in vision after wearing (20%).
Conclusions: The prevalence of visual acuity defect was high in rural adolescent. Eye screening of school going children is recommended and spectacles to be distributed free or at low cost to those students diagnosed with refractive errors.

Keywords: Refractive error, Adolescent, Student, Visual acuity, Spectacle, School going

INTRODUCTION

Refractive error could be considered as an avoidable condition among various conditions leading to visual disabilities in children. Provision of spectacles to the needy is a cost-effective health intervention. Hence the VISION 2020 initiative to eliminate avoidable blindness has given high priority to correction of refractive error and has placed it within the category of "childhood blindness."[1] Most of the children with uncorrected refractive error are asymptomatic and hence screening helps in early detection and timely interventions. In countries with high attendance of children in schools, integration of vision screening within screening for other health issues is recommended.[2] However, differences in the availability of access to eye care services and even the magnitudes of refractive error between rural and urban students are not considered.

Such a vision screening project was introduced in Chhattisgarh, India. The staff of community ophthalmology unit annually screens school children both in urban and rural areas. The children of remote rural areas are examined in mobile eye units, while the school teachers trained in vision screening examine students of urban schools. All children identified with refractive error are offered spectacles at low cost.[3]

We conducted a study in the school in Jagdalpur city as part of this screening campaign to assess the magnitudes and risk factors of uncorrected refractive error in 12-20 years old school children of rural tribal area. Based on the study results, we recommended policies for eye care of children in these age groups.

METHODS

This study was conducted between July to September 2017. Written consent of school principal of selected school was obtained. Verbal consents of students were obtained for screening them. The research protocol adhered to the provision of the Declaration of Helsinki for research involving human beings.

The students were selected according to their classes in the school. We randomly selected 258 students out of 308. To achieve 95% confidence limit and 90% of power in our study, we used STATCAL of Epi Info 6(Centers for Disease Control and Prevention, Atlanta, GA, USA) to calculate the sample size for our study.

The study field staff included three medical students trained in vision screening, one satiation, one ophthalmologist and one camp coordinator. Prior to the initiation of the study all field investigators were familiarized with the standard operating procedures involved. A pilot was conducted to validate the data collection forms to minimize inter-observer variations.

The students were given a written questionnaire to assess their knowledge, attitude and practices for visual acuity. The field investigators obtained a detailed history about present and past ocular disorders, history of medical or surgical treatment and a family history of refractive error in the siblings. The distant vision of a child was tested utilizing Snellen's chart.

The visual acuity was tested at with the chart at 6 meters. If uncorrected vision was <6/9 in either eye, the child was declared to have defective vision.

The data was entered in Microsoft Excel 2016 spread sheet after ensuring completeness of the filled forms. If any missing data was noticed, the concerned authority was contacted at the earliest and the details were rechecked.

We estimated the prevalence of uncorrected visual acuity using parametric methods and univariate type of analysis. To validate the data, we calculated frequencies, percentage and their 95% confidence intervals

All children with uncorrected visual acuity were advised proper balanced diet and an eye checkup and to wear spectacles if needed. Children with eye disease were further examined and managed at the base hospital free of cost. The study results were shared with the scientific fraternity and policies for improving eye care of children were proposed.

RESULTS

We evaluated 258 children that were randomly selected from a government higher secondary school. The coverage of screening was 258/308 (83.77%). The children significantly differed by proportions of students in 'age groups'. Visual acuity defect prevalence rises with age and maximum is seen in age group 19-20 years (85%). Male to female ratio in students with defects was 52:48. Maximum defect is seen in class 12th students (34%). 83% students never got their eyes checked out of which 25% had defective visual acuity. Positive attitude toward spectacles preventing normalization of eyes and spectacles leading to dependence and worsening of vision were elicited. Students whose parents have eye related problem have prevalence of 64%. 83% of students advised to wear spectacles who don't have, cost of spectacle is most common cause (80%) and is preceded by not much difference in vision after wearing (20%).

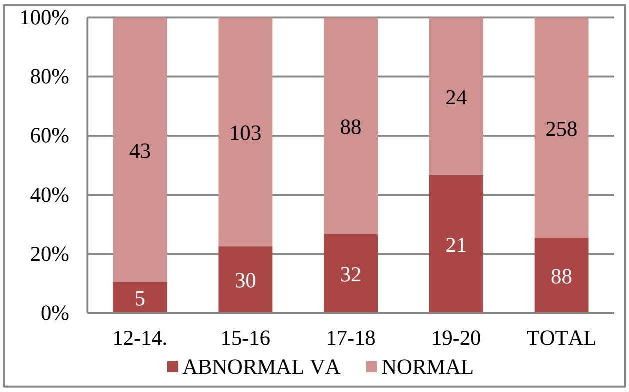

Figure 1: Visual acuity defect in various age group.

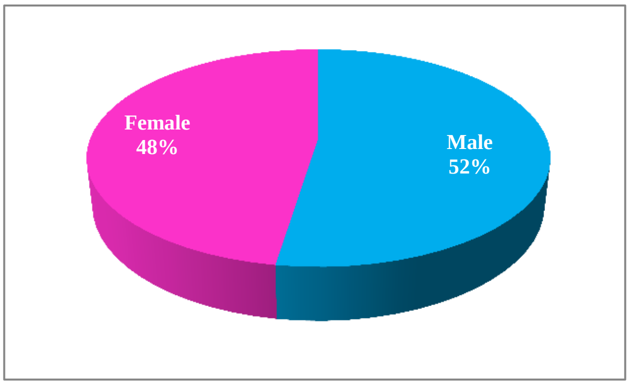

Figure 2: Male and female ratio of visual acuity defect.

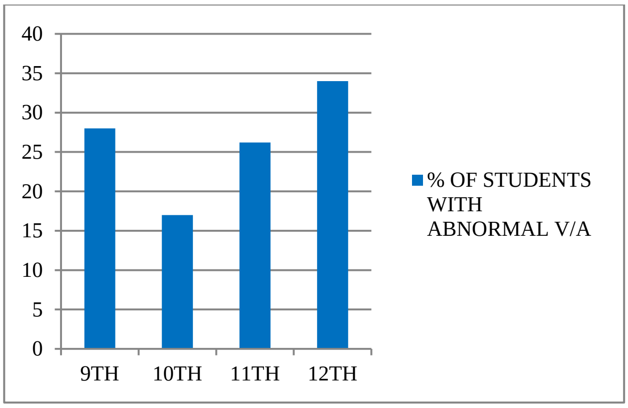

Figure 3: Class wise prevalence of visual acuity defect.

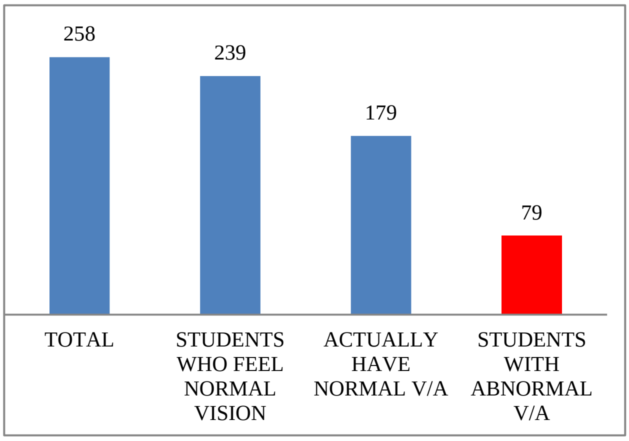

Figure 4: Students perception about their vision.

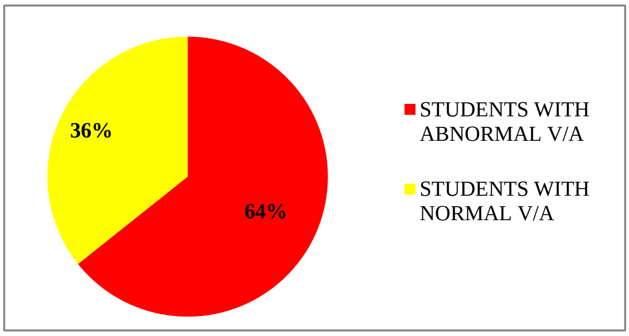

Figure 5: Students with abnormal V/A whose parents have eye related problems.

DISCUSSION

The prevalence of visual acuity defect was significantly higher in 12 to 20 years old school children of rural area. The coverage of refractive services was poor in rural areas. Children with visual acuity defects need timely treatment; otherwise they could become dense and irreversible refractive problem.[4]

Among school children in the study area, we focused on uncorrected visual acuity rather than the magnitude and risk factors of visual acuity defects. We found that even after accounting for the differences in rates by age groups and gender, the prevalence rates of defects were considerably different between school children that studying in different classes. One could speculate that this difference could be influenced by a combination of the following factors: (1) the screening methods used in rural areas, (2) the uptake of refractive services, (3) the difference in prevalence rates of refractive error and other eye conditions between children of rural areas. Proper methods with quality checks applied in our study ensured that differential methods had minimum influence on identification of children with visual acuity defects. In our study, we found that very less rural children with visual acuity defects used spectacles. Thus uptake of refractive services in the past does not seem to make a significant difference. Therefore, rates and the risk factors of refractive error among rural children truly seem to be different.[5]

The higher prevalence of visual acuity defects in rural areas of our study matched with the observations made in Delhi and Andhra Pradesh studies.[6,7] It should be noted that all these 3 studies used similar protocols. The prevalence of visual acuity defects in urban areas in our study was almost similar to the 5.65% reported in another study conducted in the past in Pune.[8] also observed that older children had higher risk of developing refractive errors and visual acuity defects.[9,10]

The prevalence and severity of visual acuity defects were significantly higher in children of urban schools compared to those of rural schools in Taiwan.[11] Lithander found that the prevalence of high visual acuity defects among 12-year-old girls was 2.82% compared to 13% prevalence in the general population. This could be due to genetic predisposition for high visual acuity defects among either females or children of semi-urban towns of Oman.[12,13] In our study, we did not observe visual acuity defects of such large magnitude among rural girls. Dandona et al in Andhra Pradesh Eye Diseases Study (AEPDS) study also noted that higher age was a predictor of visual acuity defects, and children of higher age had 2.5 times higher risk compared to young children.[14] Saw et al. in a study in Xiamen province of China, noted that 2nd grade students of urban area had defective visual acuity at the rate of 19.3% (95% CI, 12.3-29.0). Among children of rural area, it was 6.6% (95% CI, 2.4-14.3). Although defective visual acuity in urban students was linked to more near work compared to the students of rural area, element of chance in this observation could not be ruled out.[15] Prevalence of defective visual acuity was 2.9% in Sherpa (nomadic) children, while Tibetan children (settled in Nepal) had myopia at the rate of 21.7%.[16] Thus different studies suggest that defective visual acuity seems to be significantly associated to the life style in rural areas. While comparing outcomes of different studies, one should remember that the prevalence identified in studies on school-going children would be higher than that identified in studies on school-aged populations. [17]

Czepita et al noted that gender influences the occurrence of defective visual acuity in school-going children of age ranging from 6 to 18 years.[18] Therefore, while studying the magnitude of defective visual acuity in relation to rural and urban population, we conducted regression analysis. It is interesting to note that when we conducted univariate analysis, gender was not significantly associated to defective visual acuity in rural children; however, boys had higher risk of uncorrected refractive error after accounting for other confounders. This issue could be further studied by conducting a longitudinal study

Our study had few limitations. There was problem in communication due to language barrier. Accommodative spasm also could not be entirely ruled out.

General practitioners, school nurses, teachers and optometrists have been involved in eye and vision screening in different studies.[18,12,19,20] In our study, we involved teachers of rural schools and medical students and trained them in vision-testing procedures. Thus irrespective of the manpower used, if proper checks are in place, vision screening can be implemented and defective visual acuity among school children can be addressed. However, sustainability of such a different approach should be studied before recommending it to others to adopt it as a system.

Vision screening and refractive services for school students have been recommended by WHO.[2] The magnitude and causes of defective visual acuity seem to differ in different age groups. Hence refractive services should be adapted to the situation in the various areas of developing countries.

CONCLUSION

Refractive error needs careful evaluation and preventive care for school children which leads to impaired quality of life and hamper with their educational life. Assessing the risk factor will help health care provider and school authority to prevent and control the problem of refractive error in future generation which helpful for students to live a problem free life.

Recommendations

- Study can be done in large sample size.
- Same study can be done in different setting such as community.
- Comparative and combined studies can be conducted on other essential eye problems.
- Comparative study can be done between rural and urban setting.

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