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A Prospective Study to Assess the Quality of Preliminary Eye Screening Done on School Children by Teachers in Andhra Pradesh

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Abstract

Aim: To assess the quality of vision screening done by trained schoolteachers on schoolchildren.

Method: This study was carried out in Greater Hyderabad by selecting 10 schools in 3 different clusters by means of systematic random sampling. Teachers were imparted training for detecting vision defects and important ocular conditions and were permitted to screen the students using a protocol ascribed to them. Students who were screened by teachers were rescreened by optometrist to compare and analyse the outcome of the training imparted.

Results: A total of 25 schoolteachers were trained and utilized for screening 600 students in age ranging from 8 to 13 (mean is 10.5 and \pm SD is 1.87) girls constituting 55%. The impact of training increased knowledge level to 88%. Similarity found in detection of children with poor visual acuity <6/9 by both 'the trained teachers and optometrist. Significant eye conditions which required early intervention were detected with the help of signs and symptoms learnt through the training (Kappa statistic=0.95) suggesting an excellent agreement among the teachers and optometrist.

Conclusion: The study results suggest that trained teachers can be relied upon for screening children to identify various eye conditions including refractive errors. This study recommends incorporating a module on vision screening in the teachers' education curriculum and conducting screening in schools on a regular basis.

Keywords: Schoolchildren; Schoolteacher; Optometrist; Screening; Assessment; Visual acuity; Refractive errors; Ocular conditions; Visual impairment; Blindness; Childhood blindness

Introduction

A global initiative was launched by the World Health Organization in 1999 to eliminate avoidable blindness by the year 2020 [1]. Childhood blindness is one of the top priorities in this program as blind children contribute more cumulative blind years than adults who become blind later in life. Approximately, 500,000 children become blind every year and 70 million blind person years are added each year due to childhood blindness [2]. In India alone there are 270,000 blind children i.e. constituting approximately 19.0% of the blind population [3]. 'Visual disabilities in children' including the 'Childhood Blindness' should be addressed through a comprehensive program approach [4].

A recent study examined 6,935 children and estimated that the prevalence of childhood blindness was 0.17% (95% confidence interval 0.09 to 0.30) of which treatable refractive error caused 33.3%, followed by 16.6% preventable causes in which 8.3% due to vitamin A deficiency and 8.3% due to amblyopia after cataract surgery [5]. Such reports reveal that 50% of blindness is avoidable [6]. Most of the children population in India [7] is in rural areas where awareness on the conditions causing avoidable childhood blindness is relatively unknown [8]. Educating parents and teachers with adequate knowledge on these conditions would help in preventing the causes of

visual impairment, early detection and early intervention of these conditions.

A comprehensive eye health program was conducted for school going children supported by Lions Clubs International and Johnson and Johnson Vision Care 'Sight for Kids' undertaken by L V Prasad Eye Institute and Lions Partner eye facilities in Greater Hyderabad. This program is focused on the children studying in Government and Government aided primary and upper-primary schools in the underserved locations of Greater Hyderabad. In the process of screening, schoolteachers were utilized for detecting eye problems among the children after imparting a concise training. This study wanted to analyse the effectiveness of teachers' involvement in detecting children through preliminary screening in the pursuit of examining every child in the school and appropriately referring for addressing each and every eye condition; simple to complex. Henceforth, a qualified optometrist and teachers who were fresh to this kind of program have been utilized in this study. This study reports the effectiveness of teachers training which reduces the time of ophthalmic personnel in early detection and accessibility for up-taking eye care services by children belonging to marginalized sector communities.

Methods

This study was carried out in 10 schools located in three Mandalas (Mandala is another word for Tehsil, an administrative division of

population cluster) of Greater Hyderabad which were selected through systematic random sampling from 90 schools allotted for School Screenings carried out by 'Sight for Kids' project of L V Prasad Eye Institute.

This program obtained approval from the State Board of Education of Government of Andhra Pradesh and after getting permission from the divisional authorities, contacted the schools for participation. In this regard, all the schools in this cluster were contacted for nominating teachers to take-up the program and the nominated teachers were trained for detecting eye problems and vision defects. The program trained the 'trainers of the schoolteachers' for taking up school screening in their respective schools (Figure 1).

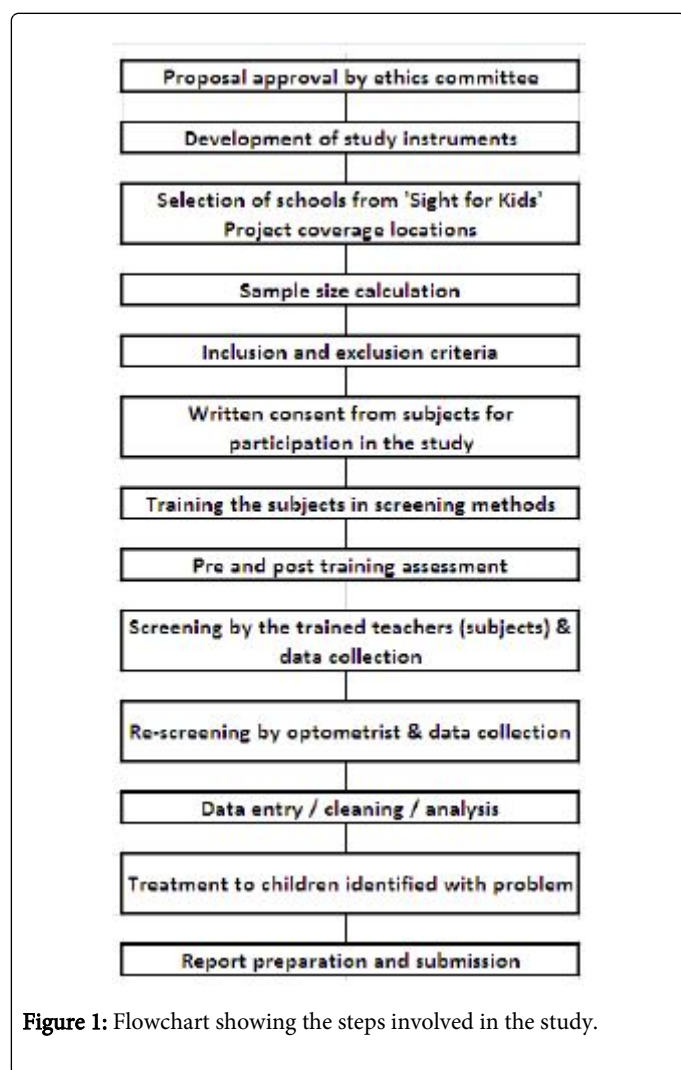


Figure 1: Flowchart showing the steps involved in the study.

In this study, the teachers handling students of fourth and fifth class were utilized based on their willingness to participate were included. Totally 25 teachers (male 48% and female 52%) were involved in screening the children. The teachers were provided with a screening kit which includes:

A Teacher's Manual; Detailed notes on eye parts and functions, common eye problem among children, problem identification procedures, treatment procedures, data entry and management, eye care awareness information and the follow-up procedures)

A Snellen 6/9 Visual Acuity Card

A measuring tape - for measuring 6 meters distance

A torch light - for external eye examination

Baseline data formats

Referral forms

A kit bag to store all these materials and

A poster with information on signs and symptoms of eye ailments and good eye health practices which will be permanently displayed in the schools

The trained teachers were made to cover the entire school; class by class by explaining the entire children about the purpose, signs and symptoms of common eye ailments and the student's role: 'how to cooperate during eye screening'. Moreover, they were trained to perform torch light examination to look at the external eye for signs and symptoms, recording the visual acuity measurement, make a note of the complaints, identified eye ailments and make a referral to the eye centre.

The trained teachers, after giving instructions on the method of distance visual acuity measurement to the children in the class room using a standardized Snellen 6/9 E chart (Brown and Story 1998) performed the test in open area where there is ample light. If the child was able to say or point out all the four directions of E in the visual acuity chart, the visual acuity was recorded as 6/9. If not, it was recorded as <6/9. Torchlight was used by the teachers for examining the external parts of the eye to observe abnormal signs and symptoms on the eye. A perception questionnaire on the screening program with the involvement of the teachers was administered among the subject (school teachers involved in screening) to understand the level of knowledge improvement and attitude of the teachers. This questionnaire had the following fields:

Age and gender of the teacher,

Years of experience,

Major teaching subject,

Health training attended before,

Opinion on the training,

Difficulty found while training other colleagues,

Solution to overcome the difficulty,

Difficulty found while screening the children,

Solution to overcome the difficulty in screening the children,

Self-grading before training,

Self-grading after training,

Appreciation of such programs in future.

Statistical analysis method

In the context of measuring the comparison of the visual acuity and the signs and symptoms of external eye, the instruments used were same for both the teacher and the investigating optometrist. The optometrist had performed similar screening after the teachers' screening is completed and the data recorded by the teachers was not exposed to the optometrist. The data of the teachers and the

optometrist were entered Microsoft Office Excel spread sheet and double verified for entry errors and was analysed using 'SPSS 16.0 version' Software. The visual acuity measured and the ocular signs and symptoms identified by the teachers and the optometrists for each student was compared. The outcome measures were estimated by comparing the agreement between the teachers and the investigator on visual acuity of the screened students using kappa statistics.

This study was followed by service delivery for the children who were identified with ocular problems:

Service delivery procedures:

Treatment services by ophthalmic personnel for the children identified with eye problem/vision defects by the school teachers

Detailed eye examination/prescription of spectacles/referral to base hospital for further management by ophthalmologist

Informing parents regarding referral to ophthalmologist

Providing spectacles (with children preferred spectacle frames)

Providing treatment/surgical intervention and sight enhancement/rehabilitation

Follow-up of children who received spectacles and treatment

Follow-up of children through home visits by field service organizer for uptake of eye care services

Follow-up of beneficiary status at every school

Results

A population based 'Refractive Error Study in Children' (RESC) conclusively shown that myopia (refractive error) is a main problem among children attending schools. Further, it revealed that myopia is related to the poor performance of educational and socio economic status possibly related to the emphasis on reading and other tasks associated with school performance [9]. Similarly, this study attributes to the prevalence of refractive errors and other causes in school children.

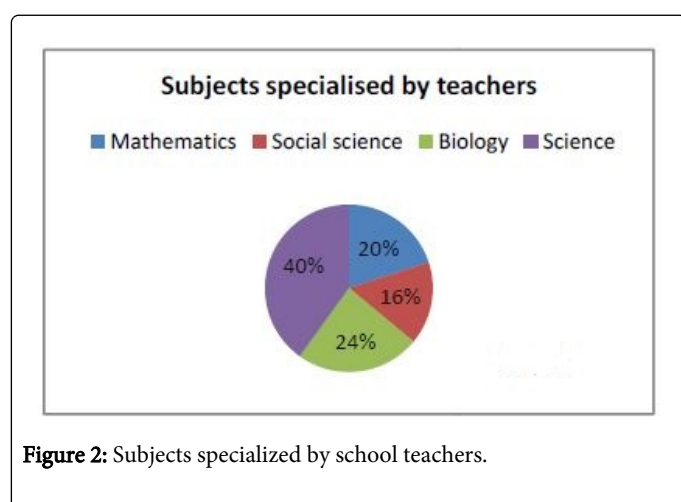


Figure 2: Subjects specialized by school teachers.

In this study, totally 25 schoolteachers participated in which the age was ranging between 23 and 58 in which 52% were women teachers. Among them, 80% (n=20) of the teachers had 3 and more years of

teaching experience. 40% (n=10) the teachers were handling science subject, 24% (n=6) biology, 20% (n=5) mathematics and 16% (n=4) social science and every subject expressed that they have not undergone training on vision screening and eye care after taking up teaching profession (Figure 2).

On expressing their opinion, prior to the vision screening and eye health awareness training program which was conducted in a day, 16% (n=4) of teachers expressed that they were poor in eye health and care knowledge, 72% (n=18) expressed average and 12% (n=3) expressed good. The same questionnaire was re-administrated after the training program and the 72% (n=17) teachers expressed 'good' and 28% (n=8) expressed 'excellent'. Only one teacher expressed that training of a colleague was difficult while screening the school children at the school and expressed that training of every teacher in this vision detection program as a solution to it. All the subjects expressed that screening of children in the learnt method was easy. All the subjects expressed that this sort of training program and initiating health screening to be promoted everywhere (Figure 3).

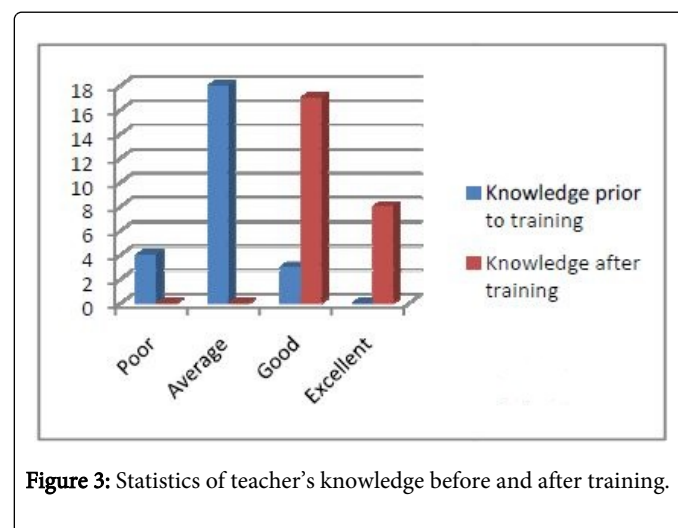


Figure 3: Statistics of teacher's knowledge before and after training.

A total of 600 students were screened by the trained teachers from 10 schools selected for the study. The median age was 10.5 (range 8 to 13 years). Enrolment of Girls (55%) was slightly more than boys in the classes 4th and 5th. Out of these students only 0.3% (n=2) children were already wearing spectacles (Table 1).

The study compared the screening skills of the trained teachers with the qualified optometrist in which the screening parameters and the screening procedure were one and the same.

Out of the 600 children screened by the teachers, 3.5% (n=21) were identified to have poor visual acuity i.e. <6/9 in right eye and 3.3% (n=20) with <6/9 in left eye. On the other hand, in the screening done by optometrist, the children to have poor visual acuity is same and accurate (Kappa statistic=0.95) suggesting an excellent agreement between the optometrists and the teachers screening of visual acuity. The students reported complaints at the time of teachers' screening were 28 (4.6%). The symptoms included blurred vision, burning, pain, low vision at night, headache, and watering of eyes, abnormal coloured spots, redness and abnormal deviation of eyeball. Among this, the numbers of students identified for further management and referred were 16.

S.No	Age	Gender		Total	Detected by Teachers				Detected by Optometrist			
		M	F	RE*	Others§		RE		Others			
					M	F	M	F	M	F	M	F
1	8	6	7	13	1				1			
2	9	56	72	128	1	2	1	2	1	2		1
3	10	94	136	230	6	6	5	7	5	6	2	1
4	11	105	102	207	3	1	8	5	4	1	4	
5	12	5	10	15								1
6	13	3	4	7		1				1		
Total		269	331	600	11	10	14	14	11	10	6	3

*RE=Refractive Error
 §Others=Signs and symptoms of eye disease such as watering, redness, pain, headache so on

Table 1: Screening skills of the trained teachers with the qualified optometrist.

The optometrists detected only 11 students with above symptoms and signs.

Detection of children with signs and symptoms of ocular conditions other than poor visual acuity by the teachers and the optometrist was significant in the aspect of Diplopia, microphthalmus, squint and iris coloboma 64% (n=7). Eye problems such as nystagmus, corneal scar, bitot spots and blepharitis were missed in teachers' screening.

Discussions

A screening for the purposes here 'involves the appraisal of only those conditions that are commonplace and amenable to easy and early intervention' [10]. Vision Screening in Schools are expected to help in identifying children who may have undetected vision problems and eye ailments and refer them for further management. Still, preliminary screening at schools cannot be relied on to provide same results as a comprehensive eye and vision examination done by qualified ophthalmic personnel. Screening can be done by many methods. Presently, school screening programs in schools managed by Government sector are planned once in a year and it is carried out by the District Blindness Control Society with the coordination between Sarva Siksha Abhiyan (SSA) Program implemented by National Program for Control of Blindness (NPCB) [11] Usually, vision screenings are part of local eye hospitals, social service agencies or groups like the Lions and Rotary Clubs. Yet, eye screening programs cover very meager number of schools every year and many children with vision defects and eye problem unable to learn that they have a vision related problem and most of the children cannot access eye care services due to lack of eye care services in many rural and urban locations. This is due to human resource constrains in government and private sectors.

Sustainability of school screening is based on the involvement of the National Program for Control of Blindness, allied health programs and the schoolteachers and making it mandate.

Indian government started utilizing teachers for identifying children with eye problem since 1978 through the DANIDA supported NPCB and the CBCB through 1996, with emphasis on equipment and

training including the development of local education program such as school vision screening programs [12].

Based on the NPCB criteria, This study utilized the school teachers for measuring Visual acuity among the children and the results were same while it was rescreened by the investigating optometrist were as there was significant correlation (Kappa statistic=0.95) with an excellent agreement.

The prevalence of refractive errors analysed in this study 3.5% (Visual acuity <6/9) represents significantly based on the criteria recommended for the teachers which is almost the closer to the Bangalore medical college area school screening study by Pavithra et al. [13].

This study has noticed that children with ocular conditions such as Microphthalmus, Iris Coloboma and squint were identified by the teachers after the training programs which were potential conditions for visual rehabilitation and if unnoticed it may lead to amblyopia and visual impairment. Conditions such as Vitamin A Deficiency and other causes can be addressed by Low-Vision intervention or appropriate treatment which has been already documented by SJ Hornby et al. study [14].

This study strengthens the current concept of training teachers and using the resources of trained teachers to train other teachers for detecting eye problems among school children. Moreover, this study had emphasized the need for similar school children health screening programs which can cover a large number of student populations and enhance appropriate services According to UNICEF, this sort of school screening programs followed by service delivery will ensure preventing school dropouts that are due to health issues [15].

Conclusion

The result of this study gives emphasis to involve schoolteachers in detecting vision defects and eye ailments among schoolchildren who have less access to ophthalmic care in developing countries like India. The Action Plan of Vision 2020 Global Initiative for the Elimination of Avoidable Blindness obstinate to educate children in looking after

their eyes as part of the normal school curriculum. Ensure that children undergo a simple vision screening examination on regular basis, ideally as part of the school health program, with provision of spectacles to those who will benefit. Ensure that all children with special needs are examined by an ophthalmologist and receive medical, surgical, optical or low-vision services to maximize their vision. Ensure good linkages between eye-care services and those providing education and rehabilitation services for incurably blind children [16].

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