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ORIGINAL RESEARCH ARTICLE

Effectiveness of Training Teachers in Vision Screening of School Children Supported by Foundation for the Prevention of Disability

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Abstract:
A training programme was conducted by an ophthalmologist for 7 primary school teachers. The programme lasted 2 hours. There were 2 lectures on common eye diseases in childhood and a demonstration of how to use number chart designed according to Snellen's specifications. There was an interactive session to ensure that they had understood the vision recording methodology. These teachers went back to school and examined the vision of children from grade1 to Grade 7. Two weeks later an optometrist visited the school and re-examined all the children in the same place and using the same charts. The visual acuity recording of teachers and optometrists were compared and results tabulated.

Key words: *Vision screening, School children, Teachers training*

INTRODUCTION

Good visual acuity is crucial for successful learning in school. It is therefore essential for parents and teachers to know the visual status of school going children. Unfortunately, children are not always able to tell when they cannot see clearly. The causes of poor vision are several, refractive errors being the commonest. Dandona et al (1) found that 61.5% of children with vision impairment had refractive error. In other studies, this figure has been higher at 81.7% (2) and 94.8% (3)

Refractive error is a condition in which rays of light do not come to a focus on the retina, therefore forming a blurred image. If the point of focus is in front of the retina, distance vision is blurred, this condition is called as myopia or short sightedness. Such children have good vision for near, so they can read well from a book but cannot see the blackboard, projector or activities on a playground clearly.

If the rays of light come to a focus behind the retina, the condition is called hypermetropia (long sight). Such children have fairly good distant vision but have a lot of strain in doing near work. In higher degrees even distant vision may be blurred

Astigmatism is the condition wherein the curvature of the eyeball varies in different axes, this causes varying degrees of blurring for distance and near depending on the curvature.

There may be a problem in vision even if children apparently have good vision if eyesight. The child may have good vision in one eye and very poor vision in the other. He or she continues to function well without realizing the problem. It is essential to detect such uni-ocular poor vision before the age of 8 years and treat with appropriate glasses and patching. Beyond this age, the condition is irreversible in spite of treatment – Amblyopia. Prevalence of amblyopia in children has been found to range from 1.1%(3) to 12% (1). Children with amblyopia have no binocular vision and depth perception. They have several problems later in life as they are ineligilble for several types of jobs and for such life skills such as driving. Recognising refractive errors and amblyopia and offering a means of treatment can effectively address a significant part of childhood blindness. Shortage of qualified optometrists and eye care professionals especially in rural areas remains a major obstacle (4). Recognizing poor vision early has been one of the important issues in our CBR programme and we have often wished to reach out to more children both normal and with disability.

Sarva Siksha Abhyaan has given us this opportunity. As part

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of the Sarva shiksha ABhyaan, it is proposed to integrate as many special children as possible in the normal school system. This is especially important in villages where there is just one school and one or two teachers for a range of age groups and abilities. Teachers form a very influential part of the community and can influence change in attitudes to spectacles, early treatment of squint etc. Several studies have also used teachers very effectively for vision screening of school children. Teachers from primary schools of government schools are being posted in The Spastics Society of Karnataka for a period of 2 weeks. They have a series of lectures and practical demonstrations in order to give them an orientation to the identification and basic management of children with special needs.

One of the sessions is devoted to the methods of managing a child with poor vision in the classroom. In rural schools most children do not have access to an optometrist or ophthalmologist for regular vision checks. We decided to train the teachers in vision recording so that all the children in the school can have the benefit of the vision screening. As we were doing this kind of programme for the first time, we wanted to do a pilot study to evaluate the training methodology. It was necessary to choose the right methods for our conditions and the educational background of our teachers.

There are several questions that need to be addressed in planning a vision test for children-

1. Who will do the testing?
2. Where will the screening test be performed
3. At what age will the children be screened
4. What type of vision chart will be used for the screening
5. What is the cut –off level of visual acuity that we are going to use for referral
6. Where will the children be referred for detailed examination?
7. How is spectacle usage going to be monitored and evaluated
8. How frequently will the vision screening be done?
9. Will we be screening only for visual acuity or for other diseases

The pilot study has been conducted to answer these points and evaluate a practical strategy for screening in our conditions.

METHODOLOGY

- Area of the Study: Harohalli Village, Kanakapura Taluk, Karnataka, India.
- Class- Children from Grade 1 to Grade 7
- Number of Children-1054, 485 Males and 569 Females.
- Number of Teachers - 7
- Number of Optometrists - 2
- Number of Ophthalmologist-1

Tools Used - Number chart based on Snellen's design

For reasons of proximity to the testing optometrist, we have selected 7 teachers in our CBR programme who were serving in Bangalore rural and kanakapura taluks. The duration of the training was limited to 2 hours as this was the same time available for us in the SSA programme also.

All teachers were given a portable Snellen's number chart and taught the correct method of using it. They were given a handout of the correct procedure to follow regarding lighting conditions, distance to be used etc., They were to check the right eye first and then the left eye. All the children were examined in natural light at a distance of 20 feet which was measured with a tape. Teachers spoke to the children before the test was done and explained the procedure in the local kannada language which is understood by all the children in this population. They were told to list, grade-wise the vision recording of all the children uniocularly, right eye first. If any child was not able to read 6/6, his vision was rechecked again on the same day. If a child was already wearing glasses, his vision was checked only with the glasses on. Each teacher was asked to check the vision of at least 100 children. There was a practical demonstration of the whole procedure. The teaching programme also included a talk on common vision problems in children and treatment options in order to improve the awareness of paediatric eye care.

An optometrist visited these schools after 2 weeks and screened the same children in the same school setting to see the difference in recording of vision by a professional and a school teacher. The results were statistically analysed to know the extent of errors made by the teachers.

RESULTS

1814 eyes of 907 children (Table 1) were screened by both teacher and optometrist whereas in 1255 (69 %) eyes, there was no difference in the recording of visual acuity of children.

False positive results:

In 499 eyes, a false positive result was recorded, i.e., teacher recorded worse vision than the

optometrist. In majority of these cases, (408 eyes) 81.76% the difference was by one line only. Among these cases, in 305 eyes (61%) the teacher had recorded an acuity of 6/9 whereas the optometrist has recorded 6/6. In 82 eyes, (16.33%) the teacher had recorded acuity of 6/ 12 and the optometrist had recorded 6/9. In 11 eyes, (0.2%) the teacher had recorded acuity of 6/18 in contrast to the optometrist's recording of 6,12. In 91 eyes (18.12%), the difference in recording was 2lines or more. Thus we see that majority of the false positive errors have been made at the 6/6 – 6/ 9 level. I we use a cut off level of 6/ 12 as standard for referral, the number of referrals would be 94 (0.5%)

Other studies have suggested that when the referral range is more than 5 to 10 %, training methodology needs to be evaluated. (Limburg et al).

False negative:

In 56 eyes of children, the teacher had recorded visual acuity higher than the optometrist. Of these, in 37 eyes, (66.07 %) the difference was one line only. Out of 1814 eyes, only in 19 eyes, (1.04 %) the difference was 2 lines or more. This clearly reveals that in a very insignificant number of eyes with refractive error are possibly missed by the teachers who have been trained under this program. Table 2 shows data on the number of False Positive and Negative readings and Table 3 provides explanation of the False Positive and Negative scoring

Table 1: Total Number of Children Screened for Vision

Grade	Male	Female
7	27	34
6	90	119
5	82	88
4	74	96
3	83	86
2	74	80
1	55	66
	485	569

Total-1054 Children
Out of which 907 children were present for the study.

Table 2: Data on the number of False Positive and Negative readings

	Number of eyes	Total Number of eyes	%
False positive(2)	408	1814	22.50
False positive(4,6)	91	1814	5.01
False negative(3)	37	1814	2.03
False negative(5,7)	19	1814	1.04
No difference	1259	1814	69.40

Table 3: Explanation of the False Positive and Negative scoring

0	Absent
1	No difference between the teacher's and optometrist's reading
2	1 line better vision recorded by optometrist
3	1 line worse vision recorded by optometrist
4	2 lines better vision recorded by optometrist
5	2 line worse vision recorded by optometrist
6	3 or more lines better vision recorded by optometrist
7	3 or more lines worse vision recorded by optometrist

DISCUSSION

Several studies have established the usefulness of using school teachers and health workers for screening for visual defects in children. They have been trained at several levels – eg., for vision recording alone [5] and also for more detailed referral issues such as bitot spots, leucoma etc. [1,6]. We have focussed on vision recording alone as our study was a pilot study aimed at assessing our training methodology and improving upon it for successive batches of teachers.

We restricted our training programme to 2 hours in the pilot study as we were aware that we would have the same amount of time even in the teacher training programme. Other studies have employed more extensive and longer periods of training for field workers or teachers used for screening (1 week in Kariapetti Paediatric eye evaluation programme[8], 1 day by Hans limburg[9]). As the time available is short, training was restricted to distance vision recording alone. Most studies use Landolt C ring or illiterate E optotypes[7] of 6/9 size as a single line chart[5]. Snellen's chart in room illumination has been used effectively[7,3] to screen school children in the school environment too.

We have chosen the number chart as it is less time consuming and all school children are familiar with it. It reduces the time needed to give instructions. The whole chart was used as we were evaluating the training process rather than the children who need referral services.

In 502 eyes, a false positive result was recorded, i.e., teacher recorded worse vision than the

optometrist. In majority of these cases, (408 eyes) the difference was by one line only. Among these cases, in 305 eyes, the teacher had recorded an acuity of 6/9 whereas the optometrist has recorded 6/6. In 82 eyes, the teacher had recorded an acuity of 6/ 12 and the optometrist had recorded 6/9. In 11 eyes, the teacher had recorded acuity of 6/18 in contrast to the optometrist's recording of 6, 12. Thus we see that majority of the false positive errors have been made at the 6/6 – 6/ 9 level. If I we use a cut off level of 6/ 12 as standard for referral, the number of referrals would be 5.12%. Other studies have suggested that when the referral range is more than 5 to 10 %, training methodology needs to be evaluated[5]. So our training methodology compares favourably with this standard. This also compares favourably with the average number of school children with refractive errors as seen in other studies[1, 2]. So we are unlikely to miss any children with refractive errors.

In a study conducted in Madhya Pradesh, India [1], teachers referred 4.91% of children to an ophthalmic assistant using 6/9 or lesser as standard for referral. Out of this 57.97% were found to be false positive. In our study, the overall rate of false positives is 17% which compares favourably with other studies.

In 91 eyes (5.01%), the optometrist recorded a visual acuity which was 2 lines better than the teacher's recording. We consider this as an error made by the teacher in recording, which should be addressed in our future programmes

The reasons for false positivity may be several. It is possible that children did not understand the test when explained for the first time. When there was doubt, teachers probably chose the lower value in order to avoid missing children with refractive error.

It is important to reduce the number of false positives as this increases the burden of the referral centres. In rural settings, parents probably have to miss a day's earnings just to take children to the hospital. In addition, they have to deal with the anxiety of possibility of wearing glasses, which is still a social stigma.

To avoid this, we have identified some areas of the training programme which need more emphasis. Children especially in the lower classes should be examined in smaller groups so that the instructions can be heard without too many distractions. Every child who is found to have lesser than 6/9 vision should be re-examined at least 2 more times, preferably on another day before referral.

False negative results indicate that the teacher have missed children with vision problems and is a reflection of the quality of screening programme. It is encouraging to note that the chances of a real problem being missed is unlikely even with a teacher checking vision.

CONCLUSION

This pilot study has shown us that it is possible to teach vision recording in a short period of time. We believe the entire chart should be used for recording rather than just the 6/9 line so that teachers come to know about the severity of the visual loss and can pay particular attention to those with uniocular loss and severe visual loss. Some of our training methods need to be modified for future groups of teachers. We would like to increase the training programme to 4 hours. Then the teachers can be divided into smaller groups and we can spend more time in giving practical training in vision recording. Referral cards should be given to the teachers, if possible with the name of the nearest hospital printed on it for the convenience of parents. It is also a good idea to maintain a card for each child to follow the progress year on year. Nearly 200 teachers will be trained in our center alone every year and if they follow this systematically, early recognition and treatment of vision problems in all school children should become a reality.

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