



Effectiveness of Empowering School Teachers to Screen Refractive Errors in School Going Children in the Rural Area of Vadodara, Gujarat

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Financial Support: None declared

Conflict of Interest: None declared

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How to cite this article:

Patel DN, Kathad MM, Jay P, Rathod A, Rawal A, Rathod J. Effectiveness of Empowering School Teachers to Screen Refractive Errors in School Going Children in the Rural Area of Vadodara, Gujarat. Natl J Community Med 2018; 9(10):769-772

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Date of Submission: 16-08-18

Date of Acceptance: 13-10-18

Date of Publication: 31-10-18

ABSTRACT

Introduction: Does the empowering school teachers in reflectory error screening reduced the burden of preventable cause of blindness? In most of the schools, eye check-up is done yearly at a time of school health week program. If we can able to empower school teacher to diagnose with appropriate technology of refractive error measurement we can reduced the encumbrance of refractive error. Does it easy as it sounds?

Methodology: the study was non-randomised control trial done among school going children of 5 to 8 years of age done in rural area of Vadodara district. New model (screening of refractory error by school teachers) was compared with standard model (screening of refractory error by medical doctors) to assure validity and reliability of screening model for identifying reflective error.

Results: Kappa statistics was found 0.4482, which indicates weak agreement on comparison of both models. Sensitivity of new model (31.25%) was also low as compared with standard model.

Conclusion: Applicability of new model (refractive error screening by trained teachers) is not proven, as validity and reliability of new model was poor.

Key words: Refractive error, School Teachers, Snellen's Chart, School health program

INTRODUCTION

School Health Program (SHP) is envisioned as an important tool for the delivering of preventive, promotive and curative health services to the children. Focus of SHP is to address the wellbeing and nutrition needs of children¹. The proven association between healthiness and educational attainment will be running parallel to each other^{2,3}. As per estimates, approximately 80% of total children attend primary schools and 60% complete their forth standards of education, with wide-ranging variation amongst countries and gender⁴. So,

school is an ideal platform to for promotion of eye health, but not limiting to that.

Despites of effective running program since long time, low vision due to Uncorrected Refractive Error (URE) is commonest impairment among the children of Gujarat with the prevalence ranging from 23% to 61%^{5,6}. As per World Health Organization (WHO), nearby 285 million persons have visual impairment, comprising 39 million individuals who are blind and 246 million who have low vision worldwide⁷. URE is the second main cause of severely impaired vision in the world, even though it

can be diagnosed at primary care level and corrected simply by a pair of spectacles⁸.

School Health Program is an opportunity to identify those children who have refractive error as large number cohort of children is accumulated at one place. But due to certain limitation of SHP that is take place only once a year and sometime incorrect identification of students having reflective error as normal as basic health check up on first day of SHP is done by teachers, ASHA and Anganwadi workers who are rarely aware of exact criteria or methods to diagnose of reflective error. This organized situation low down the success of school health week program along with increases in number of children in cohort who have uncorrected refractive error.

So another alternative for above situation, we can suggest is to empower school teachers to diagnose reflective error with the help of simple tool "Snellen's chart". If we are able to teach school teachers about proper method of using Snellen's chart, we can able to diagnose hidden cases of reflective error that missed till the date. Routinely eye screening in School Health Program Week was done annually but, if school teacher is trained in such procedure they can screen every student systematically at appropriate time and also do such screening twice or thrice in a year. From above background and if we establish such new model for screening of refractive error, the question rise is: "how much we sure that the screening test of reflective error done by school teachers is valid and reliable?"

Faculties of community medicine are well aware of Snellen's chart and its interpretation. We can also expect none of erroneous result if screening done by experts of subject (community medicine faculty). So, two models can be prepared and compared to know the validity and reliability of screening test for identifying reflective error.

OBJECTIVE

The study was conducted to check reliability and validity of results of refractive error screening if we empower school teachers; and also to know the effectiveness of empowering school teachers to screen refractive error.

METHODOLOGY

This was a non-randomised control trial done among school going children of 5 to 8 years of age. The study was done in rural area of Vadodara district. All the students were present in class included as sample size and a total of 150 school children

were examined. Children who suffering from refractory error and already diagnosed for the same and children who do not want to participate in study were excluded from the study. Ethical permission for the study was granted from Sumandeep Vidyapeeth Institutional Ethical Committee (SVIEC).

List of rural schools were obtained from DEO office, Vadodara. Government school Amodar was selected through randomly from the list by lottery method. Permission to carry out study was also obtained from principal of school after discussing on various aspects of study. Training of teachers of 5th to 8th of standard was done to diagnose the refractory error in school children by using snellan's chart". Data of study was collected over a period of 3 days; first day is dedicated for training of teachers, second day teachers examined school children and, third day faculty of community medicine examines same students.

Study tool:

1. Snellen's chart: It is an eye chart that can be used to measure visual acuity. Those school teachers, who ready to voluntarily participate in this project, were trained for identification of refractory error by using snellan's chart after giving them some basic information about refractory error in understandable local language (Gujarati). Practical session was also arrange for the teacher as part of teacher's training and doubts and difficulties was discussed, and corrected so every teacher uses this procedure with same standard. The same tool was used by medical doctors to screen children for refractive error. To avoid bias we masked the teachers' results (first screening result) during second screening.
2. Report of refractive error screening: it was used to document the number of students who had refractive errors and who had not. Two separate reports for each student were available; one was examined by school teacher and second was examined by medical doctors.

Criteria used to diagnose refractive error:

Students having refractive error or not was decided by following criteria.

1. Having refractive error: positive by teachers + positive by medical doctors
2. Not having refractive error: negative by teachers + negative by medical doctors
3. Not having refractive error: positive by teacher + negative by medical doctors
4. Having refractive error: negative by teacher + positive by medical doctors

Statistical analysis: Data from report enter in to Graphpad software to conclude the results. Relia-

bility of teacher’s screening results was checked by “Kappa statistics” and validity was checked by measuring “sensitivity and specificity”.

RESULTS

A total 150 students examined twice for screening of refractive error. Among them 89 (59.33%) were girls and 61(40.67%) were boys (Table 1).

Out of 16 (10.67%) students having refractive error only 5 (3.33%) is identified by school teachers, while 11 (7.33%) students missed during screening done by school teachers (table 2).

Table 1- Sex and standard wise distribution of study participant

Standards	Male (n=61)	Female (n=89)	Total (n=150)
5 th	11 (7.33)	16 (10.67)	27 (18)
6 th	13 (8.67)	17 (11.33)	30 (20)
7 th	22 (14.67)	38 (25.33)	60 (40)
8 th	15 (10.00)	18 (12.00)	33 (22)
Total	61 (40.67)	89 (59.33)	150 (100)

Figure in parenthesis indicate percentage.

Table 2- Distribution of children according to diagnosis by school teacher and medical students

Refractive error (diagnosed By school Teacher)	Refractive error (diagnosed By Medical doctors)		Total
	Present	Absent	
Present	05 (3.33)	00	05 (3.33)
Absent	11 (7.33)	134 (89.33)	145 (96.67)
Total	16 (10.67)	134 (89.33)	150 (100)

Figure in parenthesis indicate percentage.

Table 3: Calculated statistics to check reliability and validity of screening test done by school teacher from table 2.

Statistics	Results
Kappa statistics	0.4482
Sensitivity of test	31.25%
Specificity of test	96.40%
Positive Predictive Value (PPV) of test	100.00%
Negative Predictive Value (NPV) of test	92.41%

Table 3 shows that reliability indicator, kappa statistics, is found 0.4482, which indicates weak agreement on comparison of both models. It shows that 44.82% of results have similar agreement between two screening models. Validity of test is determined by sensitivity and specificity. It shows model 1 (screen by school teacher) identify only 31.25% of students having refractive error while 68.75% of students diagnosed as normal among total students having refractive error.

DISCUSSION

The diagnostic modalities should have certain features i.e. sensitivity, specificity and predictive value i.e. (PPV and NPV)⁹. Refractive error measured by school teachers is effective tool for screening or not, and similar agreement was observed in comparison with gold standard method or not was explained in current study. Refractive error diagnosed by medical doctors has been taken as gold standard for calculation of validity and reliability of models.

If we can empower school teachers to identify refractive error, burden on health care system can be reduced and we can run fast on track to achieve goal of vision 2020: The Right to Sight¹⁰.

Cohen's kappa coefficient (κ) is an indicator which measures inter-observer agreement for qualitative items¹¹. It is normally supposed to be a more strong measure than simple percent agreement calculation. Kappa statistics measures reliability of test. Weak level of agreement was found between two models, that was evidence by kappa statistic value of 0.4482.

In the present study the sensitivity of the model 1(screening done by teachers) was found to be 31.25%. So, if we establish model 1 to be available, we were reducing the validity of screening test (sensitivity) as 68.75% of total refractive error students we were missed. Specificity of model 1 is very high 96.40% that means, the test was able to identify the students without having refractive error among total students who had no refractive error. PPV value for model 1 is 100%, which is explaining of having 100% probability that children with a positive screening test (diagnosed as having refractive error) with model 1 truly have the same condition. NPV value for model 1 is 92.41%. NPV explaining the probability that subject with a negative screening test truly don't have the disease.

Even with trustworthy results found for specificity, PPV and NPV, the model 1 is not appropriate because the reliability of test is low and level of agreement between two models is not acceptable. As refractive error is diseases which is easily identifiable with simple measures and easily corrected with just pair of spectacles, low sensitivity of model 1 is not acceptable, even though other parameters of validity is favourable because it diagnosis differs from what it intends to measure.

Successful applications of new model will increases work portfolio of school teachers, so high level of motivation and re-motivation is required for teachers, might be this aspect was missing in current study. More intensive training in terms of increasing level of expertise and duration of leaning might results in effective model.

CONCLUSION

Applicability of new model (refractive error screening by trained teachers) is not proven, as validity and reliability of model 1 is poor. School teachers are amongst the few persons who are always nearer to a large proportion of school going children, so with comprehensive changes in current model or finding another appropriate model that suits to school teacher to identify early refractive changes is required and also need of an hour as millions of children are still suffer from the issue of this preventable cause of blindness.

ACKNOWLEDGEMENT

Current research is done as part of EviGENCHIP program of Sumandeep Vidyapeeth University. We also extend our gratitude to principal, teachers and students of studied school.

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