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Effect of refractive error correction in the scholastic performance of school going children

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Abstract
Background: To study about the effect of refractive error correction in the scholastic performance of students who were given spectacle correction under school health programme in urban and rural areas of Gujarat.
Objective: To compare the scholastic performance of students before and after subjective correction who were given best possible spectacle correction during previous school health programs and to study whether the students were benefitted with spectacle correction or not, if yes then which group of students were more benefitted-myopes, hypermetropes or astigmatic students, is there any difference between boys and girls, if yes then who were more benefitted- boys or girls; does age at which the correction is given affect the outcome of the study.
Settings: various students of Urban and Rural Areas of a district of Gujarat, India.
Design: observational study.
Materials and Methods: In this study we visited various students of urban and rural areas of a district of Gujarat and collected data of 310 students who were given spectacle correction during the previous school health program, in the form of their age, sex, age at which correction was given, Standard refractive error (whether the student is myopic, hypermetropic or astigmatic) and the scholastic performance before and after subjective correction and comparison made between each and every data. A study was conducted 1)to know whether the student's academic performance improved after spectacle correction or not, 2)which category of students were more benefitted-myopes, hypermetropes or astigmatic students, 3)to study the results between girls and boys and to evaluate whether there is any difference between them, and if yes who was more benefitted girls or boys, 4)does age at which spectacle correction is given affect the scholastic performance of students, 5)to study various confounding factors which can hamper the outcome of our study.
Results: The statistical analysis revealed that there was remarkable improvement in the scholastic performance of myopic and astigmatic students but the study was not statistically significant in hypermetropic students. The study also revealed that girls were more benefitted with the spectacle correction than boys. There was marked improvement in the performance of students if their refractive error was corrected during the early stages of life that is when the child is in his primary schools. Late correction did not yield satisfactory result. Certain confounding factors were also encountered in this study- age bar, intelligent quotient of individual student, interest in studies, atmosphere around the student, cooperation and active involvement of parents, school to school variations in the scoring system, stream to which the student belong also hampers the resultant outcome.
Conclusion: From the above study we concluded that myopic and astigmatic students were more benefitted with spectacle correction as compared to hypermetropic students. Extra attention should be paid for the scholastic improvement of hypermetropic students as only spectacle correction is not sufficient to improve scholastic performance of such students. Girls were more benefitted with subjective correction as compared to boys. Beneficial results were obtained if the spectacle correction was given during primary schools as compared to spectacle correction given during secondary schools and later on. The above result was proved right by statistical analysis also.

Keywords: school health programme, myopia, hypermetropia, astigmatism, spectacle correction

Introduction

Eyes are the most precious sense organs and contribute greatly to one's learning capabilities right from childhood. The school going years are the formative years for determining one's physical, intellectual and behavioural development. Children usually don't complain of defective vision especially if one eye is involved. They may not be even aware of their problem. They adjust to poor eyesight by sitting near the blackboard, holding the books closer to the eyes, squeezing the eyes and even avoiding work requiring visual concentration. The importance of normal vision in children has lead to vision screening initiatives worldwide with governmental support. Reduced vision because of uncorrected refractive errors is a major health problem in school children in India. Vision screening should be done to identify children with unsuspected remedial conditions, so that treatment can be offered before educational and social progress is affected. The conditions that are commonly detected in the eye screening in school children are refractive errors (myopia, astigmatism and hypermetropia) and amblyopia, apart from other ocular diseases. Refractive errors are very common in children and easily correctable, usually with the use of spectacles. It is the commonest cause of visual impairment around the world. School screening programme have been an established part of school health services since 1907 and remain universally recommended.

Materials and Methods

Settings

The study was carried out in various schools of urban and rural areas of Gujarat.

Case Selection and Eligibility Criteria

The study was carried on 310 students of various urban and rural schools of a district of Gujarat who were given spectacle correction during previous school health programme. We screened various students of urban and rural areas of Jamnagar for refractive error and out of them 310 students were found to have refractive errors. We categorized those students into myopic, hypermetropic and astigmatic students. We also grouped the students into boys and girls having refractive error. We also grouped the students into two age groups (first group between 1st to 7th
Standard and second group between 8th to 12th standard) and compared the resultant outcomes of the study.

Method

In this study, we visited various students of urban and rural areas of a district of Gujarat and screened 310 students having refractive errors from 1st to 12th standard who were given spectacle correction during the previous school health program, in the form of their age, sex, age at which correction was given, standard refractive error (whether the student is myopic, hypermetropic or astigmatic) and the scholastic performance before and after subjective correction, presence of confounding factors and compared each and every data. A study was conducted 1)to know whether the student's academic performance improved after spectacle correction or not, 2) which category of students were more benefitted-myopes, hypermetropes or astigmatic students, 3) to study the results between girls and boys and to evaluate whether there is any difference between them and if yes who was more benefitted girls or boys, 4)does age at which spectacle correction is given affect the scholastic performance of students, 5)to study various confounding factors which can hamper the outcome of our study. After obtaining various data of the present study proper statistical analysis of the present study was carried out and the resultant outcomes were proved statistically.

Discussion

The data obtained from the above study was analysed statistically and the following conclusion was derived from the above study: - Out of 310 students, there were 132 girls and 178 boys who had refractive errors who were given spectacle correction during previous school health programme.

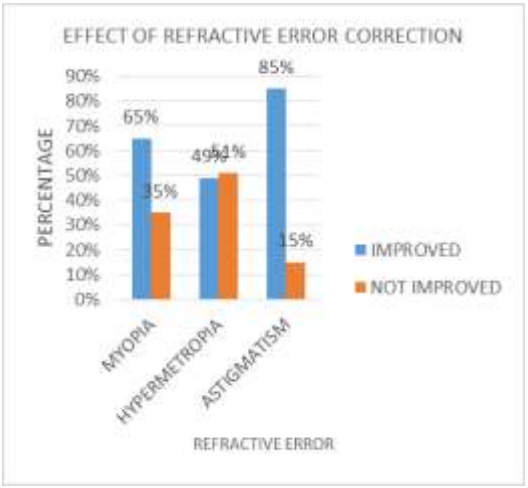

Fig 1

The above graph depicts the effect of subjective correction in the scholastic performance of students under school health program. Out of total 310 students, 202 students showed improvement in their scholastic performance and 108 students showed no improvement in their scholastic performance following subjective correction. Amongst 214 myopic students 65% students showed improvement in their scholastic performance following subjective correction and 35% students showed no improvement. Amongst 49 hypermetropic students 49% students showed improvement in their scholastic performance and 51% students showed no improvement. Amongst 47 astigmatic students, 85% students showed improvement in their scholastic performance and 15% showed no improvement.

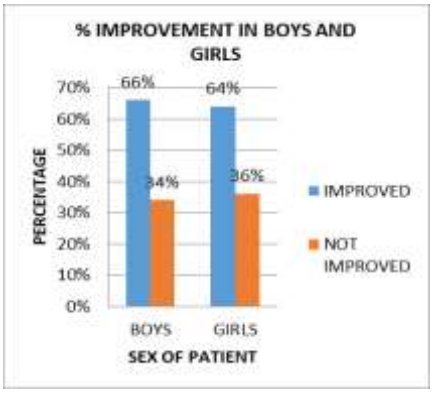

Fig 2

The above graph depicts that amongst 178 boys, 118 boys showed improvement in their school performance and 60 boys showed no improvement. Amongst 132 girls, 84 girls showed improvement in their school performance and 48 girls showed no improvement.

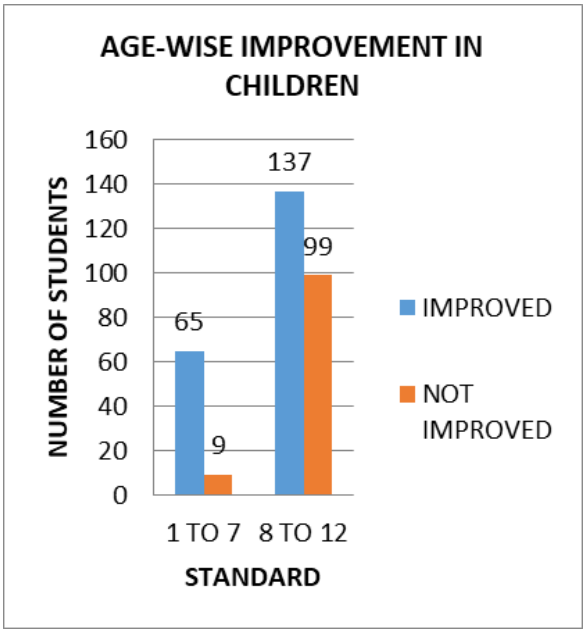

Fig 3

The above graph depicts that amongst 74 students between 1st to 7th standard, 65 students showed improvement in their annual results following subjective correction and 9 students showed no improvement. Out of the 236 students between 8th to 12th standard, 137 students showed improvement in their annual results and 99 students showed no improvement.

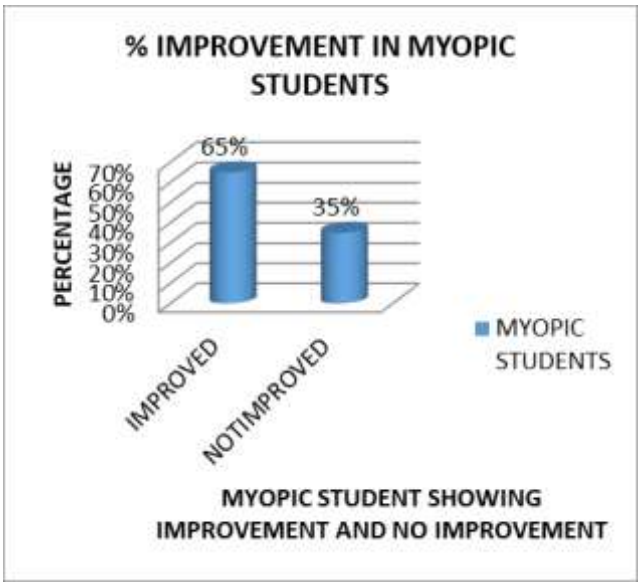

Fig 4

Out of total 214 myopic students, 65% showed improvement and 35% showed no improvement in their annual results following subjective correction.

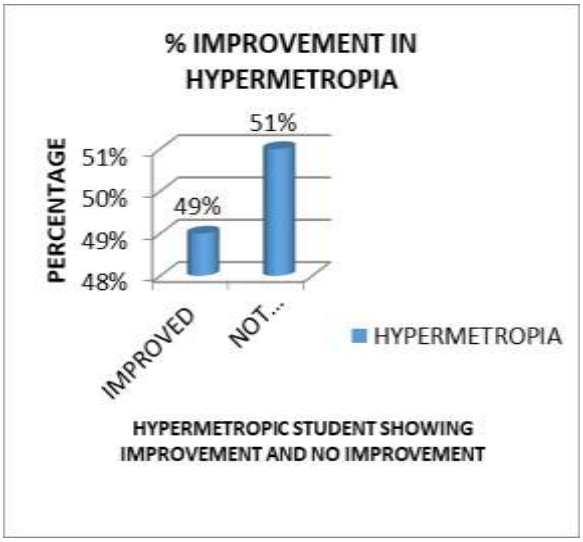

Fig 5

Out of total 49 hypermetropic students 49% showed improvement in their annual results and 51% showed no improvement following subjective correction.

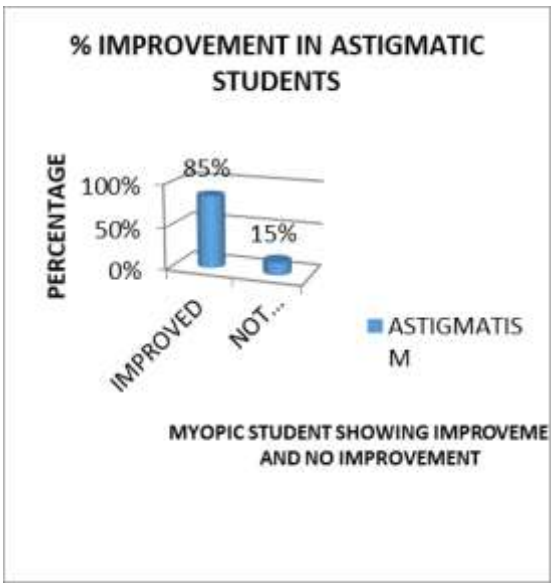

Fig 6

Out of 47 astigmatic students, 85% showed improvement in their annual results and 15% showed no improvement following subjective correction.

Summary

On statistical analysis of the present study, the Chi Square was 13.931 and the P value was 0.0009.The above values reveal the confidence interval of 95% which is statistically significant. Thus the study reveals that there is improvement in the scholastic performance of students if we correct their refractive errors by providing spectacles under school health program. Out of total 310 students, 202 students showed improvement in their school performance. Out of total 214 myopic students, 138 students showed improvement in their school result depicting that myopic students get benefitted on

giving spectacle correction. Out of total 49 hypermetropic students, 24 students were benefitted and 25 students were not benefitted from spectacle correction depicting that subjective correction alone cannot improve the school performance of hypermetropic students; they need additional attention to improve their scholastic performance like proper parental counselling, providing nutritious food, maintaining
A healthy atmosphere around the children, indulging them in mind concentrating activities. Out of total 47 astigmatic students, 40 students improved drastically suggesting that subjective correction is of utmost importance in improving the scholastic performance of astigmatic students. Out of 178 boys, 118 boys showed improvement in their annual results and out of 132 girls 84 girls showed improvement in their annual result following subjective correction depicting that improvement is comparatively more in girls as compared to boys. Amongst 74 students of 1st to 7th standard, 65 students showed improvement while amongst 236 students of 8th to 12th standard only 137 students showed improvement in their annual results following subjective correction depicting that the earlier the spectacle correction is given, the better is the improvement in the scholastic performance of students. The chi square value of the above statistical analysis was 20.726 and the p value was <0.0001 which is statistically significant strengthening out expected outcome.

Conclusion

The above study concludes that

- Correction of the refractive error of myopic students improved their scholastic performance.
- Correction of the refractive error of astigmatic students improved their scholastic performance.
- Correction of refractive error of hypermetropic students didn't showed significant improvement in their scholastic performance suggesting that refractive error correction alone is not sufficient for their scholastic development. They need additional attention to improve their scholastic performance like proper parental counselling, providing nutritious food, maintaining a healthy atmosphere around the children, indulging them in mind concentrating activities etc.
- Their was significant improvement in the performance of girls after subjective correction suggesting that more and more efforts should be made to promote spectacle correction in girls, helping them to reach heights of success and help them to perform best of their caliber.
- Our study also revealed an important finding that if subjective correction was given during the earlier years of life, more improvement in the academic performance was observed as compared to correction given during the later years of life. This finding reveals that once the crucial time has passed and the child has lost interest in studies because of his refractive error, it is very difficult to inculcate seriousness and interest in his studies, thereby it is very difficlut to improve his scholastic performance.
- Overall outcome of the present study is in the favour of spectacle correction during school health programme. This study reveals that government's gesture of improving the refractive error of school children under school health programme is like a boon for all the school going children suffering from refractive error. Improvement of scholastic performance of school going children by proving spectacle correction marks a step of success towards the development of our nation and leads to a better and bright future.

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