

# A prospective study of prevalence of colour blindness among school children

Ahmed Aljabali<sup>1\*</sup>, Muhemmed Swadique<sup>2</sup>, Ravi RV<sup>1</sup>, Rekha S<sup>1</sup>, Juhi Saji<sup>3</sup>

<sup>1</sup>Ophthalmologist, A1 Salama Group of Eye Hospitals, Kerala, INDIA.

<sup>2</sup>Professor, Department of Ophthalmology, Kannur Medical College, Kerala, INDIA.

<sup>3</sup>Optometrist, A1 Salama Group of Eye Hospitals, Kerala, INDIA.

Email: [dr.ahmed.aljabali@gmail.com](mailto:dr.ahmed.aljabali@gmail.com)

## Abstract

**Background:** Colour Blindness has an enormous personal, social and economic impact limiting the education and life choices of otherwise healthy people & placing a significant weight on family, community, social & health service. Group of diseases and conditions occurring in childhood or early adolescence, which, if left untreated leads to severe visual impairment that are likely to be untreatable later in life. **Materials and Methods:** A cross sectional study was conducted in 4 different nearby schools, after obtaining the permission from D.E.O. of Kannur. Which was conducted over a period of five months from January 2019 to May 2019 in the Department of Ophthalmology, Kannur Medical College, and Kerala, India and A1 Salama Eye Hospital, Kannur. Informed consent was taken from each student of 4 schools. In each school from grade 6th to grade 10th all students were called according to the roll number in a class room where a complete examination of vision and detailed examination of eye like slit lamp and fundus examination to rule out other pathologies/ocular disease was done. Later name, age and sex of each students were noted down. For colour vision Ishihara's Type Test chart was used. **Results:** A total of 1410 students were evaluated from 4 different schools of the Kannur, among which 771 (54.68%) were males and 639 (45.31%) female students from grade 6th to grade 10th were screened between 11 to 15 years. The prevalence of colour blindness was found to be in 22 (1.560%) students out of 1410 students. Colour blindness was seen in 17 (2.20%) male students and 5 (0.78%) female student affected (Table-1). Among the colour blind 20 (1.41%) were protanopes, 3 (0.21%) were deuteranopes and none were tritanope. (Table-2) Males were affected more compared to female students. The prevalence of protanopes were seen in male students where as deuteranopes were seen in both male and female students. **Conclusion:** The prevalence of colour blindness was noted to be higher in males (i.e. 1.3%) when compared to that in females (i.e. 0.1%). which can be seen depending on the pattern of inheritance of colour blindness. In many cases, student remains unaware about the colour blindness disability. It may cause difficulties in learning and choosing profession. Hence early screening for colour vision disorder and utilizing new method of teaching or learning process can lead to a better life and better profession.

**Key Word:** Blindness, protanopes, deuteranopes, tritanope.

## \*Address for Correspondence:

Dr. Ahmed Aljabali, Ophthalmologist, A1 Salama Group of Eye Hospitals, Kerala, INDIA.

Email: [dr.ahmed.aljabali@gmail.com](mailto:dr.ahmed.aljabali@gmail.com)

Received Date: 02/09/2019 Revised Date: 21/10/2019 Accepted Date: 05/11/2019

DOI: <https://doi.org/10.26611/10091225>

## Access this article online

Quick Response Code:



Website:

[www.medpulse.in](http://www.medpulse.in)

Accessed Date:

19 November 2019

## INTRODUCTION

Colour Blindness has an enormous personal, social and economic impact limiting the education and life choices of otherwise healthy people & placing a significant weight on family, community, social & health service. Group of diseases and conditions occurring in childhood or early adolescence, which, if left untreated leads to severe visual impairment that are likely to be untreatable later in life (blindness).<sup>1,2</sup> As we all know one of the most important organ in the human body are eyes and the most wonderful gift is vision, the importance of eye is neglected by many people by not paying proper attention towards eye care.<sup>3,4</sup> According to the World Health

Organisation (WHO), about 75% of causes of blindness can be avoided through preventive or therapeutic measures. Control of childhood blindness is main priority of the WHO through its programme "VISION 2020: the Right to Sight".<sup>5</sup> In the developing countries 25% of the populations are constituted by children in the school-going age group (6-15 years). They fall best in the preventable blindness age group & schools are the best for imparting health education to the children.<sup>6</sup> Children do not complain of defective vision, may not even be aware of their problem. Children make various adjustments to the poor eyesight by sitting near the blackboard, holding the books closer to their eyes, squeezing the eyes, avoiding work requiring visual concentration.<sup>7</sup> Schools are also one of the best centers for effectively implementing the comprehensive eye healthcare programme. Hence, present study was conducted with the objective of estimating the prevalence of colour blindness among school children in a tertiary care hospital.<sup>8</sup>

## MATERIALS AND METHODS

A cross sectional study was conducted in 4 different nearby schools, after obtaining the permission from D.E.O. of Kannur. Which was conducted over a period of five months from January 2019 to May 2019 in the Department of Ophthalmology, Kannur Medical College, and Kerala, India and Al Salama Eye Hospital, Kannur. Permission from school Principal was obtained. Informed consent was taken from each student of 4 schools. In each school from grade 6th to grade 10th all students were called according to the roll number in a class room where a complete examination of vision and detailed examination of eye like slit lamp and fundus examination to rule out other pathologies/ocular disease was done. Later name, age and sex of each students were noted down. For colour vision Ishihara's Type Test chart was used. Test was carried out by making the students to sit in front of examiner by holding the test chart at a distance of 75 cms from the student and student is made to close one eye and read the number in each plate till all 38 plates are read or traced the colour. And answers were noted done. And again, the other eye was closed, and test was repeated. Followed by which presence of colour blindness were noted and again the colour blindness was divided into protanopes and deuteranopes depending on the response.

### Inclusion Criteria

- Students from 11-15 years.
- Students willing to participate in present study.

School which were near and easily accessible to hospital

### Exclusion Criteria

- Students with ocular pathology.
- Any history of medication for more than one month.

**Sampling Method:** Convenient sampling.

**Statistical Analysis:** Descriptive statistical analysis has been carried out in the present study Prevalence Number of all current cases of specific disease existing at a given point in time x 100/Estimated population at the same point in time.

## RESULTS

A total of 1410 students were evaluated from 4 different schools of the Kannur, among which 771 (54.68%) were males and 639 (45.31%) female students from grade 6th to grade 10th were screened between 11 to 15 years. The prevalence of colour blindness was found to be in 22(1.560%) students out of 1410 students. Colour blindness was seen in 17 (2.20%) male students and 5 (0.78%) female student affected (Table-1). Among the colour blind 20 (1.41%) were protanopes, 3 (0.21%) were deuteranopes and none were tritanope. (Table-2) Males were affected more compared to female students. The prevalence of protanopes were seen in male students whereas deuteranopes were seen in both male and female students.

**Table 1:** Gender Wise Distribution of Colour Blindness

Colour Bliand	Gender		Total
	male	Female	
Affected	17(2.20)	5(0.78)	22(1.560)
Not Affected	754(97.79)	634(99.21)	1388(98.43)
Total	771	639	1410

**Table 2:** Distribution of Protanopes and Deuteranopes

Colour Blind	Protanopes	Deuteranopes	Total
Affected	20(1.41%)	3(0.21%)	23(1.63%)

**Table 3:** Gender Wise Distribution of Type of Blindness

Colour Blind	Protanopes		Deuteranopes		Total
	Male	Female	Male	Female	
Number(%)	20(1.41%)	0	1(0.07)	2(0.14)	23(1.63%)

## DISCUSSION

Colour vision test using the Ishihara's chart helps in diagnosis of colour blindness in mass population and it is more reliable than any other test for a screening purpose.<sup>9</sup> Previous studies have shown the reliability of test chart i.e., according to the test results of these studies the sensitivity of the test chart is of 96% and specificity of 98.5%. Hence most of the time Ishihara test plates have been used in mass screening or for the diagnosis of colour blindness.<sup>10</sup> A study among school children of Patiala city, India reported 3.85% males and 0.38% females to be

colour blind.<sup>11</sup> In this study the type of colour blindness in Ethiopian population, which demonstrated 4.2% of males and 0.2% of females having various forms of colour blindness. Similar study in Jat Sikhs of Patiala city of India, reported an incidence of 3.83% and 0.13% in males and females respectively.<sup>12</sup> Bansod was carried out in total of 595 students in Pune showed the prevalence rate of 2.02% and found to be more in male students than female students.<sup>13</sup> Another study conducted in a total of 2001 students were examined, in which 1050 male students and 951 females with mean age of 10.35 ( $\pm$  2.75) and 10.54 ( $\pm$  2.72) respectively. Among the total of examined students, 2.1% had some colour vision defects in some pattern. Of the male population, 3.9% had colour vision defects while none of the female was found with the deficiency.<sup>14</sup> Previous studies done of school going children and the elder age group from 15-45 years showed the report of prevalence i.e., 8.48% and 4.9%. Osuobeni *et al* observed in their study, that the children showed a prevalence rate of 2.9% of colour blindness. As there is no treatment for colour blindness. Special contact lenses can be used to help some people with colour blindness distinguish the difference between colours. Some careers require good colour perception like being a lab technician who needs to interpret tests results-based colour or an electrician who needs to tell the difference between different coloured wires. Because of this those with colour blindness may need to limit their career options. In children it is important to know of colour blindness so teachers can adjust their lessons to provide a better learning environment.<sup>15</sup>

## CONCLUSION

The prevalence of colour blindness was noted to be higher in males (i.e. 1.3%) when compared to that in females (i.e. 0.1%). which can be seen depending on the pattern of inheritance of colour blindness. In many cases, student remains unaware about the colour blindness disability. It may cause difficulties in learning and choosing profession. Hence early screening for colour vision disorder and utilizing new method of teaching or learning process can lead to a better life and better profession.

## REFERENCES

1. Chia A, Gazzard G, Tong L, Zhang X, Sim E-L, Fong A, *et al*. Red-green colour blindness in Singaporean children. *Clin Experiment Ophthalmol*. 2008; 36: 464–467.
2. Karim K, Saleem M. Prevalence of congenital red-green colour vision defects among various ethnic groups of students in Erbil City. *Jordan J. Biol*. 2013;6:235–238
3. Simunovic MP. Colour vision deficiency. *Eye (Lond)*. 2010;24:747–755.
4. Al-Aqtum MT, Al-Qawasmeh MH. Prevalence of colour blindness in young Jordanians. *Ophthalmologica*. 2001; 215: 39–42.
5. Dahlan H, Mostafa O. Screening for colour vision defects among male Saudi Secondary School Children in Jizan City, Kingdom of Saudi Arabia. *Med. J. Cairo Univ*. 2013;81:513–517.
6. Kalloniatis M, Luu C. The perception of colour. *Organ. Retin. Vis. Syst*. 2007;1–31.
7. Arora K, Garg R. Comparative study of colour blindness among various immigrant populations in Punjab. *Int. J. Appl. Basic Med. Res*. 2012; 2: 214–217.
8. Shah A, Hussain R, Fareed M, Afzal M. Prevalence of red-green colour vision defects among muslim males and females of Manipur, India. *Iran J. Publ. Heal*. 2013; 42: 16–24.
9. Tabansi PN, Anochie IC, Nkanginieme KEO, Pedro-Egbe CN. Screening for congenital colour vision deficiency in primary children in Port Harcourt City; teachers' knowledge and performance. *Niger J. Med*. 2008;17:428–432.
10. Nwosu SN. Ocular problems of young adults in rural nigeria. *Int ophthalmol* 1998; 22:259–263.
11. Ugalahi MO, Fasina O, Ogun OA. Impact of congenital colour vision defect on colour-related tasks among secondary school students in Ibadan, Southwest Nigeria. *Niger J. Ophth*. 2016; 24(1):20-24.
12. Ayanniyi A, Mahmoud A, Olatunji F. Causes and prevalence of ocular morbidity among primary school children in Ilorin, Nigeria. *Niger J. Clin*. 2010; 13: 248–253.
13. Mulusew A, Yilikal A. Prevalence of congenital colour vision defects among school children in five schools of Abeshge District, Central Ethiopia. *JOECSA*. 2013; 10–14.
14. Oriowo O, Alotaibi A. Colour vision screening among Saudi Arabian children. *S Afr Optom*. 2008; 67: 56–61.
15. Horace C, Thuline M. Colour-vision defects in American School Children. *JAMA*. 1964; 188: 514–518.

Source of Support: None Declared  
Conflict of Interest: None Declared