

A STUDY ON COLOUR VISION DEFICIENCY AMONG MEDICAL STUDENTS OF ODISHASushree Sangeeta Kar¹, Manju Agrawala²¹Assistant Professor, Department of Physiology, Srirama Chandra Bhanja Medical College and Hospital, Cuttack.²Tutor, Department of Physiology, Srirama Chandra Bhanja Medical College and Hospital, Cuttack.**ABSTRACT****BACKGROUND**

Normal human beings are trichromates and can appreciate three primary colours which are red, green and blue. The inability to appreciate colour properly is known as colour blindness or colour vision deficiency. Unless challenged with situations where appreciation of normal colour is specifically required, colour vision deficiency goes unnoticed. Medical profession is one of such professions where appreciation of proper colour is very essential. But many of the doctors are not aware of their colour vision deficiency. Early detection would definitely help them in their profession. The present study was undertaken to screen out colour vision deficiency amongst the medical students.

MATERIALS AND METHODS

The study was carried out among the 1st and 2nd semester medical students of SCB Medical College and Hospital (n = 226) from January 2017 to April 2017 with the help of Ishihara chart. The polychromatic plates in Ishihara chart were shown to the participants for the period of 3 seconds. They were asked to read the number or trace the winding lines in each plate. A person with colour vision deficiency confuses certain colours and will read a different number from a normal person on the same plate. Such observations were noted carefully.

RESULTS

After careful screening, it was noted that among the study population (n = 226), 14 were colour deficient (8.91% of male study population). None of the female participants were found to be colour deficient.

CONCLUSION

Medical students have to deal with colours in all stages in their career. The study helps the subjects to be aware of their limitations. Alternate means of observation should be encouraged that puts emphasis on tissue architecture rather than colour. They can be guided to take up specialties that do not require accurate colour perception skills. Many unnecessary litigations and medico legal cases can therefore be avoided. This would benefit the medical students and the society at large.

KEYWORDS

Colour Vision Deficiency, Ishihara Chart, Medical Students, Screening.

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BACKGROUND

Normal human population is trichromate, i.e. they have three cone systems. Therefore, normal human eye perceives three primary colours, which are red, green and blue. The red and green cone pigments are arranged in tandem on the q arm of the X-chromosome. Therefore red-green colour vision deficiency is sexually transmitted and shows sexual selectivity, the females being the carriers and the males being the sufferers. So, the prevalence is more in males and less in females in all races. The blue cone pigment is situated on chromosome 7. So blue colour vision deficiency is autosomally transmitted. Hence shows no sexual selectivity.

Colours have three attributes: hue, intensity and saturation.¹ For the perception of colour, the synergistic and harmonic functions of retina, especially the rod cells, lateral geniculate nucleus of the thalamus and area v8 of visual cortex are essential. To appreciate the lush green fields, majestic sky during sunrise and sunset and the brilliant colours of the different flowers, we need to have a sense of normal colour perception and have a normal colour vision. The ability to appreciate colour is essential for smooth execution of daily activities. For medical professionals, it is even more critical. Many health conditions are reflected as changes in body colour like pallor, cyanosis, icterus and eruptions on skin and other inflammatory and post traumatic skin colour changes. Specialisations requiring detail study of microscopic field such as identification of different blood cells in a smear, change in colour of body fluids treated with reagents such as Benzidine dye test and most importantly surgical procedures require very precise sense of appreciation of colour. The students of health sciences must be made aware of their deficiencies so that they can take appropriate measures in clinical practice to avoid any shortcomings and litigation. The present study was undertaken to evaluate the

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presence of congenital colour vision deficiency among the medical students who are future healthcare providers to make them cautious about their colour vision deficiency so that they will be more alert during evaluation of coloured samples and clinical signs. Medical students and practitioners should be screened for colour vision deficiency and advised about it, as normal colour vision is very crucial for them and the lack of it would definitely affect their performance as a healthcare provider in general practice and in certain specialties like Pathology and Microbiology.

Aims and Objectives

To study the prevalence of colour vision deficient subjects amongst medical students in Odisha and to suggest means of overcoming them.

MATERIALS AND METHODS

The study was carried out among medical students age 18 to 22 years with mean age 18.6 years (S.D. ± 1.54) of SCB Medical College and Hospital. Out of 250 students who had consented for the study, 24 were excluded as they had refractive errors such as myopia, hypermetropia and astigmatism (n= 226). Study period was from January 2017 to April 2017. The study was carried out with the help of Ishihara Chart.

The chart consists of polychromatic plates containing printed figures made up of coloured spots on a background of similar shaped spots. The figures are designed in such a way that only a person with normal vision will be able to read the numbers correctly. A person with colour vision deficiency will not be able to see the number or may see a different number. The study was performed in the department of Physiology of SCBMCH in the human laboratory. The laboratory room had adequate day light. The plates were kept at normal reading distance of 75 cm from the subject and the plates were kept right angle to the vision. All coloured plates in the Ishihara Chart were shown to the participants for a period of 3 seconds and they were asked to read the number or trace the figure in a plate as was the case. The results obtained were carefully noted.

RESULTS

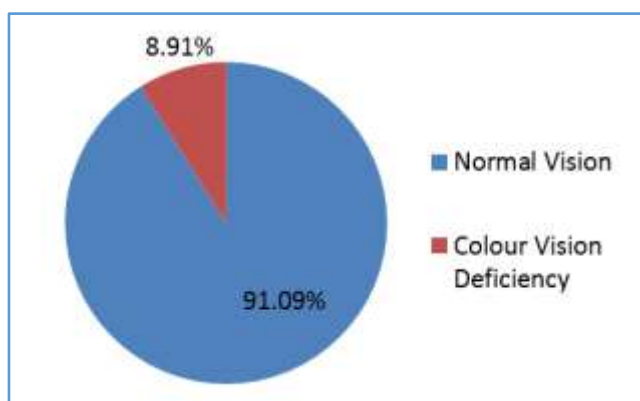


Figure 1. Distribution of Subjects with Colour Vision Deficiency among the Male Study Population

Total Study Population	100
Male	69.47
Female	30.53
Table 1. Gender Distribution of Study Population in Percentage	

Subject (n=226)	No.	%
Male (n=157)	14	8.91
Female (n=69)	0	0
Table 2. Percentage Distribution of CVD in First Year Students		

After screening out it was observed that among the study population (n=226) 14 were colour deficient. In the present study we found that all the colour deficient subjects were males. 8.91% of males were colour deficient. None of the female study population were found to be colour deficient.

DISCUSSION

The difficulties faced by the colour deficient subjects in medical profession were documented by previous works. The prevalence of CVD varies from race to race and differs in different geographical area. Vijaylaxmi.² et al, reported CVD in Hindu South Indian population. The prevalence reported was 2.1% in 7,542 males and 0.2% in females. Prevalence of CVD in Caucasians is 8% for men and 0.4% for women.³

In the western Nepal, a study on 964 school children (10-19 years of age), CVD was found in 18 boys with prevalence of 3.8%, but none of the girls were affected.⁴ In USA, prevalence among junior medical students was 12.8%.⁵ and dental students it was 7.8%.⁶ In UK prevalence among histology students was 8.7%.⁷

7% male and 0.4% female population is suffering from CVD in 10 million American people.⁸ In Faisalabad the prevalence was 2.4% in males and 4.48% in females.⁹ In the present study we undertook in Odisha, the prevalence was 8.91% in males and 0% in females.

A few studies reported the inconveniences of colour-deficient professionals in clinical and laboratory studies.¹⁰⁻¹⁵

The colour deficient subjects reported difficulties in recognizing bodily colour changes (pallor, Icterus, cyanosis, rashes, bruise, abrasion), slides where accurate colour detection is important. They also expressed difficulties in reading coloured charts, urine analysis, mouth and throat lesion, titration end points and tissue identification during surgery. The works of Spalding revealed a wide range of difficulties experienced by colour vision deficient subjects in clinical practice with changes of error being significant.

Study of Campbell et al revealed that the medical practitioners with colour vision deficiencies could not identify and outline properly the clinical signs and symptoms in comparison to practitioners with normal colour vision.¹⁶ Examinations of histologic and histopathologic/microscopic sections are based upon the difference in colours developed after staining them according to the staining techniques specified. As the prevalence of colour deficiency in the general population is quite common, it is a pertinent point

that this dependency upon colour differentiation poses a serious obstacle for several medical students especially beginners as first and second semester students, who are expected to correctly identify colours.

Recent practice is to adjust according to a gray scale in laboratory work as well as gray scale copies of colour photo micrographs for examination purposes. Gray scale images to emphasize the texture of tissues and the contrasts between the tissues to give importance to tissue architecture. In this approach the colour deficient subjects would give emphasis on tissue structure rather than on colour. According to Rubin et al, students with normal or trichromatic colour vision should be encouraged to consider structural characteristics of cells and tissues in gray scale photo micrographs that may otherwise be overlooked by staining.¹⁷ The percent distribution of colour vision deficiency is different from that reported by other workers. This could be due to the fact that colour vision deficiency was not studied in Odisha previously. A further study with a large study population will help to corroborate the findings. With increase in age and experience, the medical fraternity tends to use more intuitions whereas medical students are more likely to use analysis.¹⁸ Students of medical science therefore would be relatively more receptive and adaptive to newer practices that would help them to overcome the shortcomings of their congenital colour vision deficiency. Screening at an early stage would enable them to become aware of their limitations and developing means to overcome them. Every human being has a right to equality and helping a colour deficient subject to identify this, so that they can overcome their limitation would only strengthen this motto.

CONCLUSION

In summary, colour vision deficiency is quite prevalent amongst medical students of Odisha. This study helps the subjects to be aware of their condition. Hence, alternate means of observation should be encouraged that puts emphasis on tissue architecture rather than colour. This will help them to avoid mistakes and hence medico legal implications and litigations in professional life. It also helps the subjects to take care of their own health and wellbeing in day to day activities other than profession. As the present study revealed prevalence of colour study deficiency in medical students, it is equally important to screen out other larger student population such as school students. This can guide them to take up careers which do not require stringent colour perception skills.

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