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PREVALENCE OF CONGENITAL COLOR BLINDNESS AMONG UNDER GRADUATE MEDICAL STUDENTS

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ABSTRACT

Congenital colour blindness is a common X-Linked genetic disorder, with a prevalence of approximately 5% in Asian males in the general population. Though it creates less problems in day to day life, certain professions demand a high degree of colour perception. This study estimates the prevalence of congenital colour blindness among undergraduate medical students. Colour vision of 568 undergraduate medical students was tested using Ishihara's colour plates. Eleven male students were found to have defective colour vision, out of which only one was aware of his defect. This study was conducted to help the undergraduate students to persue a speciality subject which does not require a high degree of colour perception.

KEYWORDS: dyschromatopsia, congenital, ishihara, colour vision, genetic, Protanope and Deuteranope.

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INTRODUCTION

Color blindness is a common X- linked genetic disorder. However, most of color blinds remain undetected in general population due to absence of proper screening. [1)] A color blind person usually does not suffer from any significant disability. But they may encounter certain problems in different fields involving interpretation of color based results. The prevalence of congenital red- green color blindness in Asian males is around 5%. Yet, there have been few studies into the prevalence of color vision deficiency among medical professionals. Medical professionals requiring special skills such as interpretation of color based chemical reactions in laboratories, studying color- Doppler datas require normal color vision. Thus, medical students and doctors should be screened for deficiency and advised about it [2]. The subjects were instructed to read the Ishihara plates in adequate day light condition binocularly.

MATERIALS AND METHODS

A total number of 568 under graduate medical students aged 17 to 22 years studying in Sree Balaji Medical College and Hospital were included in the study. 287 were males and 281 were females. Informed consent was taken from all students. Students were also asked to fill a questionnaire which included questions regarding consanguinity among their parents, possession of driving license, the presence of systemic diseases and intake of chronic medications. All the students underwent visual acuity testing, slit lamp examination, color vision testing using pseudo isochromatic Isihara plates and fundus examination was done in appropriate cases.

RESULTS

Out of the 568 subjects tested 11 males (1.9%) were found to be color defectives. None of the females were found to have color vision defect. Our study results correlate with the prevalence of color blindness in general population in South India [3], which was 2.4%. All the 11 male subjects identified the numeral in the first plate. In the transformation plates (2-9), the color defective subjects read a different number as compared to normal individuals. In the vanishing plates (10-17), color defectives did not identify the numeral, while the color normal individuals identified it. In the hidden digit plates (18-21) that have no numeral, the color defective people identified a numeral which will not be seen by normal individuals. All the 11 subjects were then classified into Protanope and Deuteranope with the help of classification plates (22-25). Out of 11 color defective male subjects, 6 had green color defect (Deutranomaly) and 5 had red defect (Protanomaly). None of them had Deuteranopia or Protanopia. All the subjects except one was aware of their defect.

DISCUSSION

Congenital color deficiencies are caused by inherited photopigment abnormalities. Protan, deutran and titran represent the color deficiencies involving the absence or abnormality of single photopigment (dichromats and anomalous trichromats). Protan and deutran color deficiencies are together named as red – green deficiency. The three cone cells in humans are S (400-500nm), M (450-630nm) and L (500-700nm). The pigments present in the L and M cones are encoded on the X chromosome. Red – green defects are inherited in a X- linked recessive pattern (Xq 28) [4,5]. Males who have only one X chromosome are hemizygous and they will always manifest color vision deficiency if they inherit an abnormal gene from their mother. Females on the other hand have two X chromosomes one inherited from each parent, so usually they will not show a complete manifestation of the typical color defect unless they are homozygous. The Ishihara color test is a test to determine if a patient has color blindness. It was named after Dr. Shinobu Ishihara who first published the test in 1917 as a professor at the University of Tokyo. It is the most widely used screening test for red-green color deficiency [6]. The prevalence of red-green color deficiency varies between human populations of different racial origin. It is about 8% for Caucasian males, 5% for Asian males & 4% for African males, in the general population. Our study shows a prevalence of 1.9% in medical students. This is low in comparison to the general population. It correlates with the

results obtained in a South Indian population based study showing a prevalence of 2.4% [3]. The low prevalence obtained in our study may also be due to the specialized population included.

CONCLUSION

Our study shows a prevalence rate of 1.9% among male undergraduate medical students and none among female medical students. The low prevalence may be due to the increased awareness among city (urban) students about color vision defects which would have prevented them from choosing career in medicine. Also the number of consanguinous marriages is very less in our study. Though color vision defects do not affect normal daily activities significantly, certain sub specialities in medicine which require color- based interpretations like color-doppler, laboratory investigations with color coding may be affected. Our study was done to estimate the prevalence of color vision abnormalities in the undergraduate medical students so that these subjects may be given proper career counseling.

CONFLICT OF INTEREST

Conflict of interest declared none.

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