

Prevalence of Color Vision Deficiency among the Students of Quaid-e-Azam Medical College, Bahwalpur, Punjab, Pakistan

Dr Maryam Khan Lashari ; Dr Baset Mahmood & Dr Aliya Razzaq

ABSTRACT

INTRODUCTION:

Color vision is due to cones. Color vision deficiencies (deficiency or absence of cones) are a group of condition that affect perception of color. They cause a range of changes in color vision. These condition are divided into three major categories: red-green color vision defects, blue-yellow color vision defects, and a complete absence of color vision.

OBJECTIVES :

The objective of study was to:

- *Determine the prevalence rate of color vision deficiency among the students of QAMC*

STUDY DESIGN:

It was an observational, descriptive, cross-sectional type of study

SETTING:

Study includes the students of Quaid-e-Azam Medical college.

DURATION:

Study was carried and completed from 1st May 2015 to August 2015.

OBJECTS AND METHODS:

Students of Quaid-e-Azam medical college, Bahawalpur were taken into study. A pre-destined questionnaire was given to the students for data collection.

RESULTS:

A survey of color vision deficiency among 823 students of five batches (2010-2015) of MBBS revealed a prevalence of 0.729% with a marked male predominance (males 1.66%, females 0.0%). Among the students 337(40.94%) were males and 486 (59.05%) were females. Mean Ages was 22 Years (19-23years)

COCLUSIONS:

It is concluded that medical students and doctors should be screened for deficiency and advised about it, and that there should be more study of the effects of CVD on decision making in general practice and same specialties.

KEY WORDS:

Color blindness, prevalence, health care workers, screening

INTRODUCTION

The ability of the human eye to see and distinguish different colors and their shades is a remarkable gift of the nature

Just imagine life without colors.....! Surely a hazardous picture comes in our minds when we think a little deficiency causes so many problems then in absence of colors what could have happened?

Color vision is due to cones. Color deficiencies (deficiency of absence of cones) are a group of condition that affects perception of color.

They cause a range of changes in color vision. These conditions are divided into three major categories: red-green color vision defects, blue-yellow color vision defects, and a complete absence of color vision.

Red-green color vision defects are most common form of color vision deficiency affecting males more than females. Among populations with northern European ancestry, it occurs about in 8 percent of males and 0.5 percent of females. Blue-yellow color vision defects which are rare cause problems with differentiating shades of blue and green. Blue-yellow color vision defects males and females equally. This condition occurs in less than 1 in 10000 people worldwide

An absence of color vision called achromatopsia is uncommon. There is only black and white perception only. A mildest form of this condition incomplete achromatopsia almost always have additional problems with vision including reduced visual acuity, increased sensitivity to light (photophobia) and small eye movement called nystagmus. Complete achromatopsia affects an estimated 1 in 30,000.

Color vision deficiency is often undiagnosed and may cause problems faced by people with color vision deficiency affecting their choice of career, job disabilities recognizing road traffic signals and other such problems in our daily lives. Congenital color vision defects (CVD) are common inherited (most commonly X linked) non progressive and untreatable disorders. Screening children for these disorder is established practice in the United Kingdom so that those affected can be advised about occupational preclusion. Population based work on the broader impact of color vision is however limited 2.

The present study aims to find the prevalence of color blindness in Quaid-e-Azam Medical college, Bahawalpur, Punjab, Pakistan.

Methodology

Setting:

The study included the entire students of QAMC.

Duration of Study:

It was from 1st May 2013 to August 2013

Study Population:

All the students of QAMC were taken as study population

Sampling:

No sampling was needed as all the students of college were tested

Inclusion Criteria:

- All the students of QAMC
- Both Sexes

Exclusion Criteria:

- Students absent from college at the time of data Collection
- Unwilling Students

Study Design:

- It is cross-sectional, Observational and descriptive type of study

Data Collection:

Data was collected of a predestined Questionnaire. It consisted of question regarding family history, color discrimination and blood samples recognition

The color vision deficiency was determined using the 25-plate ishihara's test of color vision. The color vision testing plates are held at 75cm from the person and tilted at right angle to the line of vision. The test was done in a properly lighted room resembling to the effect of natural day light. To ensure this practical time (12:00pm to 2:30pm) was selected for study. The person was asked to read the numbers seen on the test plates 1 to 17 and the time given for telling the number was less than 5 seconds. An assessment of reading of plates 1 to 15 determines the normality or defectiveness of color vision. If 13 or more plates are read correctly the color vision is regarded as normal. If only 9 or less than 9 plates are read correctly the color vision was regarded as red green deficient. The plates 16 and 17 are used to differentiate proton and deuteron types of color vision deficiency. A proper consent was taken from all the teachers working with their respective classes at the time of study.

Data analysis:

Data was analyzed manually first prevalence for color vision deficiency was calculated. Finally family history and distribution among classes was calculated.

Results:

A survey of color vision deficiency among 823 students of five batches of MBBS revealed prevalence of 0.792% with a marked male predominance. Among the students 337(40.94%) were males and 486(59.05%) were female. Mean age was 22years(range 19-23years)

Out of these total 823 students 6 students (fig 1) were color blind and all were males. No female was recorded as color blind. All the color blinds were having dichromacy type(red green) blindness. Almost all of them had difficulties in reading plates 3,4,15 and 17 of ishihara chart.

Among these students there was very interesting family history. In normal 823 students 3 students had family history of color blindness and in 6 color blind students also 3 students were having family history of color blindness (tab 1)

Affected students reported different difficulties regarding color discrimination listed in tab 2 and 3.

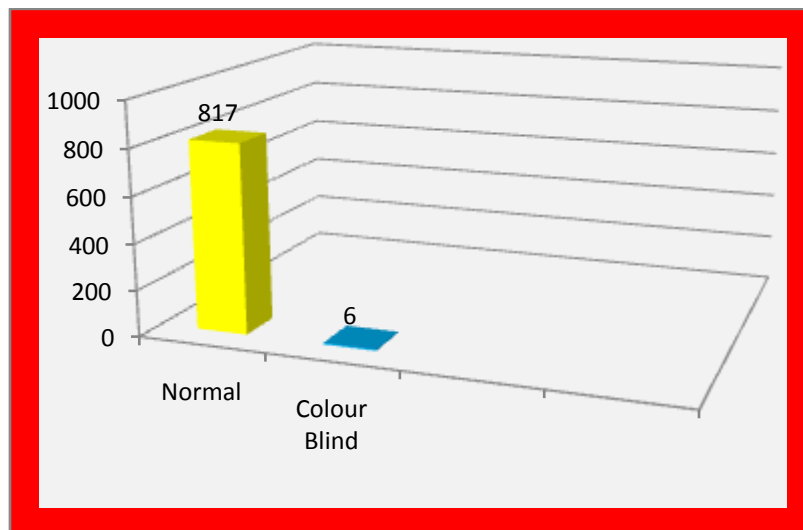


Fig 1: Prevalence Of Color Vision deficiency in QAMC

Colour Blindness	Total	+ve Family History	Percentage
No	817	3	0.36%
Yes	6	3	50

Table 1: Family History of Color Blindness

Discriminative History	Males	Females
Never	333	486
Occasionally	-	-
Frequently	1	-
Always	3	-

Table 2: Distribution of difficulty in green and red discrimination

Discriminative History	Males	Females
Never	332	486
Occasionally	-	-
Frequently	1	-
Always	4	-

Table 3: Distribution of difficulty in Blue and Green discrimination

Table 4: Class Wise Distribution

Class	Normal		Color Blind	
	Males	Females	Males	Females
Ist year	35	134	2	-
2nd year	48	86	1	-
3rd year	70	87	3	-
4th year	106	106	-	-
Final Year	72	73	-	-
Total	331	486	6	-

Discussion

The term color blindness commonly used in daily practice is a misnomer. To our best knowledge, we have not come across any person who is totally color blind i.e. he/she should appreciate everything in life as black and white only. Instead, all the persons diagnosed as Total color blindness by Ishihara Chart could identify the primary colors correctly when shown each color individually. In addition to Ishihara vision test plates other methods such as Naegel anamaloscope test and Franseworth –

Munsell hundred hue test are also available to test for color vision. These two tests are more sensitive and accurate, but time consuming; thus, not suitable for mass screening. The Ishihara test charts were chosen in this study because it is easier and quicker to perform; familiarization with all the colors is not necessary since the answer given is in terms of numbers and not in terms of colors; the test is accurate for assessment of color vision deficiency in mass screening.

The prevalence of color vision deficiency in our sample of medical students and healthcare personnel was similar to reported rates in Western general population and healthcare workers.⁶

It is well-known that people who are deficient in color vision adapt to their deficiency by using cues. In a population-based cohort study, Cumberland found congenital color defects confer no functional disadvantages in relation to educational attainment or unintentional injury, thus challenging the rationale for screening.⁷ It is generally accepted that color vision deficient adults can drive safely because they can tell a stop sign by its shape and know which traffic light means “go” and which one means “stops” because they are always in the same order on traffic lights. However, technological changes (e.g. lower cost of color printing, wide use of color computer monitors) present additional problems for those with this deficiency.⁸ Is the problem faced by these people merely a minor inconvenience?

For the healthcare practitioners, detection of certain clinical signs require unimpaired color vision, such as cyanosis, jaundice, retinal changes, color of body fluids (e.g. haematuria), and blood in vomitus. When compared with normal controls in the performance of clinical tasks requiring color differentiation, those who are color vision deficient tend to perform poorer.^{9, 10, 11} The extent to which these difficulties translate into actual clinical errors is unknown. In our society where we are placing increasing emphasis on equal opportunity, people with color vision deficiency need not face unnecessary discrimination.¹²⁻¹³ However, early detection of color vision deficiency is helpful for those embarking on a healthcare profession. For the color vision deficient doctors, disciplines such as anesthesiology, emergency medicine, pathology, microbiology and dermatology may

pose difficulties but psychiatry and neurology are less problematic.^{14,15}

Conclusion:

- Medical students and doctors should be screened for this deficiency.

References

- [1] Genetic home references: A reference to service of the U.S national library of medicine.
- [2] Cumberland p. JS Rahi, S Peckman, impact of congenital colour vision defects on occupation, *Archive of diseases in childhood* 2005;90-908
- [3] Colour blindness and testing in children by Melanie Lilliston Stephend F Austin state university spring 2000
- [4] Adams J.A Haegerstorm-Portnoy G 1987 colour deficiency diagnosis and management in vision care pp 971-743
- [5] Newell FW *Ophthalmology- principles and concept* 8th edition St Louis, Mosby-Year book, Inc. 1996-1998
- [6] Spading JA colour vision deficiency in the medical profession 1999,49:469-457
- [7] Cumberland PS, Rahi JS Peckham. CS impact of congenital colour vision deficiency on education and unintentional injuries findings from the 1958 British birth cohort *BMJ* 2004;329-423

[8] Cole BL The handicap of abnormal colour vision Cain EXP Op tom 2004 87,258-75

[9] Campbell JL Spalding AJ Birch J Doctors and the assessment of clinical photographs does colour blindness matter Gen Pract. 1999:49-467

[10] Campbell JL Spalding Spalding JA MIR FA Birch Doctors and the assessment of blood glucose testing sticks does colour blindness matter BJP 2000:393-5

[11] Koningsberger JC, van Norren D, van Niel JC, Dekker W. does colour blindness vision deficiency in the endoscopic influence the accuracy of endoscopic signals 1994:26:549-53

[12] Spalding JA medical and congenital colour vision deficiency: unnoticed problems and the case for screening 1999:49-247-52

[13] Spalding JA confessions of a colour blind physical Cain EXP Op tom 2004:87:344-9