Short Communication

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Prevalence of Color Vision Deficiency in Qazvin

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Abstract

Background: Color vision deficiency (CVD) is an X chromosome-linked recessive autosomal dominant. Determine the prevalence of color blindness in Qazvin population.
Materials and Methods: In a cross sectional study color vision deficiency examined in 1853 individuals with age 10-25 years old who participated in private clinics and eye clinic of Bu-Ali hospital in Qazvin in 2010. The screening of color vision deficiency was performed using Ishihara test. Data were analyzed by SPSS-16 with χ^2 test with $p<0.05$.
Results: Mean age of participant was 17.86±4.48 years. 59.5% of them were female. 3.49% of the total population had color vision deficiency that 0.93% and 2.56% were female and male respectively.
Conclusion: color vision deficiency must be noticed by decision makers in health field for screen planning.

Introduction

Color blindness or color vision deficiency (CVD) is inability to see certain colors or perceive their differences [1]. CVD is an X-linked recessive congenital disease that will be expressed in males with a higher probability and almost is inherited from the mother to the boy. It can be classified as acquired or inherited which includes monochromacy, dichromacy and trichromacy. Monochromacy is the complete color blindness that is so rare and occurs when two or all three of the cone pigments are missing.

Dichromacy includes protanopia **(**caused by the complete absence of red retinal photoreceptors), deuteranopia (caused by the absence of green retinal photoreceptors) and tritanopia (complete absence of blue retinal receptors). In anomalous trichromacy, one of the three cone pigments is altered in its spectral sensitivity and includes protanomaly, deuteranomaly and tritanomaly in which the spectral sensitivity of the red, green and blue/yellow receptors is altered. Achromatopsia is the most severe kind of color blindness and the prevention to see the color by the patient. The most prevalent color blindness is for the green and red colors which is called Daltonism [2, 3].

Some of the color blind people do not recognize any color and perceive the world as gray. The use of some drugs, retinal and optic nerve diseases also may cause the color blindness [2]. Although the statistics of the different groups and populations are not the same, nearly 8% of the male and 0.5% of the female has contacted the color blindness [4-9]. The prevalence of the color blindness is of course different in different regions of the world. The reason for the difference seems to be the racial diversity, the number of participants under study, different age groups, different inferences by the researchers, and the definition tools. Even though the color blindness does not cause a considerable problem in common life, but it sometimes causes the life or financial problems in some jobs and the disturbance during the children educational process. Most of the patients do not know about their color visual deficiency and find about it when they go to school or work if needed and examinations. This project was performed mainly aiming to determine the prevalence of color blindness among the patients of the clinic of Bu-Ali hospital in Qazvin in 2010.

Materials and Methods

In this descriptive research, a random group of 1835 males and females aged between 10-25 years old with mean age of 17.86±4.48 from among the patients coming to the eye clinic of Bou-Ali Hospital in Qazvin were studied. Each patient who came to the eye examinations and did not have the qualifications including the symptoms of eye trauma, past eye surgeries, organic amblyopia, ptosis and cataract, longtime using a drug, diseases of the posterior segment, visual pathways and severe refractive errors was chosen. The patients, if agreed, were selected to participate in the study and were being examined after answering the questions of the check list.

The color blindness test was performed by the Ishihara color test that is one of the simplest screening methods that is used throughout the world now. Ishihara color test is a booklet which its first page is testimonial and all people, either color blind or not, can recognize them. The pages 2-5 would be recognized as 8, 6 and 29 by the

normal people while these numbers would be recognized as 3, 5 and 70 by the people with red and green color blindness. The participants should not spend more than 3 seconds to recognize the numbers. Exceeded pause if repeated in more than 4 pages, would be a sign of low color blindness but we categorized them in our research as normal.

In the present research, the time was about 3 seconds and the distance to the booklet was 70 cm. The light was about 200 -250 luxes and the normal lamps were used. If any doubt in the test results, other pages were used in which there were colored routes that the patients had to trace by their fingers. There were a group of the patients that contacted classic color blindness and we divided them into either deuteranopia and or protanopia but it was not possible to categorize them in a generalized group of green and red blindness.

In addition to Ishihara test as a booklet, a system installed on the computer containing the Ishihara program and some tests for blue/yellow color blindness was used. The people were studied and examined separately. All eye and optometric examinations were performed on the patients before the color blindness test. Finally, the data of the research were analyzed by using the SPSS-16, the χ^2 test with a significance level of 0.05.

Results

In this cross sectional study, 1835 patients with mean age of 17.86±4.48 were studied. 59.5% of them were female. 3.49% were conducted color blindness from which 0.93% and 2.56% were female and male respectively. Ten per cent of the population under study had amblyopia from which 53.8% and 46.2% were female and male respectively. There was not a significant relationship between amblyopia and CVD, as less than 1% of the females and 3.51% of the males from all patients with amblyopia had color blindness. 59.29% and 7.52% of the population under study were respectively myopic and hyperopic. 35.3% and 4.8% of female of the said population were respectively myopic and hyperopic.

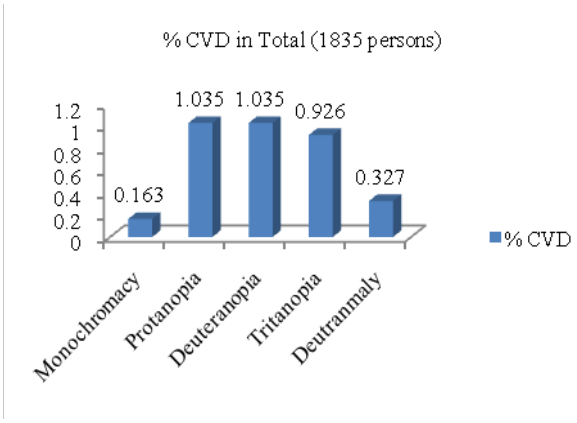

Figure 1. Frequency of all kinds of color blindness in the population under study

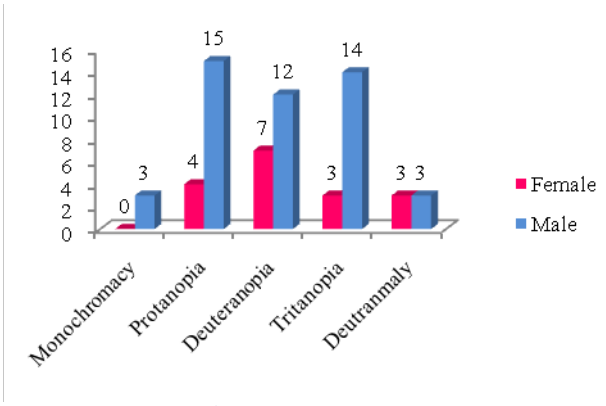

Figure 2. The number of the people contacted color blindness according to the kind of color blindness and the gender of patients

24% and 2.72% of males of the said population were respectively myopic and hyperopic. From the population under study, 11 female and 32 male patients with myopia and 3 male patients with hyperopia contacted color blindness. No one of females was color blindness hyperopic. There was not a significance relationship among CVD and refractive errors in the population under study.

Discussion

According to the present research, the prevalence of color blindness in Qazvin was 3.49%. The color blindness prevalence among males and females were different like the studies performed all around the world and Iran.

The color blindness prevalence among the students in the city of Sari was 2.41% [8]. The color blindness among boys and girls was respectively 4.02% and 0.46% in Spain [6]. It was 9.33% and 0.51% respectively among males and females in France [7]. Also it was 0.63% among students (girls 0.38% and boys 0.25%) in Tehran [9]. The color blindness prevalence in the European, Asian and or African countries is some different but finally indicate a general conclusion that is the higher prevalence of color blindness in males than females.

Studying the research results from the color blindness prevalence throughout the world shows that it is 0.8-9.3% among males and 0.4-3.2% among females [10]. The most recent study in Nepal showed it is 2.1% among males [11]. It was demonstrated in a study that the color blindness is increasing among the African males and in the colonist regions [12].

In Saudi Arabia, the prevalence of color blindness in females is about 0.35% [13]. The other study on the medical students showed it as 5.37% [14]. Generally it seems that the results in most countries are about the same with some differences and the color blindness prevalence among males is higher than females. The color blindness prevalence in the public needs multilateral and extensive studies and the awareness of its prevalence is so effective on the social and individual activities. As color recognition in some jobs like medicine and educational trainers and or in other people during some daily activities like driving is so essential, the inability to recognize the

colors correctly there will be tragic consequences. So it is logical that people would be screened regarding this disorder.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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