# The Incidence of Color Blindness among some school children of Pokhara, Western Nepal

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## ABSTRACT

The incidence of color blindness varies from race to race and different in different geographical area. Since, there is no such report about the prevalence of color blindness in the western part of Nepal, the present study had been conducted to find out the incidence of color blindness among school children of Pokhara city, western Nepal. Participant's (n=964, 474 boys, 490 girls, age group 10 to 19 years) color vision was tested by using Ishihara chart (38 plates). Among 474 boys, 18 boys were color blind with the prevalence of 3.8%. None of girls were found to be color blind. Out of 18 color blind boys, nine, six and three boys were the victims of deuteranopia, deuteranomaly and protanomaly respectively. The incidence of color blindness were more amongst the Darji (14.3%) and Newar (9.1%) ethnic groups.

**Keywords:** Color Blindness, School children, Western Nepal, Ethnic groups, Ishihara chart.

## INTRODUCTION

John Dalton was the first scientist to give a clear description of his own affliction of color blindness in 1798.[1] Color blindness is an abnormal condition characterized by the inability to clearly distinguish different colors of the spectrum. Human color vision is normally trichromatic i.e. the mixture of red, green and blue lights.[2] Most color vision defects are congenital and permanent. Red-Green defects (Protan and Deutan) show the highest prevalence in the general population.[3] Impaired color vision, in the case of red-green color blindness, is genetically determined by X- linked recessive inheritance and thus occurs in males but is transmitted via female and about 8.0% of all women are carrier of it.[4] Being a genetic disorder, the incidence, of color blindness, varies from race to race and different in the different geographical regions of the world inhabited by people of different ethnicity.[5] Asian males have a prevalence of color vision defects of 4.9% compared to 0.6% in females.[6] Person with defective color vision are at a disadvantage especially for employment purposes such as pilots, drivers, in defence services and in technical fields like engineering and medical profession.[7] Though the incidence of color blindness has been reported from various populations of several countries, only one recent study has found about 2.2% prevalence of color blindness in the boys of Kathmandu Valley.[8] There is no report of such study undertaken about the prevalence of color blindness of the western part of Nepal. So the present study had been conducted to find out the incidence of color blindness and racial difference of it among the school children of Pokhara City, western Nepal.

**Table-1:** Distribution of color blindness of the subjects according to Ethnic groups

| Ethnic groups | Total no. of Boys | No. of boys with color blindness | % of corresponding ethnic groups |
|---|---|---|---|
| *Brahman* | 80 | 4 | 5.0 |
| *Chhetri* | 72 | 2 | 2.8 |
| *Magar* | 95 | 2 | 2.1 |
| *Gurung* | 118 | 6 | 5.1 |
| *Newar* | 22 | 2 | 9.1 |
| *Darji* | 14 | 2 | 14.3 |

## MATERIALS AND METHODS

In the present study, six secondary schools were selected randomly out of 130 schools keeping in mind that all areas of Pokhara city are represented. The total number of schools children were 964 (474 boys and 490 girls) from grade 6 to grade 10 with age between 10 to 19 years. Among 24,819 numbers of school children in Pokhara in 2006.[9] The study had been done from March to June 2006.

Color vision was tested by using Ishihara Chart ("Ishihara Type Tests for Color Blindness"- 38 plates (1990) Eye Care- Ludhiana, India). Subject were asked to seat in a room with sufficient light and read the chart keeping it 33 cm away from the eyes. The types of colorblindness were differentiated with the help of key provided with the chart.

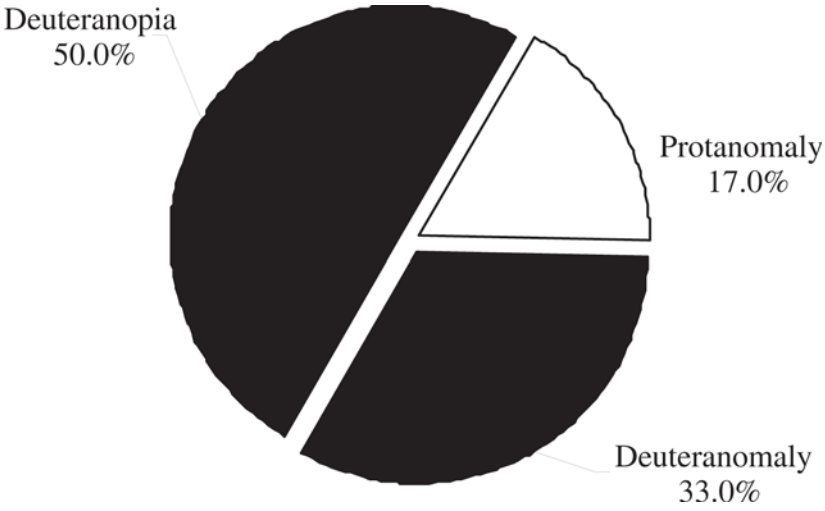


**Fig. 1**. Percentage distribution of different types of color blindness of the boys of the present study

## RESULTS

In the present 964 school children (boys 474, girls 490, age 14.09 ± 1.65 years), from six schools of Pokhara sub-metropolitan city, Nepal was assessed for color blindness.

The distribution of different types of color blindness of the subjects of the present study is presented in Fig. 1. Among the boys 18 were color blind with a prevalence of 3.8%. None of the girls were found to be color blind. Among the color blinds, 9, 6 and three 3 boys were the victims of deuteranopia, deuteranomaly and protanomaly respectively.

Table-1 shows color blindness is prevalent among the *Darjis* (14.3%) followed by Newar (9.1%), *Gurung* (5.1%) and *Brahman* (5.0%).

## DISCUSSION

The percentage distributions of color blindness in different countries are found to be variable: in our finding the prevalence of color blindness among the boys were found to be similar recorded in Japan, 3.6%,[10] China 3.7%[11] and American Negro, 3.7%,[12] but less than the European whites, 8.0%,[13] America, 8.0%,[14] Tehran, 8.2%,[15] Korea, 5.9%[16] and Singapore, 4.8%.[17] However, the prevalence of the color blindness (boys) in our present study is higher than that of Uganda, 1.9%,[18] Congo, 1.8%,[19] Libya, 2.2%, India, 2.3%,[5] Colombia, 2.4%[20] and China, 3.0%.[21]

None of the girls in our study were found to be color blind, which corroborates with the some researches done in India,[22] Tibet,[23] Spain,[24] Kenya,[25] but in few studies color blindness were detected among girls; in India; {0.1% in Patiala city,[7] 1.1% in Punjab,[26] 0.8% in Aligarh and Simla[5]) 0.4% in Korea[16] and 0.4% in Tehran.[15]

The percentage distributions of color blindness in our studies were found different in different ethnic groups: highest in *Darji* (14.3%) followed by *Newar* (9.1%). Since the color blindness is genetically transmitted its distribution is likely to be variable in different ethnic groups. The numbers of subjects in our studies though not adequate but our finding corroborates with the observations done earlier.[5]

To find out exact incidence of color blindness among the different ethnic groups, a further study in a large sample is necessary.

Although several therapies have been proposed (e.g. electrical eye stimulation, Iodine injections, large doses of vitamins), there are no treatments or surgical procedures to improve the quality of an individual's chromatic vision.[27]

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