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INCIDENCE OF COLOUR-BLINDNESS AMONG MEOS AND SUNNI MUSLIMS OF HARYANA

Dr Surender Singh
Associate Professor of Zoology
Govt College for Women Panchkula, Haryana, India

Abstract: Biological variations exist among human individuals as well as among groups of individuals at various levels. The existence of genetic variations in populations leads to evolution because there is natural selection favouring organisms that are best adapted to the environment. The present investigation was planned on Meos and Sunni Muslims of Haryana because instances of close inbreeding were observed among them. Individuals were studied for Colour-blindness trait by using Ishihara chart (1960). Five colour blind individuals were encountered during the study. No colour blind female was observed in both the endogamous groups. Chi-square values of homogeneity with respect to intercaste differences between Meos and Sunni Muslims were found to be non-significant.

Keywords*:* Variations, Colour-blindness, Ishihara chart, Haryana.

Introduction

Colour blindness is one of the common genetic disorders observed in all human populations. It is one of the X-linked conditions which is widely used as a genetic marker in study of human variation. It results in the impairment of the colour (red and green) vision, from a moderate degree upto complete colour blindness. The genes responsible for red/green colour blindness are located on the X-chromosome within the Xq28 band (Filosa et al., 1993). In humans, colour sensations are produced by different combinations of primary colours–red, green and blue. Deficiency in colour perception may result from partial or complete inability to perceive any of primary colours. Red and green colour blinds can see only two colours – yellow and blue of the spectrum. They do not see rest of the colours and therefore, red and green colours are easily mistaken by them.

According to the deficient abnormal cone pigment colour blindness is divisible into protan (red), deutan (green) and tritan (blue) types. The protanids are again of two types-protanopia (strong) and protanomalia (mild). Deuteranoids are also of two types- deuteranopia (strong) and deuteranomalia (mild). The tritan forms of colour deficiency are rare, occurring in a frequency of 1:30300 (Francois and Verriert, 1961).

The incidences of colour blindness vary from race to race and are, therefore, different in the different geographical regions of the world inhabited by people of different ethnicity. The maximum incidence of colour blindness has been reported from the Caucasian population consisting mostly of the European Whites (Clements, 1961; Vries-de-Mol and Went, 1978) and the minimum incidence from certain regions of Africa (Applemans, 1953), the incidences from the various Asian countries being in between these two extremes (Chan et al., 1992; Naresh, 1995).

The investigations for exploring the incidences of colour blindness were done on various populations (Balakrishna and Satyanarayana, 1994; Sahaya and Sengupta, 1995; Parvatheesam and Babu, 1996; Ahmed and Sengupta, 1997; Borthakur et al., 1997a, b; Rahman et al., 1998; Al-Aqtum et al., 2001). Only Yadav et al. (1995, 1997a, b, 1998a, 2000) and Yadav and Singh (2002) have reported this trait among different endogamous groups from Haryana.

Materials and Methods

This test was performed using the series of plates designed as a "Test for colour Blindness" (38 plate Edition) by Ishihara (1960). As many as 395 individuals were asked to read the plates in diffuse day light from suitable distance. The readings were recorded on the standard performa. The subjects were diagnosed according to its instruction manual.

Results

The frequencies of colour blind individuals were 0.976% in Meos and 1.578% in Sunni Muslims. The frequency to cb allele was found to be 0.010 in Meos (Table 12) and 0.016 in Sunni Muslims (Table 1). The relative frequencies of protans and deutans are also presented in the table 1. The former was absent in Meos but it was present in Sunni Muslims (0.526%). The incidence of deutans was found to be more in Meos (0.976%) than Sunni Muslims (0.526%). Totally colour blind individuals were recorded in Sunni Muslims (0.526%). The case of totally colour blind individual was not encountered in Meos. Table 2 reveals the Ishihara plate readings of the affected colour vision subjects. Chi-square values of homogeneity with respect to intercaste differences between Meos and Sunni Muslims were found to be non-significant. No female was found to be colour blind during the present study.

Table 1: Percentage Frequency of the Normal and Colour-blind Individuals in Meos and Sunni Muslims of Haryana

Population Group	Sex	Number tested	Normal		Colour blind					Total		Colour vision gene frequencies	
			No	%	Protan		Deutan		Totally colour blind	No	%	Cb	cb
					Strong	Mild	Strong	Mild					
Meo :	M	110	108	98.182	–	–	–	2 (0.976 %)	–	2	1.818	0.982	0.018
	F	95	95	100.00	–	–	–	–	–	–	–	–	–
	M+F	205	203	99.024	–	–	–	2 (0.976 %)	–	2	0.976	0.990	0.010
Sunni Muslim	M	100	97	97.000	–	1 (0.526 %)	1 (0.526%)	–	1 (0.526%)	3	3.000	0.970	0.030
	F	90	90	-	–	–	–	–	–	–	–	–	–
	M+F	190	187	98.421	–	1	1	–	1	3	1.578	0.984	0.016

The values in parenthesis show the percentage frequency

Table 2: Ishihara Plate readings by Affected Colour Blind Subjects of Meos and Sunni Muslims of Haryana

Population group	Subject No.	Ishihara plate number																									Remarks
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Meo	Control	12	8	6	29	57	5	3	15	74	2	6	97	45	5	7	16	73	X	X	X	X	26	42	35	96	Normal vision
	102(M)	12	3	6	70	85	2	5	17	31	X	X	X	X	X	X	X	X	3	2	46	73	2(6)	4(3)	3(5)	9(6)	Mild Deutan
	148(M)	12	8	5	70	85	2	5	17	21	X	X	X	X	X	X	X	X	5	3	45	73	2(5)	4(3)	3(6)	9(8)	Mild Deutan
Sunni Muslim	48(M)	12	3	5	70	36	2	5	17	21	X	X	X	X	X	X	X	X	5	3	46	73	(2)6	4(2)	(3)5	8(6)	Mild Protan
	135(M)	12	8	6	70	35	2	5	17	31	X	X	X	X	X	X	X	X	5	2	25	33	2	4	3	9	Strong Deutan
	179(M)	12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour blind

M = male, F= female, X = not readabl

Discussion

The present investigation showed that frequency of colour blindness (cb) allele was 0.010 in Meos and 0.016 in Sunni Muslims. The range in the north-west Indian populations, however, is from nil in Pangwala, Gaddi-scheduled castes of Kangra (Bhasin et al., 1986), Gujjar of Delhi (Mukherjee et al., 1979), Ramdasia, Jain Bania, Chadha and Sansi of Haryana (Yadav et al., 2000) to 0.118 in Artisan of Himachal Pradesh (Jain, 1973-74). The Muslim of Delhi showed 0.046 frequency of cb allele (Kalla, 1971) which is about three times than the cb allele frequency observed in Sunni Muslims of Haryana in the present investigation. The Meos showed value of cb allele in concordance with Rajput (0.010) of Delhi (Mukherjee et al., 1979), Jat (0.011), Rajput (0.010), Gujjar (0.010) of Haryana (Yadav et al., 1995) and Chakali (0.010) of Andhra (Sudhakar et al., 1997) while Sunni Muslims were reported to have value of cb allele close to Brahmin (0.016) of Kulu district (Bhasin et al., 1974), Rajput (0.019) of Kinnaur district (Bhalla and Chopra, 1979), Koli (0.014) of Kullu district (Bhalla et al., 1980a), Labana Sikh (0.020) of Kurukshetra district (Yadav et al., 1997a).

The cb allele frequency in the present caste populations was in accordance with that reported for populations from neighbouring areas of north-west India.

Pickford (1963) suggested that natural selection may have acted more forcefully on this character among others than the Caucasians. This idea was further progressed by Post (1962, 1963) into theory of Relaxed Selection. One of the major assumptions of this theory is that colour blindness was decidedly disadvantageous in primitive cultures of hunters and food-gatherers, and was therefore selected against. A balance between selection and mutation rate would be reflected by the frequencies of colour-blindness in the above-mentioned societies.

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