

COMPARISON OF THE INCIDENCE OF COLOUR BLINDNESS BETWEEN SECTIONS OF LIBYAN AND INDIAN POPULATIONS

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Abstract: Incidence of Red-Green colour blindness was studied in a Libyan population and was then compared with the same in two samples of Indian population. The incidence of the Red-Green colour defect was found to be 2.209% amongst the males and 0.0% amongst the females in the Libyan study. However, the incidence was only 1.841% amongst the ethnic Libyan males. This incidence was comparable with those reported from other African countries like Congo and Uganda.

The incidence of Red-Green colour defect amongst the Indian males was found to be 2.295% while it was 0.840% amongst the Indian females.

Key words: colour blindness
Indian

Red-Green

Libyan
Ishihara chart

INTRODUCTION

Study of colour blindness is usually undertaken more out of an academic interest than for its clinical relevance. However, employment in certain professions like working in the capacity of pilots, loco drivers and a few others necessitates a normal colour vision and hence colour blind persons are likely to be rejected from such professional jobs.

Being a genetic disorder, 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 (1, 2, 3) and the minimum incidence from certain regions of Africa (4, 5), the incidences from the various Asian countries being in between these two extremes (6, 7, 8, 9, 10). Though the incidences of colour blindness have been reported from various populations of several countries, no study appears to have been reported for the Libyan population. The present study was, therefore, conducted on

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a small sample size consisting of medical and paramedical students studying in Al-Arab Medical University at Benghazi in Libya and then compared with two comparable sample sizes obtained from two regions of northern India.

METHODS

The present study has been conducted on a total number of 787 subjects comprising of 486 males and 301 females in the compact age group of 17–24 years. All the subjects were either medical or paramedical students studying medicine, dentistry or pharmacy in Libya or India.

TABLE I : Break-up of the subjects of study at Benghazi (Libya).

Nationality	Males	Females	Total
Libyan	163	179	342
<i>Non-Libyan</i>			
Egyptian	11	1	12
Yemenian	3	—	3
Palestinian	2	2	4
Mauritian	1	—	1
Burkina Faso	1	—	1
Total	181	182	363

The Libyan component of the study comprised of testing of colour vision for 181 male and 182 female (total 363) students pursuing studies of medicine, dentistry or pharmacy in Al-Arab Medical University at Benghazi in Libya. Out of this number, 342 students were of Libyan nationality while 21 students were of various other nationalities (Table I). All the subjects were Muslim by religion.

The Indian component of the study was conducted at two places, i.e. Aligarh and Shimla, both in the northern part of India.

TABLE II : Distribution of the subjects of the Indian component of the study.

Distribution	Place of study		
	Shimla	Aligarh	Total
Sex-wise	Males	170	135
	Females	54	65
	Total	224	200
Religion-wise	Hindus	212	93
	Muslims	—	107
	Sikhs	12	—
	Total	224	200
			424

A total of 200 students (135 males and 65 females), all of whom were undergraduate medical students of Aligarh Muslim University, were tested for colour vision at Aligarh. Another group of 224 medical students (170 males and 54 females) of IG Medical College at Shimla were also tested for colour vision. The distribution of the Indian subjects has been shown in Table II.

Colour vision was tested for all the subjects by using the pseudo-isochromatic plates contained in the Ishihara Chart. Plate numbers 1 to 21 were used to determine if any Red-Green colour deficiency existed in a given subject and, thereafter, plate numbers 22 to 25 were used to determine the precise type of the deficiency. Only Red-Green defects are identifiable from the Ishihara Chart which does not have any provision for detecting persons with Blue-deficiency. Therefore no attempt was made to detect persons with Blue-deficiency, which is, in any case, quite rare. No anomaloscope has been used in the present study.

RESULTS

The incidence of colour blindness in the Libyan component of the study has been

TABLE III : Incidence of colour blindness in the Libyan subjects.

Defect	Males (n=181)			Females (n=182)			Total (n=363)	
		Number affected	Percentage		Number affected	Percentage	Number affected	Percentage
Red defect	mild	0	0.0	0	0.0	0.0	0	0.0
	strong	2	1.105	0	0.0	0.0	2	0.551
Green defect	mild	0	0.0	0	0.0	0.0	0	0.0
	strong	2	1.105	0	0.0	0.0	2	0.551
Total		4*	2.209**	0	0.0	0.0	4	1.102

* 3 of the 4 cases of Red-Green defect were found amongst the ethnic Libyan while the fourth case was found in an Egyptian male.

** The percentage works out to 1.841% for ethnic Libyan males since 3 out of 163 Libyan males were found to have Red-Green defect.

TABLE IV : Incidence of colour blindness in the Indian subjects.

Place of study	Defect	Males		Females		Total	
		Number affected	Percentage	Number affected	Percentage	Number affected	Percentage
Aligarh (n=200) males = 135 females = 65	Red defect :						
	mild	0	0.0	1	1.539	1	0.500
	strong	0	0.0	0	0.0	0	0.0
	Green defect :						
	mild	0	0.0	0	0.0	0	0.0
	strong	3	2.222	0	0.0	3	1.500
Shimla (n=224) males = 170 females = 54	Red defect :						
	mild	1	0.588	0	0.0	1	0.446
	strong	1	0.588	0	0.0	1	0.446
	Green defect :						
	mild	1	0.588	0	0.0	1	0.446
	strong	1	0.588	0	0.0	1	0.446
Total (n=424)		7	2.295	1	0.840	8	1.887
males = 305							
females = 119							

shown in Table III which shows the incidence as 2.209% in males and 0.0% in females. Of the 4 colour blind cases detected, 2 were protanopes and the other 2 deutanopes. Again, 3 of the colour blind subjects were of Libyan ethnicity making it 1.841% for ethnic Libyan males (n = 163). The fourth case of colour blindness was a non-Libyan, i.e. an Egyptian male out of 11 male Egyptian subjects tested.

The incidence of colour blindness in the Indian component of the study has been shown in Table IV. Of the 4 colour blind subjects detected in Aligarh, 3 male subjects (2 Muslims and 1 Hindu) showed strong deutanopia while the fourth case, who was a Muslim female subject, showed mild protanopia. In the Shimla group, 4 cases of colour blindness were distributed as 1 strong deutanope, 1 mild deutanope, 1 strong

protanope and 1 mild protanope. All the 4 cases of colour blindness in the Shimla group were amongst the Hindu male subjects.

DISCUSSION

Despite a comparatively smaller sample size, the results of the present study compare well with those of several other studies about the incidence of colour blindness. Thus, the incidence of 2.295% amongst the Indian males in our study is close to, though somewhat lower than, the incidences reported by several other workers (6,11,12,13,14) which vary from 2.88% to 5.66% in different parts of the country. Similarly, the low incidence of 0.84% amongst the Indian females in the present study is comparable to the incidences reported by workers from other parts of India (6,11,12,14), Nepal (10) and from Tibetan population (15), with the incidences ranging from 0.0% to 1.13% amongst the females in such studies. All the studies invariably report a much higher incidence amongst the males as compared to the females which is only to be expected since colour blindness is a genetic disorder transmitted through the sex-linked recessive X-chromosome (16).

In the Libyan component of the study, the overall incidence was found to be 2.209% in the males and 0.0% in the females. But since out of the 4 cases of colour defect detected in the Libyan study only 3 were Libyans ethnically out of a total of 163 ethnic Libyan males tested, the incidence amongst the ethnic Libyan males *per se* can be said to be only 1.841%. The fourth case of colour defect was found in a subject who was of Egyptian origin.

If the presently reported incidence of colour blindness is to be treated as reflective of the overall Libyan population, the incidence of 1.841% amongst the Libyan males compares fairly well with the incidences of 1.85% reported from Congo (4) and 1.86% reported from Uganda (5). Though all these three, i.e. Libya, Congo and Uganda, are African countries, the features of the Libyans appear to be different in several respects from those of the Congolese and Ugandans. In fact, Libya is a north African country south of the Mediterranean and is therefore geographically close to the Europe. The two extremes of the reported incidences of colour blindness are, incidentally, on the two geographical sides of Libya, i.e. highest incidences of colour blindness have been reported from the Europe on the north of Libya and the lowest incidences of colour blindness have been reported from some African countries south to Libya. Thus, the colour defects are known to be amongst the highest in the Caucasian populations from where incidences as high as 7.3% (3), 8.04% (1) and 9.4% (2) have been reported from various European countries. On the other side, the lowest reported incidences of 1.85% in Congo (4) and 1.86% in Uganda (5) are from African countries. However, the pattern in the various African countries is not uniform. Thus, while it is as low as 1.85% in Congo and 1.86% in Uganda, the incidence is substantially higher at 4.2% in Ethiopia (17).

In view of the known ethnicity and racial origin of the Libyans, it would be appropriate to conduct a more extensive study to find out the incidences of various types of colour blindness covering a wider Libyan population. Such an analysis of the

incidences of the individual types of colour defects was not taken recourse to in the

present study in view of the comparatively smaller sample size.

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