

A Study of Age Changes in Skin Colour Reflectance of Vokkaliga Boys of Mysore

L.S. Sidhu, P. Singal, D.P. Bhatnagar and A. Kaur

Department of Human Biology, Punjabi University, Patiala 147 002, Punjab, India

KEY WORDS Ecology. Skin Colour. Punjabis. Variation.

ABSTRACT The present study is based on a sample of 130 Vokkaliga boys of Mysore ranging in age from 9 to 20 years. EEL skin reflectance spectrophotometer with nine filters (601-609) of different wavelengths has been used for quantitative evaluation of skin reflection of each subject at three sites i.e. center of forehead, inner side of upper arm and flexor surface of forearm. At all the three sites, the darkening of the skin has been observed during pre-adolescent phase at center of forehead and inner side of upper arm. During post adolescent period further darkening of skin has occurred at inner side of upper arm, whereas at the other two sites, a slight lightening of skin colour is observed. While comparing the skin colour reflectance of the present sample with Punjabi boys, it has been observed that Vokkaliga boys have significantly low percentage reflectance at all the three sites and with all the nine filters.

INTRODUCTION

Skin colour as a criterion of racial classification has been employed by many investigators from time immemorial (Montagu, 1964). The data of earlier studies were mostly based on qualitative methods but recently quantitative methods have been developed e.g. skin colour reflectance spectrophotometer. Jaswal (1978) has reported a relationship between skin colour and caste hierarchy. Lee and Lasker (1959) and Kalla (1969a) have emphasized on the role of genetics in skin tanning pertaining to individual variations in the thickness of the corneum, which affects the penetration of different ultra-violet wavelengths to different extent.

Age change in skin colour in different populations living under different ecological conditions have been reported during the middle of the twentieth century. Garn et al. (1956) was probably one of the forerunners to work on this problem. Subsequently many investigators have reported data pertaining to age changes in skin colour (Walsh, 1964; Huizinge, 1965; Omoto, 1965; Mazess, 1967; Tiwari and Kalla, 1968, 1969; Kalla, 1969b,

1971, 1973; Conway and Baker, 1972 and Jaswal, 1977).

In the present paper an attempt has been made to study the age changes in skin colour reflectance of Vokkaliga boys of Mysore, ranging in age from 9 to 20 years.

MATERIALS AND METHODS

The present study is based on a cross-sectional random sample of 130 Vokkaliga boys of Mysore ranging in age from 9 to 20 years pertaining to skin reflectance.

Mysore occupies a central position in the southern part of India and has tropical climatic conditions as the tropic of cancer passes through this area. Its temperature varies from 12°C in winter to 37°C in summer. The winter season is of very short duration. Because of the coastline Mysore is engaged in the development of fishing and boat building activities. The main occupation of Vokkaliga's is fishing and agriculture. On account of particular nature of their livelihood as they have to work in sun, it leads to the tanning of their skin.

Skin colour measurements were obtained on a portable EEL reflectance spectrophotometer with nine Ilford filters. These nine narrow wavelength filters (601 to 609) transmit the following dominant wavelengths. 425 mu (601), 465 mu (602), 485 mu (603), 515 mu (604), 545 mu (605), 575 mu (606), 595mu (607), 655 mu (608) and 685 mu (609). The readings were taken using all the nine filters at the center of the forehead, the medial aspect of the upper arm, and the flexor surface of the forearm. Standard technique given by Wiener and Lourie (1969) was followed while using this instrument.

The data collected were grouped in four age groups i.e. 9-10 (post juvenile phase), 11-13

Table 1: Mean and S.D. of skin percentage reflectance of Vokkaliga boys at three sites by age-groups

Age	601 (425)		602 (465)		603 (485)		604 (515)		605 (545)		606 (575)		607 (595)		608 (655)		609 (685)		T.M.R.	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD		
<i>Centre of Fore head</i>																				
9-10 (Post-Juvenile Phase)	35	10.06	1.82	14.98	1.99	13.18	2.24	13.59	2.35	15.14	3.11	18.99	4.03	26.79	5.05	36.53	5.98	42.54	4.66	21.31
11-13 (Pre-adolescent)	36	9.78	1.87	12.12	1.71	12.48	1.76	12.92	1.75	14.22	2.08	17.61	2.16	25.41	2.74	36.17	3.95	41.78	3.71	20.28
14-16 (Adolescent)	27	9.83	1.85	12.98	2.03	13.62	1.68	14.00	2.37	14.54	2.24	18.19	2.65	27.17	3.18	36.63	4.89	41.61	3.59	20.95
17-20 (Post-adolescent)	32	9.54	1.76	12.46	2.20	13.67	2.18	14.02	2.17	15.35	2.45	19.11	2.42	27.06	3.16	39.53	4.74	45.53	5.04	21.18
<i>Innr side of upper arm</i>																				
9-10 (Post-Juvenile Phase)	35	12.38	2.51	16.96	2.73	17.19	2.70	18.39	3.20	19.62	3.28	25.26	4.56	33.93	5.13	44.92	5.67	48.47	5.53	26.35
11-13 (Pre-adolescent)	36	11.25	2.44	15.07	2.73	15.80	2.78	16.24	3.24	18.31	3.50	22.43	4.29	30.79	5.31	42.24	6.15	47.90	4.98	24.45
14-16 (Adolescent)	27	11.36	2.41	15.53	2.38	16.61	1.93	17.17	3.05	18.04	2.72	23.67	2.88	31.91	3.24	42.20	3.43	28.24	3.82	24.97
17-20 (Post-adolescent)	32	10.70	2.23	14.34	2.66	15.42	2.96	16.18	3.66	17.26	3.11	22.55	2.82	30.47	4.71	42.22	5.12	46.50	4.89	23.96
<i>Flexor surface of fore arm</i>																				
9-10 (Post-Juvenile Phase)	35	10.93	2.15	14.32	2.48	14.96	2.95	15.41	2.59	16.87	2.86	21.57	4.76	28.98	4.45	39.17	5.17	43.63	4.75	22.87
11-13 (Pre-adolescent)	36	9.81	1.64	12.94	1.97	13.62	2.28	14.08	2.38	15.67	2.60	19.78	3.20	26.67	4.31	37.25	4.85	41.94	4.81	21.31
14-16 (Adolescent)	27	9.67	2.03	12.95	2.34	13.54	2.36	13.88	2.43	15.24	2.66	18.44	3.41	25.99	3.66	36.57	4.20	41.99	3.41	20.92
17-20 (Post-Adolescent)	32	8.94	1.66	12.47	2.35	13.35	2.21	13.89	2.23	15.14	2.64	20.08	2.95	26.21	4.16	38.18	4.87	41.39	4.10	21.07

(pre-adolescent phase), 14-16 (adolescent phase) and 17-20 (post-adolescent phase).

RESULTS AND DISCUSSION

Table 1 presents the mean and standard deviation of skin percentage reflectance of Vokkaliga boys at three sites with all the Ilford nine filters in different age groups.

A darkening of skin colour during pre-adolescent phase has been observed with all the filters and at all the three sites (Table 1, Fig. 1). This is followed by decrease in pigmentation of

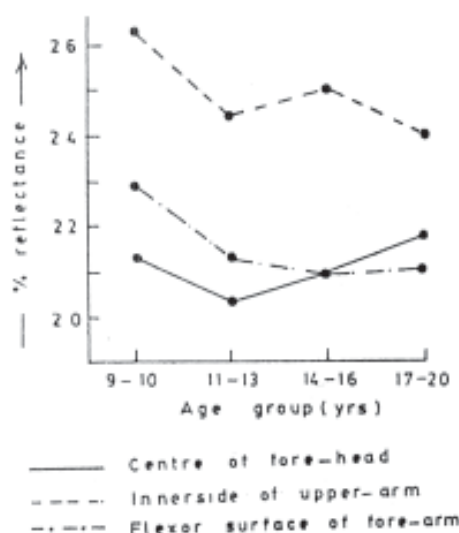


Fig. 1. Variation in total mean% reflectance TMR from skin at three sites by age group in Vokkaliga boys

skin colour during adolescent phase at the center of fore head and the inner side of the upper arm except with filter no. 609 at the center of fore head and filter no. 605 and 608 at the inner side of upper arm. During post adolescent period again there is a darkening at the inner-side of the upper-arm except with filter no. 605 and 608. At the center of the forehead the decrease in pigmentation continued up to post adolescent period. At flexor surface of the forearm, the pre-adolescent darkening continued into an adolescent period and after that the pigmentation is almost similar in post-adolescent period, when the data for reflectance of all the filter is pooled up (Fig. 1).

The darkening during pre-adolescent age has also been reported by Garn et al. (1956), Walsh (1963), Tiwari and Kalla (1969) and Kalla (1971). This may be due to the pre-pubertal increase in the melanocyte stimulating hormone. According to Jaswal (1977) the lightening of skin colour during adolescence is a by-product of physiological changes appearing when the growth processes are most active. A natural consequence of decline in pigmentation induced by enhanced endocrinal activity during adolescence is noticed in the appearance of the post pubertal darkening phase, as soon as the endocrinal activity subsides to its normal level.

At the exposed site of the body i.e. at flexor surface of forearm, the extension of pre-adolescent darkening into an adolescent phase in the present sample is supported by the findings of Walsh (1963), Conway and Baker (1972), Hulse (1970) and Kalla (1971). Like the present popu-

Table 2: Comparison of skin percentage reflectance of Vokkaliga boys with Jat-Sikh boys at three sites with nine filters (601-609)

Filter	Centre of Forehead				T-test	Inner side of upper arm				T-test	Flexor-surface of forearm				T-test
No.	Vokkaligas		Jat Sikh			Vokkaligas		Jat Sikh			Vokkaligas		Jat Sikh		
	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
601	11.14	5.57	14.22	2.55	5.72*	11.47	2.13	21.04	4.05	14.24*	10.15	3.71	19.92	3.97	20.28*
602	12.57	2.07	16.57	2.71	13.21*	15.45	2.89	24.52	4.19	10.26*	13.30	2.53	23.22	4.45	21.76*
603	13.06	2.12	17.18	3.07	12.37*	16.23	3.02	25.88	4.15	10.56*	13.92	2.87	24.72	4.30	23.52*
604	13.54	2.27	18.22	3.40	12.91*	16.85	3.57	26.61	4.16	9.24*	14.34	2.75	25.28	4.22	24.42*
605	14.74	5.25	19.71	3.70	8.76*	17.90	2.36	27.33	3.96	12.71*	15.63	2.93	25.45	3.94	20.90*
606	18.43	3.41	25.92	3.85	16.42*	23.52	4.72	34.13	4.62	18.84*	20.05	4.13	31.95	5.10	21.07*
607	26.19	4.38	36.11	3.88	10.47*	31.90	5.56	45.39	5.70	18.33*	27.27	5.00	42.52	5.98	22.00*
608	37.13	6.08	46.88	5.94	12.90*	43.16	6.03	54.91	5.26	16.57*	38.06	5.72	51.92	5.56	19.61*
609	42.77	4.93	50.67	5.74	11.75*	48.21	2.89	56.35	5.47	8.52*	42.36	2.73	55.29	5.20	18.94*

* Statistically significant at 0.1 per cent level

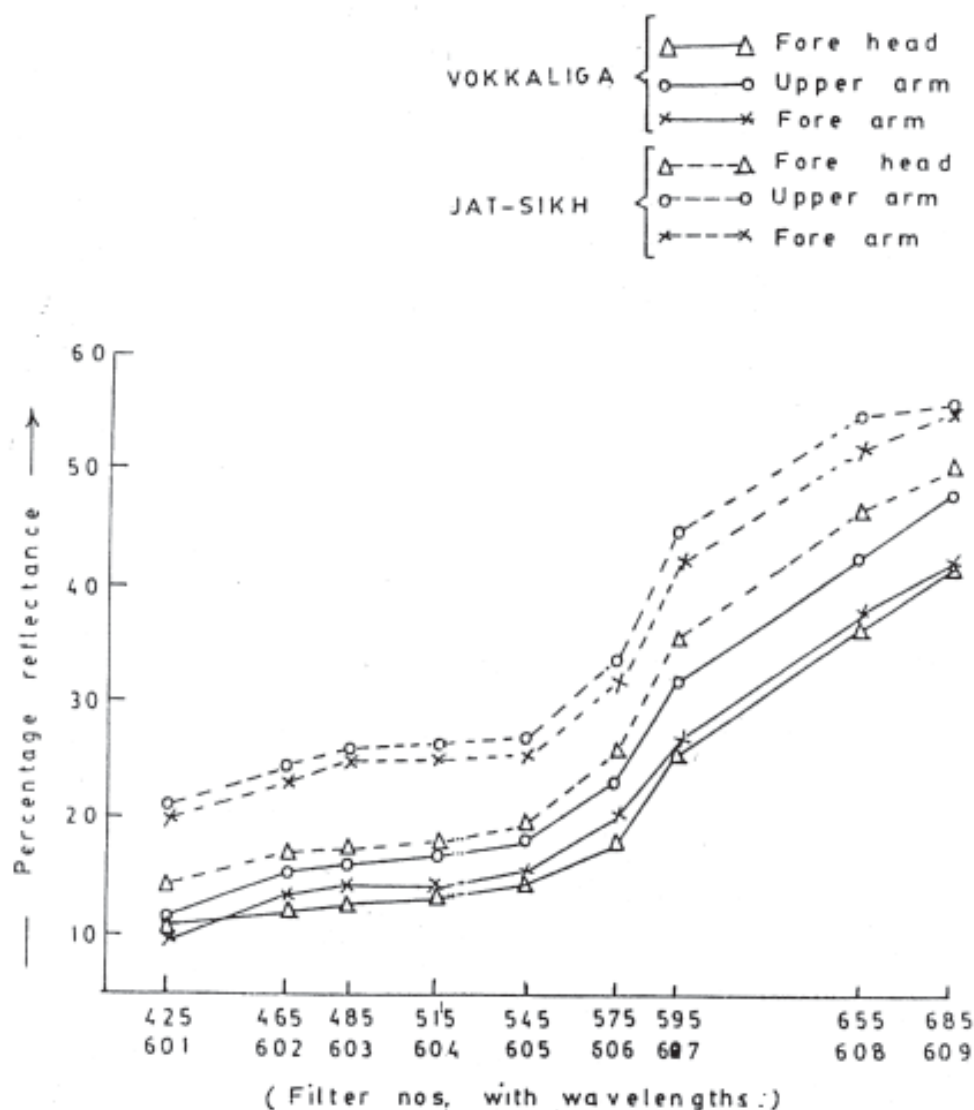


Fig. 2. Changes in percentage reflectance from filter no. 601 to 609 of skin colour of Vokkaliga and Jat-Sikh boys

lation, the populations studied by these authors were also living either in tropics or rural areas. So the effect of climate must be playing an important role for extension of darkening phase into an adolescent age. In the present study occupation may be another factor because they have to work in sunlight for their livelihood but surprisingly forehead although darkest in colour, but has shown a trend of decrease in pig-

mentation of skin colour in adolescent as well as post-adolescent period with most of the filters.

The skin colour reflectance is the highest at the inner side of the upper arm and the lowest at the center of the fore head with all the filters and at all ages except in the age group of 17-20 years (Fig. 1,2). This is because exposed parts are more prone to absorption of solar radiation giving rise

to low percentage reflectance.

While comparing the skin colour reflectance of Vokkaliga boys with Punjabi boys (Kaur, 1981), it has been observed that Vokkaliga boys experience low percentage reflectance with all the filters and at all the three sides (Table 2, Fig. 2). The differences are statistically significant at 0.1 per cent level. The low percentage reflectance in Vokkaliga boys may be attributable to the factors associated with the climatic conditions at Mysore. Genetical factors may also have played some role, as these two groups are endogamous at caste level.

REFERENCES

- Conway, D.L. and P.T. Baker: Skin reflectance of quechua Indians. The effect of genetic admixture, Sex and age. *Amer. J. Phys. Anthropol.*, **36**: 267 (1972).
- Garn, S.M., S. Selby and M.R. Crawford: Skin reflectance studies in children and adults. *Am. J. Phys. Anthropol.*, **14**: 101-117 (1956).
- Huizinga, J.: Reflectometry of the skin in Dogons. *Proc. Kon. Ned. Akad. Wet.*, **68**: 289-296 (1965).
- Hulse, F.S.: Skin colour among the Yemenite Jews of the isolate from Habben. *Proc. VIIIth Congs. Anthropol. Ethnol. Sci.*, **1**: 226-228 (1970).
- Jaswal, I.J.S.: Age changes in skin pigmentation of human males. *J. Ind. Anthropol. Soc.*, **12**: 266 (1977).
- Jaswal, I.J.S.: Skin colour in North Indian populations. *Am. J. Hum. Evo.*, **8**: 351 (1978).
- Kalla, A.K.: Genetic differences in skin tanning capacity. *Genetica*, **40**: 591 (1969a).
- Kalla, A.K.: A study of age differences in skin pigmentation in male. *J. Anthropol. Soc. Nippon.*, **77**: 248-252 (1969b).
- Kalla, A.K.: A study of age differences in skin pigmentation in males. *Zingruigaku Zasshi*, **77**: 246-253 (1971).
- Kaur, A.: *A Comparative Study of Skin Colour in Vokkaliga of Mysore and Jat-Sikhs of Punjab*. M.Sc. Dissertation, Pbi. Univ. Patiala, Unpublished (1981).
- Lee, M.M.C. and G.W. Lasker: The sun tanning potential of human skin. *Hum. Biol.*, **31**: 252 (1959).
- Mazess, R.D.: Skin colour in Brahmin Negroes. *Hum. Biol.*, **39**: 145 (1967).
- Montagu, A.: *An introduction to Physical Anthropology*. Charles C. Thomas Publisher, Illinois (1964).
- Omoto, K.: Measurement of skin reflectance in a Japanese twin sample. *J. Anthropol. Soc. Nippon.*, **73**, **1** (1965).
- Tiwari, S.C. and A.K. Kalla: Dimorphism in the effect of adolescence on skin pigmentation. *Anthropologist*, Sp. Vol., 169-174 (1968).
- Walsh, R.J.: Variations in the melanin content of the skin of New Guinea natives at different ages. *J. Invest. Dermat.*, **42**: 261-265 (1963).
- Walsh, R.J.: Variation in the melanin content of the skin of New Guinea natives at different ages. *J. Invest. Dermat.*, **42**: 261-265 (1964).
- Weiner, J.S. and Lourie, J.A.: *Human Biology. A Guide to Field Methods*. Blackwell Scientific Publications. Oxford and Edinburgh (1969).