Research Article

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SKIN COLOUR EVALUATION BY DARSHAN (OBSERVATION) AND NARROW BAND REFLECTANCE SPECTROPHOTOMETER (MEXAMETER INSTRUMENT) ACCORDING TO DIFFERENT *DEHA PRAKRITI*

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ABSTRACT

Ayurveda is holistic science of life. *Prakriti* is a unique concept of Ayurveda. According to this concept every individual is different from other. These differences are at Physical, Physiological and Psychological levels. The differences in skin colour are found in individuals according to different *Deha Prakriti.* This was a cross sectional study, carried out with objective to compare skin colour by Darshana Pariksha (observation) and narrow band reflectance spectrophotometer (Mexameter) according to different *Deha Prakriti.* For this study the volunteers were enrolled from various colleges of the city. Only Unmarried healthy female students' age in between 18 - 30 years were selected. 1187 volunteers were initially screened as per inclusion and exclusion criteria. Screened 904 volunteers were assessed for *Prakriti Parikshan* until getting dominant *Prakriti*. (Participants having more than 65% lakshana of single *Prakriti*). Out of 904 volunteers 58 had *Vata* Dominant *Prakriti*, 70 had *Pitta Dominant Prakriti* and 61 had *Kapha Dominant Prakriti*. Out of 58 *Vata Dominant Prakriti* 50 volunteers, out of 70 *Pitta* Dominant *Prakriti* 50 volunteers while out of 61 *Kapha* Dominant *Prakriti* 50 volunteers were randomly selected by computer generated random number table. Skin colour evaluation was done by observation and by Mexameter. Correlation analysis (Spearmen correlation coefficient) was applied for results obtained. It showed that p value is 0.0007 for *Vata Prakriti*, 0.0089 for *Pitta Prakriti* and 0.034 for *Kapha Prakriti*, which is found to be highly significant. Hence there is correlation between skin colour evaluation by observation method and by instrument (Mexameter).

Keywords: *Prakriti*, *Vata*, *Pitta*, *Kapha*, Mexameter

INTRODUCTION

Ayurveda attributes primary importance to prevention and the maintenance of positive health [1]. The major preventive approach for maintaining and improving the quality of life includes individualise daily regime *(Dinchaarya*), Seasonal regime (*Ritucharya*) behavioural and ethical consideration (*Sadavritta*). Healthy lifestyle is the key of longevity of life which depends on the *Prakriti* (bio- identity i.e. body - mind constitution) of an individual. *Prakriti* of an individual is decided at the time of Shukra- Shonita Samyoga (fertilisation)[2]. It shows differences in the physical, physiological and psychological characteristics of an individual. *Prakriti* means *Swabhav* or nature of an individual. *Prakriti* has been one most notable basic construct of Ayurved health care philosophy; it fundamentally explains biological specificity operating at cellular and genomic level is held largely responsible for distinctions among individuals in various aspects like function and appearance[3]. Ayurveda identified the best set of substrate like *Aahar* and *Vihar* useful to optimise the system performance referring to *Prakriti* sub type it is therefore clear that knowledge of *Prakriti* subtype may go a long way in heath maintenance by making one, aware of suitable and unsuitable substances applicable on one to one basis[4]. Variation in skin characteristics found as per predominant *Deha Prakriti*[5].

The Skin colour variation is also seen according to different *Deha Prakriti*. The *Panchamahabhuta, Shukra Dhatu*, diet of mother during pregnancy, *Desha, Jaati, Jatharagni* and *Aahara* are responsible in determination of *Varna* along with their *Deha Prakriti*. *Charaka* acharya describes three colours of skin on the basis of *Panchbhautika* constitution that is *Avadat* (Fair Skin), *Krishna* (Dark Skin) and *Shyam*[6]. According to Astanga Samgraha, the colour of *Shukra Dhatu* is also responsible for the formation of colour and complexion of embryo. Complexion is determined by the paternal factors[7]. Acharya Sushruta has stated the influence of *Aahar* on the colour of the fetus[8]. Astanga Samgrahakara has stated the influence of *Desha, Kula* and *Jati* on *Varna*[9]. Acharya Charaka has clearly referred *Jatharagni* as a causative factor for *Ayu, Varna, Bala, Swasthya, Utsaha, Upachaya, Prabha, Oja, Teja* etc.[10]

Acharya Vagbhata has mentioned different kinds of *Varnas* according to the types of *Prakriti*. Such as *Priyangu*, *Durva*, *Sharakand*, *Gorochan*, *Padma*, *Suvarna* etc[11]. Acharya Charaka and Sushruta have given the importance to the *Varna* in *Prakriti*. According to Charaka, *Kapha Prakriti* persons have *Gaur Varna*. According to Sushrutacharya, *Pitta Prakriti* persons have reddishness of the nails, eyes, tongue, lips, palms and soles, whereas that of *Kapha Prakriti* has the *Gaur Varna* of the skin like *Durva*, *Indivar*, *Sarakand*, etc.[12 -15]

In modern science skin colour reflects the amount of pigments (Melanin and carotene) in the skin. The skin colour possesses melanin but the difference arises how melanin pigments are packed within the skin. Skin Colour is affected by melanin, haemoglobin, carotene, hormonal influence and environmental sun exposure. There are two pigmentation compounds in the skin that contributes to skin colour. Constitutive skin colour is the basic melanin inherited according to genetic program and is without any direct effect by solar radiation. Facultative skin

colour is inducible is the result of sun exposure and includes immediate tanning and delayed tanning. As a result, it is reversible and will decrease to the level of constitutive skin colour.[16]

In this study two investigation methods were used for skin colour evaluation. It was done by observation and its results were categorised as *Gaur, Shaym* and *krishna*. Same volunteers were examined by an instrument Mexameter and its results were categorised as fair, brown and dark brown skin. This present study is proposed to find correlation between skin colour evaluation by observation (*Darshan Pariksha*) and by instrument (Mexameter).

Aim and Objectives

To study correlation between skin colour evaluation by Darshana Pariksha (observation) and narrow band reflectance sprectophotometer (Mexameter) according to different *Deha Prakriti.*

MATERIAL AND METHODS

This was cross sectional study carried out with objective to study correlation between skin colour evaluation by observation and narrow band Reflectance Spectrophotometer (Mexameter) according to different *Deha Prakriti*. The volunteers enrolled for this study were selected from various Arts, Sciences, Management, Commerce, Engineering colleges of the city. During actual study period total 150 volunteers 50 from each group were selected (n master version 2.0 updated 2015).

Unmarried healthy female students' age in between 18 - 30 years were selected. Total 1187 female volunteers were initially screened with the help of screening proforma of inclusion and exclusion criteria**.** 904 volunteers fulfilled these criteria were screened for *Prakriti Parikshan* until getting dominant *Prakriti*. Out of 904 volunteers 58 volunteers had *Vata* Dominant *Prakriti*, 70 volunteers had *Pitta* Dominant *Prakriti* and 61 volunteers had *Kapha* Dominant *Prakriti*. Remaining volunteers were excluded due to *Dwandwaj Prakriti*. Out of 58 *Vata* Dominant *Prakriti* volunteers 50 volunteers, out of 70 *Pitta* Dominant *Prakriti* 50 volunteers while out of 61 *Kapha* Dominant *Prakriti* volunteers 50 volunteers were randomly selected. Total 150 volunteers 50 from each group were randomly selected by computer generated random number table.

Prakriti parikshan was done on the basis of score for each question. We reframe questioners on the basis of score pattern of Ayu soft software. This study was carried after getting clearance from college Ethics Comittee. Present study is carried out as per International conference of Harmonization-Good Clinical Practices Guidelines (ICH-GCP) or as per Declaration of Helsinki guidelines.

Inclusion criteria

- Unmarried healthy female volunteers.
- Age: - 18 – 30 yrs.
- Volunteer residing in particular area since last six months.
- Volunteer residing 50 kms periphery from study site.
- Occupation- students.
- Volunteer with middle socio-economic class.
- Willing for consent.

Exclusion criteria

- Volunteers participated in any other clinical trial 4 weeks prior to enrolment into this study.
- Volunteer with history of Anaemia.
- Volunteer with history of any allergic disorder.
- Volunteer with family H/O Congenital or hereditary disorders.
- Volunteer with history of travelling in another environment in last 4 weeks.
- Volunteers with premature sign of skin aging.
- Volunteers with addiction of smoking and chronic Alcohol intake.

Skin colour was evaluated by observation and with the help of narrow band Reflectance Spectrophotometer (Mexameter). All 150 volunteers were instructed not to apply any cosmetic before 24 h of skin examination.

Skin Examination

The study used two skin colour evaluation methods. The first method is based on observation. In this method out of Trividh Pariksha, Darshana Pariksha was used to determine skin colour. *Varna* was categorising as *Gaura Varna, Shyam Varna* and *Krishna Varna.*

Measurement of Skin colour by Mexameter

In second method an instrument, Mexameter was used. The Mexameter is based on the absorption principle. The special probe emits light of three defined wave-lengths. The Melanin is measured by two wavelengths which have been chosen in order to achieve different absorption rates by the melanin pigments. For the colour two different wavelengths are used to measure the absorption capacity of the skin. One of this wave-length corresponds to the spectrum absorption peak of haemoglobin. The other wavelength has been chosen to avoid other colour influences.

Advantages

1. Very quick and easy measurement.
2. Continuous measurement.
3. Highly sensitive values for melanin.
4. Accuracy of Mexameter can be checked easily anytime.
5. Worldwide established and used in many scientific studies.

Asian people fall in photo type V where melanin content ranges between 150-650 (Table 1). For convenience in present study this was further categorised (Table 2).

RESULTS

Out of total 150 volunteers, the age wise distribution of 50 *Vata Prakriti* volunteers showed 39 (78%) were in 21 – 23 years age group, 7 (14%) were in 24 – 26 y and 4 (8%) were in 27 – 29 years. Out of 50 *Pitta Prakriti* volunteers 42 (84%) were in age group 21 – 23 years, 6 (12%) were in 24 – 26 years while 1 (2%) was in 27 – 29 and 2% were up to 30 years. Out of 50 *Kapha Prakriti* volunteers showed 44 (88%) were in 21 - 23 years age group, 6 (12%) were in 24 – 26 years age group. (Table 3)

Out of total 150 volunteers, 31 (62%) volunteers were having *Shyam Varna*, 12 (24%) were having *Gaur Varna*, 7 (14%) volunteers were having *Krishna Varna* of *Vata Prakriti.* Out of 50 *Pitta Prakriti* volunteers showed 60% *Gaur Varna*, 40%

Shyam Varna. Kapha Prakriti volunteers showed 53% *Shyam Varna*, 43% *Gaur Varna* while 6% *Krishna Varna* volunteers. After the statistical analysis by using chi square test it found highly significant difference. This may be due to predominance of *Mahabhuta.* In *Vata Prakriti* group *Shyam varna* has predominance due to *Vayu* and *Akash Mahabhuta* while *Gaur varna* has predominance in *Pitta Prakriti* due to *Agni* and *Jala Mahabhut*. This difference is statistically significant (p = 0.0016) (Table 4)

Among total volunteers 68% *Vata Prakriti* volunteers were having brown colour skin while 28% were having fair skin. For *Pitta Prakriti* 66% were having less Fair skin and 34% having brown colour skin. 58% *Kapha Prakriti* volunteers were having fair skin and remaining 42% were having brown colour skin. The variation in melanin index according to *Prakriti* showed that certain factors are responsible for colour of individual. According to Ayurveda *Panchamabhuta* plays an important role in skin colour determination. It is very clear that there was predominance of brown colour skin in *Vata Prakriti*; fair colour skin in *Pitta Prakriti* and result of *Kapha Prakriti* was in conclusive as both fair and brown colour skin was seen in them. (Table 5)

The above table showed correlation between *Twacha Varna* and skin colour. In *Vata Prakriti* volunteers it was observed that maximum volunteers were *Shyam Varniya* and their melanin content also showed brown colour. In *Pitta Prakriti* maximum volunteers were *Gaur Varniya* and had fair skin while in *Kapha Prakriti*, volunteers had *Gaur* and *Shyam Varna* and their melanin content is also showing fair and brown colour skin. After applying correlation analysis (Spearmen correlation coefficient) between melanin score and *Twacha Varna* in different *Prakriti* it showed that p value is 0.0007 for *Vata Prakriti*, 0.0089 for *Pitta Prakriti*, 0.034 for *Kapha Prakriti* which is found to be highly significant. Hence there is correlation between Skin *Varna* examined for *Darshan Pariksha* and melanin score examined by using Mexameter. (Table 6)

Table 1: Interpretation of results by Mexameter

S. No.	Melanin content	Result	Photo type
1	0-150	Very Fair skin	Type I-Celtic type
2	50-250	Slightly Darker skin	Type II-Caucasian white
3	100-350	Light brown skin	Type III-Mixed type
4	150-500	Brown skin	Type IV-Mediterranean type
5	150-650	Asian/Indian skin	Type V
6	600-999	Black skin	Type VI

Table 2: Melanin Contain in Asian People

S .No.	Melanin contain	Result
1	150-317	Fair skin
2	317-484	Brown skin
3	484-650	Dark brown skin

Table 3: Age Wise Distribution of Volunteers Enrolled (N = 150)

Age (years)	Number of Volunteers			Total	P value
	Vata Prakriti (N= 50)	*Pitta Prakriti* (N= 50)	*Kapha Prakriti* (N= 50)		
18 - 20	00	00	00	**00**	**0.179**
21 – 23	39 (78%)	42 (84%)	44 (88%)	**125 (87.75%)**	
24 – 26	07 (14%)	06 (12%)	6 (12%)	**19 (12.73%)**	
27 – 29	04 (08%)	1 (02%)	0 (00%)	**05 (3.33%)**	**df = 2**
Upto 30	00 (00%)	1 (02%)	0 (00%)	**01 (0.67%)**	
Total	**50 (100%)**	**50 (100%)**	**50 (100%)**	**150(100%)**	

Table 4: Varna Wise Distribution of Volunteers Enrolled (N = 150)

Varna	Number of Volunteers			Total	P value
	Vata Prakriti	*Pitta Prakriti*	*Kapha Prakriti*		
Gaur	12 (24%)	30 (60%)	21 (43%)	**63 (42.00%)**	
Shyam	31 (62%)	20 (40%)	26 (53%)	**77 (51.33%)**	**0.0016**
Krishana	07 (14%)	00 (00%)	03 (06%)	**10 (6.64%)**	**df = 4**
Total	**50 (100%)**	**50 (100%)**	**50 (100%)**	**150(100%)**	

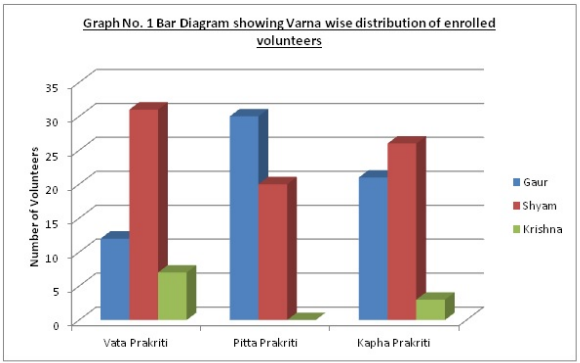
Table 5: Skin Color Wise Distribution of Volunteers (N = 150)

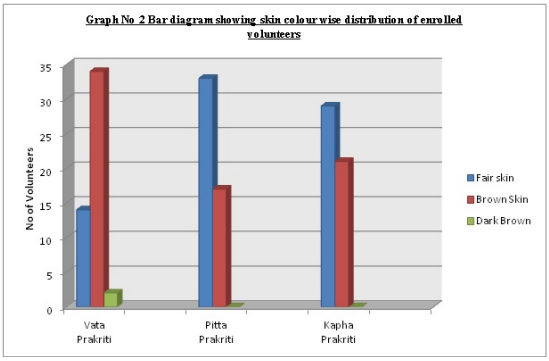
Colour	Number of Volunteers			Total	P value[@]
	Vata Prakriti	*Pitta Prakriti*	*Kapha Prakriti*		
Fair Skin	14 (28%)	33 (66%)	29 (58%)	**76 (50.66%)**	
Brown skin	34 (68%)	17 (34%)	21 (42%)	**72(48%)**	**0.001**
Dark brown skin	02 (04%)	00 (00%)	00 (00%)	**02(1.34%)**	**df - 2**
Total	**50 (100%)**	**50 (100%)**	**50 (100%)**	**150(100%)**	

Fair skin – 150-317, Brown skin 317-484, Dark brown skin 484-650

Table 6: Correlation analysis between Melanin score and colour skin in different Prakriti

Prakriti	Spearmen correlation coefficient	p-value	Significance
Vata	0.4623	0.0007	Highly Significant
Pitta	0.3664	0.0089	Highly Significant
Kapha	0.3004	0.0341	Highly Significant





DISCUSSION

In present study out of 150 volunteers' maximum volunteers i.e. 125 (83.33%) were in between 21-23 years age group. In this study the mean age of Volunteers were 22.14 years. This may be due to awareness of skin health in the young college going students. This study was carried out on healthy volunteers. The female volunteers were selected because gender wise variation of skin is well known.[18]

Melanin is one of the factors responsible for skin colour. In 2001 G. G. Hillebrand[19] reported that individuals lived in sun exposed area has higher melanin index as compare with people has who lived in less sun exposed area. In 2011 Alizerza Firooz[20] found that melanin index was higher in 20- 30-year age group than 10 - 20-year age group.

In this present study *Twacha Parikshan* was done according to different *Prakriti* with the help of observation and instrument. *Vata Prakriti* volunteers were having *Shyam Varna*. When same volunteers were examined for their melanin contain, they showed brown colour skin. Both the results are in same direction. *Pitta Prakriti* volunteers had *Gaur Varna* while their melanin content showed fair skin. *Kapha Prakriti* volunteers had Gaur as well as *Shyam Varna* and their melanin content showed fair skin and brown colour skin. All this result of *Twacha Varna* and skin colour according to *Prakriti* shows matching in subjective and objectives parameter of skin according to *Prakriti.* After applying agreement analysis between melanin score and *twacha Varna* in different *prakriti* it showed that p value is 0.0007 for *Vata Prakriti*, 0.0089 for *Pitta Prakriti* and 0.034 for *Kapha Prakriti* which is found to be highly significant. Hence there is correlation between *Twacha Varna* examined for darshan pariksha and melanin score examined by using Mexameter.

CONCLUSION

The skin colour evaluation by observation and instrument (Mexameter*)* showed similarities in their results. After applying Correlation analysis between melanin score by Mexameter and skin colour assessment by observation in different *Deha Prakriti* is showed p value is 0.0007 for *Vata Prakriti*, 0.0089 for *Pitta Prakriti* and 0.034 for *Kapha Prakriti*, which is highly significant. Hence there is correlation between skin colour evaluation by observation method and by instrument (Mexameter*)*. So we can use just observation method while studying skin colour assessment qualitatively rather than instrument.

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