

PRAKRITI AND ITS INFLUENCE IN BASAL ENERGY EXPENDITURE (BEE)

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Abstract

The energy needed to carry out fundamental metabolic functions is called as Basal Energy Expenditure. It is measured in calories, a unit of heat, and is represented by the symbol Kcal. Prakriti is unique characteristic feature of Ayurveda which plays an important role in the life of each individual from conception till death. Prakriti does not change during the whole life and is responsible for the physical and mental characteristics of an individual. The energy requirement varies depending on the predominance of the Dosha. The present study was focused on to find whether there is any difference between the Basal Energy Expenditure of persons belonging to major three Prakriti. Cross-sectional, quantitative, descriptive survey was conducted and BEE was calculated with the help of Equations by Harris-Benedict. ANOVA test showed significant results. (P<0.0001)

Keywords: Ayurveda; Prakriti; Basal Energy Expenditure; Harris-Benedict.

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INTRODUCTION

Basal Energy Expenditure (BEE) is used to determine an individual's caloric needs. This is the energy needed to carry out fundamental metabolic functions, such as breathing, ion transport, normal turnover of enzymes and other body components, etc. The interrelations between energy expenditure and body composition during adulthood are complex and appear to vary with life stage and with sex. Lean body mass is a major determinant and women tending to have more body fat. As a result, their BEE is lower than that of otherwise comparable males.^[1] Low energy expenditure, due either to low basal energy demands^{[2][3][4][5]} or to low physical activity energy expenditure (AEE).^{[5][6][7]} It is measured in calories, a unit of heat, and is represented by the symbol Kcal. Total energy expenditure, also known as metabolic rate, is affected by such factors as amount of physical activity, number of hours spent sleeping, types of foods consumed, exposure to extreme temperatures, and amount of muscle mass a person carries.

A characteristic feature of Ayurveda is that it considers the individual as a whole, rather than just the disease. Prakriti is one of eternal principles of Ayurveda^[8] which plays an important role in the selection and establishment of every factor for which a person is going to interact from conception till death, e.g. lifestyle, diet planning, etc. Prakriti stands for nature of the body in terms of Dosha and is decided at the time of conception according to the predominance of Dosha. It does not change during the whole life and is responsible for the physical and mental characteristics of an individual. The individuals of specific Prakriti exhibit biological variations in terms of structure, function, behaviour, individual response to internal and external environmental stimuli.^{[9][10][11]} Prakriti is of seven types, i.e. Vataja, Pittaja, Kaphaja, three Dwandaja and

one Samadoshaja. Among these, Samadoshaja is an excellent and homeostatic state.^{[9][10][11]} However, the equilibrium of Doshas is well maintained in all Prakrities.^{[12][13]}

The present study was focused on to find whether there is any difference between the Basal Energy Expenditure of persons belonging to major three Prakriti viz. Vataja, Pittaja & Kaphaja.

MATERIALS AND METHODS

This was a cross-sectional, quantitative, descriptive survey study performed with a sample size of 60. (20 subjects of each Prakriti) Written informed consent was obtained from all participants. A form was used to record socio-demographic, clinical (based on the history) and anthropometric data of each participant. Weight and height were measured while fasting and after bladder emptying. Subjects were barefoot, wearing bermuda shorts and a t-shirt, and standing in the bipedal position, with their chin parallel to the floor. Thorough review of the literature was carried out to study the physical, psychological and behavioural characters of three Prakriti. A special proforma was prepared based on the characters and Prakriti of 60 subjects and assessed. (Annexure 1) Basal Energy Expenditure (BEE) in Kcal/d was calculated with Energy Requirement Equations by Harris-Benedict as follows.

Men: $66 + (13.7 \times \text{Weight}) + (5.0 \times \text{Height}) - (6.8 \times \text{Age})$

Women: $655 + (9.6 \times \text{Weight}) + (1.7 \times \text{Height}) - (4.7 \times \text{Age})$ Where – Weight in (Kg), Height in (cm) & Age (years)

Inclusion Criteria

- Healthy individuals between the ages 18-30 year.

Exclusion Criteria

- Individuals below 18 and above 30 Years of age.
- Persons suffering from metabolic diseases

OBSERVATIONS AND RESULTS

Table 1 shows the mean values of Age, Height and Weight of all the subjects of respective Prakrities with SD.

Table 2 shows that mean height for male in Vata Prakriti group was 158.25 cm, in Pitta Prakriti males it was 164 cm and in Kapha Prakriti Males it was observed as 163.64 cm. For Females of Vataprakriti, mean height was observed as 156.63 cm in Pitta Prakriti it was 161.88 cm and in Kapha Prakriti Females mean height was 157.22 cm.

The same table shows the mean weight for males of Vataprakriti was 43.88 kg, in Pitta Prakriti 50.13 and in Kapha Prakriti subjects it was 61.18 kg. Where as in females of Vata Prakriti, mean weight was 45.67 kg, in Pitta Prakriti 49.75 kg and in Kapha Prakriti females mean weight was 53.67 kg.

Table 3 shows the gender difference in Mean Basal Energy Expenditure of subjects according to their respective Prakrities. For Vata Prakriti male mean BEE was 1316.3 Kcal/d where as for females of the same Prakriti showed mean BEE 1275 Kcal/d. In Pitta Prakriti Males it was 1418.4 Kcal/d corresponding to the females with mean BEE as 1331.1 Kcal/d. In Kapha Prakriti Males mean BEE was 1550.5 Kcal/d and Kapha Prakriti females it was calculated as 1352.4 Kcal/d.

Table 4 shows that Mean Basal Energy Expenditure in Vata predominant subjects irrespective of its gender was calculated as 1295.72 Kcal/d. In Pitta Prakriti subjects it

was 1400.98 Kcal/d where as in Kapha Prakriti subjects mean BEE was 1461.37Kcal/d.

Study shows that there is significant difference in the Basal Energy Expenditure (BEE) of subjects belonging Prakrities with predominance of particular dosha. The statistical Analysis was done with ANOVA test by comparing groups against each other. Groups were also compared by unpaired 't' test.

F = 1.099, The P value is 0.8386. This test suggests that the difference between the two SDs is Not significant. (Table 5) F = 6.746, The P value is 0.0001. This test suggests that the difference between the two SDs is extremely significant. However the two-tailed P value is 0.0602, considered not quite significant. (Table 6)

F = 7.416, The P value is < 0.0001. This test suggests that the difference between the two SDs is extremely significant. However the two-tailed P value considered not quite significant. (Table 7) F-value was observed 20.462 with standard error 85.031. The P value is less than 0.0001. By conventional criteria, this difference is considered to be extremely statistically significant. (Table 8)

DISCUSSION

Ayurveda explains all bodily actions based on the status of three Doshas i.e. Vata, Pitta and Kapha. All the physiological processes are directly controlled by these Tridosha. Vata and Pitta are responsible for destructive changes in their predominant stage due to their specific properties. Vata is responsible for respiration and control of movement. Pitta is responsible for maintenance of body heat and Kapha is responsible for maintenance of body form and structure. In Ayurveda diagnosis of Prakriti provides unique insight into understanding and assessing one's health.

Table 1: Mean score age, height and weight

Particular	Vata		Pitta		Kapha	
	Mean	SD	Mean	SD	Mean	SD
Age (Yr)	21.15	± 3.16	22.1	± 3.65	23.55	± 4.38
Height (cm)	157.27	± 6.79	163.57	± 4.93	160.75	± 6.53
Weight (Kg)	44.95	± 3.39	50.05	± 2.72	57.8	± 7.84

Table 2: Mean Height and Weight

Particular	Vata		Pitta		Kapha	
	Male	Female	Male	Female	Male	Female
Mean Age (Yr)	20.87	21.33	22.68	19.75	25.27	21.44
Mean Height (cm)	158.25	156.63	164	161.88	163.64	157.22
Mean Weight (kg)	43.88	45.67	50.13	49.75	61.18	53.67

Table 3: Gender difference in Mean Basal Energy Expenditure

Prakriti	Mean BEE Kcal/d	
	Male	Female
Vataja	1316.3	1275
Pittaja	1418.4	1331.1
Kaphaja	1550.5	1352.4

Table 4: Mean Basal Energy Expenditure (Prakriti wise)

Prakriti	Mean BEE Kcal/d	SD
Vata Prakriti	1295.72	± 47.77
Pitta Prakriti	1400.98	± 50.09
Kapha Prakriti	1461.37	± 130.0

Table 5: Comparison of Vataprakriti Vs Pittaprakriti

Prakriti	KS	P Value
Vata	0.1400	> 0.10
Pitta	0.1074	> 0.10

Table 6: Comparison of Pittaprakriti Vs Kaphaprakriti

Prakriti	KS	P Value
Pitta	0.1074	> 0.10
Kapha	0.1412	> 0.10

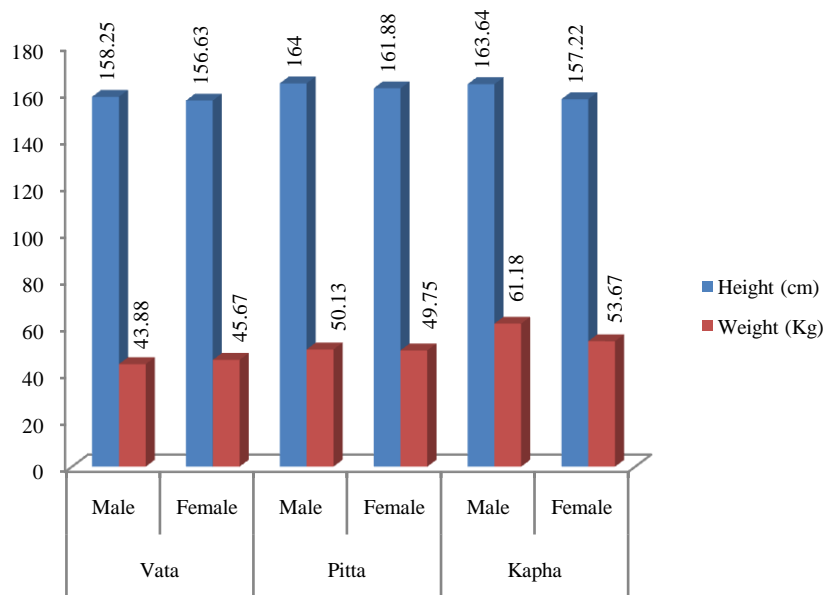
Table 7: Comparison of Vataprakriti Vs Kapha Prakriti

Prakriti	KS	P Value
Vata	0.1400	> 0.10
Kapha	0.1412	> 0.10

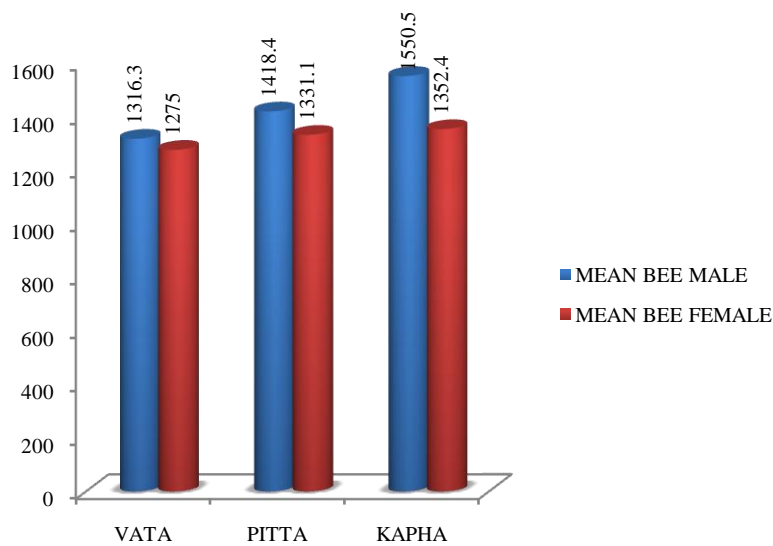
Table 8: ANOVA test of three groups

Comparison	Difference	Q	P Value
Vata Prakriti vs Pitta Prakriti	-109.39	5.750	P < 0.001
Pitta Prakriti vs Kapha Prakriti	-60.390	3.174	P > 0.05
Vata Prakriti vs Kapha Prakriti	-169.78	8.924	P < 0.001

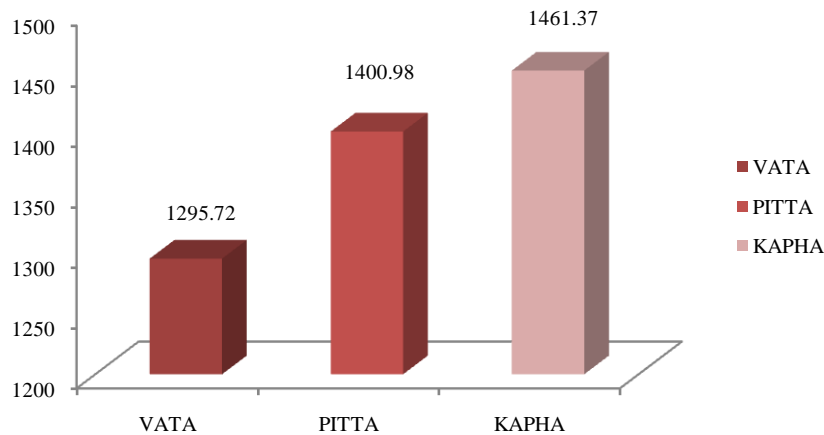
Graph 1: Mean Height and Weight



Graph 2: Gender difference in Mean Basal Energy Expenditure



Graph 3: Mean Basal Energy Expenditure (Prakriti wise)



It is comprehensive in scope, spanning both physical and mental aspects. It is not merely a diagnostic device but also a guide to action for good health. It provides detailed guidelines to adapt one's food and behaviour to suit one's Prakriti.

Gender of a person may influence the basal energy requirement.^[14] Anthropometric variables like weight, height and age of person also certainly affects the basal energy requirement in healthy individuals.^[14] Hence subjects belonging to young group with age ranging from 18 to 30 were selected for this study to avoid the bias which could have arise because of larger age differences. However, a profound fall in body weight with reduction in physical activity and some mental changes resulting in metabolic may also affect the same in pathological conditions.

In present study, it has been observed that Prakriti significantly influences the basal energy expenditure of a person. The differences in the mean values of variables viz. weight and height might have been responsible for this outcome. The physique of persons belonging to Kapha Prakriti in relation to the above mentioned variables is certainly

stronger than the person belonging to Pitta or Vata Prakriti of same age group. Likewise the stature of Pitta Prakriti person is stronger in comparison with the person of Vata Prakriti. Hence mean basal energy expenditure of persons belonging to Kapha Prakriti is higher than the persons of Pitta and Vata Prakriti. Also mean basal energy expenditure of Pitta Prakriti persons is higher than the persons belonging to Vata Prakriti.

Food energy is needed to balance energy expenditure in order to maintain body size, body composition for desirable physical activity consistent with long-term good health.^[15] Present study also endorse the concept of energy requirement of a person according to ones basic constituent i.e. Prakriti. Dietary requirement should be modified suitable to the Prakriti of an individual. In general, an individual with Vata Prakriti should take unctuous, warm, and sweet substances. One with Pitta Prakriti should take cool, heavy, sweet, bitter and astringent food articles which carries appropriate energy in terms of calories required for the subjects of these Prakrities respectively. Whereas Kapha Prakriti person should consume food in which dry, warm, light, pungent, bitter and astringent tastes predominate.^[16]

Annexure 1: प्रकृति परिक्षण पत्रक (Proforma for analyzing Prakriti)

क्र	परिक्ष्य विषय	वात प्रकृति	पित्त प्रकृति	कफ प्रकृति
१	देह	कृश	सुकुमार	सुडौल, सुबद्ध
२	देह रचना	विषमोपचित	शिथिल	समुपचित
३	ललाट	छोटा	मध्यम	महत, ऊँचा, चौडा
४	दंत	छोटे, विषमसंहत	विशुद्ध	समसंहत
		कृष्णाभ	पिताभ	श्वेताभ
५	नेत्र	धुसर, अनवस्थित	पिंगल, आरक्त	शुक्ल, प्रसन्न
६	मुख	परुष	आस्यगंध	सुकुमार
७	ओष्ठ	शुष्क	लालीयुक्त	बडे, सिग्ध
८	जिह्वा	रुक्ष	ताम्र	सिग्ध
९	छाती	छोटी, कृश	मध्यम	मांसल, बडी
१०	हस्त/पाद	कृश, छोटे	मध्यम	मांसल, बडे
११	नख	परुष, अल्पवृद्धिमान	ताम्र, छोटे	दीर्घ, कच्छपपृष्ठाकार
१२	त्वचा	खर, रुक्ष	पिप्ल, व्यंग, तिलकालकयुक्त	सिग्ध, मृदु
१३	त्वचास्पर्श	शीतोष्ण	उष्ण	शीत
१४	वर्ण	कृष्ण	गौर	गौर
१५	श्मश्रु	अल्प, रुक्ष, स्फुटित	अल्प, मृदु, क्षीप्रपतीत	अतिघन, अतिसिग्ध, दीर्घ,
	केश/लोम			
१६	संधीचेष्टा	सशब्द चेष्टाए	शिथिल मृदु	सुश्लिष्ट संधी
१७	अग्नि	विषम	तीक्ष्ण	मंद
१८	क्षुधा/तृष्णा	विषम	प्रभुत एवं वारंवार	अल्प
१९	कोष्ठ	क्रुर	मृदु	मध्य
२०	रसप्रियता	मधुर, अम्ल, लवण	मधुर, कषाय, तिक्त	कटु, कषाय, तिक्त
२१	स्वर/वाणी	स्फुटित/बहुभाषी	तीक्ष्ण	सिग्ध,
२२	पराक्रम	अल्प	प्रभुत	प्रभुत
२३	प्रतिक्रिया	अनिश्चित	तत्काल/शीघ्र	विचारपूर्वक
२४	गती	लघु	दृता	गजसमा
२५	सामान्यबल	अल्प	मध्यम	उत्तम
२६	निद्रा	अल्प एवं वारंवार उठना पडता है।	ठीक मगर पूर्णतः शांत नहीं।	शांत एवं भरपूर
२७	वजन	अल्प एवं जल्द बढ़ता नहीं।	प्रमाणबद्ध	ज्यादा और जल्द बढ़नेवाला।
२८	क्रोध	अल्प	शीघ्रकोपी	अल्पकोपी
२९	क्लेश	असहनशील	असहनशील	सहनशील
३०	स्मृति	अल्प	मध्यम	उत्तम

Vataja, Pittaja, Kaphaja & Sama Prakriti persons abide Vishamagni, Teekshagni, Mandagni and Sama Agni respectively.^[17] Hence recommendations for dietary energy intake from food must satisfy requirements for the attainment and maintenance of optimal health, physiological function and well-being according to ones Prakriti.

CONCLUSION

The constitutional purpose provides an insight into the deeper functioning of an individual. It is possible to understand the kinds of foods,

fruits, herbal medicines, emotions, thoughts, climates & activities that are suitable for particular Prakriti. The data presented here are cross-sectional. Present study shows that Basal Energy Expenditure in Kapha Prakriti Person is more as compared to other persons predominant in Pitta prakriti. Also Basal Energy Expenditure in Pitta Prakriti Person was more as compared to persons predominant in Vata Prakriti. There are areas associated with lean mass and basal energy expenditure. Study sample was not probabilistic; further studies with a more representative population are needed to precise the results.

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