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Research Article

ASSOCIATION OF BASAL METABOLIC RATE WITH DIFFERENT *DEHA PRAKRITI* IN HEALTHY INDIVIDUALS- A CROSS-SECTIONAL STUDY

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ABSTRACT

Deha Prakriti is a comparatively stable constitutional phenotype of individual which is described in Ayurveda. BMR is influenced by body size, age, sex and the amount of metabolically active tissue. **Aim & Objective:** To find out the association between *Deha prakriti* and BMR status of the subject. **Methodology:** Cross-sectional observational study was conducted in 90 apparently healthy volunteers aged 18-40 years at Ayurvedic & Unani Tibbia College and Hospital, New Delhi. Participants were divided into three groups based on predominant *Prakriti*, as assessed by the CCRAS Ayur Prakriti Web Portal, with groups being *Vatadhikya* (Group A), *Pittadhikya* (Group B) and *Kaphadhikya* (Group C). BMR was determined by BIA using a Body Mass Analyzer. Differences between groups were compared using one-way ANOVA with a Tukey post-hoc test. **Results:** The mean BMR were 1393.6 ±168.4 kcal/day, 1308.7±164.6 kcal/day & 1312.0±183.8 kcal/day for Group A, B & C respectively. The difference among the groups was statistically significant (ANOVA p=0.001033). Tukey analysis revealed significant differences between Group A and Group B (mean difference 84.9 kcal/day, p=0.026537) and Group B and Group C (mean difference −3.3 kcal/day, p=0.039232), but not between Group A and Group C (mean difference 81.6kcal/day, p=0.470345). **Conclusion:** BMR was significantly different among three *Prakriti* groups in this sample with highest mean value among *Vatadhikya* individuals. This study demonstrates that the constitutional features of Ayurveda may have quantifiable physiological correlates. But the pattern seen could be due to differences in sex, age, height, weight, body composition and lifestyle so the findings are preliminary and need to be confirmed using larger research and direct metabolic measures.

INTRODUCTION

Deha Prakriti is an important concept in Ayurveda which explains the essentially unchanging constitutional qualities of a person which are derived from the predominance of *Vata*, *Pitta* and *Kapha*. According to Ayurvedic literature different types of *Prakriti* are related with certain body build, digestive system, strength, activity and physiological response. Basal metabolic rate (BMR) is the energy expenditure for maintenance of the essential physiological processes at rest and is a major component of total energy expenditure in one day. Resting energy expenditure is influenced by body size, sex, age, body composition and other physiological characteristics. linkage of resting energy expenditure with *Deha Prakriti* can give an objective linkage between Ayurvedic constitutional evaluation and modern physiology. The present study was undertaken to find out whether BMR varies among healthy persons with dominant *Vata*, *Pitta* and *Kapha Prakriti*.

Individual constitution is a key concept in Ayurveda for health maintenance and clinical decision making. *Deha Prakriti* is the usual stable constitutional phenotype of a person and interpreted in terms of predominance and interaction of *Vata*, *Pitta* and *Kapha*. These constitutional patterns are described in classical Ayurvedic texts as pertaining to differences in

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physical build, physiological function, digestive capacity, strength, behaviour and susceptibility to disease. [1,2,3] From a modern physiological perspective, basal metabolic rate (BMR) is an important component of the daily energy expenditure. This is the energy needed to sustain the basic physiological functions at rest. BMR varies from person to person and it is affected by age, sex, body size, fat free mass, endocrine status, nutritional status and other physiological and environmental factors.[4,5,6,7] The conceptual link between *Prakriti* and metabolism is of particular importance in Ayurveda, since *Agni*, the functional principle of digestion and transformation, is described in different ways according to the constitutional phenotypes. *Vata* dominant people are related to *Vishamagni*, *Pitta* dominant people are related to *Tikshnagni* and *Kapha* dominant people are related to *Mandagni*. These descriptions hint that observable metabolic traits could be a manifestation of constitutional differences. Attempts to operationalise *Prakriti* for research have increasingly moved from predominantly clinician-dependent assessment toward standardised instruments. The Central Council for Research in Ayurvedic Sciences (CCRAS) has developed a standardised *Prakriti* Assessment Scale and web-based implementation, although broader validation and reproducibility across populations remain active methodological concerns.[8,9] Research has also explored biochemical, genomic, anthropometric, and physiological correlates of *Prakriti*, supported the value of testable biological hypotheses while not establishing deterministic or causal mechanisms[10]. Previous Studies have been done on the relationship between *Prakriti* and BMR in the past have reported differing patterns and have used heterogenous populations and methods and including studies in young women and studies with *Dwandwaja Prakriti*.[11,12,13] But the present study compared BMR in three dominant single-*Dosha* constitutional groupings in apparently healthy individuals of both sexes. The aim was to find out the relationship of *Deha Prakriti* with BMR. The research question was if there is an association of BMR between individuals falling in different main *Deha Prakriti* categories. The null hypothesis was that *Deha Prakriti* was not associated with BMR.

AIM

To evaluate the association of *Deha prakriti* with BMR.

OBJECTIVE

To find out the association between *Deha prakriti* and BMR status of the subject.

METHODOLOGY

Study design and setting

This was a cross sectional, observational, non-randomized study conducted at Ayurvedic & Unani Tibbia College and Hospital, Karol Bagh, New Delhi, over a period of 1 year. Healthy volunteers were recruited among the students and staff of the institution and relatives or attendants of patients attending the out-patient department. Sampling was convenience sampling.

Ethical Approval and Registration

Ethical approval and registration of the study was approved by the Institutional Ethics Committee (IEC) vide letter No. Dated 25.10.2024 F-S (423)/2020-Co/IEC (Ayurveda)/148 The study was registered with the Clinical Trials Registry of India (CTRI/2025/04 /084480; registered 09 April 2025). All subjects provided written informed consent before enrolment.

Criteria of selection of Participants (Inclusion & exclusion criteria)

Inclusion criteria

1. Subjects of age group between 18-40 yrs.
2. Subjects belonging to both of the genders.
3. Apparently healthy volunteers i.e., no history of serious illness or disease.

Exclusion Criteria

1. Participants who are smoker, tobacco and alcohol consumer.
2. Participants suffering from any congenital anomalies or major physical disabilities.
3. Participants with any drug dependency.
4. DM, HTN, hypothyroidism, hyperthyroidism or any other serious systemic disorder.

All the included participants were apparently healthy male and female participants aged 18–40 years willing to provide written informed consent. Study participants were not allowed to have major systemic disease, diabetes mellitus, hypertension, thyroid problems or other major systemic conditions, congenital defects or major physical limitations, substance dependency and were also not allowed to use tobacco, alcohol or smoking products. Subjects who were pregnant or lactating were excluded and subjects on treatment for serious medical disorders were also excluded.

Sample size and Group

Sample size - 90

Study groups - 3 (30 in each group)

A total number of ninety (90) participants were recruited, thirty (30) in each group. Group A was *Vatadhikya Prakriti*, Group B was *Pittadhikya Prakriti* and Group C was *Kapadhikya Prakriti*. All 90

participants who signed up for the study completed it without dropouts.

Analysis of *Prakriti*

The assessment of *Deha Prakriti* was done using the Ayur Prakriti Web Portal created by Central Council for Research in Ayurvedic Sciences (CCRAS). Participants were classified according to their dominant *Prakriti* using the portal assessment.

Assessment of BMR

Evaluation of BMR was determined with Body Mass Analyzer based on bioelectrical impedance analysis (BIA) concept for body-composition assessment and provides a device-estimated BMR value. Because respiratory gas exchange was not measured, the outcome was reported as BIA/device-estimated BMR rather than directly measured metabolic rate. BIA is non-invasive and widely used for estimating body-composition variables, but its accuracy depends on population-specific equations, hydration status, and standardised measurement procedures.[14] Direct measurement of resting energy expenditure is generally performed by indirect calorimetry under standardised conditions. [4,15] The present findings were interpreted within these methodological constraints.

Statistical Analysis

Demographic, clinical, anthropometric and Ayurvedic observations were noted in a pre-designed case record form. For continuous variables, mean, standard deviation (SD) and standard error (SE) were applied. Categorical variables were described using frequencies and percentages. The mean BMR of the three groups was compared using one-way analysis of variance (ANOVA). Tukey's post hoc test was used for pairwise comparisons. Statistical significance was defined as $p < 0.05$.

OBSERVATIONS

Ninety participants were enrolled in the research and all completed the research. Each *Prakriti* group had 30 participants. Total sample consisted of 42 males (46.67%) and 48 females (53.33%).

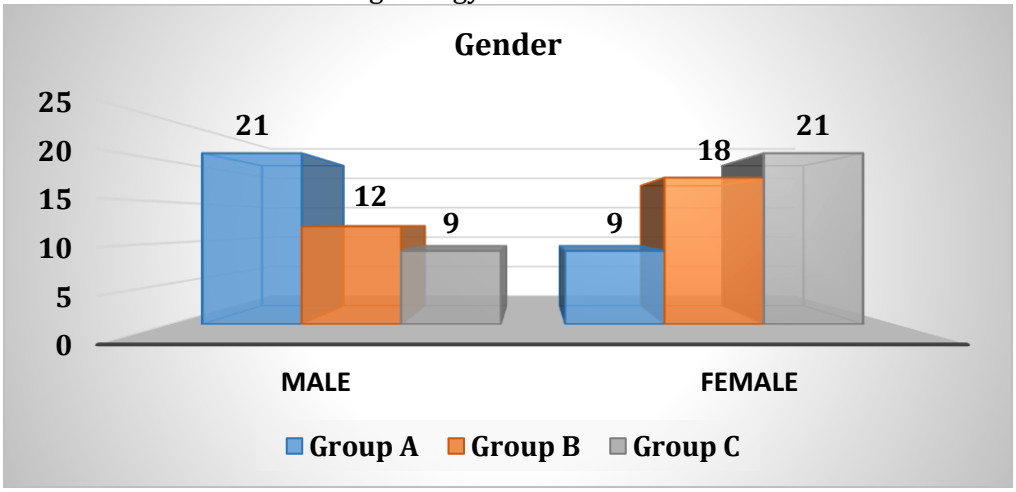


Fig 1: Distribution of male & female participants

The most common age group was 21-25 years (46 cases, 51.11%). The study population was predominantly students.

Table 1: Distribution of male & female participants

Gender	Group A	Group B	Group C	Total	Percentage
Male	21	12	9	42	46.67%
Female	9	18	21	48	53.33%
Total	30	30	30	90	100.00%

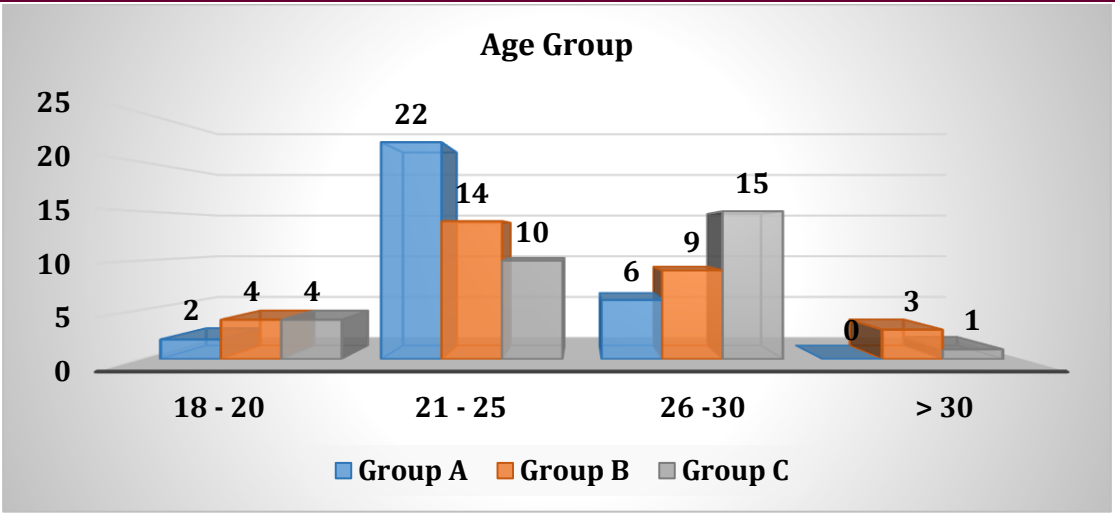


Fig 2: Distribution of age groups of participants

Table 2: Distribution of age groups of participants

Age Group	Group A	Group B	Group C	Total	Percentage
18 - 20	2	4	4	10	11.11%
21 - 25	22	14	10	46	51.11%
26 -30	6	9	15	30	33.33%
> 30	0	3	1	4	4.44%
Total	30	30	30	90	100%

Table 3: Distribution of marital status of participants

Marital Status	Group A	Group B	Group C	Total	Percentage
Married	1	3	3	7	7.78%
Unmarried	29	27	27	83	92.22%
Total	30	30	30	90	100.00%

Table 4: Distribution of Habitats of subjects

Habitat	Group A	Group B	Group C	Total	Percentage
Urban	29	27	23	79	87.78%
Semi Urban	0	0	1	1	1.11%
Rural	1	3	6	10	11.11%
Total	30	30	30	90	100.00%

Table 5: Distribution of religion of subjects

Religion	Group A	Group B	Group C	Total	Percentage
Hindu	23	21	26	70	77.78%
Muslim	3	8	3	14	15.55%
Sikh	1	0	0	1	1.11%
Christian	0	0	0	0	0.00%
Others	3	1	1	5	5.56%
Total	30	30	30	90	100%

Table 6. Distribution of participant's diet

Dietary Habits	Group A	Group B	Group C	Total	Percentage
Vegetarian	17	15	20	52	57.78%
Non-Vegetarian	13	15	10	38	42.22%
Total	30	30	30	90	100.00%

Table 7: Distribution of addiction of participants

Addiction	Group A	Group B	Group C	Total	Percentage
Tea/Coffee	6	6	6	18	20.00%
Alcohol	0	0	0	0	0.00%
Tobacco	0	0	0	0	0.00%
Smoking	0	0	0	0	0.00%
None	24	24	24	72	80.00%
Total	30	30	30	90	100%

Table 8: Distribution of sleep patterns of participants

Sleep	Group A	Group B	Group C	Total	Percentage
Normal	25	29	25	79	87.78%
Disturbed	5	1	5	11	12.22%
Total	30	30	30	90	100.00%

Table 9: Distribution of bowel habits of subjects

Bowel Habits	Group A	Group B	Group C	Total	Percentage
Regular	27	28	28	83	92.22%
Irregular	3	2	2	7	7.78%
Total	30	30	30	90	100.00%

Table 10: Distribution of stool consistency of participants

Stool Consistency	Group A	Group B	Group C	Total	Percentage
Normal	26	27	27	80	88.89%
Loose	0	1	1	2	2.22%
Constipated	4	2	2	8	8.89%
Total	30	30	30	90	100%

Table 11: Distribution of urine output of participants

Urine Output	Group A	Group B	Group C	Total	Percentage
Normal	29	29	30	88	97.78%
Frequent	0	1	0	1	1.11%
Burning micturition	1	0	0	1	1.11%
Strangury	0	0	0	0	0%
Total	30	30	30	90	100%

Table 12: Distribution of participants having allergy

Allergy	Group A	Group B	Group C	Total	Percentage
No	25	24	26	75	83.33%
Onion	1	2	1	4	4.44%
Dust	3	1	1	5	5.55%

cold	0	0	0	0	0.00%
Banana	0	1	0	1	1.11%
pollen	1	1	1	3	3.33%
Smoke	0	1	1	2	2.22%
Total	30	30	30	90	100%

Table 13: Distribution of emotional stress of subjects

Emotional Stress	Group A	Group B	Group C	Total	Percentage
Average	9	7	9	25	27.77%
Moderate	13	17	11	41	45.56%
Too Much	10	8	6	24	26.67%
Total	30	30	30	90	100.00%

Table 14: Distribution of body built of subjects

Built	Group A	Group B	Group C	Total	Percentage
Average	19	13	13	45	50.00%
Emaciated	4	3	3	10	11.11%
Well-built	5	14	14	33	36.67%
Tall	2	0	0	2	2.22%
Total	30	30	30	90	100%

Table 15: Distribution of Nutritional status of subjects

Nutrition	Group A	Group B	Group C	Total	Percentage
Moderate	19	15	12	46	51.11%
Malnourished	0	0	1	1	1.12%
Well nourished	11	15	17	43	47.77%
Total	30	30	30	90	100.00%

Table 16: Distribution of height of subjects

Height (cm)	Group A	Group B	Group C	Total	Percentage
< 150	0	2	1	3	3.33%
151 - 160	5	10	13	28	31.11%
161 -170	13	14	11	38	42.22%
171 - 180	11	4	5	20	22.22%
> 181	1	0	0	1	1.11%
Total	30	30	30	90	100%

Table 17: Distribution of weight of subjects

Weight (Kg)	Group A	Group B	Group C	Total	Percentage
< 45	1	4	3	8	8.89%
46 - 55	7	8	7	22	24.44%
56 -65	13	9	12	34	37.77%
66 -75	7	7	5	19	21.11%
76 - 85	2	2	3	7	7.78%
> 86	0	0	0	0	0.00%
Total	30	30	30	90	100%

Table 18: Distribution of BMI of participants

BMI (Kg m²)	Group A	Group B	Group C	Total	Percentage
16 -20	14	9	9	32	35.56%
21 - 25	16	20	13	49	54.44%
26 - 30	0	1	8	9	10.00%
Total	30	30	30	90	100.00%

Table 19: Distribution of appetite of subjects

Appetite	Group A	Group B	Group C	Total	Percentage
Good	13	11	9	33	36.67%
Moderate	17	19	20	56	62.22%
Poor	0	0	1	1	1.11%
Total	30	30	30	90	100%

Table 20: Distribution of dietary habits (food intake) of subjects

Dietary Habits	Group A	Group B	Group C	Total	Percentage
Samashana	10	16	13	39	43.33%
Adhyashana	5	3	7	15	16.67%
Vishamashan	12	6	4	22	24.44%
Pramitashana	2	3	4	9	10.00%
Viruddha aahara	1	2	2	5	5.56%
Total	30	30	30	90	100%

Table 21: Distribution of *Vihara* of subjects

Vihara	Group A	Group B	Group C	Total	Percentage
No	0	0	0	0	0.00%
Less	4	7	4	15	16.67%
Proper	9	1	2	12	13.33%
Regularly	11	10	11	32	35.56%
Irregularly	4	12	13	29	32.22%
Excess	2	0	0	2	2.22%
Total	30	30	30	90	100%

Table 22: Distribution of *Koshtha* of subjects

Koshtha	Group A	Group B	Group C	Total	Percentage
Mridu	3	14	4	21	23.33%
Madhyama	20	15	25	60	66.67%
Krura	7	1	1	9	10.00%
Total	30	30	30	90	100%

Table 23: Distribution of *Prakriti* of subjects

Prakriti	Group A	Group B	Group C	Total	Percentage
Vata	30	0	0	30	33.33%
Pitta	0	30	0	30	33.33%
Kaphaj	0	0	30	30	33.33%
Vata-pitta	0	0	0	0	0.00%

Pitta-kapha	0	0	0	0	0.00%
Vata-kapha	0	0	0	0	0.00%
Sannipataja	0	0	0	0	0.00%
Total	30	30	30	90	100%

Table 24: Distribution of *Saara* of subjects

Saara	**Group A**	**Group B**	**Group C**	**Total**	**Percentage**
Rasa saara	3	4	7	14	15.56%
Rakta saara	0	10	3	13	14.44%
Mamsa saara	1	1	2	4	4.44%
Meda saara	1	5	7	13	14.44%
Asthi saara	17	2	3	22	24.44%
Majja saara	5	5	3	13	14.44%
Shukra Saara	3	3	5	11	12.22%
Satva saara	0	0	0	0	0.00%
Total	30	30	30	90	100%

Table 25: Distribution of *Samhanan* of participants

Samhanan	**Group A**	**Group B**	**Group C**	**Total**	**Percentage**
Pravara	0	1	1	2	2.22%
Madhyama	28	29	29	86	95.56%
Avara	2	0	0	2	2.22%
Total	30	30	30	90	100%

Table 26: Distribution of *Satmya* of subjects

Satmya	**Group A**	**Group B**	**Group C**	**Total**	**Percentage**
Pravara	0	0	2	2	2.22%
Madhyama	27	26	26	79	87.78%
Avara	3	4	2	9	10.00%
Total	30	30	30	90	100%

Table 27: Distribution of *Satva* of subjects

Satva	**Group A**	**Group B**	**Group C**	**Total**	**Percentage**
Pravara	1	3	5	9	10.00%
Madhyama	17	19	21	57	63.33%
Avara	12	8	4	24	26.67%
Total	30	30	30	90	100%

Table 28: Distribution of *Aahara shakti* of participants

Aahara Shakti	**Group A**	**Group B**	**Group C**	**Total**	**Percentage**
Pravara	2	3	1	6	6.67%
Madhyama	25	26	27	78	86.67%
Avara	3	1	2	6	6.67%
Total	30	30	30	90	100%

Table 29: Distribution of *Vyayama shakti* of subjects

Vyayama Shakti	Group A	Group B	Group C	Total	Percentage
Pravara	6	5	3	14	15.55%
Madhyama	17	21	19	57	63.33%
Avara	7	4	8	19	21.11%
Total	30	30	30	90	100%

All participants were literate and were not below the poverty level. The majority were single, and lived in the city. Most subjects had normal sleep and bowel habits, normal stool consistency and normal urine production. Of these, 52 (57.78%) participants were vegetarian and 38 (42.22%) were non-vegetarian. Eighteen (20%) subjects reported tea/coffee use and no participant reported alcohol, tobacco or smoking use. Differences in physical activity were observed between the groups. 27.77% of the participants reported average emotional stress, 45.56% reported moderate emotional stress and 26.67% reported extreme emotional stress. The most frequent height was 161-170cm (42.22%) and the most frequent weight was 56-65kg (37.77%). Subjects had a BMI of 21–25 kg/m^2 in 54.44% of cases. As per the observations of the Ayurvedic constitutional, there were 30 in each group of *Vatadhikya*, *Pittadhikya* and Kaphadhikya. Most of the participants were having *Madhyama Samhanana*, *Madhyama Satmya*, *Madhyama Satva* and *Madhyama Aahara Shakti*.

RESULTS

Table 30: BMR among the three dominant *Prakriti* groups

Prakriti	n	Mean BMR (kcal/day)	SD	SE
Vatadhikya (A)	30	1393.6	168.3935	30.74431
Pittadhikya (B)	30	1308.7	164.6219	30.0557
Kaphadhikya (C)	30	1312.0	183.8372	33.56394

The highest mean BMR was observed in Group A (*Vatadhikya*) (1393.6kcal/day) followed by Group C (*Kaphadhikya*) and Group B (*Pittadhikya*) with 1312.0 and 1308.7kcal/day respectively. The one-way ANOVA analysis of the statistics showed a statistically significant difference in general (F=2.330518, p=0.001033).

Fig 3: Mean BMR of Three Groups

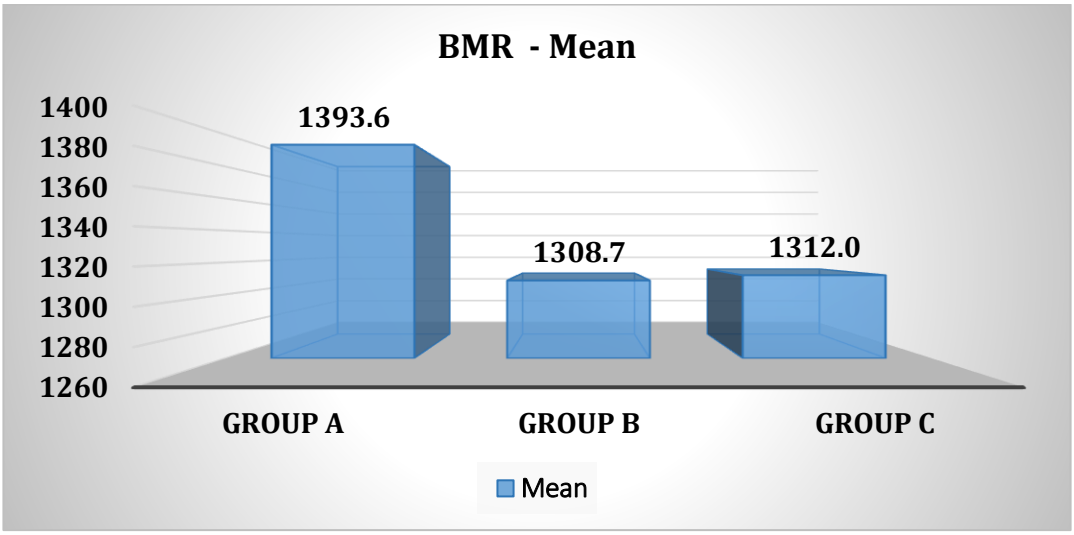


Table 31: Assessment of BMR in Different individuals

BMR	N	Mean	SD	SE	F – Value	P- Value
Group A	30	1393.6	168.3935	30.74431	2.330518	0.001033
Group B	30	1308.7	164.6219	30.0557		
Group C	30	1312.0	183.8372	33.56394		

Table 32: Tukey post hoc pairwise comparisons of BMR

Comparison between Groups	Mean difference	SE	p value	Interpretation
A vs B	84.9	21.66123	0.026537	Significant
A vs C	81.6	23.18032	0.470345	Not significant
B vs C	−3.3	22.33646	0.039232	Significant

Tukey analysis revealed a statistically significant difference between *Vatadhikya* and *Pittadhikya* participants. Mean BMR of *Vatadhikya* participants was higher by 84.9kcal/day. The mean value of BMR was higher in Group A but the difference between *Vatadhikya* and *Kaphadhikya* was not statistically significant. Statistically *Pittadhikya* and *Kaphadhikya* were different but mean value of BMR was very similar to each other.

DISCUSSION

The main finding of the present study was a statistically significant difference in the mean BMR among the three predominant *Prakriti* groups. The highest mean BMR was observed in the participants from *Vatadhikya*. This gives a quantitative physiological measure to investigate the Ayurvedic concept that the constitutional phenotype is associated with characteristic patterns of functioning.

Mean BMR values were 1393.6kcal/day in *Vatadhikya* group, 1308.7kcal/day in *Pittadhikya* group and 1312.0kcal/day in *Kaphadhikya* group. There was no significant difference between *Vatadhikya* and *Kaphadhikya* in the pairwise analysis, but ANOVA was significant. The present sample had higher average BMR in *Vatadhikya* persons especially in comparison with *Pittadhikya* individuals. Hence, the best conclusion is not that *Vata Prakriti* has higher BMR universally as compared to the other constitutional kinds.

Several physiological factors affect BMR. Resting energy expenditure is mainly determined by fat-free mass, but also age, sex, body size, endocrine status, nutritional status and physical activity contribute. [4,5] There was a higher proportion of males and relatively more younger subjects in group A of the present study. It was also slightly overrepresented in the taller height and heavier weight groups. The higher BMR of the *Vatadhikya* group may be explained by these characteristics.

Also, a conceptual framework is presented from the Ayurvedic perspective. Classical descriptions associate *Vata* with *Chala* and *Shighra* qualities and with *Vishamagni* indicating variability and rapidity of physiological activity, *Pitta* with *Ushna* and *Tikshna* attributes and *Kapha* with stable, heavy and unctuous characteristics.[1-3] These concepts should be considered as hypotheses for physiological investigation and not as explanations of the measured BMR. The present study does not show that *Vata* itself causes an elevated metabolic rate.

Body composition is particularly important. BMR estimates from BIA are associated with metabolically active tissue, particularly fat-free mass. Brain, liver, heart, kidneys and skeletal muscle are major contributors to resting energy expenditure. [4,5] In the present analysis, lean body mass was not adjusted for separately, and thus some of the difference described as a *Prakriti*-associated difference may actually reflect differences in metabolically active tissue. This constraint strongly influences the interpretation of the findings.

Mean BMR was lower in the *Pittadhikya* group than in the *Kaphadhikya* group and the difference was statistically significant in paired test. In absolute terms, the mean change was only 3.3kcal/day. Such a small numerical difference should be interpreted with caution especially when the sample is small and no adjustment is made for several physiological factors. This is not to suggest that *Kapha*-dominant people possess a faster metabolic rate than *Pitta*-dominant people.

Previous studies on the relationship between *Prakriti* and BMR have been limited by age, sex or constitutional categories.[11,12,13] The present study adds further data by including both sexes and equal number of individuals in 3 of the large single-*Dosha* groups. However, the external validity is limited as the sample was mainly drawn from an institutional and student population.

The broader Ayurvedic principle of individualized therapy may have ramifications for this study. The *Prakriti* based assessment has been the traditional way to guide *Aahara* and *Vihara* and the individual responses to environmental and therapeutic elements. The present results allow for the investigation of constitutional assessment in terms of physiological end-points that could be measured. But BMR alone isn't enough to predict what a person should eat or how likely they are to get a disease. The therapeutically relevant tailored approach should incorporate body composition, physical activity, dietary intake, endocrine status, sleep and stress.

Future studies in Ayurveda-modern physiology should use direct measurement of resting energy expenditure by indirect calorimetry, standardized pre-test conditions and multivariable statistical models adjusting for age, sex, height, weight, fat-free mass, physical activity and relevant hormonal variables. Such studies can assess whether an independent association of Prakriti and metabolic rate persists after adjusting for classical physiological parameters.

Overall, the data should be viewed as preliminary evidence for a possible relationship between constitutional phenotype and resting energy expenditure. They recommend more research but do not establish a causal or exclusive association between Prakriti and BMR

CONCLUSION

The present cross-sectional study shows statistically significant difference in BMR in persons having *Vatadhikya*, *Pittadhikya* and *Kaphadhikya Prakriti*. The highest average BMR was found in the *Vatadhikya* group (1393.6±168.4kcal/day), followed by the *Kaphadhikya* group (1312.0±183.8kcal/day) and the *Pittadhikya* group (1308.7±164.6kcal/day). There was a significant overall group difference and paired testing showed a difference between *Vatadhikya* and *Pittadhikya* but not between *Vatadhikya* and *Kaphadhikya*. These findings provide preliminary evidence for detectable physiologic correlates of Ayurvedic constitutional phenotype in resting energy expenditure. However, the observed differences could not be attributed to *Prakriti* alone since BMR is greatly influenced by body size, sex, age, body composition and life style characteristics several of which differed between groups and were not independently corrected. Thus, the current findings should be considered a correlation, not proof of causality. The study supports further interdisciplinary research combining Ayurvedic constitutional assessment with modern metabolic monitoring. Larger multicentric studies using indirect calorimetry, comprehensive body composition evaluation and adequate confounder adjustment are needed before recommending *Prakriti*-specific BMR in clinical practice.

Limitation

The findings are limited in their generalizability due to the relatively small sample size (n=90). Convenience sampling in one institutional context, with predominantly student and urban participants. Cross-sectional design, not allowing to prove causality or long-term metabolic trends. BMR measured by BIA and not by indirect calorimetry. Lean body mass, fat mass and other body composition variables were not covariate-adjusted for independently in the main analysis. Age, sex, height, weight, physical activity, food intake, sleep and psychological stress as potential confounding factors. There is no independent assessment of hormonal, genetic, biochemical and environmental variables.

Future Scope

There will be a future scope of larger size multicenter study with equal gender and age mix. Indirect calorimetry is the reference method for resting energy expenditure. Comprehensive analysis of fat free mass, skeletal muscle mass, % body fat and visceral fat may be done. Future study may be adjusted for age, sex, anthropometry, activity, diet, sleep and stress in a multivariate model. Assessment of hormonal, biochemical and genetic correlations can be done. Longitudinal and intervention studies can be done for causality and stability. Clinical research on obesity, diabetes, thyroid and other metabolic diseases for individualized medical applications can be done.

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