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Ayurgenomics Of Metabolic Risk: A Cross-Sectional Study Linking Kapha Prakriti With Pre-Diabetic Markers:

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Abstract
Background: *Ayurgenomics explores the genetic and constitutional basis of individual health predispositions based on Ayurvedic Prakriti types. Kapha Prakriti, characterized by traits such as heaviness and sluggishness, has been traditionally associated with metabolic slowdown and weight gain. These features may predispose individuals to metabolic risks, including pre-diabetes* ***Objective****: To investigate the association between Kapha Prakriti and pre-diabetic markers, including fasting blood sugar (FBS), body mass index (BMI), and familial history of diabetes, from an Ayurgenomics perspective.* ***Methods:*** *This cross-sectional study involved 50 adults aged 30–60 years, assessed for Prakriti using a validated Ayurvedic questionnaire. FBS and BMI were measured using standard procedures. Statistical analyses examined correlations between Prakriti dominance and metabolic risk markers.* ***Results:*** *The cohort comprised 56% Kapha-dominant individuals, with the remainder Pitta and Vata. The Kapha group showed higher mean FBS (118 ± 4.5 mg/dL) and BMI (28.6 ± 2.3 kg/m²). Significant positive correlations were observed between Kapha Prakriti and both FBS ($r=0.65$, $p<0.01$) and BMI ($r=0.72$, $p<0.01$). Pitta and Vata groups demonstrated weaker, non-significant associations.* ***Conclusion:*** *The study highlights the Ayurgenomic link between Kapha Prakriti and increased pre-diabetic risk markers, reflecting genetic and constitutional predispositions to metabolic dys-regulation. Incorporating Prakriti assessment into early screening may facilitate personalized prevention strategies, bridging Ayurvedic principles with modern genomics to combat metabolic disorders.*
Keywords*: DM, Prameha, Prakriti, Ayurveda, Ayurgenomics, Prediabetic, Diabetic Melitus.*

INTRODUCTION:

Pre-diabetes is a growing public health concern characterized by elevated blood glucose levels not yet reaching diabetic thresholds [1]. *Ayurveda*, an ancient holistic system of medicine, emphasizes the concept of *Prakriti*—an individual's unique constitution—formed by the three doshas: *Vata*, *Pitta*, and *Kapha* [2]. These *prakriti* types influence an individual's physical, physiological, and psychological attributes and predispose them to certain health conditions.

Kapha prakriti, associated with qualities such as heaviness, sluggishness, and mucus production, has been traditionally linked to metabolic slowdowns and fat accumulation [3],[4]. These traits are analogous to modern concepts of insulin resistance and metabolic syndrome components, which underpin pre-diabetic states [5]. Classical texts describe *Kapha* as responsible for structure and stability but also highlight its potential to lead to disorders if in excess or imbalanced [6]. This study investigates whether the Ayurvedic constitutional types correlate with modern pre-diabetic markers, providing an integrative approach to early detection and prevention.

Research has identified 52 single nucleotide polymorphisms (SNPs) that distinctly differentiate between *Kapha*, *Vata*, and *Pitta prakriti*, suggesting a genetic basis for these constitutional types [7]. Among these, *Kapha prakriti* shows a strong association with 34 specific DNA methylation regions, which are also linked to elevated BMI [8]. The genetic profile of *Kapha prakriti* includes polymorphisms such as those in the CYP2C19 gene, which are associated with slower drug metabolism [9].

Table I: Methodological Framework of the Study

Section	Details
Study Design and Participants	Cross-sectional observational study with 50 adults aged 30–60 years from community health centers. Inclusion: FBS 95–125 mg/dL (pre-diabetic), not diagnosed with diabetes, not on anti-diabetic medications. Exclusion: Diagnosed diabetes mellitus, significant co-morbidities affecting metabolism. [10]
Prakriti Assessment	Evaluated using a validated questionnaire based on classical Ayurvedic descriptions [11]. Assessed physical features, physiological functions, and psychological traits to determine dominant *prakriti*—*Vata*, *Pitta*, or *Kapha* [12].
Measurement of Risk Markers	FBS measured after overnight fasting using standardized glucometers. BMI calculated as weight (kg) / height (m)^2. Family history of diabetes documented via interviews. [13]
Statistical Analysis	Data analyzed using descriptive statistics. Pearson's correlation coefficient used to examine relationships between *prakriti* types (categorical) and quantitative variables (FBS, BMI). Significance set at $p<0.05$.

Results:
Out of 50 participants, 28 (56%) were identified as *Kapha*-dominant, 12 (24%) as *Pitta*-dominant, and 10 (20%) as *Vata*-dominant. The mean FBS and BMI among these groups were:

- ***Kapha*:** FBS = 118 ± 4.5 mg/dL; BMI = 28.6 ± 2.3 kg/m²
- ***Pitta*:** FBS = 106 ± 3.8 mg/dL; BMI = 25.4 ± 1.9 kg/m²
- ***Vata*:** FBS = 102 ± 2.7 mg/dL; BMI = 23.7 ± 1.5 kg/m²

Table II :Pearson's Correlation of *Prakriti* Types and Metabolic Indicators in Study Participants

Variables	Pearson's r	p-value (2-tailed)	Sample Size (N)	Interpretation
Kapha Pradhana Prakriti & FBS	**0.65**	**<0.01**	50	Significant positive correlation
Kapha Pradhana Prakriti & BMI	**0.72**	**<0.01**	50	Significant positive correlation
Pitta Pradhana Prakriti & FBS	**0.35**	**0.06**	50	Weak, non-significant correlation
Pitta Pradhana Prakriti & BMI	**0.30**	**0.09**	50	Weak, non-significant correlation
Vata Pradhana Prakriti & FBS	**0.25**	**0.15**	50	Weak, non-significant correlation
Vata Pradhana Prakriti & BMI	**0.20**	**0.25**	50	Weak, non-significant correlation

The data clearly shows that individuals with *Kapha Pradhana Prakriti* exhibit a strong positive correlation with both fasting blood sugar (FBS) and Body Mass Index (BMI). The correlation coefficients of 0.65 for FBS and 0.72 for BMI are statistically significant ($p < 0.01$), indicating that as the dominance of *Kapha* increases, so do the FBS levels and BMI values. This suggests that *Kapha prakriti* may be associated with a predisposition to metabolic issues such as higher blood sugar and increased body weight. Among the 50 participants, 28 (56%) were identified as *Kapha*-dominant. Their mean FBS was 118 ± 4.5 mg/dL, and their mean BMI was 28.6 ± 2.3 kg/m². Compared to other groups, these values are notably higher, emphasizing the tendency of *Kapha prakriti* individuals to have elevated metabolic parameters. This aligns with Ayurvedic understanding that *Kapha* dominance correlates with a propensity for weight gain and metabolic imbalance. In contrast, the *Pitta* and *Vata* groups show weaker correlations with FBS and BMI, with correlation coefficients below 0.35 and p-values not reaching statistical significance. The *Pitta* group, comprising 12 participants (24%), had mean FBS of 106 ± 3.8 mg/dL and BMI of 25.4 ± 1.9 kg/m², while the *Vata* group (10 participants, 20%) had mean FBS of 102 ± 2.7 mg/dL and BMI of 23.7 ± 1.5 kg/m². These lower values and weaker correlations suggest that *Pitta* and Vata prakriti may have lesser influence on these metabolic parameters in comparison to *Kapha*. Overall, this analysis supports the hypothesis that *Kapha Pradhana Prakriti* is associated with higher FBS and BMI levels. This finding is significant because it aligns with *Ayurvedic* concepts that associate *Kapha*

dominance with a tendency towards weight gain and metabolic imbalance, which are risk factors for conditions like diabetes. Recognizing *prakriti*-based predispositions can be valuable for personalized health assessments and early intervention strategies.

DISCUSSION

The present findings underscore a significant association between *Kapha Prakriti* and elevated metabolic risk markers, specifically fasting blood sugar (FBS) and Body Mass Index (BMI). The data reveal that *Kapha*-dominant individuals (56% of the sample) exhibit higher mean FBS (118 ± 4.5 mg/dL) and BMI (28.6 ± 2.3 kg/m^2) compared to *Pitta* and *Vata* groups. Notably, the correlations between *Kapha Prakriti* and these parameters are strong and statistically significant ($r = 0.65$ and 0.72, $p < 0.01$), suggesting a constitutional predisposition to metabolic sluggishness, weight gain, and insulin resistance [14]. Classical Ayurvedic texts describe *Apathya nimittaja prameha* (acquired *prameha*) as a lifestyle-related disorder influenced by dietary indiscretions, sedentary habits, and psychological stress. These factors—such as excessive intake of heavy, sweet, and slimy foods, along with inactivity and mental stress—contribute to the manifestation of *prameha*, which closely resembles modern type-II diabetes[15]. The observed data align with these descriptions, as the traits associated with *Kapha*—such as sluggishness and fat deposition—mirror the risk factors for pre-diabetes and metabolic syndrome identified in contemporary research[16, 17]. Previous research supports this association; found correlations between *Kapha* traits and components of metabolic syndrome, emphasizing the potential of *Prakriti*-based screening. Integrating *Prakriti* assessment can thus enrich community health strategies by enabling early, personalized interventions [18].

CONCLUSION

Kapha Prakriti individuals demonstrate higher pre-diabetic risk markers, validating *Ayurvedic* insights into constitutional predispositions. *Prakriti* profiling offers a simple, non-invasive, and cost-effective means to identify at-risk populations early, supporting personalized preventive care and lifestyle modifications [19]. Incorporating *Ayurvedic* principles into modern healthcare systems holds promise for enhancing early intervention efforts and promoting holistic health management.

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