International Journal of Community Medicine and Public Health
Khuntia BK et al. Int J Community Med Public Health. 2024 Nov;11(11):4326-4334
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20243293

Original Research Article

Comparison of questionnaire and clinician-based assessment of Prakriti/body constitution in young adults: an observational study

Bharat Krushna Khuntia[1], Shubhangi Rathore[1], Vandna Sharma[1], Avantika Rani[2], Aman Agarwal[1], Krishnaveni Rengarajan[1], Ashish Datt Upadhyay[3], Mansingh Jat[1], Nath Madhu[4], T. Velpandian[4], Gautam Sharma[5]*

[1]Centre for Integrative Medicine and Research, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India
[2]Department of Pediatrics Pulmonology, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India
[3]Central Research Unit, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India
[4]Department of Ocular Pharmacology, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India
[5]Department of Cardiology, Centre for Integrative Medicine and Research, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India

Received: 17 August 2024
Accepted: 19 September 2024

***Correspondence:**
Dr. Gautam Sharma,
E-mail: drgautamsharma12@gmail.com

ABSTRACT

Background: Ayurveda emphasizes a personalized medicine approach based on Prakriti (body constitution) assessment which involves morphological observation and detailed history of physiological, behavioural, and psychological attributes. In Ayurveda research, two commonly used prakriti questionnaires are developed by CSIR (Q1) and CCRAS (Q2). These questionnaires are presumed to have similar predictive capabilities, but no study has compared them with the clinician-based prakriti assessment method for suitability in clinical settings. This study aimed to compare Q1, Q2, and their agreement levels with the clinician-based prakriti assessment (CPA) method.
Methods: This observational study was conducted from July 2022 to January 2023, involving adults of both sexes aged aged 18-35 years. Upon obtaining written informed consent, trained Ayurvedic clinicians assessed the prakriti of all participants using Q1, Q2 and CPA methods.
Results: Out of 138 participants recruited, 67% were female. The mean±SD age for males and females was 27.80±4.43 and 26.58±4.56, respectively. Mixed prakriti types were more common than predominant types among participants. The CPA method substantially agrees with Q1 (Cohen's kappa=0.75) and moderately agrees with Q2 (Cohen's kappa=0.59). The positive predictive value ranges for Q1 and Q2 were (46.2-100%) and (48-100%), respectively.
Conclusions: Q1 and Q2 are consistent with the CPA method, with Q1 showing better agreement. Further studies including other questionnaires is required to validate the results.

Keywords: Ayurveda, Personalized medicine, Prakriti, Questionnaire

INTRODUCTION

Research in integrative medicine investigating the relationship between the body constitution and genomic, metabolic and blood parameters has increased in recent years.[1-3] Stratification methods based on human phenotypes and genetic polymorphisms have been helpful in clinical risk prediction and personalization of dietary and pharmacological interventions.[4] Researchers have explored body constitution phenotyping methods from traditional Chinese medicine (TCM), Sasang medicine, and Ayurveda, i.e. traditional Indian medicine, to predict disease susceptibility and personalize management strategies given the limitations of pharmacogenetic

studies.[2,5-8] Traditionally Ayurvedic clinicians uses Prakriti, i.e. body constitution, based classification system to predict the disease susceptibility, assess disease severity and personalize the preventive or therapeutic recommendations. As per the Ayurveda Prakriti classification system, human population can be stratified into the predominant constitutional types, viz. Vata Prakriti, Pitta Prakriti and Kapha Prakriti, and combinations i.e. mixed Prakriti types such as Vata-Pitta Prakriti, Pitta-Kapha Prakriti and Kapha-Vata Prakriti, etc. An individual's Prakriti is determined by examining their morphological characteristics, physiological characteristics, behavioral and psychological attributes, and responsiveness to diet, medication, and the environment (Table 1). Integrative research studies using Ayurvedic Prakriti classification methods have shown that responsiveness to hypoxia-like conditions differs between individuals of different Prakriti types which have the translational value in developing personalized medicine.[9-11] In the published literature, most of the Prakriti-based studies have used the following Ayurvedic Prakriti questionnaires, namely Council of Scientific and Industrial Research (CSIR)-Prakriti questionnaire (Q1), Central Council for Research in Ayurvedic Sciences (CCRAS) Prakriti questionnaire (Q2), Centre for Development of Advanced Computing (C-DAC) Ayusoft Prakriti assessment software (Q3), TN Medical College (TNMC) Prakriti assessment tool (Q4), and prototype Prakriti analysis tool (PPAT) (Q5).[3,9,12-16] These Prakriti questionnaires are developed by different institutions based on Ayurveda classical texts for research and clinical assessment purposes, but traditionally, the Prakriti of a person is assessed by experienced Ayurvedic clinicians who are well versed with Ayurveda Prakriti characteristics and also have the skill to identify those Prakriti characteristics by utilizing visual, tactile, auditory, and interrogative techniques in the study participants. Eventually, to minimize the subjectivity in Prakriti assessment of the questionnaires, algorithms have been developed by different institutes.[17]

Table 1: Characteristic features of different predominant Prakriti types.

	Vata-predominant constitution	Pitta-predominant constitution	Kapha-predominant constitution
Anatomical features	Thin body frame, Weakly developed body, dry/rough skin texture	Moderate built, soft/loose musculature, moles/acne/ freckle	Broad frame, well built, smooth, firm musculature, clear skin
Physiological and behavioural tendencies	Irregular dietary habits and digestive capacity, tendency towards constipation, less sleep, easy wakefulness, intolerance to cold, excessive speech, rough voice	Regular food habit, high digestive capacity, heat/summer intolerance, sweating, loud, clear voice, good communication skills, good analytical abilities	Less food intake, low frequency of food, tendency to gain weight, good sleep quality, slow and stable gait, less speech, slow initiation, good memory, deep voice
Psychological characteristics	Quick response, unstable emotions, enthusiastic	Anger, stress, quick decision taking ability	Endurance, stable emotions

Table 2: Comparison of Prakriti assessment methods.

Prakriti domains	Method of assessment	Clinician-based Prakriti assessment	CSIR Prakriti questionnaire (Q1) components	CCRAS Prakriti questionnaire (Q2) components
Anatomical features				
Appearance	Visual	Overall appearance	-	Appearance
Bilateral symmetry/ proportions/ height, body parts length, breadth	Visual	Body frame/ height/ proportions of body parts (chest, shoulders, hands, palms, soles, nails, joints, face, eyes, eye lashes, lips,	Body build, body frame, head, forehead, face, eyebrows, eyes, lips, jaws, shoulder, chest, hands, palms, nails, legs, soles, joints	Height, forehead breadth, width of four fingers of the hand
Body structure/size	Visual	Body built/size/laxity/ compactness	Body build, joints, face, eyes, eyebrows, eyelashes, lips	Overall built, muscle laxity
Skin	Visual, tactile, interrogation	skin color/texture/moles/ wrinkles/, prominent veins	Skin nature[1,2], texture[1-3], appearance and color	color, texture
Hair	Visual, tactile, interrogation	Hair color, texture, density, greying of hairs	Scalp hair nature[1,2], scalp hair texture[1-4], scalp hair color, body hair color scalp	appearance, texture, density, greying

Continued.

Prakriti domains	Method of assessment	Clinician-based Prakriti assessment	CSIR Prakriti questionnaire (Q1) components	CCRAS Prakriti questionnaire (Q2) components
			hair growth/bulk	
Eye	Visual, interrogation	Eyes appearance, color, size, responsiveness to sunlight	Color, appearance[1,2]	size, color, dryness, irritation
Eye lashes	Visual, interrogation	Eye lashes size		eye lashes size/density
Teeth	Visual, interrogation	Teeth size, texture	Size, appearance, shape/alignment, color	size,
Complexion	visual, tactile, interrogation	Lip size, color, nail size color, palms, sole color texture	Color, nature of palms, soles, lips, nails, palate	Nail texture, color
Physiological functions				
Metabolism appetite, thirst, digestion etc.	Interrogation	Appetite frequency, food amount, tolerability of hunger, thirst, eating speed, digestive capacity, sweat amount, body odor, feces quantity and tendency, sleep quantity, wakefulness trait, dreams	Frequency, quantity/amount related to appetite, thirst, bladder habits, digestive capacity, perspiration, body odor, temperature, sleep duration, sleep quality, bowel habit tendency	Appetite, frequency, food amount, appetite tolerability, eating speed, water intake amount, frequency, body temperature, stool quantity, evacuation tendency/frequency of using of laxative, sweat quantity, odour, sleep duration, quality, dreams
Metabolism weight change	Interrogation		Body weight changes	
Food preferences	Interrogation	Preference to tastes	Food/dietary preferences and suitability	sensitive to hot/spicy food items
Seasonal and temperature preferences	Interrogation	Preference and tolerance to seasons	Preference and problem related to temperature and humidity Seasonal preference and related health problems	Sensitive to excessive heat/summer season
Physical activities				
Walking pattern	Visual, interrogation	Walking style/pattern,	Walking speed, steps, amount and style	Gait
Working pattern	Interrogation	Initiation tendency, procrastination tendency, fickleness	Working speed, quality, style/accuracy	Activity
body parts movements	Visual, interrogation	Movements of body parts	Voluntary/involuntary movements of eyes, eyebrows, jaw, lips, tongue, head, shoulders, hands, legs	Undue frequent movements of body parts
Speech	Auditory	Voice pitch, quality, speech consistency, speech content/tone/quantity/ convincing ability	Quality of voice, content of speech	Voice type, irrelevant talk/profound orator
			Speed and amount of speech	
Strength				
	Interrogation	Immunity, physical strength,	physical, mental strength, resistance to illness and healing power	Tendency of mouth ulceration
Psychological				
Memory	Interrogation	memory, grasping/comprehending ability, retaining ability	Speed of memory, forgetfulness, recalling, initiation, making new	Memory (immediate and late recall tests), intelligence tests (spotting the differences,

Continued.

Prakriti domains	Method of assessment	Clinician-based Prakriti assessment	CSIR Prakriti questionnaire (Q1) components	CCRAS Prakriti questionnaire (Q2) components
			friends, anger, irritability	reasoning), comprehension
Initiation	Interrogation	Friendship, learning ability,	Quality of retaining, planning, execution, achieving ends, retaining friends, anger, forgiveness, generosity, faith and beliefs	Indecisiveness,
Anger	Interrogation	Anger intensity	Memory type olfactory, auditory, tactile, gustatory, visual	Anger/irritation
Generosity	Interrogation	Courage, enmity		Enmity, reconciliation tendency, politeness, humbleness
Artistic traits	Interrogation	Artistic traits		Bravery
Stress management ability	Interrogation	Responsiveness to stress, patience, content, tendency to get attached, retaining relationships		Response to adverse situations

Since Prakriti assessment is essential for developing personalized therapeutic regimens, identifying susceptible individuals, devising tailored preventive strategies, and discovering biomarkers. Therefore, all the Prakriti assessment questionnaires available in the public domain must have a high level of agreement among themselves and with the gold standard clinician-based Prakriti assessment method. Since all the questionnaires are developed from the same classical Ayurveda texts, it is believed that they would have a good level of agreement, but there is no study available that compares the agreement level between the different questionnaires and the clinician-based method. Moreover, Prakriti assessment questionnaires, such as the Q1 and Q2, (Table 2) take approximately forty-five minutes to an hour respectively to assess Prakriti of an individual, which is a longer duration for the research studies carried out in clinical settings. Therefore, comparing Prakriti questionnaires with the clinician-based assessment method is necessary to identify the agreement level and reproducibility of results, considering the time factor as well. So, this study evaluated the agreement level among the Q1, Q2, and the clinician-based Prakriti assessment (CPA) method for determining the Prakriti type among healthy young adults.

METHODS

This cross-sectional study was conducted at the Centre for Integrative Medicine and Research (CIMR), All India Institute of Medical Sciences (AIIMS), New Delhi, from August 2022 to January 2023. Adults residing in the Delhi national capital region (NCR) were invited to participate in the present study using digital pamphlets circulated in social media groups. Written informed consent was obtained from all participants. Permission from the institute ethics committee, All India Institute of Medical Sciences was obtained before the initiation of the study (ref. no. IEC-199/04.03.2022, RP-52/2022).

Participants eligible for this current study were healthy young adults of both sexes, aged 18-35 years old; able to understand Hindi and English properly to comprehend the Prakriti assessment tests and interact easily.

Exclusion criteria were a previous medical diagnosis of primary disease conditions (self-reported), such as advanced malignancies, significant systemic diseases like chronic kidney diseases, severe hepatic, pulmonary, cardiac disease and other neurologic diseases, and major psychiatric disorders (e.g., psychosis, major depression, bipolar disorder) that can interfere with Prakriti assessment.

Prakriti questionnaires

The Q1 was developed by the Council of Scientific and Industrial Research (CSIR) and the Institute of Genomics and Integrative Biology (IGIB), and it is freely available. The questionnaire inquired about demographic data, medical history, and Prakriti-related characteristics pertaining to anatomical features, physiological tendencies, physical/behavioural patterns, voice, communication abilities, strength levels and psychological attributes, and memorizing and recalling abilities. The Q1 took about 45 minutes for a single person's Prakriti assessment and was administered by clinicians who had received prior training. The Prakriti-type assignment was derived from the main Prakriti questionnaire and matched with scores online generated by the CSIR-quick Prakriti questionnaire (a subset of the detailed questionnaire) available on the CSIR website.

The Q2 Prakriti assessment scale, developed by the Central Council for Research in Ayurvedic Sciences,

Ministry of Ayurveda, Government of India, is freely available to the registered Ayurvedic clinicians.[18] The Q2 comprises demographic data, medical history, and Prakriti-related features, including physical appearance, physiological, behavioural, and psychological attributes. The CCRAS master trainers provided operational training to the Ayurvedic clinicians who administered the Q2 in the current study. The Prakriti assessment session for a single person took around 60 minutes, and the final Prakriti types were derived from the CCRAS Prakriti portal after entering the Prakriti questionnaire options/ values. Ayurvedic clinicians with more than ten years of experience carried out the clinician method-based Prakriti assessment, covering Prakriti-related features as mentioned in Ayurvedic classics. It took around 25 minutes to assess the visual, auditory observations and taking history regarding physiological tendencies and psychological attributes.

Ayurveda Prakriti types

According to Ayurvedic tri-dosha theory, there are seven major categories of Prakriti types, but considering the doshik proportion, there can be maximum of ten groups, namely vata (V) predominant Prakriti, pitta (P) predominant Prakriti, kapha (K) predominant Prakriti, vata-pitta (VP) mixed Prakriti, pitta-vata (PV) mixed Prakriti, pitta-kapha (PK) mixed Prakriti, kapha-pitta (KP) mixed Prakriti, vata-kapha (VK) mixed Prakriti, kapha-vata mixed Prakriti (KV), vata-pitta-kapha-sama Prakriti (VPK). As per the published literature prevalence of the predominant Prakriti types (V, P, and K) is 10-15 per cent approximately, whereas the mixed Prakriti (VP, PV, PK, KP, VK, and KV) constitutes the rest, 85-90 per cent.[11] Sama Prakriti (VPK) types are rarely observed. This study assessed Prakriti independently using Q1, Q2 and CPA method. Participants were given detailed advice on diet and lifestyle changes based on their Prakriti type.

Method of Prakriti assessment

Each participant's Prakriti was assessed on the same day using questionnaires (Q1 and Q2) and the CPA. Five trained Ayurveda clinicians administered the Q1 and Q2, and the CPA method was performed by experienced Ayurveda experts, ensuring confidentiality among the assessors. All participants were evaluated using Prakriti questionnaires, and clinician methods were used with randomly generated sequences (i.e., ABC, ACB, BAC, BCA, CAB, CBA) to administer the three assessment methods. The assessors were not blinded to which questionnaire they were administering but the subjects were blinded to the questionnaire which they were administered. The final Prakriti-type assignment for Q1 and Q2 were generated by the CSIR-IGIB trisutra portal (https://Prakriti.igib.res.in/system/home) and the CCRAS Prakriti assessment portal (http://ccras.res.in/ccras_pas/), respectively. The Ayurvedic clinicians assigned the final Prakriti types based on their expertise once the assessment was completed. The clinician based Prakriti assessment method comprises guna (Ayurvedic attributes) based examination of the Prakriti features/attributes according to the Ayurvedic classic Charaka Samhita.

Statistical analysis

The sample size of 138 participants was calculated based on the assumption that the two questionnaires had excellent ability to identify Prakriti, considering 90% sensitivity with an absolute error of 10% with 95% confidence level. The agreement between the Ayurvedic clinician-based Prakriti assessment and the questionnaire-based approaches was assessed by calculating sensitivity and positive predictive values (PPV) with 95% confidence interval (95% CI) for all ten combinations of Prakriti types: V, P, K, VP, VK, PK, PV, KV, KP, and VPK. Each Prakriti type was considered as the outcome, while other Prakriti types were considered non-outcome. Cohen's kappa coefficient was used to find overall agreement. The Stata ver. 14.2 was used for the statistical analysis. Scores obtained for each Prakriti type using the questionnaires and independent Ayurveda clinicians were collected on a spreadsheet and p value less than 0.05 was considered as significant.

RESULTS

Among 138 studied participants (Figure 1), 92 (66.66%) were female (Table 3). The Q1 identified 21% of individuals with predominant Prakriti type and the remaining 79% as mixed Prakriti types. The Q2 identified 9 % of individuals with predominant Prakriti type (V and K types only, no P type was identified) and the remaining 91% as mixed Prakriti types. The clinician's method identified 20% of individuals as predominant Prakriti types and the remaining 80% as mixed Prakriti types. No Prakriti assessment (Q1, Q2 or CPA) method identified any sama Prakriti (VPK) individual. All three methods identified a higher number of kapha Prakriti (K) types among the predominant Prakriti types, and a majority of kapha pitta types were identified among the mixed Prakriti types (Figure 2).

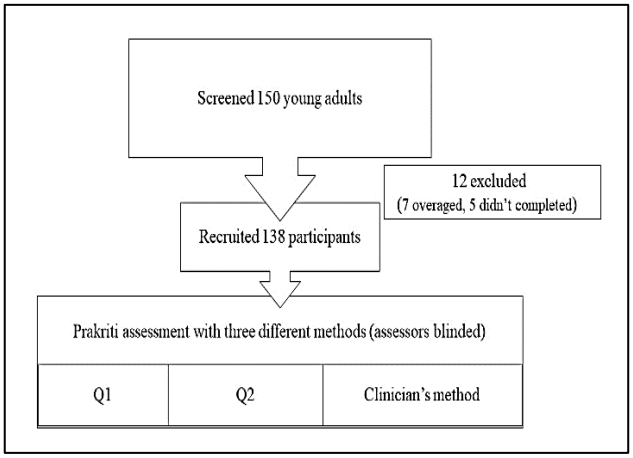

Figure 1: Prakriti assessment flow chart.

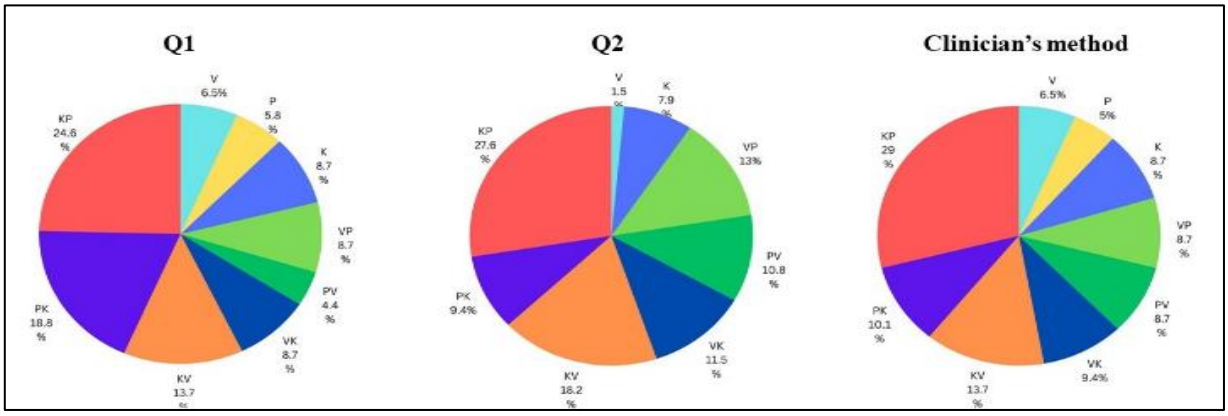

Figure 2: Distribution of Prakriti types (%) determined by Q1, Q2 and clinicians assessment method.

The frequency (%) distribution of all Prakriti types performed by both the questionnaires (Q1, Q2) and the CPA is depicted in Table 4. A substantial agreement (kappa =0.75, p<0.001) was observed between the CPA method and the Q1, whereas a moderate agreement (kappa =0.59, p=0.001) between the CPA and the Q2.

The diagnostic ability of the Prakriti assessment methods (Q1 and Q2 compared with CPA method for each Prakriti type is depicted in Table 5. The sensitivity (95% CI) of Q1 for V, P and K predominant Prakriti types were 100 (66.4-100%), 100 (59-100%) and 100 (73.5-100%), respectively, with reference to the Prakriti types assessed with the clinical method. For mixed Prakriti type identification, Q1 showed highest sensitivity (95% CI) for KV Prakriti type [89.5 (66.9-98.7%)]. The positive predictive value (95% CI) of Q1 for identifying the predominant V, P and K Prakriti types were 100 (66.4-100%), 100 (59-100%) and 100 (73.5-100%) respectively. For mixed Prakriti identification Q1 showed highest PPV (95%CI) for the PV [100 (54.1-100%)].

Table 3: Demographic characteristics of the participants.

	Male (n=46)	Female (n=92)
Age (Mean±SD)*	27.80±4.43	26.58±4.56
Education level		
Primary N (%)#	1 (2.17)	1 (1.08)
Senior secondary N (%)	11 (23.91)	17 (18.47)
Graduation N (%)	19 (41.30)	23 (18.47)
Post graduation/higher degree N (%)	15 (32.60)	51 (25)
Height (Mean±SD)*	168.75±5.75	156.17±6.16
Weight (Mean±SD)*	69.35±12.47	60.69±12.69

*Mean±SD: Mean with Standard deviation. #N%: Number of participants(Percentage)

Table 4: Frequency (%) of each Prakriti types assessed by Q1, Q2 and clinician assessment.

Prakriti	Q1 frequency (%)	Q2 frequency (%)	Clinician Prakriti frequency (%)
V	9 (6.52)	2 (1.45)	9 (6.52)
p	8 (5.8)	0	7 (5.07)
K	12 (8.7)	11 (7.97)	12 (8.7)
VP	12 (8.7)	18 (13.04)	12 (8.7)
PV	6 (4.35)	15 (10.87)	12 (8.7)
VK	12 (8.7)	16 (11.59)	13 (9.42)
KV	19 (13.77)	25 (18.12)	19 (13.77)
PK	26 (18.84)	13 (9.42)	14 (10.14)
KP	34 (24.64)	38 (27.54)	40 (28.99)

Cohen's kappa for Q1 and clinicians' assessment: 0.75, p<0.001**.** Cohen's kappa for Q2 and clinicians' assessment: 0.59, p=0.001
Q1: Prakriti questionnaires are developed by CSIR. Q2: Prakriti questionnaires are developed by CCRAS. V: vata Prakriti, P: pitta Prakriti, K: kapha Prakriti, VP: vata pitta Prakriti, PV: pitta vata Prakriti, VK: vat kapha Prakriti, KV: kapha vata Prakriti, PK: pitta kapha Prakriti, KP: kapha pitta Prakriti

Table 5 Sensitivity and positive predictive value of Q1 and Q2.

Prakriti type	Questionnaire	Sensitivity (95% CI)	PPV (95% CI)
V	Q1	100 (66.4-100%)	100 (66.4-100%)
	Q2	22.2 (2.81-60%)	100 (15.8- 100%)

Continued.

Prakriti type	Questionnaire	Sensitivity (95% CI)	PPV (95% CI)
P	Q1	100 (59-100%)	87.5 (47.3-99.7%)
	Q2	-	-
K	Q1	100 (73.5-100%)	100 (73.5-100%)
	Q2	75 (42.8-94.5%)	81.8 (48.2-97.7%)
VP	Q1	66.7 (34.9-90.1%)	66.7 (34.9-90.1%)
	Q2	83.3 (51.6-97.9%)	55.6 (30.8-78.5%)
PV	Q1	50 (21.1-78.9%)	100 (54.1-100%)
	Q2	83.3 (51.6-97.9%)	66.7 (38.4-88.2%)
VK	Q1	69.2 (38.6-90.9%)	75 (42.8-94.5%)
	Q2	76.9 (46.2-95%)	62.5 (35.4-84.8%)
KV	Q1	89.5 (66.9-98.7%)	89.5 (66.9-98.7%)
	Q2	63.2 (38.4-83.7%)	48 (27.8-68.7%)
PK	Q1	85.7 (57.2-98.2%)	46.2 (26.6-66.6%)
	Q2	71.4 (41.9-91.6%)	76.9 (46.2-95%)
KP	Q1	72.5 (56.1-85.4%)	85.3 (68.9-95%)
	Q2	70 (53.5-83.4%)	73.7 (56.9-86.6%)

Q1: Prakriti questionnaires are developed by CSIR. Q2: Prakriti questionnaires are developed by CCRAS. V: vata Prakriti, P: pitta Prakriti, K: kapha Prakriti, VP: vata pitta Prakriti, PV: pitta vata Prakriti, VK: vata kapha Prakriti, KV: kapha vata Prakriti, PK: pitta kapha Prakriti, KP: kapha pitta Prakriti. 95% CI: 95% confidence interval

The sensitivity (95% CI) of the Q2 for K and V predominant Prakriti type were 100 (66.4-100%) and 22.2 (2.81-60%), whereas no P predominant Prakriti type was identified. For mixed Prakriti type identification, Q2 showed the highest sensitivity (95% CI) for both VP and PV Prakriti, which was 83.3 (51.6-97.9%). The positive predictive value (95%CI) of Q2 for identifying the V and K predominant Prakriti types were 100 (15.8-100%) and 81.8 (48.2-97.7%) respectively. Q2 has highest PPV (95% CI) for the PK [76.9 (46.2-95%)].

DISCUSSION

In recent past, integrative medicine research has witnessed increase in studies exploring the relationship between the body constitution and genomic, metabolic and blood parameters in humans.[2,3,19-23] Ayurveda constitution-based research studies have used various Prakriti assessment questionnaires which are primarily software-based, time consuming, and require training and cost to use them. These issues, are considered as challenges for performing Prakriti assessment in clinical settings.[24] While we recognize that the uniformity of the tools must be maintained, it is also observed that the questionnaires have a lot of heterogeneity in questions and their outcomes. The Prakriti assessment scales need to be more transparent, and reporting needs to be according to the good reporting practices. Therefore, evaluation of the agreement between different Prakriti assessment questionnaires, such as the CSIR-IGIB Prakriti questionnaire, CCRAS Prakriti assessment questionnaire, is necessary to demonstrate the reliability of the study results obtained using these tools in the scientific community.[9,12-14] Although these questionnaires are derived from classical Ayurvedic texts and differ in design and construct, they are generally assumed to have similar predictive power and reasonable agreement in assigning Prakriti types. Ayurveda clinical assessment based on classical references and as taught in the Ayurveda institutions give a benefit in terms of shorter assessment duration and convenience in clinical settings. However, no attempt to compare questionnaires in terms of their agreement with clinician assessment, and convenience in clinical use has ever been tried. The aim of the current study was to assess the agreement between Q1, Q2 and CPA method in the assignment of the Prakriti type, considering the expediency in the clinical setting.

The study participants were recruited from a range of 18 to 35 years, in order to reduce age-related confounding variables and facilitate the comparison of questionnaire-based and clinician assessments. The total percentage of predominant Prakriti types (V, P, and K) identified by the CPA, Q1 and Q2, which were 20%, 21%, and 9%, respectively, lies within the range previously determined by studies.[12,25] Q1 and the CPA method segregated the population into nine Prakriti-type categories, whereas the Q2 identified participants under the eight Prakriti categories. While identifying the predominant Prakriti types, all three methods were found to be equally sensitive for the K types. This is in line with previous studies that reported a higher prevalence of kapha Prakriti, which makes sense considering that all methods of assessment rely on ancient texts that characterize the kapha with a greater number of attributes.[3,16] However, all the three Prakriti phenotyping methods were unable to identify any individual with VPK (sama Prakriti) type which is consistent with the classical Ayurvedic principle that sama-Prakriti individuals are rare in the population.[26]

In contrast, the Q2 showed low sensitivity for the V and could not identify P types. Q2's inability to identify pitta Prakriti (P type) can be explained by the design and arrangement of the questions related to Pitta traits,

possibly because there are no or less questions to capture an individual's preference for cold climates/seasons and assessing participants' intolerance to the summer season/hot climate. In addition, the clinical method allows for greater flexibility in considering subtle observations when determining the final Prakriti type. This indicates that further improvement is needed to enhance Q2's discriminating ability, particularly for analyzing pitta (P) traits. Comparing Q1 with Q2, no consistent pattern was observed in terms of sensitivity for mixed Prakriti identification, implying that both questionnaires are more or less similar in identifying individuals as mixed Prakriti types. The positive predictive value (PPV) of both the Q1 and Q2 questionnaires was also determined to evaluate their ability to accurately determine the probability that a positive result from the questionnaire indicates the presence of the specific Prakriti being tested for instead of being a false positive. This study also revealed that Q1 had higher PPV for all mixed Prakriti categories in comparison to Q2, except the PK mixed Prakriti types. One notable difference observed among the three methods is that clinician assessment was more feasible, required no particular training to administer, and took less time than questionnaire-based approaches.

A trial by Abhilash et al compared three selected tools in 100 healthy volunteers.[27] The new Prakriti questionnaire agrees fairly with the Ayusoft (kappa 0.434 and Spearman correlation 0.506) and TNMC (kappa 0.429 and Spearman correlation 0.454) questionnaires. The authors concluded that the new tool has the potential to be used on a large scale among patients. The findings of our study are similar, showing that the clinician's assessment of Prakriti is in fair agreement with the two software-based Prakriti assessment questionnaires.

Our observations indicate that the questionnaire-based Prakriti assessment tools align with the clinician's assessment, which is an efficient and time-saving approach for clinical settings. The current study has several limitations: first, we compared the agreement level of only two freely available questionnaires with the clinician assessment method, secondly the sample size needed to be bigger; third, the Prakriti-specific characteristics-wise analysis was not possible due to time constraints and inaccessibility to the algorithms of software-based Prakriti assignment by the CCRAS and CSIR questionnaires.

CONCLUSION

The study findings demonstrate a good agreement between the clinician's method of Prakriti assessment and the two questionnaire-based assessment tools in predicting Prakriti types, suggesting that the principles of the Prakriti assessment remain the same, despite of the questionnaires being adopted by different institutes. However, considering the Prakriti assessment's convenience and time duration in clinical settings, a clinician's assessment is suitable for predicting the Prakriti type.

ACKNOWLEDGEMENTS

The authors would like to thank the all participants, nursing officers, non-technical staff of the Center for Integrative Medicine and Research (CIMR), AIIMS, New Delhi, India for their contribution to the conduct of the trial. We also acknowledge the Ministry of AYUSH, Govt. of India, for their support through the Center of Excellence grant for Yoga and Ayurveda to the CIMR, AIIMS, New Delhi, India.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee All India Institute of Medical Sciences (ref. no. IEC-199/04.03.2022, RP-52/2022)

REFERENCES

1. Hasanzad M, Sarhangi N, Aghaei Meybodi HR, Nikfar S, Khatami F, Larijani B. Precision medicine in non communicable diseases. Int J Mol Cell Med. 2019;8(2).
2. Won HH, Lee S, Jang E, Kim KK, Park YK, Kim YJ, et al. A genome-wide scan for the Sasang constitution in a Korean Family suggests significant linkage at chromosomes 8q11.22-23 and 11q22.1-3. J Altern Complement Med. 2009;15(7):765-9.
3. Satyamoorthy K, Valiathan MV, Anchan S, Bellampalli R, Bhale S, Bharadwaj R, et al. Determinants of Prakriti, the human constitution types of Indian traditional medicine and its correlation with contemporary science. J Ayurveda Integr Med. 2014;5(3):166.
4. Sadée W, Dai Z. Pharmacogenetics/genomics and personalized medicine. Hum Mol Genet. 2005;14(suppl-2):R207-14.
5. Bhushan P, Kalpana J, Arvind C. Classification of human population based on HLA gene polymorphism and the concept of Prakriti in Ayurveda. J Altern Complement Med. 2005;11(2):349-53.
6. Engwa GA, Nweke FN, Karngong GN, Afiukwa CA, Nwagu KE. Understanding the pathogenesis, therapeutic targets/drug action and pharmacogenetics of type 2 diabetes: is there a future for personalised medicine? Endocr Metab Immune Disord Drug Targets. 2020;20(10):1569-89.
7. Ghodke Y, Joshi K, Patwardhan B. Traditional medicine to modern pharmacogenomics: ayurveda Prakriti type and CYP2C19 gene polymorphism associated with the metabolic variability. Evid Based Complement Alternat Med. 2011;2011:1-5.
8. Huang Z, Chavda VP, Bezbaruah R, Uversky VN, Sucharitha P, Patel AB, et al. An ayurgenomics approach: Prakriti-based drug discovery and

development for personalized care. Front Pharmacol. 2022;13:866827.
9. Indian Genome Variation Consortium, Aggarwal S, Gheware A, Agrawal A, Ghosh S, Prasher B, et al. Combined genetic effects of EGLN1 and VWF modulate thrombotic outcome in hypoxia revealed by Ayurgenomics approach. J Transl Med. 2015;13(1):184.
10. Juyal RC, Negi S, Wakhode P, Bhat S, Bhat B, Thelma BK. Potential of ayurgenomics approach in complex trait research: leads from a pilot study on rheumatoid arthritis. Novelli G, editor. PLoS One. 2012;7(9):e45752.
11. Prasher B, Varma B, Kumar A, Khuntia BK, Pandey R, Narang A, et al. Ayurgenomics for stratified medicine: TRISUTRA consortium initiative across ethnically and geographically diverse Indian populations. J Ethnopharmacol. 2017;197:274-93.
12. Abbas T, Chaturvedi G, Prakrithi P, Pathak AK, Kutum R, Dakle P, et al. Whole exome sequencing in healthy individuals of extreme constitution types reveals differential disease risk: a novel approach towards predictive medicine. J Pers Med. 2022;12(3):489.
13. Chauhan NS, Pandey R, Mondal AK, Gupta S, Verma MK, Jain S, et al. Western Indian rural gut microbial diversity in extreme Prakriti endo-phenotypes reveals signature microbes. Front Microbiol. 2018;9:118.
14. Kumari S, Laxmikant SD, Sonika B, Khanal S. Efficacy of integrated Ayurveda treatment protocol in type 2 diabetes mellitus- a case report. J Ayurveda Integr Med. 2022;13(1):100512.
15. Shalini TV, Jnana A, Sriranjini SJ, Tanwar AS, Brand A, Murali TS, et al. Exploring the signature gut and oral microbiome in individuals of specific Ayurveda Prakriti. J Biosci. 2021;46(3):54.
16. Rastogi S, Chiappelli F. Development and validation of a prototype Prakriti analysis tool (PPAT): inferences from a pilot study. AYU Int Q J Res Ayurveda. 2012;33(2):209.
17. Tiwari P, Kutum R, Sethi T, Shrivastava A, Girase B, Aggarwal S, et al. Recapitulation of Ayurveda constitution types by machine learning of phenotypic traits. Chaubey G, editor. PloS One. 2017;12(10):e0185380.
18. Rajan S, Munjal Y, Shamkuwar M, Nimabalkar K, Sharma A, Jindal N, et al. Prakriti analysis of COVID-19 patients: an observational study. Altern Ther Health Med. 2021;27(S1):12-7.
19. Dey S, Pahwa P. Prakriti and its associations with metabolism, chronic diseases, and genotypes: Possibilities of new born screening and a lifetime of personalized prevention. J Ayurveda Integr Med. 2014;5(1):15.
20. Hou HI, Chen HY, Lu JJ, Chang SC, Li HY, Jiang KH, et al. The relationships between leptin, genotype, and Chinese medicine body constitution for obesity. Evid Based Complement Altern Med. 2021;2021:1-11.
21. Kim HK, Lee H, So JH, Jeong SH, Seo DY, Kim JY, et al. Energy metabolism and whole-exome sequencing-based analysis of Sasang constitution: a pilot study. Integr Med Res. 2017;6(2):165-78.
22. Lee SK, Yoon DW, Lee SW, Kim JY, Kim JK, Shin C. Non-alcoholic fatty liver disease among Sasang constitutional types: a population-based study in Korea. BMC Complement Altern Med. 2015;15(1):399.
23. Yao SL, Wang Q, Zhang ZZ, Wu JX, Cheng N, Xu X, et al. Genome-wide association study on susceptibility genes associated with yang-deficiency constitution: a small sample case-control study. Chinese J Integr Med. 2015;21:601-9.
24. Tripathi PK, Gehlot S. Critical analysis of concept of Prakriti and challenges in its assessment: a review. Int J Res Ayurveda Pharm. 2016;7(3):1-4.
25. Govindaraj P, Nizamuddin S, Sharath A, Jyothi V, Rotti H, Raval R, et al. Genome-wide analysis correlates Ayurveda Prakriti. Sci Rep. 2015;5(1):15786.
26. Chinthala R, Baghel AS, Shubhangi K, Bhagavathi NNL. A case-control study for exploring the association of Prakriti with Rheumatoid Arthritis. J Ayurveda Integr Med. 2023;14(5):100789.
27. Abhilash M, Sudhikumar KB. Development of a clinically useful tool for Prakriti assessment. Int J Ayurved Med. 2021;12(3):599-609.
28. Bhalerao S, Patwardhan K. Prakriti-based research: Good reporting practices. J Ayurveda Integr Med. 2016;7(1):69-72.

Cite this article as: Khuntia BK, Rathore S, Sharma V, Rani A, Agarwal A, Rengarajan K, et al. Comparison of questionnaire and clinician-based assessment of prakriti/body constitution in young adults: an observational study. Int J Community Med Public Health 2024;11:4326-34.