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Development and validation of a Prototype *Prakriti* Analysis Tool (PPAT): Inferences from a pilot study

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Abstract

Prakriti, for its tangible impacts upon decision making in Ayurvedic clinical practice, requires a thorough and fool-proof method of examination. Conventional methods adopted for *Prakriti* examination are found inconsistent with huge inter- and intra-rater inference variability. By observing the gaps in the field, the present study aims to develop a prototype *Prakriti* analysis tool and its evaluation on inter-rater validity grounds. The study observes that *Vata* and *Pitta* constructs of *Prakriti* identification in Ayurveda have a significant inter-rater correlation ($P < 0.001$ and $P < 0.01$), whereas *Kapha* has less ($P < 0.02$) correlation. It is inferred that for less correlated variables like those of *Kapha*, a better understanding is required to reach a better consensus.

Key words: *Prakriti*, tool, validation

Introduction

Prakriti: The fundamental constructs

Prakriti has been one most notable basic construct of Ayurvedic health care philosophy. It fundamentally explains the biological specificity operating at cellular and genomic level and is held largely responsible for distinctions among individuals in various arenas of functions and appearance.[1]

An etymological dissection of the word *Prakriti* resembles prototype in meaning (*Pra* = primary, *Kriti* = creation). *Prakriti* in Ayurvedic reference stands to be a generic unit where individual biological variabilities are distinctly distinguishable on the basis of genetic specificity and epigenetic influences related to an individual. For practical purposes, Ayurveda identifies *Prakriti* as a system specification applicable to individual biological functions. Based upon the basic configurative details of constituting *Dosha*, *Prakriti* has broadly been divided into seven subtypes. It is, however, understood that there can be innumerable such subtypes based upon differential combination of constituting *Dosha*. It is also important to understand that in order to ensure its optimal and long-term functioning, Ayurveda identifies the best set of substrates (*Ahara* and *Vihara*) useful to optimize the system performance referring to *prakriti* subtype. It is therefore clear that knowledge of *Prakriti* subtype may go a long way in health maintenance by making one aware of suitable and unsuitable substances applicable on a one-to-one basis.[2] Eventually, for its subtle level operating mechanism, *Prakriti* is also held responsible for disease susceptibility and drug behavior variations among people of similar age and physical profiles.[3,4] Due to its complex, yet prospective bearings upon preventive and curative decision making related to Ayurvedic health care, *Prakriti* examination has attracted significant attention since antiquity.[5] For its apparent resemblance, Ayurvedic somatotypical classification based upon *Prakriti* is often correlated to the constitutional psychology classification proposed by Sheldon.[6] The concept of *Prakriti*, however, remains novel for its distinct rooting in Ayurvedic theory of *Pancha-Mahabhuta* and also by a clear proposal of the factors which may possibly influence the performance of variables in a particular *Prakriti*.

The concept of *Prakriti* has remained a subject of extensive exploration in the recent past. As a result, it is now better understood in terms of its genomic and biochemical correlations and subsequent clinical applications.[7-10]

Methods of examining *Prakriti*

Charaka Samhita, an ancient Ayurvedic script (200 BC), describes elaborately about *Prakriti* including the methods of its examination on objective and subjective basis. It describes vividly about various physical, physiological, and behavioral features specific to *Dosha* types, whose presence may give a clue to the dominance of some *Dosha* over the other. An observation of available features thereby indicates the dominance of specific *Dosha*, eventually helping *Prakriti* identification in an individual.[11] This method of *Prakriti* examination is followed by most successors of *Charaka*

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Samhita with additional elaborations of features at places to mark further clarification.

One striking feature notable to classical *Prakriti* examination in Ayurveda is its reliance upon positive features to reach at a confirmatory *Prakriti* determination. As a result, absence or presence of features specific to one *Dosha* has never been allowed to be used as clue to the presence or absence of another *Dosha*. This so called "inclusion approach" is found more realistic compared to an "exclusion approach" where *Dosha* determination can also be made on the basis of absence of certain features. In biomedicine too, inclusion diagnoses based upon positive features are found to be more consistent with pathophysiological process, compared to the exclusion diagnoses based upon absence of certain features. The more we learn about the disease process and its systemic effects, the more comprehensible we become to its manifestations. Eventually, on the basis of this learning, many erstwhile exclusion diagnoses are changed into inclusion diagnoses based upon comprehensible features. This change is most visible in the field of psychiatry where exclusion diagnoses ruled for long periods of its history.[12]

It is important to observe that in reference to *Prakriti* determination, ancient Ayurvedic scholars consistently stressed upon positive features of *Dosha* in their subtle details to reach at a *Prakriti* determination through their direct observation in an individual.

Despite its clear mention in classical texts, we observed that current methods of *Prakriti* determination largely rely upon comparative grading of features in reference to three principal *Doshas*, namely, *Vata*, *Pitta*, and *Kapha*. It is observed that in these methods, independent variables are considered to be expressed differentially in reference to different *Doshas* available to the individual. Unfortunately, these methods are found inclined toward false-positive or false-negative *Prakriti* determination, particularly in conditions where expression of certain variable is falsely presumed and crafted in reference to a *dosha* group to make the whole series of expression an ordinal one. To make it clear, we can take the example of body built as a variable. A strong and muscular built is proposed to be a feature of *Kapha*, whereas a thin and slender built is of *Vata*. It is important to note that in classical texts, *Pitta* does not find a specific mention about its body built. Ignorance of this fact and consideration of compulsive differential expression of variables in every *Dosha* category eventually proposes medium built (between *Vata* and *Kapha*) as an expression of *Pitta*. As body built is not a real expression to *Pitta*, considering medium built as an expression of *Pitta* eventually brings a false *Prakriti* determination favoring *Pitta*.

We have also seen that the current methods of *Prakriti* diagnosis have not been validated before their use. It is for this reason that inter-rater and intra-rater variability among the results obtained is a frequent observation.[13] Recently, researchers (2011)[14] have approached to develop and validate a self-assessment tool of *Prakriti* examination. This study, however, cross-examined the newly developed tool against one commonly used tool which itself was not validated statistically. Moreover, self-assessment tools are often considered less reliable compared to physician's examination for propensity of former toward better choices among the offered options.[15]

Considering the difficulties observed in conventional *Prakriti* determination, CDAC has developed Ayusoft software where *Prakriti* can be determined with the help of a computer-assisted questionnaire.[15] Though good, this approach still requires validation by making it largely available to Ayurvedic hospitals and research institutes and by cross-checking the inferences generated by this. It is also observed that a *Prakriti* examination made through conventional ways gives us only a proportional idea about the predominance of certain *dosha* upon the others. It, therefore, does not explain about the *Doshagunas* which are actually responsible for a particular *Dosha* expression. It is important to understand that *Doshagunas* are the primarily the classes of attributes which ultimately determine the expressions in a particular *Dosha* group. Every *Dosha* has got its different set of *Gunas*, and the features pertaining to every *Doshaprakriti* are in correspondence to these *Gunas*. Consequently, the conventional method of *Prakriti* examination does not offer any help to clinical decision making in conditions where predominance of a *Dosha* is required to be judged further in terms of expressing *Guna*. It is important to understand here that every *Dosha* is a composite of certain *Guna* which eventually governs the expression of certain variables coming under its ambit. From Ayurvedic perspective, therefore, *Guna* is the smallest unit of *Dosha*, which ultimately helps in determining a *Prakriti*. We presume that expressing *Guna* identification along with a proportionate *Prakriti* determination may have greater implications in Ayurvedic clinical practice compared to *Prakriti* determination alone. A clearer identification of disease susceptibility within a *Dosha* group and a better choice of drug referring to the specific component of *Dosha* may be few immediate rewards to this approach. Making Ayurvedic interventions truly personalized in harmony to the vision conceived and nurtured in Ayurveda could come as its future dividends.[16]

Considering the actual spirit of *Prakriti* examination elaborated in *Charaka Samhita* and also considering the limitations observed in current methods employed in *Prakriti* determination, we developed a prototype *Prakriti* analysis tool (PPAT) for a rapid, yet dependable diagnosis of *Prakriti*, including the identification of specific *Guna* components of *Dosha* responsible for such a dominance in an individual. For their intricate complexities and philosophical tenets, standardization of diagnostic tools in CAM has always been a challenging issue.[14] Validity tests consisting of construct and content validity and reliability tests consisting of inter- and intra-rater testing are two important parameters on which a new diagnostic tool can be judged for its dependable and unbiased use in clinical application. To make this PPAT standardized, we screened it through validity and reliability tests. The observations made in inter-rater testing were subjected to the correlation analysis to identify the degree of agreement between the observations made by two independent observers in reference to *Prakriti* determination of the same subjects.[17,18]

Materials and Methods

Designing the prototype *Prakriti* analysis tool

Identifying the variables

Considering the deficits observable in current methods of

Prakriti examination[6] and also considering the didactical importance of component observation of individual *Dosha*, we decided to observe the *Dosha* attributes (*Gunas*) in reference to their positive expression in an individual leading to *Prakriti* expression. For this, an extensive search of *Prakriti* examination method elaborated in *Charaka Samhita* was made to identify the feature expressions pertaining to specific *Dosha*. We were able to identify 12, 6, and 8 attributes in reference to the expressibility of *Kapha*, *Pitta*, and *Vata*, respectively (Appendix 1). Among these identified attributes, further exploration was made to check the feasibility of objective or subjective examination of their expressions in individuals. As a result, one attribute in *Kapha (Madhur)* and two in *Pitta (Katu* and *Amla)* were found difficult to be observed objectively for their expression (quantity and quality of semen). Identifying difficulty in objective measurement of these variables and also for their gender-linked limitation of application, we omitted them from the revised version of PPAT (Appendix 2). As a result, PPAT tested for reliability is composed of only 11 features to *Kapha*, 4 to *Pitta*, and 8 to *Vata*. We also have observed that individual attribute classes were found expressing more than one variable in many cases. In those conditions, we identified all the variables belonging to the same attribute class and have given them equal weightage in reference to that attribute class. This method of choosing the variables for *Prakriti* determination has earlier been described in some recent studies.[5,14]

Scoring to the individual variables, attribute class, and Dosha

To make a quantitative and, thereby, proportionate examination of *Dosha*, we arbitrarily allocated an equal number to every *Dosha*. In every *Dosha* group, this number was then fractioned equally among the attribute classes. Subsequently, the score of every individual attribute class was further fractioned equally among the expressed variables belonging to the same feature class. It was proposed that variables belonging to the attribute class represent the quantum unit of *Dosha* expression. A cumulative sum of such quanta, in turn, represents quantitative expression of a feature class initially and of a *Dosha* finally. For the said purpose, every *Dosha* class was attributed with 1056 as an arbitrary number. This score was divided equally among the attribute classes identified in each *Dosha* class. As a result, each attribute class was allocated with score of 132, 264, and 96, respectively, in *Vata*, *Pitta*, and *Kapha* groups. This attribute class score was further divided equally among the total measurable expressed features selected in each class. Selection of a particular number against a *Dosha* class was primarily based upon choosing a number which can be divided suitably to give a complete number to every expressed feature. We have seen this kind of arbitrary scoring pattern earlier in many studies pertaining to *Prakriti* analysis.[14] It is important to understand here that the numbers assigned against any feature in the proposed method are just arbitrary and are designed for the ease of statistical analysis with a care for proportionate scoring in reference to the share of a particular feature in the whole of *Prakriti* representation referring to a particular *Dosha*. This scoring thereby looks logical and reliable for such studies.

Content validity

Content validity of any interrogatory tool is concerned with how well the individual items in the tool correspond to the concept of what is being measured.[17] It is usually tested using the qualitative techniques. Content validity of the PPAT was examined primarily in reference to the classical description of *Prakriti* examination available in *Charaka Samhita*. Considering their measuring feasibility, subsequently, the selected variables in PPAT were also cross-validated by an expert group consisting of six Ayurvedic experts for their suitability as a dependable expression to identify dominance of a particular *dosha*.[14] For such a test, we adopted a novel content validity testing method that involves cross-examination of selected variables for their suitability to represent dominance of a *Dosha*. Each Ayurvedic expert was provided with a sheet consisting of selected variables in PPAT and was asked to give their inference against each variable in terms of its level of applicability for dominance identification of a particular *Dosha*. The inferences were recorded in four levels, namely, strongly applicable, applicable, not applicable, and strictly not applicable. An analysis of total inferences from the expert group was made. Variables rated for the first two levels were finally taken up for further testing.

Construct validity

To make a construct validity test, every individual variable identified in PPAT was cross-examined by an expert group to see the feasibility of expressions to be examined by either of the common methods of clinical examination, namely, inspection and interrogation. As a result, attribute class of *madhur* in *Kapha Dosha* group and attribute class of *Katu* and *Amla* in *Pitta Dosha* group were dropped from the final PPAT for their selective expressibility and difficulty in observation. Remaining variables were found convincing for their dependable examination through inspection or interrogation methods.[5,13]

Selection of volunteers for pilot testing of PPAT

To exclude any disease-induced change in the expressed variables, and thereby to ensure the observation of the innate *Prakriti* of an individual uninfluenced by any endogenous or exogenous factor, we selected healthy volunteers of either sex, aged between 20 and 30 years. To ensure the homogenous sampling, we selected a group of an Ayurveda college students belonging to the same level and asked for their consent to participate in the study. This was a nonrandomized sampling and everyone belonging to the same level was invited to participate in the study. Every consented participant was further enquired about their health status to ensure participation of healthy volunteers only in the study.

Conduction of the testing

Selected and consented volunteers were then explained about the study and their role in the study. Every volunteer was then provided with a PPAT format to be filled in for their demographic details. Afterward, every volunteer was examined by an Ayurveda expert (selected arbitrarily from an Ayurveda teaching institute on the basis of their clinical experience) for the presence of the variables representing various *Doshas* in the given format. After completion of the examination, each positive variable (represented as yes in PPAT) was counted for the individual score to give rise to a final score against each attribute class and *Dosha*. As per the total scores obtained against each *Dosha*, a judgment about *Dosha* dominance was made. As per the differential scores obtained in various attribute classes, a particular *Guna* contribution to *Dosha* dominance was also observed.

Inter-rater reliability

To test inter-rater reliability of PPAT, same volunteers were subjected for *Prakriti* examination by another experienced Ayurveda expert without being explained about the earlier observations made in the first test.

Statistical analysis

Scores obtained for each attribute class and for each *Dosha* category by two independent observers were collected on a spreadsheet and were subjected to a correlation (based on ranked total score) analysis using SPSS (version 11.5).

Results

Totally 34 volunteers were registered for the study. All of them were examined on PPAT by the first rater. Among all the registered volunteers, however, only 26 could complete a subsequent second examination by another independent rater. As the study intended to analyze the inter-rater reliability, only those volunteers who had completed the examination by both raters were included for statistical analysis. The mean age of the 26 analyzed volunteers (16 males and 10 females) was 24.3 years (range 22–30 years). The net score obtained in one *Dosha* category by one observer was compared to the net score obtained by the other observer for the same group. A correlation coefficient of 0.4074 for *Kapha*, 0.5245 for *Pitta*, and 0.8081 for *Vata* was observed. This correlation was found less significant (for degree of freedom $n - 2$, where $n = 26$) in reference to *Kapha* observations ($P < 0.02$), significant ($P < 0.01$) to *Pitta*, and highly significant ($P < 0.001$) to *Vata* observations [Table 1]. A correlation among various attribute classes in individual *Dosha* groups was also done as per their total rank scores obtained to identify the principal features contributing the most to the *Dosha* identification correlation. It is seen that about half of *Kapha* attributes (5 among 11) contributed significantly to the correlation. The correlation ratio among attribute classes was much higher in *Pitta* and *Vata* where three-fourths (3 among 4) and all (8 among 8) attributes contributed to the correlation [Table 2].

Table 1: Correlation of inferences of two independent investigators about individual *Prakriti* clusters

Dosha cluster	Correlation coefficient	*P* value
Kapha	0.4074	<0.02
Pitta	0.5245	<0.01
Vata	0.8081	<0.001

Table 2: Correlation of inferences of two independent investigators about various attributes contributing to *Prakriti* identification

Dosha	Attribute	Correlation coefficient	*P* value
Kapha	*Snigdha*	-0.05773	-
	Slakshna	0.0	-
	Mridu	-0.01522	-
	Sara	0.3857	0.05
	Sandra	0.0019	-
	Manda	0.4755	0.01
	Staimitya	0.4399	0.02
	Guru	0.5608	0.01
	Sheeta	0.4564	0.02
	Picchila	0.0	-
	Accha	-0.0347	-
Pitta	*Ushna*	0.3947	0.05
	Tikshana	0.6577	0.001
	Drava	0.2120	-
	Visra	0.4720	0.01
Vata	*Ruksha*	0.7002	0.001
	Laghu	0.7002	0.001
	Chala	0.5580	0.001
	Bahu	0.6172	0.001
	Shighra	0.6654	0.001
	Sheet	0.6108	0.01
	Parush	0.8178	0.001
	Vishad	0.5422	0.01

Discussion

Development of a practical, valid, and handy tool to make a *Prakriti* diagnosis may have enormous implications. To make the best use of fundamental construct of *Prakriti* as a dependable tool of decision making in Ayurveda aiming ultimately toward a personalized medicine, we need to develop tools which can give us reproducible results in variable settings. Unfortunately, despite its irrevocable importance to Ayurvedic therapeutics, method of *Prakriti* examination has rarely been scrutinized to the level of acceptable contemporary research tools. Development of a tool catering to the physician's need without distorting the classical constructs of Ayurveda is thereby a primary requirement of research in Ayurveda. Validating these tools to the contemporary needs is the next step which would be required to refine the tool as per the needs arising during the pragmatic testing. This study approached to develop the PPAT on lines of these needs felt with due care for the classical vision of *Prakriti* (content validity) and also the designing of the tool (construct validity). At the same time, it also cared for the deficits noticed in the current methods of *Prakriti* examination [Figure 1]. As disease and environmental factors are supposed to affect the external expression of many variables crucial to *Prakriti* examination, we tried to minimize these influences in the study by selecting healthy volunteers of young age. To minimize high sample variability, it limited the recruitment of sample to a pre-identified setting only (an undergraduate college).

Observations made in this study are significant in many ways. This study reinforces the earlier attempts of establishing the significance of *Dosha* variables in terms of their measurable expressibility.[13,14] By observing the highly significant correlation between *Vata Dosha* features observed by two interdependent raters, we can easily infer that *Vata* presents with stable features which are easily observable, offering less inter-rater variability. This observation is endorsed further by the finding that every variable in *Vata* was contributing significantly to this correlation. This observation gives us an idea that the *Vata* features commonly have a uniform level of agreement, and so these features can easily be utilized for

making a *Prakriti* analysis tool. In *Pitta*, the correlation is less marked, yet it is contributed by three of its four principal attribute classes. For *Drava* property of *Pitta*, a correlation could not be established. *Drava* property in *Pitta* is found to be expressed by features like: (1) lax and soft flesh and joints and (2) profuse sweat, urine, and stool formation. An absent correlation suggests that these features are associated with difficulty of interpretation and so an agreement is difficult to be arrived. It is therefore important to understand that to make a valid tool, we need to bring more clarity in examining these expressions more objectively. The study was unable to find a comparable significant correlation between the independent observations made for *Kapha*, as it is observable in case of *Vata* and *Pitta*. Among the 11 attribute classes of *Kapha*, only 5 contributed toward a significant correlation. The ones which did not contribute to correlation in *Kapha* are: *Snigdha*, *Slakshna*, *Mridu*, *Sandra*, *Picchila*, and *Accha*. These attributes in reference to their respective variables are again required a thorough revisit to their construct for their better appreciability by any and every observer.

How does a *P* value of 0.02 of *Kapha* lead to a less significant state in a correlation study? This question can best be addressed by realizing the conceptual gap that exists between statistical significance given by a *P* value (i.e. the probability that is observed due to chance) and statistical inference (i.e. the interpretation of a significant *P* value – what does it really mean). The former is just the result of a mathematical computation, whereas the latter results from logic and reasoning. Here, we have a significant *P* value for a very low correlation in *Kapha*. Correlation coefficients do not imply cause–effect, but merely association. This means that as we simply increase the sample size, we are bound to achieve low *P* values, even if the association is weak or quasi-nonexistent. This is what we have here: a statistically significant *P* value for *Kapha* for a correlation that is so weak that it fails to explain over 75% of the variance.

Limitations of the study

Despite the significant observations in finding the possibility of reaching a more dependable PPAT during the process, the study is also found to have its own limitations. As the volunteers were undergraduate Ayurveda students, an expression bias during the interrogation could not be ruled out. It is also suggested that a rater's experience may play crucially in making judgments about the expressions of features related to various *Doshas*. An examiner's bias is a known limiting factor with such tools unless the examiners are trained well with the proposed tool and with the method of expression observations. The study also has a limited external validity for it was done with two observers only. To have a better external validity, it is required to be tested with many Ayurveda experts. A high inter-rater variability in the *Kapha* group marks the need of more serious efforts to make a uniformly applicable construct of the tool, particularly in reference to *Kapha*.

Conclusions

Designing a *Prakriti* analysis tool in tune with the contemporary scientific research requirements is an ambitious task. This is a multistep process requiring a thorough analysis of needs and resources, followed by a careful crafting. The craft is then required to be tested and retested on various parameters till it reaches a consensus of producing convincing, yet reproducible results in variable settings. This study analyzes the designing of a PPAT and tests it on various validity and reliability parameters. It is observed that the tool is good in reaching a consensus in reference to *Vata* and *Pitta* expressions, whereas it is not able to make a convincing correlation between observations made for *Kapha* group. Besides indicating the deficits related to the construct of the tool under study, it also indicates the intricate complexity associated with observations made in reference to *Kapha* features compared to *Vata* and *Pitta*. So, *Kapha* features are required to be designed more carefully to make their better appreciation by every observer, and therefore to reach a better agreement. Despite its limitations, this study adds determinately toward the ultimate objective of evidence-based decision making in Ayurveda, a mandatory move if Ayurveda is thought to be mainstreamed as a dependable and reproducible form of medical intervention.[19,20]

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Appendix - I

*Preliminary version of Prototype *Prakriti* Analysis Tool (PPAT)

Note: Scores in PPAT are arbitrarily assigned assuming that each *Dosha* has an equal opportunity to be represented in the body. This is how we reached at proposing equal score to each *Dosha*. Total score for each *Dosha* was then distributed among the number of classical *Gunas* available to each *Dosha*. Each *Guna* in a specific *Dosha* category thereby arrived at having a composite equal score. An individual *Guna* score in a *Dosha* category was then further subdivided as per the available features against each *Guna*. This kind of scoring has given a proportionate weightage to each *Guna* and their features in every *Dosha* for the ease of understanding about their individual and cumulative role in determining a *Prakriti*.

***Kapha* trait**			
No.	***Guna***	**Features**	**Yes/no (scores)**
1.	*Snigdha*	• Oily skin (scratch the mid flexor aspect of Rt. forearm with some blunt object. If mark is visible, it is dry; if not, it is oily)	60
2.	*Slakshna*	• Smooth skin	60
3.	*Mridu*	• Less tolerant to difficulties	20
		• Fair complexion	20
		• Good looking face features	20
4.	*Madhur*[1]	• Good sexual capacity[2]	30
		• More offspring (0–2 = no, 3 or more = yes, including abortions or still birth)	30
5.	*Sara*	• Compact muscular body[4]	30
		• Stable body (almost consistent body weight)	30
6.	*Sandra*	• Well-formed, proportionate body parts	30
		• Well-nourished body parts	30
7.	*Manda*	• Slow physical movements	20
		• Slow conversation	20
		• Slow eating	20
8.	*Staimitya*	• Delayed (well-thought) beginning of actions	30
		• Cool temperament (less anxiety)	30
9.	*Guru*	• Slow walking speed	60
10.	*Sheeta*	• Less appetite	15
		• Less thirst	15
		• Less sweating	15
		• Tolerant to heat	15
11.	*Picchila*	• Compact joints (not prominent)	60
12.	*Accha*	• Pleasing face	20
		• Pleasing complexion	20
		• Pleasing voice	20
Total score[3]			

***Pitta* trait**			
No.	***Guna***	**Features**	**Yes/ no**
1.	*Ushna*	• Intolerant to heat	15
		• Soft textured	15
		• Fair complexion	15
		• Increased presence of moles	15
		• Good appetite and thirst	15
		• Premature graying and fall of hair	15
2.	*Tikshna*	• Voracious eater (eat good quantity at a time)	18
		• Voracious drinker (drink good quantity at a time)	18
		• Good digestive capability	18
		• Sharp reacting, argumentative	18
		• Intolerant to discomforts	18
3.	*Drava*	• Lax and soft flesh and joints	45
		• Profuse sweat, urine, and stool formation	45
4.	*Visra*	Increased and bad odor from armpit, head, and body	90
5.	*Katu*[1]	• Less sexual capacity[2]	45
		• Less no. of children (0–2 = yes, 3 or more = no, including abortions or still birth)	45
6.	*Amla*[1]	• Less sexual induration[2]	45
		• Less no. of children (0-2 = yes, 3 or more = No, including abortions or still birth)	45
Total score[3]			

***Vata* trait**			
No.	***Guna***	**Features**	**Yes/No**
1.	*Ruksha*	• Dry skin	30
		• Poorly formed and poorly nourished body	30
		• Dry, poor, interrupted, and unpleasant voice	30
		• Reduced sleep	30
2.	*Laghu*	• Quick but incoherent movements	40
		• Quick but incoherent appetite	40
		• Quick but incoherent speech	40
3.	*Chala*	Unstable joints and body parts (moves them while sitting)	120
4.	*Bahu*	• Increased number of visible tendons and veins on extremities	60
		• Over talkative	60
5.	*Shighra*	• Quick indulgence in some activity	20
		• Increased amount of anxiety	20
		• Quick reactions in the form of attachment, detachment	20
		• Fearfulness or timidness	20
		• Quick understanding and grasping	20
		• Less memory	20
6.	*Sheet*	• Intolerant to cold (does not like)	60
		• Prone to cold-induced ailments (common cold, Upper Respiratory Tract Infection)	60
7.	*Parush*	• Rough hair, nail, body, foot, and hand	120
8.	*Vishad*	• Prominent body parts (as joints)	60
		• Crepitus in joints while moving	60
Total score[3]			

1. Quantity of semen is deleted as a feature of *madhur (Kapha)*, *katu* and *amla (Pitta)* properties because of its inability to be identified precisely in males and inapplicability to females.
2. These features are specific to married people. For unmarried people, alternative questions are to be framed.
3. Total score is 960 for each *Dosha*. *Dosha* scores in every individual are to be calculated as per their availability and than a predominance may be determined.
4. Physical features like compact body and musculature are to be judged in accordance with the gender and geographic standards.

(Eds), 1st Edition., 2010, Chapter 7, Rastogi S and Chiappelli F, Bringing evidence basis to decision making in complementary and alternative medicine (CAM): Prakriti (constitution) analysis in Ayurveda P 91-106 as Table 7.4, page 103-105

Appendix - 2

Revised version of Prototype *Prakriti* Analysis Tool (PPAT) for use in healthy volunteers

Prototype *Prakriti* Analysis Tool for Healthy Volunteers (PPAT-HV)

Investigator's name ……..

Reg. No.…….. Reg. date……..

Demographic record

Volunteer's name…….Age/Sex…….

Height……..Weight…….

Address……

…….Contact No…….

Features to identify *Kapha* components

(Each *Guna* corresponds to 96 points. Feature scores are divided as per the number of total features available to a particular *Guna*.)

No.	*Guna*	Clinical feature	Method of observation	Score	Yes/No
1.	*Snigdha*	Oily skin	Inspection	96	
2.	*Shlakshana*	Smooth skin	Palpation	96	
3.	*Mridu*	Fair complexion	Inspection	48	
		Good looking face	Inspection	48	
4.	*Sara*	Compact and muscular body	Inspection and palpation	96	
5.	*Sandra*	Well-formed, proportionate body parts	Inspection	48	
		Well-nourished body parts	Inspection	48	
6.	*Manda*	Slow motor activity	Interrogation	32	
		Slow conversation	Interrogation	32	
		Slow eating	Interrogation	32	
7.	*Staimitya*	Delayed beginning of activities	Interrogation	48	
		Less anxious	Interrogation	48	
8.	*Guru*	Slow and constant walking speed	Interrogation	96	
9.	*Sheeta*	Less appetite	Interrogation	24	
		Less thirst	Interrogation	24	
		Less sweating	Interrogation	24	
		Tolerant	Interrogation	24	
10.	*Picchila*	Compact joints	Inspection	96	
11.	*Accha*	Pleasing face	Inspection	48	
		Pleasing voice	Hearing	48	

Total *Kapha* score……/1056

Features to identify *Pitta* components

(Each *guna* corresponds to 264 points. Feature scores are divided as per the number of total features available to a particular *guna*.)

No.	*Guna*	Clinical feature	Method of observation	Score	Yes/No
1.	*Ushna*	Intolerant to heat	Interrogation	44	
		Soft textured hair and skin	Inspection	44	
		Fair complexion	Inspection	44	
		Increased presence of mole	Inspection	44	
		Increased appetite and thirst	Interrogation	44	
		Premature graying and fall of hair	Inspection	44	
2.	*Tikshna*	Eat and drink good quantity of food at a time	Interrogation	66	
		Instantly reacting, argumentative	Interrogation	66	
		Intolerant to discomforts	Interrogation	66	
		Unable to tolerate hunger and thirst	Interrogation	66	
3.	*Drava*	Lax and soft flesh and joints	Inspection	132	
		Profuse sweat, urine, and stool formation	Interrogation	132	
4.	*Visra*	Increased and offensive odor from armpit, head, and body	Interrogation	264	

Total *Pitta* score...../1056

Features to identify *Vata* components

(Each *guna* corresponds to 132 points. Feature scores are divided as per the number of total features available to a particular *guna*.)

No.	*Guna*	Clinical feature	Method of observation	Score	Yes/No
1.	*Ruksha*	Dry skin	Inspection	33	
		Poorly formed and nourished body	Inspection	33	
		Interrupted and unpleasant voice	Hearing	33	
		Interrupted, reduced, and shallow sleep	Interrogation	33	
2.	*Laghu*	Fast walking speed	Interrogation	44	
		Fast intake of food	Interrogation	44	
		Fast movements, hyperactive	Inspection, Interrogation	44	
3.	*Chala*	Unstable joints and body parts (moves them while sitting)	Inspection, Interrogation	132	
4.	*Bahu*	Increased number of visible tendons and veins on extremities	Inspection	66	
		Over talkative	Inspection, Interrogation	66	
5.	*Shighra*	Quick indulgence in some activity	Interrogation	22	
		Increased anxiety	Interrogation	22	
		Quick attachment and detachment	Interrogation	22	
		Fearfulness, timidness	Interrogation	22	
		Quick understanding and grasping	Interrogation	22	
		Less memory	Interrogation	22	
6.	*Sheet*	Intolerant to cold (does not like)	Interrogation	66	
		Prone to cold-induced illness (common cold, URTI)	Interrogation	66	
7.	*Parush*	Rough hair, nail, skin, foot, and hand	Inspection	132	
8.	*Vishad*	Prominent joints	Inspection	66	
		Crepitus in joints while moving	Interrogation	66	

Total *Vata* score...../1056

Total composite score is 1056 for each *Dosha*. Individual *Dosha* scores are the cumulative sum of scores obtained against the positive features as per the recorded responses.

Physical features like compact body and musculature are to be judged in accordance with the gender, ethnic, and geographic standards.

हिन्दी सारांश

प्रकृति निर्धारण मापदण्ड का विकास एवं सत्यापन

संजीव रस्तोगी

आयुर्वेदिक चिकित्सा में अंतिम निर्णय पर पहुँचने में अपने स्पष्ट प्रभावों के कारण प्रकृति का अचूक निर्धारण बेहद आवश्यक है । प्रकृति निर्धारण हेतु सामान्यतः प्रयोग में लाये जाने वाले उपायों में एक ही जांच कर्ता द्वारा विभिन्न समय पर अथवा दो जांचकर्ताओं द्वारा एक समय पर किये गये निदान में काफी वैभिन्य मिलता है । इस प्रकार की विभिन्नता को ध्यान में रखते हुये इस अध्ययन में प्रकृति निर्धारण हेतु एक प्रारम्भिक उपाय तथा पुनः इन उपायों का विभिन्न प्रयोग कर्ताओं द्वारा प्रयोग करते समय सम्भावित वैभिन्य का अध्ययन किया गया । उपरोक्त अध्ययन में वात तथा पित्त के लक्षणों में कफ की तुलना में विभिन्न प्रयोगकर्ताओं के नतीजों में अधिक साम्यता देखी गयी । कफ के लक्षणों में साम्यता लाने के लिये अधिक प्रयासों की आवश्यकता महसूस की गयी ।