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Validity and reliability of adapted Bengali version of self-assessment questionnaire to assess *Prakriti*

Research Article

Himel Mondal[1*], Chayan Baidya[2], Shaikat Mondal[3], Sarika Mondal[4]

1. Assistant Professor, Department of Physiology, All India Institute of Medical Sciences, Deoghar, Jharkhand, India.
2. Post-graduate trainee, Department of Panchakarma, Institute of Post Graduate Ayurvedic Education and Research Shayamadas Vaidya Shastra Pith, Kolkata, West Bengal. India.
3. Assistant Professor, Department of Physiology, Raiganj Government Medical College and Hospital, West Bengal, India.
4. Medical Writer, Medical Education and Research Association, West Bengal, India.

Abstract

Background: The constitutional type of a human being, the *Prakriti*, depends on the relativity of three *Doshas* – *Kapha, Pitta,* and *Vata*. Assessment of *Prakriti* requires expertise in inspection, palpation, and interview. There are self-administered questionnaires in English that can assess the *Prakriti*. Aim: We aimed to adapt an English questionnaire - "self-assessment questionnaire to assess *Prakriti*" in Bengali (Bangla) and test its validity and reliability in the assessment of *Prakriti*. Methods: We adapted the questionnaire in Bengali by forward and backward translation. We conducted a pre-test and interview with 36 research participants. An Ayurveda physician assessed the *Prakriti* by the traditional method. The validity was tested by comparing the expert-assessed and questionnaire-assed *Prakriti*. The internal consistency was tested by Cronbach's alpha and reliability by Intra-class correlation coefficient (ICC). Results: A total of 36 (men 21, women 15) research participants of mean age 36.01 ± 3.44 participated in the pre-test, interview, and retest. Adapted Bengali "self-assessment questionnaire to assess *Prakriti*" is found to be valid for the assessment of *Prakriti*. It is reliable in terms of internal consistency (Cronbach's alpha 0.64, 0.76, and 0.81 for *Kapha, Pitta*, and *Vata*, respectively) and repeatability (test-retest ICC 0.88, 0.91, and 0.79 for *Kapha, Pitta*, and *Vata,* respectively). Conclusion: A Bengali questionnaire for self-assessment of *Prakriti* has been adapted. The questionnaire was found to be valid and reliable. This questionnaire may be used for the assessment of *Prakriti* of Bengali speaking people in any mass survey, research, or healthcare settings of Ayurveda for a quick assessment of *Prakriti*.

Key Words: *Ayurveda, Bengali, Doshas, Prakriti,* Questionnaire, Self-Assessment, Translations.

Introduction

Ayurveda is one of the traditional medicines with existence from the 2nd century BC. The philosophical and logical foundation of Ayurveda came from the school - *Vaisheshika* and *Nyaya*, respectively (1). Being one of the oldest systems of medicine, it is comprised of thousands of hypothetical treatment methods that are still evolving with the evidence from modern research outputs (2).

In the practice of Ayurveda, the constitutional type of a human being is one of the important classifications. The determination of *Prakriti* depends on the three *Doshas* – *Kapha*, *Pitta*, and *Vata* (3). Identification of the *Prakriti* is an art by applying the experience of inspection, palpation, and interview (4). For self-assessment of *Prakriti* by the patients, printed questionnaire (with the manual calculation method) and electronic questionnaire (automated calculation) are available (5, 6). Using these questionnaires may help to reduce the consultation time with the doctors where Ayurveda physicians need to attend to a large number of patients.

Bengali is the most spoken language in Bangladesh and the second most spoken language in India with 230 million native speakers in the world with additional 37 million second-language speakers (7). To the best of our knowledge, a validated and reliable questionnaire for self-assessment of *Prakriti* is not available in the Bengali language.

With this background, we aimed to adapt the "self-assessment questionnaire to assess *Prakriti*" in Bengali (8). This questionnaire would help in assessing Prakriti without involvement of a qualified Ayurveda doctor in any mass survey, research, or treatment involving Bengali-speaking population worldwide.

*** Corresponding Author:**

Himel Mondal
Department of Physiology,
All India Institute of Medical Sciences,
Deoghar,
Jharkhand - 814152, India.
Email Id: himelmkcg@gmail.com

Methods

Type, Ethics, and setting

This cross-sectional study comprised linguistic and cultural adaptation of a questionnaire from English

to Bengali. The adaptation and pre-testing of the Bengali questionnaire were carried out in West Bengal, India. The study involves a panel of adult (age >18 years) language and healthcare experts and a convenience sample of adult research participants. All the experts and participants were recruited after briefing about the study aim and protocol and then obtaining written informed consent in vernacular language (Bengali). This study was approved by the Institutional Ethics Committee. We declare that the study was conducted following the WMA Declaration of Helsinki (updated in 2013) on the Ethical Principles for Medical Research Involving Human Subjects. This study was conducted from March 2020 to March 2021. We obtained permission from the creator of the questionnaire via email on 04 March 2020. For typing the questionnaire in Bengali Unicode, we used Avro keyboard version 5.6.0 (Omicron Lab, available from: https://www.omicronlab.com/avro-keyboard.html).

Original questionnaire and modification

The original questionnaire – "The self-assessment questionnaire to assess *Prakriti*" was prepared by Patwardhan and Sharma and was modified by Tripathi, Patwardhan, and Singh at the Institute of Medical Sciences, Banaras Hindu University, Varanasi, India (8). The questionnaire is available in the public domain (available from: https://downloads.hindawi.com/journals/ecam/2011/251850.f1.pdf). It is a six-page Portable Document Format (PDF) with total 62 questions and a direct scoring column [**Figure 1a**]. We modified the questionnaire (without changing the language or questions) to a four-page PDF with an option to mark the response option and later convert the response to a score. During the edit, we found that some questions may have a response option beyond "Yes" and "No". This is a self-assessment questionnaire and an expert surveyor may not be available to clarify any query if their answer is beyond "yes' and "no". Hence, we introduced a new response option as "Don't know" [**Figure 1b**].

However, this does not change the scoring system of the original questionnaire as we considered "Don't know" as the answer "No". The rationality behind considering "Don't know" as "No" is that a person who is not aware of some characteristics may not have that characteristic. As per the original questionnaire, only a particular response gets the score, others do not get a score. That concept is preserved in our modified questionnaire. Additionally, in the original questionnaire, there was no detailed instruction about scoring. In our version, we added a segment of instruction for ease of understanding how the respondents would use the questionnaire [**Figure 1b**]. Henceforth in this manuscript, we call this modified version as the 'original questionnaire.'

Figure 1: First page of the (a) original questionnaire and (b) modified questionnaire

The self-assessment questionnaire to assess *Prakriti**

Sl. No.	Question/statement	*Guna*	Is your answer the following?	Scores to be allotted if your answer is the one that is mentioned in the previous column	Allot the Scores in this column
	KAPHA				
1.	Whether your skin remains oily throughout the year in comparison to others?	*Snigdha*	Yes	120	
2.	Are your body-hairs & skin shiny, even when no oil or moisturizer is used?	*Shlakshna*	Yes	120	
3.A.	Are you considered attractive among your friends?	*Mridu*	Yes	40	
3.B.	Do even mild or trivial injuries on your body make you upset?	*Mridu*	Yes	40	
3.C.	Among your family members, is your complexion considered fairer?	*Mridu*	Yes	40	
4.	Do you think you have intense sexual desire?	*Madhura*	Yes	120	
5.A.	Have you got well built muscles?	*Saara*	Yes	60	
5.B.	Do you change your body posture frequently? (You cannot manage yourself in a stable posture for a long duration.)	*Saara*	No	60	
6.	Do you have a well-nourished & normally developed body? (You are neither malnourished nor obese.)	*Sandra*	Yes	120	
7.A.	Are you lazy and disinterested in activities like morning walk/ jogging, swimming or any type of outdoor games?	*Manda*	Yes	40	
7.B.	Are you slow in consuming the food? (Even after all have left the dining hall, you are still consuming the same amount of food).	*Manda*	Yes	40	

a

Self-assessment questionnaire to assess *Prakriti*

Read the questions below and answer - "Yes", "No", or "Don't know" with tick mark. Once all the questions have been answered, write "Allotted score" according to the answer. Only one answer is entitled to get score that is shown in "Score to allot" column. If the answer is otherwise, the allotted score is zero.

Example: If the answer to question number 1 is "Yes", then write "120" in the "Allotted score"; if the answer is "No" or "Don't know" then write "0" in "Allotted score". If the answer to question number 3 (a) is "Yes", then write "40" in the "Allotted score"; If the answer is "No" or "Don't know" then write "0" in " Allotted score". If the answer to question number 9 is "No", then write "120" in the "Allotted score"; if the answer is "Yes" or "Don't know" then write "0".

Serial	Question	Guna	Answer			Score to allot	Allotted score
			Yes	No	Don't know		
1	Whether your skin remains oily throughout the year in comparison to others?	Snigdha	✓			Yes = 120	120
3 (a)	Are you considered attractive among your friends?	Mridu			✓	Yes = 40	0
9	Does your gait (style of walking) change with respect to speed or manner frequently?	Guru		✓		No = 120	120

Once all the questions have been answered, add the "Allotted score" of the questions of each *Dosha* and calculate according to the instructions given at the end of the question.

In many cases the same question can come up more than once. It is not wrong to question, it is necessary to determine the *Prakriti*

KAPHA							
Serial	Question	Guna	Answer			Score to allot	Allotted score
			Yes	No	Don't know		
	Whether your skin remains oily throughout the year in comparison to others?	Snigdha				Yes = 120	

b

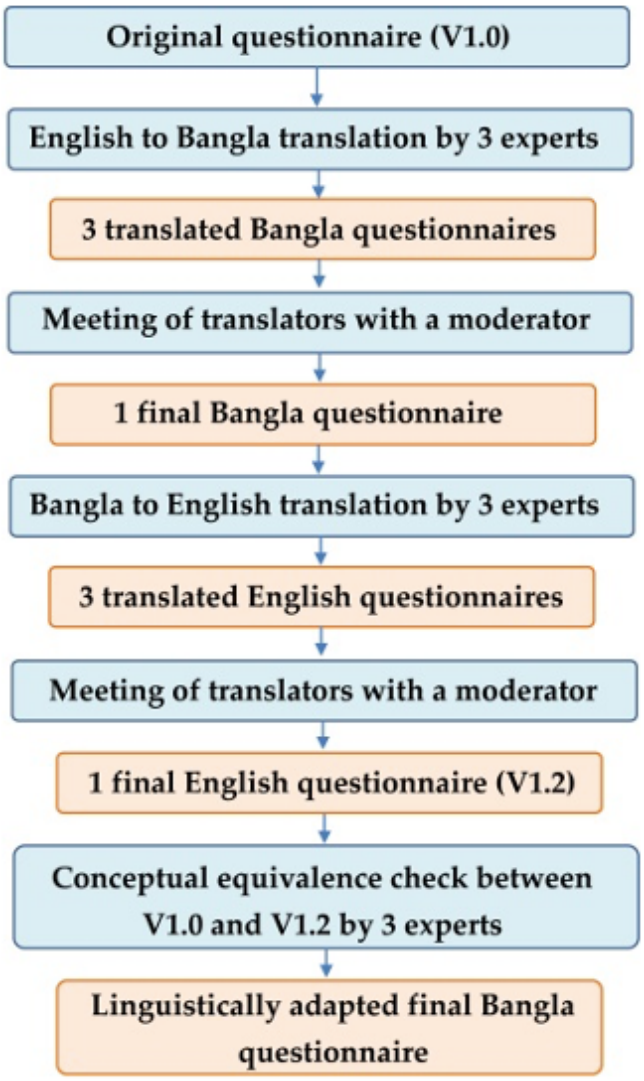
There are a total of 23 questions for *Kapha*, 16 questions for *Pitta*, and 23 questions for *Vata*. The maximum achievable number for *Kapha* is 1440, *Pitta* is 600, and *Vata* is 960. The discrepancy in score across three *Doshas* is solved by taking a percentage after completion of the questionnaire.

Translation

For the forward translation, we recruited three expert Bengali translators who had previous experience in the translation of health-related questionnaires. Similarly, for backward translation, we recruited three English language experts with previous experience in the translation of health-related questionnaires. The bilingual moderator meets with translators for finalizing a single version of the questionnaire. The meeting of the translators and moderator was conducted online (Google meet) due to the COVID-19 pandemic.

The translation process is shown in **Figure 2**. First, the questionnaire was translated from English to Bengali (forward translation). After the finalization of a single Bengali (V1.1) version, the questionnaire was translated from Bengali to English (backward translation). Three questionnaires were combined by the moderator to a single final English version (V1.2) (9).

Figure 2: Linguistic adaptation of questionnaire from English to Bengali by forward and backward translation



Conceptual equivalence

The mere linguistic translation is not enough for declaring a questionnaire suitable for pre-testing. We contacted two public health experts, one from modern medicine, and one from Ayurveda for checking the conceptual equivalence between the backward-translated English version (V1.2) and the original English version (V1.0) (10). They rated the conceptual equivalence (if each question of version V1.2 is equivalent to V1.0 conceptually) in an 11-point Likert-type scale where "0" denote "Not at all equivalent" and "10" denote "Perfect equivalence." This quantitative type of conceptual equivalence would help us to compare any difference among the scores of three *Doshas* and help to calculate inter-rater agreement. An inter-rater agreement was tested by Intra-class correlation coefficient (ICC). ICC ranges from 0 to 1 and we considered an ICC > 0.75 as acceptable (11). After finding acceptable level of conceptual equivalence (available in Result section), we proceeded for pre-testing and interview.

Pre-testing and cognitive interview

We pre-tested the questionnaire with a convenience sample of 42 research participants. We recorded their demographic details namely age, sex, education, residence, marital status, employment, spoken, and written language. First, the research participants were given the questionnaire for self-assessment of their *Prakriti* with the adapted Bengali version of the questionnaire. After their report, they were asked about their understanding on each of the questions and an expert surveyor rated their understanding of each question on an 11-point Likert type scale starting from "0" that corresponds to "Not at all understood" to "10" that corresponds to "Fully understood". An average score of > 7.5 was pre-fixed as acceptable. Along with this quantitative analysis of each question at the sentence level, participants were also asked about any difficulty in understanding any word or phrase or their suggestion on change in any word or phrase. The qualitative answers were noted down for further modification of the questionnaire. The research participants were asked to reappear after 14 days for a re-test. They were offered a free Ayurveda physician consultation for appearing for the re-test.

***Prakriti* determination by Ayurveda physician**

An experienced Ayurveda physician with five years of practice determined *Prakriti* by the traditional way with a combination of inspection, palpation, and by asking some questions as described by Kurande *et al* (4). This determination was on the same visit of the pre-testing session and after the self-assessment and interview. The physician did not take part in the pre-testing and interview of the research participants and was not aware about the result found in self-assessment.

The retest

The Bengali questionnaire was distributed among the research participants when they came after two weeks. They again self-evaluated their *Prakriti* by the self-administered questionnaire. A week was allowed for the data collection in the retest phase. A total of six participants dropped out of the study. Hence, their "test" data was discarded from the test-retest reliability analysis.

Calculation and statistical analysis

Continuous data were presented in mean and standard deviation and categorical data were presented in number and percentage. The continuous data between two groups were compared by t-test and among three groups by analysis of variance (ANOVA). Categorical data between two groups were tested by Binomial test and more than two groups by Chi-square test. The conceptual equivalence score between two raters was tested by ICC. We followed guidelines by Koo et al. for carrying out ICC and taken the range of ICC as: < 0.5 = poor reliability, 0.5 - 0.75 = moderate reliability, > 0.75 - 0.9 = good reliability, and > 0.9 = excellent reliability (11). Internal consistency for understanding score and response in self-assessment for each *Dosha* was checked by Cronbach's alpha (12, 13). For checking the

internal consistency, data of the test phase was used. For coding the response, we considered supportive response to a particular question that indicate agreement towards a *Dosha* (the answer may be Yes or No according to the nature of the question) = 3, Don't know = 2, and opposite response to a particular question that indicate disagreement towards a *Dosha* (the answer may be Yes or No according to the nature of the question) = 1. For the entire statistical test, we fixed the P <0.05 to be statistically significant. We used Microsoft Excel® 2010 (Microsoft Corporation, USA) for coding and storage of the data and IBM SPSS Statistics 20.0 (IBM Corp; Armonk, NY, USA) for statistical analysis.

Results

Two raters checked the conceptual equivalence and found that the back-translated English questionnaire is conceptually equivalence to original English version. This indirectly establishes the content validity of adapted Bengali version. The mean score of conceptual equivalence (*Dosha* wise) along with agreement between the raters is shown in **Table 1**. We found no difference among the score across *Doshas*, reflected in the result of ANOVA. The agreement between the raters (inter-rater ICC ranging from 0.78 to 0.87, $P < 0.001$) was of good reliability.

Table 1: Scores of conceptual equivalence from two raters

Dosas	Measures (Mean ± SD)		Reliability (R_1-R_2) ICC, *P*
	Rater 1 (R_1)	Rater 2 (R_2)	
Kapha	9.74 ± 0.45	9.74 ± 0.54	0.78, <0.001
Pitta	9.81 ± 0.4	9.86 ± 0.34	0.87, <0.001
Vata	9.7 ± 0.63	9.78 ± 0.42	0.82, <0.001
ANOVA *P*	0.79	0.65	-

-: Data not obtainable or necessary, SD: Standard deviation
Reliability was measured by Intra-class correlation (Two-Way Random-Effects Model, Absolute agreement) coefficients between scores of Rater 1 and Rater 2 (R_1-R_2)
One-way Analysis of variance (ANOVA) was carried out among the scores (across column) of *Kapha, Pitta,* and *Vata* obtained from the raters.

Hence, the translated Bengali version was both linguistically and conceptually acceptable.

A total of 42 research (men = 24, women = 18) participants were recruited for the pre-test. Six participants dropped out from the retest phase and as per protocol, we did not ask them about the reason why they are not appearing for the retest. We omitted the data of those six participants from the final analysis. The demographics of the final 36 research participants (men = 21, women = 15) is presented in **Table 2**. The mean age was 35.36 ± 12.59 years (male 35.05 ± 13.02 years, female 35.87 ± 12.41 years, $P = 0.85$). All the participants were native Bengali speaker. However, some of them were able to read and speak Hindi and English.

Table 2: Demographics of the research participants

Parameters		Overall (n = 36)	Men (n = 21)	Women (n = 15)	*P*
Age (years) (Mean ± SD)		35.36 ± 12.59	35.05 ± 13.02	35.87 ± 12.41	0.85*
Education n (%)	Upto 10th standard	6 (16.67)	4 (19.05)	2 (13.33)	0.01†
	10th – 12th standard	16 (44.44)	9 (42.86)	7 (46.67)	
	12th – 2-year/3-year graduation	11 (30.56)	6 (28.57)	5 (33.33)	
	Above graduation	3 (8.33)	2 (9.52)	1 (6.67)	
Employment n (%)	Employed	11 (30.56)	9 (42.86)	2 (13.33)	0.03‡
	Unemployed	25 (69.44)	12 (57.14)	13 (86.67)	
Residence n (%)	Rural	27 (75)	14 (66.67)	13 (86.67)	0.003‡
	Urban	9 (25)	7 (33.33)	2 (13.33)	
Marital status n (%)	Married	23 (63.89)	12 (57.14)	11 (73.33)	<0.001†
	Divorced, Widow, Widower	3 (8.33)	1 (4.76)	2 (13.33)	
	Unmarried	10 (27.78)	8 (38.1)	2 (13.33)	
Can speak n (%)	Bengali	36 (100)	21 (100)	15 (100)	<0.001†
	Hindi	10 (27.78)	7 (33.33)	3 (20)	
	English	4 (11.11)	3 (14.29)	1 (6.67)	
Can read n (%)	Bengali	36 (100)	21 (100)	15 (100)	<0.001†
	Hindi	3 (8.33)	2 (9.52)	1 (6.67)	
	English	10 (27.78)	6 (28.57)	4 (30.77)	

*P value of unpaired t-test (calculated between male and female), †P value of Chi-square test (calculated with overall distribution), ‡P value of Binomial test (calculated with overall distribution)

From the experience of the cognitive interview, we added three synonyms of words in parenthesis for better understanding of the terms. *Dosha* wise score of understanding is presented in **Table 3**. There was no gender difference in understanding of the questions. The Cronbach's alpha for internal consistency of understanding for *Kapha* was 0.83, *Pitta* was 0.82, and *Vata* was 0.78. The understanding of the questionnaire was consistent among the questions and participants. Furthermore, no score difference among the mean score of three *Doshas* and Cronbach's alpha indicate consistent understanding of the questions.

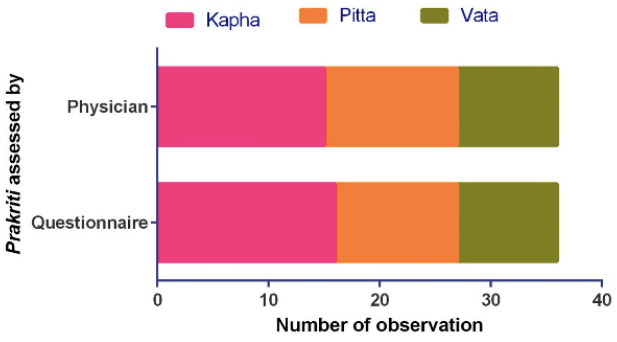
Table 3: Understanding on the questions on a 10 point scale

Dosha	Score (Mean ± SD)			*t*-test *P**	Cronbach's alpha‡
	Overall (n = 36)	Men (n = 21)	Women (n = 15)		
Kapha	9.78 ± 0.52	9.75 ± 0.54	9.81 ± 0.49	0.1	0.83
Pitta	9.82 ± 0.42	9.79 ± 0.46	9.87 ± 0.36	0.03	0.82
Vata	9.79 ± 0.46	9.74 ± 0.48	9.85 ± 0.42	<0.001	0.78
ANOVA *P*†	0.29	0.34	0.23	-	-

**t*-test *P* is calculated between men and women (across the row), † ANOVA *P* is calculated among *Kapha*, *Pitta*, and *Vata* (across column) in overall, men, and women, ‡Cronbach's alpha was calculated for score of *Kapha* (36 participants × 23 questions), *Pitta* (36 participants × 16 questions), and *Vata* (36 participants × 23 questions)

The research participants took 10.34 ± 4.67 min to fill up and prepare the final result. The sample according to predominant *Prakriti*, as found from the result of the filled up questionnaire and from the assessment by physician is shown in **Figure 3**. There was no significant difference between the two assessments of predominant *Prakriti* (χ^2 = 0.08, *P* = 0.98). This proves that the questionnaire is valid (measures what it is supposed to measure) for measurement of predominant *Prakriti*.

Figure 3: Predominant *Prakriti* determined by the questionnaire and physician



Cronbach's alpha for the test and retest, and test-retest ICC is shown in **Table 4**. All the internal consistencies were in or above the acceptable range. The test-retest ICC showed a good level of reliability.

Table 4: Internal consistency of questionnaire for determination of three Doshas and test-retest reliability

Dosha	Cronbach's alpha		ICC (Test-Retest), *P*
	Test	Retest	
Kapha	0.64	0.69	0.88, *P* <0.001
Pitta	0.76	0.71	0.91, *P* <0.001
Vata	0.81	0.78	0.79, *P* <0.001

For Cronbach's alpha, *Dosha* wise (*Kapha* 23 questions, *Pitta* 16 questions, and *Vata* 23 questions) coded data of 36 participants. For Test-Retest Intra-class correlation, we arranged score of all questions of a *Dosha* of 36 participants in test and retest column.

Discussion

We adapted the English "self-assessment questionnaire to assess *Prakriti*" in Bengali. The questionnaire is found to be valid for the assessment of predominant Prakriti. It is a reliable questionnaire and it would give similar output if tested on the same person with a time gap.

The majority of the research participants were from the rural area, were middle-aged, and with an education level of 10th -12th grade. Hence, this questionnaire can be applied to a wide range of the population. Although the written Bengali is invariably similar across West Bengal and other states of India, Bangladesh, and other countries, there may be a slight difference in spoken Bengali. That may be the reason why some words or phrases may need change with synonyms or some minor structural changes.

Adapted Bengali questionnaire with good psychometric properties may be used in any mass survey, research, or assessment of patients indoor or outdoor. In a situation where the patients are in a long queue for consultation may self-assess their *Prakriti* and the concerned busy physician may have a quick idea about the *Prakriti* of a patient. In the various corner of India, Bangladesh, and the world, the communication gap (a Bengali migrant worker visiting an English-speaking doctor) may hinder the proper assessment of *Prakriti* (14). In that case, this questionnaire may help.

Along with testing the paper-based questionnaire, we also piloted the questionnaire in an open online survey platform (Google Forms) with 10 participants as a convenience sample. The questionnaire could successfully be uploaded in Bengali language on the platform without any difficulty and the respondents did not face any technical challenges for participation. However, the result is not presented on this manuscript as it was not the primary aim of the study. The questions can be posted on the survey platform and the survey link can be shared with targeted respondents. This online mode of data collection helps in many ways. In an emergency like the current COVID-19 pandemic where a face-to-face survey with a large number of participants is difficult, the online questionnaire can be used. It also helps in reducing the printing cost, saves paper, saves time of coding the questionnaire, etc. There are service providers that provide a free assessment of *Prakriti* online (15-17). However, these are

proprietary services and it would be of little help in research.

The questionnaire originally developed by Tripathi *et al.* did not have a segment as an instruction to the respondents (5). We have introduced that for ease of self-administration. This would make the questionnaire easy to understand without any verbal instructions to the participants.

We have included a sample from West Bengal. A pretesting and interview with a sample from Bangladesh could increase the generalizability. However, it was not possible due to logistics and administrative limitations.

Suggestions

We suggest further pre-testing of the questionnaire on a sample population before application of the tool among Bengali speakers in any other geographical area like Bengali speakers in other area of West Bengal, other Indian states, Bangladesh, and other countries.

Download questionnaire

The Bengali questionnaire in portable document format (PDF) can be downloaded from the following digital object identifier number: 10.6084/m9.figshare.17153333.v1

This can be accessed from the following link: http://dx.doi.org/10.6084/m9.figshare.17153333.v1

The file can directly be found in the free repository - Figshare from the following link: https://figshare.com/articles/journal_contribution/Bengali_Bengali_questionnaire_for_self-assessment_of_Prakriti/17153333

An editable version in Microsoft Word document can be obtained from the corresponding author for further modification according to necessity.

Conclusion

A Bengali self-assessment questionnaire for the assessment of *Prakriti* has been adapted from English. This questionnaire contains 62 questions (23 for *Kapha*, 16 for *Pitta*, and 23 for *Vata*) with three-point Likert-type response options. The adapted questionnaire was found to be valid and reliable. This culturally validated questionnaire may be used for the assessment of *Prakriti* of Bengali-speaking people. This questionnaire, taking approximately 10 minutes to self-administer, would help in a mass survey of the population, research work, or primary care physicians of Ayurveda for a quick assessment of *Prakriti*. A printable form may be obtained by any interested person from the corresponding author.

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