

DEVELOPMENT OF A TOOL TO ASSESS KNOWLEDGE, ATTITUDE, AND SATISFACTION LEVEL OF PATIENTS TOWARD AYURVEDA

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ABSTRACT

Objectives: The study primarily intended to formulate and corroborate a scale to evaluate knowledge, attitude, satisfaction, and continuation of Ayurveda practice.

Methods: After a literature search, an initial questionnaire was drafted encompassing 33-items within four constructs, namely, knowledge, attitude, satisfaction, and continuation with Ayurveda. The developed questionnaire was assessed for content validity by five experts.

Results: After confirmatory factor analysis, 33-items were reduced to 22-items, confirming the structure of the scale. Further, the content validity at the scale level was above the acceptable value of 0.78, suggestive of the content validity of the scale. Spearman-Brown coefficient values for knowledge, satisfaction, and continuation with Ayurveda range between 0.7 and 0.9, suggesting good reliability. In addition, the test-retest reliability value was >0.7 for knowledge, attitude, satisfaction, and continuation with Ayurveda. Cronbach's alpha values ranging between 0.6 and 0.9 also suggest good internal consistency for the scale. Finally, the convergent (average variance extracted values) and discriminant (Fornell and Larcker) validity of the variables was met and the model indices (Chi-square 613.22; CMIN/DF<5) showed good fit.

Conclusion: The formulation of an evaluation scale is described in this paper to measure knowledge, attitude, satisfaction, and continuation with Ayurveda practice. Based on the validity analysis, this questionnaire, with four variables and a total of 22-items, can be added to the present research on Ayurveda practice.

Keywords: Attitude, Ayurveda, Knowledge, Satisfaction.

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INTRODUCTION

In empirical research, a measurement scale is a central component of research [1]. The reliability and validity of a measurement scale indicate the legitimacy of the research. Using a measurement scale, the phenomenon or occurrence is given a numerical dimension, which eases the measure of theoretical variables, such as knowledge, attitude, practice, satisfaction, quality of life, among others [2]. The field of Ayurveda practice is no exception. Globally, there are different healthcare choices which the public can choose; however, there is no consensus on the adequacy of any healthcare practice to address all the health needs [3-5]. In the present Indian healthcare system, Ayurveda remains a traditional system of medicine. Globally, due to their holistic approach, the Ayurveda practice has gained wide acceptance. Despite being a traditional medicine practice, Ayurveda has broad applications including diagnosis of health issues, preventive measures, maintenance and improvement of health [6-8], and this healthcare system is recognized by the Indian Government [9]. Unlike allopathic medicines, Ayurveda develops formulations from Ayurvedic herbs having a significant therapeutic property [10-12]. Their formulations are classically known as aristas, taila, Bhasma, churna, arka, sneha, and many more [13]. The knowledge and practice of Ayurveda has spread at an individual and community level [14]. The usage of Ayurvedic practice has been reported from different parts of India, including Karnataka [15], New Delhi [16], Lucknow [17], Mumbai [18], among others, and outside India, such as Bangladesh [19] and European countries [20]. There has been evidence on increased use of Ayurveda and hence, improvements in research designs and designing of variables or constructs to measure various aspects of the Ayurvedic system have emerged. The progress in a number of questionnaires on Ayurveda practice is high [12,21-24].

Many of the questionnaires are based on the perception of participants who used Ayurveda in daily life. From the patient's perspective, awareness on the usage of Ayurveda was reported in previous studies [25]. Ayurveda health assessment questionnaire measured participants' health assessment on physical, mental, and social domain [26]. Edwards and Streiner [27] developed a scale, the Doshā self-assessment questionnaire, to measure Vata, Pitta, and Kapha Doshā scores. Other scales included Ayurveda-based clinical assessment to measure the anxiety [21], swasthya assessment scale to measure health status, treatment plans, and progress of health [22], Prakriti assessment scale to measure prakriti [23] and Vikriti measuring scale [28] and many more. The assessment of knowledge, attitude, and practice (KAP) toward Ayurveda is widely tested among the population [29]. Mounting research evidence suggests empirical research on the KAP toward Ayurvedic medicine from a doctor's viewpoint [15,18] and among the patients [25,30]. Consequently, the choice of questionnaires depends on the concept that must be measured and on the specific population. From the literature review, it was gathered that there is a dearth on rigor related to the scale development, evaluation model, the reliability and validity of the instrument, model fit indices to measure knowledge, attitude, and satisfaction among patients on Ayurvedic practice. The assessment on these constructs is crucial to develop strategies to introduce the concept of Ayurveda on a larger population. Keeping this in mind, the researcher attempts to develop and validate a standardized scale that can be used universally to assess attitude, knowledge, satisfaction, and continuation of Ayurvedic practice.

METHODS

Study design and participants

This paper employed an observational and cross-sectional design, which involved the collection of data at a particular juncture [31].

Such a design is considered methodologically straightforward and recommended to validate measurement instruments and the reliability of instruments [32].

Participants

A formal request letter for scale development was distributed to five subject matter experts, seeking their insights and recommendations to establish the content validity of the instrument, with a designation of professor/associate/assistant professor in the University. The protocol was approved through the ethical committee approval number: EC/NEW/INST/2022/2660 and bearing CTRI Reg. No CTRI/2025/02/080018. Further, using convenience sampling, 200 participants visiting selected Ayurvedic hospitals from Amloh town of Punjab were selected, and data were collected. The inclusion criteria included patients attending the outpatient department for treatment, willing to give consent, and with proficiency in the local or English language. Patients with disoriented or altered mental status and unwilling to provide consent were excluded from the study.

Instrument development

The constructs/variables and a pool of items were generated after a literature review. The scale items included demographic characteristics, knowledge, attitude, satisfactory level, and continuation of Ayurveda. Totally, 33 items were divided into four variables, namely, knowledge (9 items), attitude (11 items), satisfaction (10 items), and continuation with the Ayurvedic system (3 items).

Content validity index (CVI)

In instrument development, estimation of CVI is the most appropriate approach to determine the scale's content validity [33]. Through a literature search, the researcher determines the constructs of the scale; however, whether the scale or the specific sets of items are appropriate to measure what it intends to measure is tested by content validity [34]. In this connection, the panel experts were requested to rate items in terms of their usefulness, ambiguity, simplicity, clarity, and relevance [35]. Each item was evaluated for ambiguity, simplicity, clarity and relevance, using a 4-point ordinal scale, wherein 1 indicated doubtful, not simple, unclear, or irrelevant; 2 suggested the item required revision; 3 denoted simplicity, clarity, relevance, or unambiguity with minor modifications needed; and 4 reflected that the item was very simple, very clear, highly relevant, or its meaning was entirely unambiguous. In addition, the perceived usefulness of each item was assessed using a 3-point ordinal scale, where 1 represented unnecessary, 2 represented useful but not necessary, and 3 represented useful. Thus, measuring content validity will validate that the data gathered will be applicable to the study settings, constructs, and participants.

Reliability of scale

Reliability is measured by computing the reliability coefficient. The reliability of the total scale was evaluated by estimating Spearman-Brown and Cronbach's alpha coefficient values [36]. The measurement scale is considered to be internally reliable if the value of Cronbach's alpha exceeded 0.7 [37]. SPSS version 24 was used for reliability tests. In addition, the reliability or stability of the same test was assessed by conducting the reliability test-retest over a period [38,39].

Confirmatory factor analysis (CFA)

The structure of factors was validated and ascertained by conducting CFA [40]. IBM SPSS AMOS Version 21 was used for the present study for CFA. The model fitness was determined by model-fit indices, namely, comparative fit index (CFI), normed fit index (NFI), CMIN/DF, and root mean square error of approximation (RMSEA) [40].

Validity

Fornell and Larcker's criteria were used to measure the discriminant validity of the scale [41]. Convergent validity was ascertained by assessing the average variance extracted (AVE) [40].

RESULTS

Participant's characteristics

The data for the development of scale was collected from five experts (doctors) from the field of Ayurveda who worked as professor or assistant professor in Chandigarh University, Punjab, India. The study was conducted after receiving informed consent from respondents, who were informed about the study topic and the reasons behind collecting the information. Further, the data on the developed questionnaire were obtained from 200 participants.

Content validity

The scale-level CVI (S-CVI) and the mean content validity ratio (CVR) were used to evaluate the CVI in the present study (Table 1). S-CVI represents the proportion of all items that were rated as content valid by the panel of experts [42]. The CVR reflects the perceived necessity of each item, with higher values signifying stronger consensus among experts regarding the item's essentiality. A CVR score exceeding 0.78 is generally deemed acceptable [42] and in this study, the scale yielded a CVR of 1. For three to five experts, the acceptable CVI values should be 1 [33]. As shown in Table 1, CVR and S-CVI for the developed Ayurveda scale are 1, indicating the assessment's content validity.

Reliability

The split-half reliability is measured by estimating the Spearman-Brown coefficient. A Spearman-Brown coefficient value of 0.5–0.7 is deemed moderate, a value of 0.7–0.9 is deemed good, and a value exceeding 0.9 is deemed excellent [36]. As shown in Table 2, the Spearman-Brown coefficient is between 0.7 and 0.9 for knowledge, satisfaction, and continuation with Ayurveda, suggesting good reliability, while for attitude, the value of 0.634 is suggestive of moderate reliability.

The test-retest reliability value of >0.70 is favorable [38]. The value of test-retest reliability was >0.7 for knowledge, attitude, satisfaction, and continuation with Ayurveda (Table 3).

CFA

In the developed scale, there were no subconstructs or subfactors in the main constructs; hence, initially, CFA was performed to validate the constructs. The path diagram is shown in Fig. 1. The original

Table 1: Content expert validity

Items	Average content validity ratio	Scale-level content validity index
Socio-demographics	1	1
Knowledge	1	1
Attitude	1	1
Satisfaction	1	1
Continuation with the Ayurveda system	1	1

Table 2: Split-half reliability

Key parameters	Spearman-Brown coefficient
Knowledge	0.846
Attitude	0.634
Satisfaction	0.773
Continuation with the Ayurveda system	0.756

Table 3: Test and Re-test reliability

Key parameters	r value (Test 1<->Test 2)
Knowledge	0.899
Attitude	0.903
Satisfaction	0.886
Continuation with the Ayurveda system	0.851

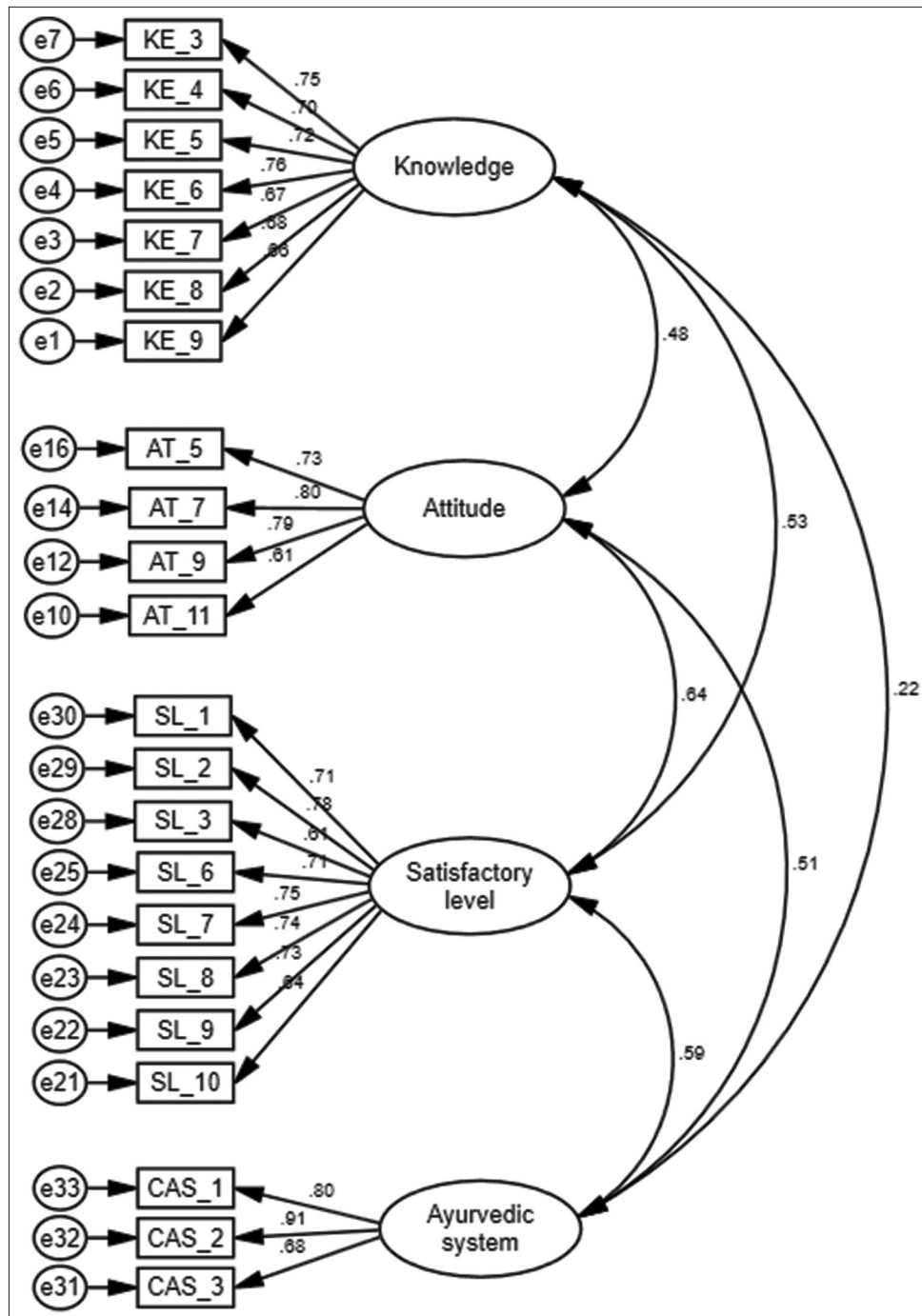


Fig. 1: Confirmatory factor analysis

questionnaire had 33 items. The items that did not measure the main variables and those with values of factor loadings being <0.5 were eliminated from further analysis. Based on CFA, items 1 and 2 from knowledge, items 1, 2, 3, 4, 6, 8 and 10 from attitude and finally, items 4 and 5 from satisfaction were removed (Fig. 1). The final scale contained four variables (22 items): 7 items in knowledge (items 3, 4, 5, 6, 7, 8 and 9), 4 items in attitude (items 5, 7, 9 and 11), 8 items in satisfactory level (items 1, 2, 3, 6, 7, 8, 9 and 10) and 3 items in continuation with Ayurvedic system (items 1, 2 and 3) (Fig. 1). To summarize, the questionnaire was reduced from 33 to 22-items questionnaire.

Model summary

After removing the items, the CFA was once again performed. The summary of model fit indices is provided in Table 4. In comparison to the initial model indices, the revised model indices have improved. The

Chi-square was 613.22 at $p=0.00$, and df (degree of freedom) was 203. The relative Chi-square (χ^2/df) was 3.02, below the 5.0 required for a good fit [43]. The other good to fit criterion was supported by the CMIN/DF value, which fits the model indices within the acceptable range (<5). The remaining model fit indices, namely, CFI, NFI, and RMSEA, were not in the acceptable range.

Estimate values

The items demonstrated satisfactory internal reliability or consistency, as revealed by a Cronbach's alpha coefficient exceeding 0.6 (Table 5).

Convergent and discriminant validity

According to the established criterion, the square root of the AVE for each construct should surpass the squared correlations between that construct and other constructs. In the present analysis, all constructs

Table 4: Model fit measurement statistics

Model	χ^2	df	χ^2/df	RMSEA (<0.08)	CMIN/DF (<5)	NFI (>0.90)	CFI (>0.95)
Initial	1681.603	489	3.438	0.111	3.439	0.585	0.658
Revised	613.228	203	3.020	0.101	3.021	0.761	0.823

Initial refers to the model without deleting any items. RMSEA: Root mean square error of approximation, CFI: Comparative fit index, NFI: Normed fit index

Table 5: Estimate value

Item	Estimate (p-value)	Cronbach's alpha	AVE
Knowledge		0.879	0.498
KE 3 I know about the licensing of Ayurvedic practitioners in India system of health.	0.750		
KE 4 I have about the law that regulates Ayurvedic practices in India.	0.697		
KE 5 I know the specific treatment duration for the Ayurvedic medicines I use.	0.719		
KE 6 I know the specific dosage regimen for Ayurvedic medicines I use	0.758		
KE 7 I know the specific form of administration for Ayurvedic medicines I use.	0.673		
KE 8 I know about the certain pre-cautions that are needed to be taken care of while using Ayurvedic medicines	0.685		
KE 9 I know about the risks if Ayurvedic medicines are not consumed as prescribed	0.655		
Attitude		0.647	0.541
AT 5, I trust that it is safe to take Ayurvedic treatment	0.734		
AT 7, I have no problem with taking Ayurvedic treatment if I have health problems.	0.796		
AT 9, I trust in the effectiveness of Ayurvedic treatment.	0.787		
AT 11, for me, the advantages of Ayurvedic treatment outweigh the disadvantages.	0.613		
Satisfaction		0.893	0.504
SL 1 Prevention or treatment of health conditions.	0.714		
SL 2 Way of relieving of symptoms or health problems.	0.778		
SL 3 Experience on any side effects of the treatment that interfere with physical health and ability to function (e.g., strength, energy levels).	0.610		
SL 6 Convenience of the use of medicines.	0.714		
SL 7 Easiness in scheduling medication	0.750		
SL 8 Frequency of medicinal use per day.	0.736		
SL 9 The way the good side of this medication outweighs the bad part.	0.728		
SL 10 overall experience	0.638		
Continuation with the Ayurveda system		0.828	0.639
CAS 1 My decision to use Ayurvedic medicine on a regular basis will be continued in the future.	0.799		
CAS 2 I will frequently use the Ayurvedic medicines in the future	0.908		
CAS 3 I will strongly recommend that others use it.	0.676		

AVE: Average variance extracted

exhibited AVE values exceeding the threshold of 0.5, as recommended by Fornell and Larcker (Table 6). These findings indicate that the scale possessed adequate convergent validity, while the AVE values also confirm that the constructs maintain satisfactory discriminant validity. Overall, the scales were found to have good convergent and discriminant validity.

DISCUSSION

The present study participants' knowledge, attitude, satisfaction, and continuation of Ayurveda practice were assessed through a questionnaire. The content domain was validated by experts, thus supporting a robust approach in utilizing literature to develop the scale and validating the same by an expert panel [44]. The questionnaire has four variables, and the construct validity was supported by CFA. Subsequently, the original questionnaire was reduced from 33 to 22-items using CFA. The scale was found to have good internal consistency. Moreover, satisfactory discriminant validity and convergent validity were exhibited by the scale. However, the model fit indices were acceptable only for CMIN/DF. Based on this information, it can be inferred that the formulated assessment scale represented a reliable, validated, and standardized instrument for evaluating multiple dimensions of Ayurveda, such as knowledge, attitude, satisfaction, and continuation of Ayurvedic practice among individuals.

The practice of Ayurveda is widely spreading across different cohorts of the population. It is essential to understand their knowledge and attitude toward Ayurveda practice and satisfaction with the Ayurveda practice. This can be assessed using a questionnaire. The questionnaire developed in this study can be used by Ayurvedic practitioners to

Table 6: Discriminant validity (AVE)

Key parameters	Knowledge	Attitude	Satisfaction	Continuation with the Ayurveda system
Knowledge	0.706			
Attitude	0.233	0.736		
Satisfaction	0.277	0.409	0.710	
Continuation with the Ayurveda system	0.049	0.258	0.346	0.800

AVE: Average variance extracted

measure the level of knowledge of Ayurveda and to see if any programs or interventions should be conducted to increase the knowledge on Ayurveda. The questionnaire could measure participants' knowledge on multiple aspects of Ayurveda, such as licensing of Ayurvedic practitioners, laws and regulations on Ayurvedic practices, dose, duration, type of formulation, and pre-cautions during intake of Ayurvedic medicines. Similarly, the attitude toward Ayurveda, such as safety, effectiveness, and advantages of Ayurveda could be measured using the developed scale. This could benefit to design proper interventions to develop a positive attitude toward the practice of Ayurveda among a large cohort of population. Further, the scale was appropriate to evaluate patients' satisfaction in terms of relieving symptoms, the preventive nature of Ayurveda, ease of scheduling the medication, convenience, regimen, and no adverse effects. Further, this

scale could measure participants' continuation with Ayurveda with relevance to the recommendation and decision to use Ayurveda.

Limitations of the study

Regarding the limitations, the total score on the scale was carried out without any intervention, the questionnaire was formulated, and content validity was examined through the opinions of five Ayurveda experts. Next, the discrepancy in the model fit indices could be investigated in further study with a different sample. Consequently, further research is required to assess the questionnaire's effectiveness. Further, the questionnaire was developed in the English language; the versions in other regional languages may need further validation. The scale was appropriate for the Indian population and cross-cultural studies may require ascertaining its appropriate usage in population from other geographical locations. Furthermore, a longitudinal study involving an intervention would be useful to evaluate if the questionnaire is responsive to the changes of patients' knowledge, attitude, and satisfaction toward Ayurveda.

CONCLUSION

The present study outlined the formulation of an evaluation scale designed to assess the extent of knowledge, attitude, satisfaction, and continuation with Ayurveda practice. This questionnaire, with four variables and a total of 22-items, can be added to the present research on Ayurveda practice.

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COMPETING INTERESTS

The authors declare that they have no conflicts of interest related to this work.

ACCESS TO DATA, CODE AND SUPPLEMENTARY MATERIALS

The datasets, codes, and additional resources are available upon reasonable request.

ETHICAL APPROVAL

For the purpose of this research, ethical approval was obtained from Desh Bhagat University, located on Amloh Road in Mandi Gobindgarh, Punjab.

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