QUESTIONNAIRE DESIGNING AND VALIDATION IN AYURVEDIC RESEARCH

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ABSTRACT

Research in Ayurveda is gaining fast momentum now a day. Newer technique and ways are being designed to revalidate and reestablish the time tested principles of Ayurveda. Questionnaire is one of the extensively used tools for the collection of data in research. Use of questionnaire eases the study for both researcher and respondents. Before using the questionnaire in Ayurveda one should know the steps in the formation of the questionnaire and its validation. A properly framed and validated questionnaire helps in proper collection and analysis of the data. Questionnaire helps to validate principle and also to update the knowledge. This article aims to put light on the steps involved in designing and validation of questionnaire in Ayurveda.

KEY WORDS: Ayurveda research, questionnaire designing, validation

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INTRODUCTION

Ayurveda is the life science and its foundation is based on multiple basic principles. A science can be called as doctrine when it is examined by many scholars and established with empirical results (Acharya JT, 2000). Measurement is one of the important tools used in any medical science and its relative research modules. One of the basic requirements of research is data collection. This process is carried out effectively by incorporating various techniques such as questionnaire format, examination and interview. The usage of questionnaire format is very wide in the field of Ayurvedic research. To standardize and validate many of the Ayurvedic principles, these questionnaires are much needed. Concept of Prakruti (Basic body constitution), Sāra (Effect of proper body elements), Samhanana (Physical compactness), Sātmya (habituation for food and activity), Satva (Mental status), Āhara shakti (Capacity for intake of food), Abhyavaharana shakti (Digestive capacity), Vyāmama shakti (Physical strength), Vaya (Age factor) and many other concepts can be brought in to lime light by adopting the questionnaire format in the research of the same. These questionnaires can be used in all sorts of Ayurvedic research. It can be used widely in basic or pure or fundamental research in order to formulate basic fixed definitions for many concepts like Dosha. It can also be used in drug research, for the purpose of identification and availability of some rare species like the drug Hamsapāda. All most all the survey studies in Ayurveda are carried out based mainly on questionnaire. Many pre clinical trials adopt questionnaire to asses many clinical parameters. In this article a sincere effort has been done to show the steps involved in questionnaire development.

The aim of this paper is to give a basic introduction to the research scholars about designing and validating questionnaires in Ayurveda research.

REVIEW OF QUESTIONNAIRE:

In the present article the entire literature is explained under the heading of steps of questionnaire development. Details regarding the same are given below.

Steps of questionnaire development:

For the development of a questionnaire following steps can be employed:

1. Decide the information required.
2. Define the target respondents.
3. Choose the method(s) of reaching target respondents.
4. Decide on question content.
5. Develop the question wording.
6. Put questions into a meaningful order and format.
7. Check the length of the questionnaire.
8. Pre-test the questionnaire.
9. Develop the final survey form.

1. Literary Review or collection of information:

The basic requisite of the Questionnaire development is the deep knowledge about the subject. One can achieve this through the literary review. As a first step it is always recommended to do a literature search on previously used and validated questionnaires that can be administered in similar settings and capture variables that are of interest according to the study hypothesis. These questionnaires do not need to be tested for reliability and results can be compared for different studies and also combined for meta-analysis. However one needs to make sure that the mode of administration should be similar to the original questionnaire.

Literature searches for articles on Ayurveda provide special challenges, since many of the Indian journals in which such articles appear are not indexed by current medical databases such as PubMed and Cochrane Central Register of Controlled Trials. To solve this problem a literature search procedure was developed that can recover the great majority of articles on any given topic.
associated with Ayurveda. This procedure proposes guidelines enabling comprehensive searches to locate all types of Ayurvedic articles, not necessarily only randomized controlled trials (Narahari S R et al., 2010). In the similar way there are many databases which also help in searching the references about the topic Eg: http://ayurvedahealthcare.com, http://cdac.in/, http://dharaonline.org, http://ayurvededamanuscripts.com/, http://ria.nic.in/, http://ayushportal.ap.nic.in and there are many CD’s published by Govt of India which also help in doing electronic search of the literary review.

Systematic literature searches in bibliographic databases are an essential step in constructing systematic reviews and health technology assessments. The purpose of this kind of search is to identify as many relevant references on a given topic in electronic databases and other databases as much as possible.

Most Important is the review about the topic in the classical texts of the Ayurveda. A detailed search about the topic should be done in all the classical and corresponding modern texts such that it covers all the details about the topic. In this era of digital age, computer can also be used for doing the literary review from the classical texts of Ayurveda. Things are relatively better and initiatives have already been started elsewhere but more and more endeavors are needed to place it on a noticeable height. As a specialized field this particular domain requires an integrative approach from both the field of Ayurveda and Information Technology. This judicious blend will definitely be of great help in different facets of Ayurveda be it clinical medicine, biomedical research or information storage and retrieval (Jamejaya S, 2013).

2. Target respondents

Important thing before starting a research is deciding the respondents and defining the population. For example, in an epidemiological survey, researchers often have to decide whether they should cover educated population and uneducated or either of the one. Secondly, researchers have to draw up a sampling frame. Finally, in the questionnaire we must take into account factors such as the age, education, etc. of the target respondents.

3. Method(s) of reaching target respondents

Mode of administration of questionnaire should be kept in mind at the time of its development. On the basis of self administered interview based questionnaire format the design and flow should be planned.

The language of questionnaires should be easily understanding to the participants. It is essential to frame the questions in a way that they can easily be understood by participant and should be according to their level of education if the questions are interpreted differently by the participants it will result in wrong answers and responses will thus be biased. Easiness of a questionnaire can be assessed by Flesch reading ease score.

Translation of a questionnaire is essential if an instrument is not available in a language of target population. Translation is not a mechanical work and should not be done on word to word bases across languages rather it should be done on the basis of meaning of the sentence. It is important to understand the context, specific issues and meanings the language carries. Back Translation is highly recommended in health surveys. Back translation helps in evaluating the quality of the translation. The original language is translated in another language and again translated back into the original language. Translation back to the original language is done by another translator who is uninformed of the origin language version. (Abdul Momin Kazi, Wardah Khalid, 2012)

There are mainly two modes of administering a questionnaire a) self-administered and b) interviewer administered questionnaire.
Self-administered questionnaire only requires distribution of questionnaire; it is much easier and doesn't require trained staff. In this technique there is less chances of information bias. Through this technique a large sample can be reached with wide geographical area and wide population. Commonly it is administered through direct distribution or mail or electronic distribution.

Interview based administration provides direct interaction with the participants but it is expensive. Interviewer has the opportunity to explain about the study and motivate the participants for definite answers. It is the best method to collect data in epidemiological studies.

4. Question content or Research Question:

The questionnaire can be framed on the basis of the hypothesis and the theory underlying the hypothesis. It should be framed by using the data available from the authoritative texts of the field. Example: Generation of items for *manasika prakriti* assessment questionnaire: The questionnaire consisted of statement on the characteristic features of *Satvika*, *Rajasika* and *Tamasika Prakriti*. The questionnaire was designed with a total of 60 questions, among which 24 questions were related to *Satva*, 24 questions for *Raja* and 12 questions for assessing the *Tama*. The *Lakshana* of each *Prakriti* was converted into English for easy understanding of the characters (Bhat R, 2013).

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<th>Table 1: Showing <em>Satvika Prakriti</em> assessment questionnaire</th>
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*Table Courtesy: Bhat R et al., (2013)*
5. Question wording and format

Scale and response format:

It is one of the important parts of designing a questionnaire. A questionnaire is a written document to gather information irrespective of mode of administration. It can be undertaken in following steps:

Type of Questions and scale:

A questionnaire can be structured or unstructured, open-ended or close ended. It can be selected according to need. Structured questionnaire can be selected if all the participants are asked same question in the same way as done in an interview. In Unstructured format questions may vary with the judgment of the interviewer. It is of more useful at clinical settings however structured questionnaire are more preferred for epidemiological studies as same data from all respondents need to be analyzed and measured. (Nigel Mathers, Nick Fox, Amanda Hunn 2002)

Open-ended questionnaire is suitable for the study when large number of options are available and where it is not possible to write all the answers in advance e.g: height of patients. It allows respondents to write answers in any way they want. This kind of questionnaire might increase the burden on work and responses have to be individually reviewed by the investigator before assigning codes and analysis. Eg: In Designing and validation of ojo kshaya scale; The scale consisted of statement for subjective parameters based on the characteristic features of Ojo Kshaya given in Charaka Samhita. The appropriate English meanings of Lakshana (symptom) were referred to and were framed in the sentence form with five options to each, e.g., Vyathitendriya means pain/discomfort in the chest region. It was framed as, “Do you feel pain or discomfort in chest region?” and the response format consisted of eight questions and the maximum score was 32 (Bhat R, 2013).

Two different reasons for using open ended as opposed to closed ended questions can be distinguished. One is to discover the response that individual give spontaneously and the other is to avoid the bias that may result from suggesting response to individuals (Vasja V, 2003).

6. Putting questions into a meaningful order and format

Opening questions: Opening questions should be easy to answer and not in any way threatening to the respondents. The first question is crucial because it is the respondent’s first exposure to the interview and sets the tone for the nature of the task to be performed. If they find the first question difficult to understand, or beyond their knowledge and experience, or embarrassing in some way, they are likely to break off immediately. If, on the other hand, they find the opening question easy and pleasant to answer, they are encouraged to continue (Reja U et al., 2003).

Question flow: Questions should flow in some kind of psychological order, so that one leads easily and naturally to the next. Questions on one subject, or one particular aspect of a subject, should be grouped together. Respondents may feel it disconcerting to keep reduced and hence decreases error; however for open-ended questions coding is done after the data is collected. Coding helps in data entry, as information of questionnaires in paper format are entered in data entry programs by putting in the numbers rather than writing the whole answer (Reja U et al., 2003). Eg: In Designing and validation of ojo kshaya scale; The scale consisted of statement for subjective parameters based on the characteristic features of Ojo Kshaya given in Charaka Samhita. The appropriate English meanings of Lakshana (symptom) were referred to and were framed in the sentence form with five options to each, e.g., Vyathitendriya means pain/discomfort in the chest region. It was framed as, “Do you feel pain or discomfort in chest region?” and the response format consisted of eight questions and the maximum score was 32 (Bhat R, 2013).
shifting from one topic to another, or to be asked to return to some subject they thought they gave their opinions about earlier.

**Question variety:** Respondents become bored quickly and restless when asked similar questions for half an hour or so. It usually improves response, therefore, to vary the respondent's task from time to time. An open-ended question here and there (even if it is not analyzed) may provide much-needed relief from a long series of questions in which respondents have been forced to limit their replies to pre-coded categories. Questions involving showing cards/pictures to respondents can help vary the pace and increase interest.

7. **Length of the questionnaire**

**Questionnaire Style and Appearance:**

The appearance and style of the questionnaire plays a very important role especially in self-administered questionnaire. Format, order, spacing, fonts used and grouping of the response are very important features of a good questionnaire and have a direct effect on the responses and time spent by the respondent to provide it. Questions should be simple, clear and easy to understand, using minimum of words and space and only things what is needed should be asked. Lengthy or confusing questionnaire can also make the interviewer confused and responses administered by the interviewers may not be accurate or complete. The clarity of questionnaire has direct impact on data collected by the interviewer and responses given by the responders. (Questionnaire Design, 2003) Example: The Hamilton Anxiety Rating Scale (HAM-A) is a psychological questionnaire used by clinicians to rate the severity of a patient's anxiety. The Hamilton Anxiety Rating Scale is composed of fourteen items. On the scale, each item is presented in a specific format. Following the item number, the item itself is listed along with a brief description of the criterion. Each criterion on the scale is an independent feeling that is related to anxiety. The collaboration of each of these independently-rated criteria is meant to evaluate a patient's anxiety severity (Hamilton M., 1959).

**Phraseology**

The wordings on the questionnaire are very important and should be given at most importance when it is framed. Appropriateness of the content, sophistication of language, sequence of question, type, form and how data is collected from the respondents says about the quality of study.

8. **Testing the questionnaire**

**Validity:**

A questionnaire must be validated to make sure that it accurately measures what it is supposed to do, regardless of the responder. Valid questionnaire helps to collect better quality data with high comparability which reduces the effort and increase the reliability of data. (Questionnaire Design, 2003) A valid questionnaire must have following characteristics (i) simplicity and viability (ii) reliability and precision in the words (iii) adequate for the problem intended to measure (iv) reflect underlying theory or concept to be measured and (v) capable of measuring change.

Validity of a questionnaire is an assessment measures which checks the quality of the questionnaire for assessing what is it supposed to. A questionnaire can be validated using following steps,

**Content Validity**

Content Validation in any tool says how well the individual items in the tool correspond to the concept of what are being examined (Bordens S K & Abott B B., 1998). It is usually tested using the qualitative technique. Eg: Content validation of the Manasika Prakriti assessing Questionnaire was done by studying the references available in Charaka Samhita. Considering their measuring feasibility and the selected variable were also cross – validated by
Ayurvedic experts for their suitability as a dependable expression to identify the dominance of particular Prakriti (Bhat R, 2013).

**Criterion/face validity:**

Face validity is the extent to which a test is subjectively viewed as covering the concept it purports to measure. It refers to the transparency or relevance of a test as they appear to test participants. In other words, a test can be said to have face validity if it "looks like" it is going to measure what it is supposed to measure (Sirkin M, 2012). For instance, if you prepare a test to measure whether students can perform multiplication and the people you show it to all agree that it looks like a good test of multiplication ability; you have shown the face validity of your test.

**Construct Validity:**

Construct validity is “the degree to which a test measures what it claims, or purports, to be measuring.” In the classical model of validity, construct validity is one of three main types of validity evidence, alongside content validity and criterion validity (Hegan E F, 2012)

Construct validity is the appropriateness of inferences made on the basis of observations or measurements (often test scores), specifically whether a test measures the intended construct. Constructs are abstractions that are deliberately created by researchers in order to conceptualize the latent variable, which is the cause of scores on a given measure (although it is not directly observable).

Construct validity is essential to the perceived overall validity of the test. Construct validity is particularly important in the social sciences, psychology, psychometrics and language studies.

**Internal consistency:**

In statistics and research, internal consistency is typically a measure based on the correlations between different items on the same test (or the same subscale on a larger test). It measures whether several items that propose to measure the same general construct produce similar scores. Internal consistency is usually measured with Cronbach's alpha, a statistic calculated from the pair wise correlations between items. Internal consistency ranges between negative infinity and one. Coefficient alpha will be negative whenever there is greater within-subject variability than between-subject variability. For example, In assessing personality scale validity using internal consistency and retest reliability data (N = 34,108) was examined on the differential reliability and validity of facet scales from the NEO Inventories. We evaluated the extent to which (a) psychometric properties of facet scales are generalizable across ages, cultures, and methods of measurement; and (b) validity criteria are associated with different forms of reliability. In the study the Cronbach’s alpha value was 0.88 indicating good internal consistency (McCrae R E & Kurtz JV, 2011).

**Factor analysis:**

Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. (Wikipedia, 2012) For example, it is possible that variations in four observed variables mainly reflect the variations in two unobserved variables. Factor analysis searches for such joint variations in response to unobserved latent variables.

**Inter rater reliability**

Inter-rater reliability, inter-rater agreement, or concordance is the degree of agreement among raters. It gives a score of how much homogeneity, or consensus, there is in the ratings given by judges. It is useful in refining the tools given to human judges, for example by determining if a particular scale is appropriate for measuring a particular variable. If various raters do not agree, either the scale is defective or the raters need to be re-trained (Wikipedia 2012).
There are a number of statistics which can be used to determine inter-rater reliability. Different statistics are appropriate for different types of measurement. Some options are: joint-probability of agreement, Cohen's kappa and the related Fleiss' kappa, inter-rater correlation, concordance correlation coefficient and intra-class correlation.

**Pilot Study**

Designing a questionnaire is incomplete without pilot study, it is impossible even for the experts to get it right the first time round. Questionnaires must be pretested that is, piloted on a small sample of people characteristic of those in the survey. In a small survey, there might be only pretesting of the drafted questionnaire. In a large survey, there may be three phases of piloting. In the first phase we might ask each respondent in great detail about a limited number of questions: effects of different wordings, what they have in mind when they give a particular answer, how they understand a particular word, etc. In the second phase the whole questionnaire is administered by interviewers. Analysis of the responses and the interviewers’ comments are used to improve the questionnaire. Ideally, there should be sufficient variations in responses among respondents; each question should measure a different quality that is, the responses between any two items should not be very strongly correlated and the non-response rate should be low. In the third phase the pilot test is polished to improve the question order, filter questions, and layout (Branacto G, Macchina S, Sigore M, 2012).

**Final survey form:**

If the questionnaire has been subjected to a thorough pilot test, the final form of the questions and questionnaire will have evolved into its final form. All that remains to be done is the mechanical process of laying out and setting up the questionnaire in its final form. This will involve grouping and sequencing questions into an appropriate order, numbering questions, and inserting interviewer instructions.

**DISCUSSION**

**The qualities of a good questionnaire**

It is extremely significant for a *Ayurvedic* researcher to know the importance of a proper questionnaire formation and to know whether it measures what it is intended to measure. Composing of a questionnaire is always much more complex than expected. Great attention is required to its flow, format and length. Making an individual question is a tedious task and validating this questionnaire is another challenge which at times is over looked. Importance should be given on whether the questionnaire will measure quantitative or qualitative data, and what would be its mode of administration.

Considering all these views here is an attempt made to explore and explain the importance of questionnaire in *Ayurveda* through an example.

Considering the deficit in the tools for the analysis of *Satvika Prakriti*, and its importance in the maintenance of health and in treating the disease, a Questionnaire for assessing the same was designed.

To frame the questionnaire literary data is collected from all classical text books of *Ayurveda*, electronic media and web media. The collected literary information is analyzed and systematically arranged. The target respondents will be educated individuals who are apparently healthy. Sample size is decided statically.

The mode of reaching target is self administrable questionnaire for the assessment of *Satva*. This mode is selected because target sample is educated and to make the sample comfortable.

Contents of the questionnaire are decided based on the literary information available in classical text books of *Ayurveda* mainly *Charaka Samhita*.

The questionnaire was framed in a close ended Likert format with 5 options for each
question i.e always, occasionally, can’t say, no and never. Always was graded as 4, occasionally as 3, can’t say 2, no as 1 and never was graded 0.

The questionnaire consisted of statement on the characteristic features of Satvika Prakriti. The literary information regarding the features of Satvika Prakriti was converted into English for easy understanding of the characters.

The questionnaire is then subjected for validation. For this purpose the questionnaire can be subjected for content validation, face validation, construct validation and statistical tests such as internal consistency, factor analysis and inter rater reliability. Table 1 shows the questionnaire format for the assessment of Satvika Prakriti (Bhat R, 2013)

After the completion of the steps of validation, the questionnaire is subjected for further process. In case of positive validation the questionnaire is subjected for the process of final survey form. If the questionnaire is negatively validated then the questionnaire should be revised from the beginning.

CONCLUSION

A good questionnaire is one which helps the researcher to achieve the objectives, provides complete and accurate information. In Ayurveda validation of many concepts is need of the era. For the process of validation, framing a suitable tool is much more essential. In this regard questionnaire development plays a major role. In the present study questionnaire development techniques has been explained in detail. Along with this a suitable example of Satvika Prakriti assessment is also described. In total a complete ideology is given with an intension of enlightening the concept of Ayurveda through questionnaire development.

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