The Impact of Improving the Quality of Test Questions Development on the Content Validity of Examinations for PhD Students of Traditional Pharmacy: a Case Report

Homa Hajimahdipoor, PhD; Somayeh Esmaeili, PhD; Maryam Hamzeloomoghadam, PhD*

Department of Traditional Pharmacy, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

To improve the quality of the MCQs, a supervising feedback strategy between the examination constructors and the Educational Development Office of the School of Traditional Medicine was performed to evaluate the content validity and designation of the course items of the phytotherapy exam for PhD students of Traditional Pharmacy. The efforts resulted in a well-constructed examination.

Keywords: *STANDARDIZATION, MULTIPLE CHOICE QUESTIONS, TRADITIONAL PHARMACY*

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Introduction

Iran has a long standing history of Traditional Medicine with Avicenna being one of the most famous physicians/pharmacists of his time. Currently, pharmacy graduates who are interested in studying the pharmacy referred to in traditional manuscripts have an opportunity to pursue their studies for a PhD degree in Traditional Pharmacy, in Iran. To assess their knowledge multiple-choice questions (MCQ) is the most commonly used type of test items because well-constructed multiple-choice tests can be an effective, efficient, reliable and valid instrument for assessing knowledge (1). A broad content area can be assessed by using MCQs to evaluate the knowledge of the students. The main advantage is their high reliability per hour of testing mainly because they are quick to answer (2). For the written assessment, documentation of validity evidence related to the content tested is the most essential procedure and the quality of the test questions is a major contributor to test reliability (3); thus, in the present study the effect of developing well-constructed MCQs on content validity of the exams in the course of phytotherapy has been evaluated.

***Corresponding author:** Maryam Hamzeloo Moghadam, PhD. Department of Traditional Pharmacy, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Email: mhmoghadam@sbmu.ac.ir

Methods

Faculty members (PhD in Pharmacognosy) were requested by the Department of Traditional Pharmacy, to construct MCQs for assessing the knowledge of the PhD students in the Phytotherapy course. The exams included 45 MCQs, which were then presented to the Education and Development Office (EDO) of School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran, for evaluation. The EDO compared the questions with the construction of the MCQs drawn up by the National Board of Medical Examiners (4) to ascertain that the items contained no issues related to test-wiseness, irrelevant difficulty or ambiguity. The EDO evaluation report demonstrated that the questions which failed to meet the construction standards of

MCQs needed reconsideration. They contained either negative statements or none of the above options. Also, while constructing some MCQs more than one answer was correct and these were designed as both answers (a) and (b) are correct or all of the above along with single answers.

Following the report from the EDO, the exam constructors were asked to redesign the questions in line with the standard rules (4) and if necessary to exclude the defective items. The revised questions were then sent back for evaluation by the EDO. The MCQs were evaluated with regards to the parameters mentioned above; content analysis was also conducted by the experts in the content area; after approval, the questions were set for the exam. A rating scale for evaluating the exam through the eyes of the examinees, provided by the EDO were filled out by the students who took the exam; the results along with the item analysis (Discriminating and Facility Indices) were presented as feedback to the exam constructors.

This study included the students enrolled in the phytotherapy course in the second professional curriculum year.

Results

The results of the content and item analysis along with the students' ratings to the quality of the MCQs are presented in table 1.

Discussion

Assessments are a crucial component of the teaching/learning process and the major determinants of the assessment are as follows: is the content that is to be assessed; selection of suitable assessment instruments for the purpose; and adequate representation of the curriculum in the assessment material (5). Multiple-choice questions are the most common type used to assess the knowledge of the students of Traditional Pharmacy; therefore, there is a need for designing effective MCQs because flawed MCQs

Table 1. Item analysis of the MCQs of phytotherapy course (FI: Facility Index, DI: discriminating Index)

Items	Score	FI	DI
1.	8	0.83	0.33
2.	6	0.67	0
3.	9	1	0
4.	7	1	0
5.	8	0.83	0.33
6.	9	1	0
7.	8	0.83	0.33
8.	7	1	0
9.	7	0.67	0.67
10.	6	0.5	-0.33
11.	9	1	0
12.	9	1	0
13.	9	1	0
14.	9	1	0
15.	9	1	0
16.	9	1	0
17.	8	0.83	-0.33
18.	9	1	0
19.	8	1	0
20.	9	1	0
21.	8	0.83	0.33
22.	7	0.83	0.33
23.	6	0.5	0.33
24.	9	1	0
25.	4	0.5	0.33
26.	8	1	0
27.	9	1	0
28.	6	0.67	0
29.	9	1	0
30.	9	1	0
31.	4	0.33	0
32.	9	1	0
33.	8	1	0
34.	7	0.67	0.67
35.	9	1	0
36.	4	0.5	-0.33
37.	1	0	0
38.	9	1	0
39.	6	0.67	0.67
40.	9	1	0
41.	4	0.5	-0.33
42.	8	0.83	0.33
43.	3	0.33	0
44.	8	0.83	0.33
45.	6	0.67	0.67

Table 1. Average scores of the examinees gave for evaluating the MCQs

	Strongly agree 5	agree 4	No idea 3	disagree 2	strongly disagree 1
No	**Question**				**Average score**
1	The term "none of the above" had not been used as an option.				5
2	The term "all of the above" had not been used as an option.				5
3	The item could be answered without looking at the options.				3.4
4	The exam did not include negatively phrased items.				4.6
5	The items were designed according to the previously introduced references.				4.2
6	There was no ambiguity in the items.				4
7	All options of an item were homogeneous.				4.4
8	Each item possessed one option that was the best answer.				4.4
9	The stems were not tricky or unnecessarily complicated.				4.6
10	The questions could not be answered just by guess and chance.				4.7

interfere with accurate and meaningful interpretation of the test scores and negatively affect the student pass rates. Hence, to develop reliable and valid tests, only items free from flaws must be constructed (6). There is a common perception that the MCQs can only evaluate lower levels of thinking while fill-in-the-blank, short answer or essay type questions are necessary to assess higher levels of thinking. However, several publications have documented that the MCQs can successfully be used to test even higher cognitive levels (7).

The content analysis results of our study demonstrated that all the aspects of phytotherapy were covered while examining the students with 15.5, 15.5, 11.1, 22.2, 4.4, 6.6, 13.3 and 11.1%, regarding the medicinal plants which were used in CNS, cardiovascular, respiratory, gastrointestinal, urinary, gynecological, immune and skin/trauma/pain disorders according to the curriculum, respectively. As most part of the course included the study of medicinal plants used in gastrointestinal disorders (compared with the other categories), the maximum number of questions had been constructed from this aspect. The distribution of questions seemed rational with regards to the curriculum and all aspects had been covered. Regarding the content analysis outcomes, and also considering that the questions had been evaluated prior on test-wiseness, irrelevant difficulty and ambiguity issues, as well as standards of designing the MCQs by the EDO [which was also acceptable from the students' perspective (Table 2)], it could be concluded that acceptable content validity was evident in assessing the knowledge of phytotherapy by the students of Traditional Pharmacy who faced the exam.

The results of the item analysis and FI revealed that all of the students had answered 51% of the questions; also the facility index for 31% of the questions lay between 0.6-0.9 (implying easy questions). Of the 18% remaining questions, the FI for 15.5% was between 0.3-0.6, which implied that the questions were of moderate difficulty and there was one question that none of the students had answered. The discriminating index for only 8.8% of the MCQs was in the acceptable range of discriminating students (0.5-0.75). On completing the analysis,

feedback was sent to the exam constructors. As the examiners believed that their questions were not ***as*** easy as revealed by the results of the item analysis, the issue raised was "why did the FI for 82% of MCQs reveal easy questions and why were only 8.8% labeled discriminative?" It should be taken into consideration that the exam was given to PhD students who had sufficient motives for studying their lessons; therefore, it was suggested that most of the examinees were above average. Another issue was also raised regarding the few numbers of students who took the exam which weakened the reliability of the statistics. It was therefore, concluded that in the case of few numbers of examinees, the FI and DI might not be good parameters for evaluating the analysis and other factors need to be introduced. Regarding the validity of the exams, evaluating the content aspect and the supervision of the standard designation of questions by the EDO could lead to an improvement in the quality of the examinations and their validity, which was suggested to be generalized for all other programmed exams. The results were based on the course of Traditional Pharmacy in Phytotherapy.

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