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General Article

"What do Ayurveda Postgraduate Entrance Examinations actually assess?" – Results of a five-year period question-paper analysis based on Bloom's taxonomy

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ABSTRACT

Background: The standards of Ayurveda education in India are being questioned in the recent years and many suggestions related to educational reforms are being put forth by educators and health policy experts. However, the Post Graduate Entrance Examinations (PGEEs) that are carried out to select the candidates to pursue postgraduate programs have received little attention in this context.
Objectives: The objective of this study was to classify the Multiple Choice Questions (MCQs) from Ayurveda PGEEs conducted in different universities of India during the five year period (ranging from 2010 to 2014) into six levels of Bloom's Taxonomy in cognitive domain.
Methods: This is a retrospective observational study. The sampling method followed was purposive sampling. Totally, 3299 MCQs obtained out of 25 question papers from seven universities spread across four zones of India (North, South, West and East) were included in the study and were classified based on the Bloom's taxonomy.
Results: About 93.3% of MCQs assessed only the 'recall' component whereas 6.2% of the MCQs assessed 'comprehension'. Percentage of MCQs that assessed 'application' level was a mere 0.3% whereas the percentage of MCQs that assessed the 'analysis' component was found to be only 0.2%. There was not even a single question to assess the 'synthesis' and 'evaluation' components.
Conclusions: We conclude that an appropriate proportion of MCQs assessing 'higher order thinking' are required to be included in Ayurveda PGEEs. While it is possible to frame MCQs to assess all six levels of Bloom's taxonomy in cognitive domain, the teachers are required to be trained well in the skills of MCQ writing. We propose that our study may be taken as a lead to introduce the required reforms in PGEEs.
Clinical Trial Registration No.: Not applicable.

1. Introduction

A postgraduate medical entrance examination (PGEE) is the qualifying examination that is offered to the medical graduates willing to get enrolled in postgraduate programs. Any PGEE that aims at selecting candidates with highest academic and professional excellence must incorporate different measures to evaluate the knowledge (cognitive domain), skills (psychomotor domain) and attitudes (affective domain) of an aspirant. Various methods of assessment have been employed from time to time by institutions and universities across the globe to fulfill these expectations [1]. In India, however, thinking abilities of the candidates in the cognitive domain (knowledge) alone are mostly evaluated in all kinds of PGEEs. Multiple Choice Questions (MCQs) are the usual kinds of items that are presented in these examinations to accomplish this objective. It is generally presumed that MCQs, if framed carefully, can assess one's thinking skills in all the six levels of knowledge domain, namely, 1. Recall, 2. Understanding, 3. Application, 4. Analysis, 5. Creation (Synthesis) and 6. Evaluation

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[2]. These levels actually represent the degrees of difficulty: i.e., the lower levels being simpler and higher levels being more complex and difficult. This categorization of levels from lower order to higher order in the knowledge domain is one of the vital components of Bloom's taxonomy. Bloom's taxonomy of educational objectives happens to be one of the most often used models while designing the different training, learning and examination methods. It was created in 1956 under the leadership of educational psychologist Dr. Benjamin Bloom in order to promote higher forms of thinking in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts [2–4]. Though there are many arguments highlighting the limitations of MCQs, they are the most commonly used testing items for undergraduate and postgraduate medical entrance examinations. It is generally accepted that MCQ testing is an efficient, objective and reliable way of assessing the abilities in the cognitive domain.

However, in the current scenario of Ayurveda education, the picture appears to be quite different. During the postgraduate education (after completing which, the students become eligible for teaching assignments), the evaluation and assessment skills do not form a part of training in general [5]. Further, there exists no formal mechanism to train Ayurveda teachers in framing MCQs. A few of the previous studies have shown that graduate level of Ayurveda education is more 'memory-oriented' than being competence based [5–8]. Therefore, the kind of postgraduate scholars who get enrolled in different institutions through competitive process often may not meet the expected levels of academic and professional excellence. Keeping this possibility in view, the present study was conceptualized to evaluate the quality of various PGEE question papers.

2. Objective of the study

We conceived the present study with an objective of evaluating the levels of thinking skills that are actually assessed through MCQs in different PGEEs of Ayurveda, conducted in different universities across India.

3. Study design

This is a retrospective observational study aimed at evaluating the Ayurveda PGEE question papers of last five years (2010–2014).

4. Sampling and data collection

The kind of sampling method followed in this study was purposive sampling. We divided India into four conventional zones: North, West, East and South. These were the strata from where we selected different universities. We consulted the online repositories of PGEE question papers such as www.ayurvedpg.com and www.liveayurved.com, and also the specific websites of different universities spread across India, to access the authentic papers. We ensured the authenticity of the question papers by choosing to include the original scanned copies only. We did not include the various 'PG Entrance Guides' available in the market deliberately because the authenticity of the question papers given in these books is often unreliable.

The total number of questions presented in PGEEs in different universities was not constant; it varied from 80 (in Jodhpur Ayurveda University – JAU) to 250 (in Maharashtra University of Health Sciences-MUHS) per year. However, except for MUHS, the average number of questions being presented per year was between 100 and 200 in most of the universities. The guiding principle followed in this study was either to have full sets of question papers for five years from each zone (North, South, West and East), or, to have at least 700 questions for five-year period from each zone. (The number 700 was arrived at after taking the average of 100 and 200 questions, i.e., 150 questions per year for 5 years, and then allowing a deletion rate of 10 questions per year for possible ambiguity). Whenever we could not access the full sets of question papers from a single university for 5 years, we clubbed those question papers with other universities in the same zone so that we could achieve our target number. Finally, seven different universities spread across North, West, East and South zones of India were shortlisted: Banaras Hindu University (BHU), Dr. Sarvapalli Radhakrishnan Rajasthan Ayurveda University (DSRRAU), Gujarat Ayurveda University (GAU), Maharashtra University of Health Sciences (MUHS), Rajiv Gandhi University of Health Sciences (RGUHS), University of Jammu (UJ), and Uttarakhand Ayurveda University (UAU).

5. Assigning the level in the cognitive domain of Bloom's taxonomy

Though the prescribed 'action verbs' were taken into consideration during this exercise to assign the 'Bloom's taxonomy level', they did not serve the purpose completely since we were assessing only MCQs. Therefore, a group of two investigators, previously trained in the concept of Bloom's taxonomy, read out aloud each of these MCQs and came to a consensus unanimously regarding the level of thinking skills the particular MCQ assessed. Whenever there was a lack of consensus, a higher level was agreed upon among the two levels proposed. Ambiguous and incorrect MCQs were eliminated during the process. Finally, a total of 3299 MCQs were included and were assessed.

6. Data characteristics

Table 1 shows the details of zonal distribution, number of questions, number of question papers, and the specific universities that were included in the study. It also shows the number of questions included in each year as per different universities in each zone.

7. Results

7.1. MCQs according to Bloom's taxonomy

The Table 2 shows the assigned Bloom's taxonomy levels of the studied sample of questions. Table 3 shows the number and percentage of questions in each level. We observed that out of 3299 MCQs, 3079 (93.3%) assessed only the 'Recall' component (level-1) and 204 (6.2%) MCQs assessed 'Comprehension' component (level-2). The percentage of MCQs that assessed 'Application' (level-3) was only 0.3% (11), whereas the percentage of MCQs that assessed the 'Analysis' component (level-4) was a mere 0.2% (5). It may be noted that there was not even a single question to assess the 'Synthesis' and 'Evaluation' (level-5 and level-6) components for the entire five-year period in our sample.

7.2. Other relevant observations

We observed that 78.9% of the questions were from Ayurveda subjects and 21.1% were from the current biomedical sciences. Among Ayurveda subjects, a significant number of questions were from *Chikitsa* (14.5%), *Siddhanta* (11.3%), *Dravyaguna* (8%), *Shaarira* (7.5%) and *Vikriti Vijnyana* (7.1%). The subjects that contributed most to the 'biomedical sciences' category were Medicine (5.6%), Physiology (3.8%), Anatomy (2.7%) and Surgery (2.5%). However, it was interesting to note that only 2.5% of questions were related to the