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Original Research Article

Descriptive analysis of theory examination question papers of 2nd MBBS pharmacology of Krantiguru Shamji Krishna Verma Kachchh University (Gujarat)

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ABSTRACT

Background: The Question Paper is the most important tool of theory exam examination. An attempt was made to assess the pharmacology question papers of university examination in accordance with their guidelines. To assess the pharmacology theory question papers for content validity, area of importance and to test the level of cognitive domain.
Methods: Twenty four papers of university comprising 695 questions after preparing 520 learning objective were analysed. All questions were analysed for coverage of different subdivision of Pharmacology and marks allotted to them, type of taxonomic level of each question asked on the basis of verb use and percentage of question asked from area of importance.
Results: It was observed that 18.40% weightage of marks given to general pharmacology and least .67% for immunosuppressant in paper I whereas in paper II, 34.90% for antimicrobial agents. About 84% questions were asked from must know area, 8.07% from nice to know area and 7.90 from desirable to know area. In paper I, 92.08% of the questions were to test factual recall (Bloom level I), remaining 07.93% were reasoning type but in other paper verbs were used to test only lower cognitive domain.
Conclusions: All the sub-divisions of pharmacology were not covered in each theory assessment. Majority of questions were asked to test lower level of cognitive domain. Theory question papers should be designed to give proper weightage to whole subject area. Blue printing of theory question papers is absolutely necessary.

Keywords: Blue printing, Cognitive domain, Pharmacology, Question paper

INTRODUCTION

The assessment is one of the key motivator to learn and learning patterns that makes it vital for successful outcome of any educational system. Evolution System rather than education objective, curriculum or teaching techniques have intense impact on students learning.[1] The quality of medical education is complex and changing and can be analogous to medical care.[2,3] The teaching learning methods in medical education are focus on all three domains Cognitive (Knowledge), Psychomotor (skills) and Affective (growing emotion and attitude) as mentioned in by Broom's taxonomy. Prerequisite Knowledge is essential for performing must know skills and developing good attitudes which will ultimate improve patient care. The most acceptable assessment methods should assess all three domains. There are mainly three assessment methods are used to assess medical students in our country which include theory for cognitive domain, Viva and practical for skills and attitude. Convincing evaluation system should be mixture of all three.[4] Theory written exam is assessment methods of evaluating different level of knowledge. Millar pyramid also reflects that knowledge and competence are

best assessed by written test.[5] The question Papers is the only tool for theory examination and framing and construction of questions are the most important component of it. So it should satisfied at least these parameters which include Validity (extent to which a test truly measures what it is supposed to measures) reliability (the degree of consistency with which a tool measures what it supposed to measure), objectivity (the extent to which two or more examiners agree on correct answer) and be able to assess the given number of examinee in proper and unbiased ways in the available resources in that system.

In present study, analysis of question paper of theory examination was done in accordance of university guideline related distribution coverage of subtopic, area of importance according to must now, nice to know and desirable to know, type of questions asked in respect reasoning and recall question and verbs used as per modified Bloom's taxonomy in questions.

METHODS

Theory question papers of Krantiguru Shamji Krishna Verma University, Kachchh (Gujarat) of 2nd MBBS Pharmacology Subject were analysed retrospectively. University conducted two examinations per year and written theory examination has two papers (paper I and paper II).Each Paper has three sections in which section I has MCQ questions of 10 marks. Remaining three sections have Short essay question and Short Question of 30 marks and optional question has weightage of 18 marks. In present study we have analysed other than Multiple choice question including optional question which having weightage of 48 marks in each paper.

Retrospective analysis of written pharmacology question papers was done on the following heading

The coverage of different subdivision of pharmacology

It was based on the basis of MCI and University Syllabus of Pharmacology and Learning Objectives were prepared purely on undergraduate books (e.g. Principles of Pharmacology) used for our medical students.

Type of taxonomic level of each question to be tested and marks allotted to them

It was done on the basis of key verb were used as per Bloom's Hierarchy of cogitative learning Type I (Knowledge), Type II (Comprehension, application) and Type III (analysis, synthesis and evolution). In present study we had put recall for knowledge and reasoning for comprehension analysis, synthesis and evaluation.

Distribution questions and marks from core area of subject

Number of questions and distribution of marked were asked from must to know area, desirable to know and nice to know area. All drugs which were used for treatment of common diseases, associated with national program and topic essential for understanding concept of pharmacology kept in "Must Know Area".

Statistical analysis

Question papers were analysed and data was prepared on Microsoft excel sheet. Descriptive statistics was used to analyse the result.

RESULTS

The Question papers of the second MBBS Pharmacology theory university exam from 2011 to 2016 were analysed. A total of 24 set of question papers were analysed. Total questions in both paper I and II including its variable parts and subdivision (describe uses and side effects of cephalosporin were counted two questions) were 695.

Table 1: Questions asked from learning objectives in pharmacology paper I.

No	Topic distribution as per university syllabus	Learning objective	Total questions asked from learning objective from 2011 to 2016	Mean questions asked from learning objective
1	General pharmacology	62	57	4.75
2	Drug acting on autonomic nervous system	44	61	5.08
3	Drugs acting on renal system	14	28	2.33
4	Drugs acting on cardiovascular system	51	51	4.25
5	Drug acting on CNS	60	55	4.58
6	Drugs acting on PNS (Local anaesthetics and skeletal muscle relaxants)	15	31	2.58
7	Autacoids and drug therapy of inflammation; Drug therapy of Rheumatoid arthritis and Gout;	28	39	3.3
8	Gastrointestinal drugs	16	41	3.42
9	Immunosupprasant	4	8	0.67
10	Chealting agent	6	13	1.08

Table 2: Questions asked from learning objectives in pharmacology paper II.

No	Topic distribution as per university	Learning objective based on university syllabus	Total questions asked from learning objective from 2011 to 2016	Mean questions asked from learning objective
1	Chemotherapy: Antimicrobial agents	48	42	3.50
2	Anticancer drugs;	6	18	1.50
3	Chemotherapy of common Infections and parasitic diseases	68	74	6.17
4	Vitamins	6	3	0.25
5	Drugs used in Endocrine disorder and Hormone Contraceptives	44	60	5
6	Drugs used in Respiratory diseases	13	18	1.5
7	Drugs acting on uterus	6	17	1.42
8	Drugs acting on blood and blood forming organs	21	46	3.8
9	Pharmacology of skin	4	18	1.5
10	Immunomodulators and Others	4	15	1.25

Table 3: Percentage means marks that were asked in given topic (pharmacology paper I).

No	Topic distribution as per university	Jan-11	Apr-11	Jan-12	Apr-12	Jan-13	Apr-13	Jan-14	Apr-14	Jan-15	Apr-15	Jan-16	Apr-16	% Mean
1	General pharmacology	16.67	16.67	25.00	12.5	16.67	16.67	20.83	12.50	20.83	12.50	25.00	25.00	18.40
2	Drug acting on autonomic nervous system (ANS)	25.00	6.25	8.33	10.42	25.00	12.50	8.33	10.42	10.42	12.50	8.33	8.33	12.15
3.	Drugs acting on renal system (diuretics)	4.17	12.50	6.25	6.25	4.17	8.33	0	6.25	6.25	6.25	4.17	4.17	5.73
4	Drugs acting on cardiovascular system	4.17	14.58	8.33	20.83	4.17	8.33	14.58	12.50	29.17	16.67	25.00	20.83	14.93
5	Drug acting on CNS,	18.75	16.67	8.33	16.67	18.75	16.67	20.83	16.67	8.33	14.58	6.25	14.58	14.76
6	Drugs acting on PNS (Local anaesthetics and skeletal muscle relaxants)	8.33	8.33	8.33	0	8.33	10.42	16.67	8.33	0	8.33	8.33	8.33	7.81
7	Autacoids and drug therapy of inflammation; Drug therapy of rheumatoid arthritis and gout;	6.25	18.75	18.75	12.50	6.25	16.67	10.42	12.50	12.50	12.50	12.50	8.33	12.33
8	Gastrointestinal drugs	4.17	6.25	16.67	16.67	4.17	6.25	8.33	16.67	8.33	12.5	10.42	10.42	10.07
9	Immunosupp-rasant	8.33	0	0	0	8.33	0	0	4.17	4.17	4.17	0	0	2.43
10	Chealting agent	4.17	0	0	4.17	4.17	4.17	0	0	0	0	0	0	1.39
11	others	0		0	0	0		0	0	0	0	0	0	

In paper I, maximum no of questions were asked from drug acting on Autonomic Nervous System (5.08) followed by General Pharmacology (4.75), drug acting on Cardiovascular System whereas in paper II, maximum number of questions were asked from chemotherapy of common infection and parasitic disease (6.17) and General Antimicrobials Agent (3.5) followed by drug used for endocrine disorder and hormonal contraceptive act as shown in Table 2. Total questions asked from antimicrobial drugs were 10.67.

Percentage of mean marks asked from each topic of paper I and Paper II have shown in Table 3 and 4 respectively. It was observed that maximum weightage of percentage marks for general pharmacology (18.40) and least for immunosuppressant (0.67) in paper one whereas in paper II maximum weightage given on antimicrobial agents 34.90%. This topic was divided into two broad heading which were chemotherapy of common infection and parasitic disease and antimicrobial agent which were weightage of 22.40% and 12.50 % respectively. Other preferred topics in paper II were drug acting endocrine disorder and hormonal contraceptive (23.96%), drugs acting on blood and blood forming organs (11.46%) and surprising immunomodulator including other (9.89%). Pharmacology of skin (5.56) had given more weightage than drug acting on respiratory diseases (4.17%). It was also observed that there was not any question was asked from major topic like respiratory in April 11, Jan 12,Jan 13 and Apr 16, Vitamin in April 11, Jan 13,Jan 14, April 14 and April 16. It was also seen for drug acting on uterus and anticancer agents. Excessive weightage was given on immunomodular and others topic particularly in April 13 which was 14.58% in paper one. It was also observed that only 4.17% weightage given on drug acting on cardiovascular system in Jan-11 whereas 29.17% in Jan -15. These types of variation were observed in several instant in both paper as shown in Table 3and Table 4.

Table 4: Percentage means marks that were asked in given topic (pharmacology paper II).

No	Topic distribution as per university	Jan-11	Apr-11	Jan-12	Apr-12	Jan-13	Apr-13	Jan-14	Apr-14	Jan-15	Apr-15	Jan-16	Apr-16	%Mean
1	Chemotherapy: Antimicrobial agents	8.33	18.75	6.25	8.33	10.42	12.5	14.58	10.42	8.33	8.33	20.83	22.92	12.50
2	Anticancer drugs;	6.25	6.25	6.25	6.25	6.25	0.00	4.17	0.00	4.17	4.17	0.00	0.00	3.65
3	Chemotherapy of common Infections and parasitic diseases	20.83	20.83	20.83	22.92	20.83	31.25	25.00	29.17	16.67	22.92	12.50	25.00	22.40
4	Vitamins	4.17	0.00	8.33	4.17	0.00	6.25	0.00	0.00	0.00	6.25	6.25	0.00	2.95
5	Drugs used in Endocrine disorder and Hormone Contraceptives	27.08	25	25.00	25.00	27.08	16.67	18.75	18.75	22.92	27.08	29.17	25.00	23.96
6	Drugs used in Respiratory diseases	6.25	0	0	4.17	0	6.25	8.33	4.17	8.33	0	6.25	6.25	4.17
7	Drugs acting on uterus;	4.17	4.17	0	4.17	4.17	0	0	4.17	4.17	4.17	6.25	6.25	3.47
8	Drugs acting on blood and blood forming organs	8.33	14.58	20.83	10.42	16.67	6.25	12.50	12.5	10.42	8.33	8.33	8.33	11.46
9	Pharmacology of skin	6.25	6.25	4.17	4.17	4.17	6.25	12.50	12.5	0	6.25	4.17	0	5.56
10	Immunomodulators and Others	8.33	4.17	8.33	10.40	10.42	14.58	4.17	8.33	25	12.50	6.25	6.25	9.89

Analysis of percentage of questions was asked from area of importance also done as shown on Table 5. It was observed that 83.88% of questions were asked from must know area, 8.07% from nice to know area and 7.90 from desirable to know area. . Analysis of question papers for cognitive domains showed 100% questions were tested from Boom's Level I in paper I of 2016 and all the year of which analysis done of Paper II. So it is not shown in tabular form. But in paper I, question papers tested for cognitive domains showed 92.08 of the questions tested factual recall (Bloom level I), remaining 07.93% tested data interpretation and critical evolution were reasoning type (Boom's II and III) as shown in Table 6. The highest percentage of reasoning type question was in 2012. All

questions were short answer type questions and from learning objectives of undergraduate syllabus. Questions from immunosuppressant and stimulant subdivision were asked in both paper but university has mentioned it only paper II syllabus.

Table 5: Percentage of questions was asked from area of importance.

University exam		Must to know area	Nice to know area	Desirable to know area
Jan 2011	Paper I	87.50	4.17	8.33
	Paper II	89.58	6.25	4.17
April 2011	Paper I	91.67	8.33	0
	Paper II	79.17	12.50	8.33
Jan 2012	Paper I	87.5	8.33	4.17
	Paper II	81.25	8.33	10.42
April 2012	Paper I	91.67	4.17	4.16
	Paper II	83.33	2.08	14.58
Jan 2013	Paper I	81.25	6.25	12.50
	Paper II	81.25	4.17	14.58
April 2013	Paper I	91.67	4.17	4.17
	Paper II	79.17	12.50	8.33
Jan 2014	Paper I	81.33	8.33	8.33
	Paper II	75.00	16.67	8.33
April 2014	Paper I	81.33	8.33	8.33
	Paper II	87.50	8.33	4.17
Jan 2015	Paper I	91.67	4.17	4.17
	Paper II	87.50	8.33	4.17
April 2015	Paper I	79.17	12.50	8.33
	Paper II	83.33	8.33	8.33
Jan 2016	Paper I	70.83	16.67	12.50
	Paper II	93.75	0	6.25
April 2016	Paper I	85.42	4.17	10.42
	Paper II	70.83	16.67	12.50
% Mean		83.88	8.07	7.90

Table 6: Percentage reasoning and recall type questions.

Year	Reasoning	Recall
2011	95.83	4.17
2012	85.42	14.58
2013	95.83	4.17
2014	87.50	12.5
2015	95.83	4.17
2016	-----	------
% mean (Except 2016)	92.08	7.92

DISCUSSION

The process of education should bring desirable change in the behaviours of learner. Acquisition of knowledge and evaluation are important component of it. Sound knowledge of theoretical subject has major influence on acquiring prerequisite skills. Written assessment in medical college is one of the major methods and question paper is major tool in the scheme of evolutions.[6] By keeping these things in mind we had evaluated theory question paper of pharmacology paper of university examination. It was noticed from result of analysis question papers that weightage of marks distribution of different subdivision of pharmacology was not uniform per year wise although mean percentage has been reflecting adequate coverage of each subdivision in Table 1, 2, 3 and 4. University has clear cut guideline regarding syllabus and their marks distributions in each section wise in spite of these in our study no question was asked on drug acting on renal system in Jan-14, more weightage on drug acting on cardiovascular system in Apri-12, Jan-15, Jan-16 and April-16. There was zero weightage of drug acting on peripheral nervous system Jan-12. The Variation of weightage of marks distribution was more observed in paper II as well in which drug acting on respiratory system missed in Apri-11, Jan-15, April-15 and drug acting on uterus was missed in Jan-12, April-13 and Jan-15. Difference of weightage of marks was also observed year wise in other topic also. More weightage was given on immunomodulator and other topic which need lesser attention. Immunosuppressant was asked in many times in paper I in spite of this topic supposed to be asked in paper II only. A study was conducted at Goa medical college observed that distribution marks were compare to our study as 15.20% vs 18.40% for general pharmacology, 12.05% vs 25.28 % for drug acting to autonomic nervous system but less variation distribution of marks in endocrine (22.40% vs 23.96%), chemotherapy (33.50 vs. 34.90%) and diuretics (5.82% Vs 5.72%).[7] Deviation marks distribution in different subdivision and year wise were observed due to difference in opinion of question setter or examiner. Each examiner has own favourites topic and selected questions from it. Adkoli stated that weightage to the content areas is a delicate issue on which even the experts often differ in opinion and weightage of various topics depended mainly on the examiners own judgment.[8] Similar studies regarding distribution of marks in different topic in other subjects in Rajasthan and Pondicherry and in pharmacology subject also reflect urgent need of guidelines for proper distribution of weightage to the content areas.[7,9,10] The adequate coverage of the course content is necessary for the validity of assessment.[11] The content validity is the most important type of validity. McAleer stated that "the content validity refers to the extent to which a test or examination actually measures the intended content area.

Blueprinting of entire syllabus is necessary for content validity. Blueprinting refers to the process where test content is carefully planned against the learning objectives.[12]

All questions were asked from content of learning objective which prepared on the basis MCI curriculum. In this regard result of present regarding weightage of different subdivision better than previous study

conducted for anatomy subject.[11] David also stated that the examination should be designed to assess the individual candidate's ability to meet the course objectives or curriculum outcomes and should cover the main content of the course.[13]

We also observed that 83.88% of questions were asked from must know area, 8.07% from nice to know area and 7.90 from desirable to know. In some of the year question asked from must know area about 71%. There are differences of opinion among teacher regarding how much weightage given to area importance. MCI has recommended that the ratio of "must know": "may know": "desirable to know" would be 6:3:1 on a 10 point scale and 60:30:10 on a 100 point scale. Our results had much difference in reference to current guideline.[14]

Modified Bloom's taxonomy identifies hierarchy of cognitive learning which are decided by the basis of use of verb in question. Level I denote knowledge, level II compression and application and level III synthesis and evolution. In present study we had analysed on two heading recall questions (level I) and reasoning question (level II and level III) Usage of verbs is the one of the most important constituent of a performance objective as it identifies what the learner must do to meet the objective.[15] We found that verb use in all questions was restricted to only factual recall or test primary level of cognitive domain in paper II and both papers I of 2006 whereas in paper I, 92.08% questions were set to test Level I and 7.92% of questions were reasoning type which used to test higher level of cognitive domain. Lower percentage of questions to test higher cognitive domain may be due to unavailability of guideline regarding it or not required for undergraduate students.

Limitation

As the parent university curriculum does not have different subdivision of learning objective of pharmacology subject and blueprinting so the analysis was done using MCI resources and books. Unable to discuss present result due to unavailability of adequate research articles in pharmacology subject. The blueprinting and table of specification are efficient methods to coordinate the test-Construction process and may be the most important step in test development.[16]

CONCLUSION

Study results shows that all the sub-divisions of pharmacology were not covered in theory assessment as per weightage of the area each university examinations.

Majority of questions were asked to test lower level of cognitive domain.

Adequate distributions of question were not as per recent guideline of area of importance.

Theory question papers should be designed to give proper weightage to whole subject area.

Blue printing and table specification are absolutely necessary for theory question papers and should be made available for examiner.

University and MCI should provide the proper blueprinting guidelines of the theory questions papers to improve its content validity.

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REFERENCES

1. Lorin W, David R. A taxonomy for Learning, Teaching, and Assessing. New York: Longman, 2001.
2. Bloom B, Englehart M, Furst E, Hill W, Krathwohl D: Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain. New York, Toronto: Longmans, Green; 1956.
3. Schuwirth LW, van der Vleuten CP. Different written assessment methods: what can be said about their strengths and weaknesses? Med Educ. 2004;38:974-9.
4. Ananthkrishan N, Sethuraman KR, Santosh K. Medical education-Principles and Practice. Pondicherry; Alumni Association of National Teacher Training Centre; 2000:117.
5. Miller GE. Educational strategic for the health professions. In: Development of educational programmes for the health professionals. WHO Public Health; 1973:52.
6. Buckwalter JA, Schumacher R, Albright JP, Cooper RR. Use of an educational taxonomy for evaluation of cognitive performance. J Med Educ. 1981;56(2):115- 21.
7. Narvekar RS, Bhandre NN, Bhandare PN. Analysis of undergraduate pharmacology question paper at Goa Medical College as regard to their content area. Int J Sci Rep. 2016;2(8):182-6.
8. Adkoli BV. Attributes of a good question paper. In: Sood R, chief editor. Assessment in medical education trends and tools. New Delhi: K. L. Wig Center for Medical Education and Technology; 1995:73-6.
9. Rohin G, Dhiraj S, Sushila S, Neha D. Analytical study of written examination papers of undergraduate anatomy: Focus on its content validity. IJBAMR. 2013;2(8):1110-6.
10. Ananthakrishnan N, Ananthakrishnan S, Oumachigui A. MBBS examinations are we asking the right questions. J Postgrad Med. 1993;39:31.

11. Sultana R, Shamim KM, Nahar L, Hasam F. Content Validity of Written Examination in Undergraduate Anatomy; Bangl J of Anat. 2009;7(1):14-8.
12. Rohin G, Dhiraj S, Sushila S, Neha D. Analytical study of written examination papers of undergraduate anatomy:Focus on its content validity. IJBAMR. 2013;2(8):1110-6.
13. Davis MH. Constructed response questions. In: Dent JA, Harden RM, editors. A practical guide for medical teachers. Edinbergh: Churchill Livingstone; 2001:326-335.
14. MCI Minutes of Meeting available at http://www.mciindia.org/meetings/EC/2015/ECMN-02.03.2015.pdf
15. Feletti GI. Reliability and validity studies on modified essay questions. J Med Educ. 1980;55(11):933-41.
16. Patrick D. Bridge, Joseph M, Robert F, Thomas R, Shlomo S. Measurement practices: methods for developing content-valid student examinations. Med Teach. 2003;25(4):414-21.

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