Evaluation of pattern and duration of university question papers in anatomy
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Abstract:
Background and objectives: Assessment drives learning. Theory summative assessment must be aligned to curricular goals. There is wide disparity in the total marks for which the examination is conducted and total duration of time of examination. The main objective of this study is to report differences in summative assessments in anatomy subject conducted by universities with respect to maximum time, maximum marks, syllabus distribution of papers, assessment of diagram drawing abilities and emphasis on clinical anatomy.
Methodology: During August 2018, an extensive search for the syllabus/curriculum document will was in the internet. In the respective university websites, the document with names 'MBBS syllabus' or possible documents with syllabus details of medical undergraduate anatomy subject were searched. Results: Information from 25 different universities conducting undergraduate MBBS degree programs were evaluated. Out of these universities, sixteen universities conduct summative exam for 3 hours. Eight universities conduct exams for 2.5 hours. State universities of Punjab, Gujarat, Madhya Pradesh, Kerala and Tamil Nadu conduct anatomy exams for 50 marks with 3 hour duration. Whereas, state universities of Andhra Pradesh, Maharashtra, Assam and Odisha conduct exams for 50 marks in 2 ½ hours. JIPMER, Pondicherry has two-hour exam for fifty marks. Only Karnataka universities [including Rajiv Gandhi University of Health Sciences and three other deemed to be universities] and All India Institute of Medical Sciences, Rishikesh conduct exams for 100 marks in 3 hours. Twenty-one universities have above diaphragm syllabus in paper 1 and below diaphragm in paper 2.
Conclusion: It is the need of the hour to have a uniform, structured, objective and rationale summative assessments in anatomy

Introduction
Assessment drives learning. Summative assessments at the end of first professional MBBS heralds an important landmark in a medical student life. A ‘pass’ makes a beautiful medical carrier, and ‘fail’ leaves an ugly ‘additional batch’ mark. Meanwhile, many medical universities have come up with immediate supplementary exams to do away with the concept of additional batch.

Medical Council of India has specified general directions for conducting summative examinations at the end of first, second and final professional courses during medical under graduation. State universities and private deemed universities have deployed different methods to enforce these guidelines. Summative examinations at the end of courses varies widely. General guidelines by MCI has two components of assessment – theory and practical examination. Even though, in many universities, theory exams mainly assesses the writing skill of a student in a given time limit, the quantity and quality of writing differs.

In anatomy subject, there are different subdivisions – general anatomy, gross anatomy, general and systemic histology, general and systemic embryology, neuroanatomy and genetics. In gross anatomy, MBBS course, is region wise – with upper limb, lower limb, thorax, abdomen, pelvis, head and neck. As the summative examination is conducted in two papers, these divisions find place in either paper 1 or paper 2. Generally, topics of paper 1 do not overlap with topics of paper 2, though exceptions are not unheard. A student has to secure 50% marks in the summative assessment to pass. Scoring such minimum marks entitles him to progress to the next level in medical undergraduate program.

Theory summative assessment must be aligned to curricular goals. To establish such a relation, the assessment method must equally represent the
components of objectives. There are no guidelines provided this apex body for summative assessment theory question paper. This resulted in arbitrary division of topics between two papers. The theory summative examination, in most of the universities is largely limited to assessment of gross anatomy concepts. Only 10 to 20% marks are allotted to histology and embryology concepts. As assessment drives learning, there is a possibility that the learner may fail to appreciate the concepts from less represented topics in assessment.

Gross anatomy is further divided into upper limb, lower limb, thorax, abdomen, pelvis, head and neck. Upper limb and lower limb are phylogenetically, functionally, and developmentally similar. Clubbing these two entities in one question paper leads to undue representation of limb anatomy alone. This also leads to combining head and neck [with neuroanatomy] with either thorax or abdomen and pelvis, leading to content heavy question paper.

There is wide disparity in the total marks for which the examination is conducted and total duration of time of examination. Widely, three hours examination is conducted for fifty marks. However, there are universities conducting three hours examinations for hundred marks. Irrespective of whether, these differences in maximum marks can result in assessment that is more accurate or not – the intention of this study will be to note and report such differences.

There are many studies reporting content validation of question papers from specific universities. There are reports of content validation in microbiology [Rajiv Gandhi University of Health Sciences] Pharmacology [Krantiguru Shamji Krishna Verma Kachchh University], Biochemistry [Maharashtra University of Health Sciences] and in anatomy [Rajasthan University of Health Sciences]. A study evaluating pathology question papers from Rajasthan university reports that syllabus distribution is highly skewed because of clubbing general and systemic pathology topics in one paper. However, there are no reports comparing the maximum duration and maximum marks compilation across the universities.

The main objective of this study is to report such differences in summative assessments in anatomy subject conducted by universities with respect to maximum time, maximum marks, syllabus distribution of papers, assessment of diagram drawing abilities and emphasis on clinical anatomy.

As anatomy is structural study, it is natural that the summative assessment should also assess diagram-drawing abilities of a student. Student must be able to draw simple line diagrams to explain the structure and 'at risk' relations. There are universities, which have given importance to this competency and explicitly included the questions exclusively concentrating on drawing diagrams. In this study, an attempt will be made to report the number of universities that have included the diagram drawing skill assessment in their summative assessments with the marks allotted to it.

Methodology

During August 2018, an extensive search for the syllabus/curriculum document was made in the internet. The names of Indian medical universities were obtained from official medical council of India website – mciindia.org from the link that lists medical colleges offering MBBS courses. In the respective university websites, the document with names 'MBBS syllabus' or possible documents with syllabus details of medical undergraduate anatomy subject were searched. The following information regarding first professional MBBS exam of anatomy subject were obtained from those documents.

- Duration of exam, number of papers, maximum marks in each paper, marks allotted for viva, practical examination, internal assessment
- Paper division – paper 1 syllabus and paper 2 syllabus
- Number of non-structured and structured long essay [with maximum marks], number of MCQs [if any, with marks], number of diagram alone questions [with marks];
- Specific comments like – maximum and minimum allotment of marks for clinical anatomy were noted.

This information was cross checked with at least two sets [paper 1 and paper 2] of question papers belonging
Evaluation of Anatomy Question Papers of different Universities - Viveka & Sudha

to either 2016 or 2017. If there is a disparity in the findings, then the university was labelled as 'not following guidelines'. This data was not considered for analysis.

If the MBBS syllabus document is not published/available from the respective medical university website, question papers of previous two years [minimum 2 sets of 2016 and 2017] were studied, and the characteristics noted. If question papers could not be obtained within the month of August 2018, then that university was excluded from the study.

Paper division: Question paper division based on the following will be grouped together
1. Above diaphragm in paper 1 and below diaphragm in paper 2 [i.e. upper limb in paper 1 and lower limb in paper 2]
2. Both limbs in one paper and remaining syllabus in other paper
3. Entire gross anatomy in paper 1 and remaining syllabus in other paper

Results

Through Internet search, required information was collected from 25 different universities conducting undergraduate MBBS degree programs. This includes 12 state health universities, 3 central institutions and 9 deemed to be universities. The information from colleges affiliated to universities other than exclusive health universities were scarce. The information is tabulated in Table 1. There is wide disparity in the duration and maximum marks of anatomy summative exams. Anatomy summative exams have two written theory exams in all universities. Out of these universities, fifteen universities conduct summative exam for 3 hours. Eight universities conduct exams for 2.5 hours.

State universities of Punjab, Gujarat, Madhya Pradesh, Kerala and Tamil Nadu conduct anatomy exams for 50 marks with 3-hour duration. Whereas, state universities of Andhra Pradesh, Maharashtra, Assam and Odisha conduct exams for 50 marks in 2 ½ hours. JIPMER, Pondicherry has two-hour exam for fifty marks. Only Karnataka universities [including Rajiv Gandhi University of Health Sciences and three other deemed to be universities] and All India Institute of Medical Sciences [AIIMS], Rishikesh conduct exams for 100 marks in 3 hours. Five universities are including MCQs in their summative exams. State medical universities of Andhra Pradesh, Punjab, Gujarat, Madhya Pradesh, Kerala and Odisha have dedicated slots for clinical anatomy in question papers [marks and number of questions are mentioned in Table 1].

Majority of the universities have two sections in each question paper, with long answer, short answer type of questions. Baba Farid University of health sciences and Kerala University of Health Sciences have fixed questions on drawing diagrams [marks and number of questions are mentioned in Table 1]. All India institute of medical sciences, New Delhi and Sambalpur University have fill in the blanks [with one-word answers]. West Bengal University of Health Sciences and Krishna Institute of Medical Sciences has internal choice. Hemchandracharya North Gujarat University has questions on family welfare in anatomy summative exams. Out of the 25 curriculum/syllabus studied, four universities have published blueprint for the summative question papers.

Twenty-one out of 25 universities have group 1 pattern syllabus with above diaphragm in paper 1 and below diaphragm in paper 2. Only Kerala University of Health Sciences, The Tamil Nadu Dr. MGR Medical University and West Bengal University of Health Sciences have group 2 pattern of question paper with both the limbs in same paper. Kerala University of Health Sciences has included thorax in paper 1. Whereas, state universities of Tamil Nadu and West Bengal have included abdomen and pelvis in paper 1. AIIMS, Delhi has whole of the gross anatomy in paper 1 and histology, embryology and neuroanatomy in paper 2. AIIMS, Rishikesh conducts exam for 200 marks and later reduces it to 100 marks.

Discussion

Though MCI has given broad guidelines for assessment, there is no uniformity in conduct of summative assessment in anatomy. There is wide disparity in both maximum marks and duration of university question papers. Assessments with 50 marks for 3 hours allocates more than three minutes [180 minutes ÷ 50 marks] for every mark to be scored.
<table>
<thead>
<tr>
<th>University</th>
<th>Time (in Hour)</th>
<th>Max marks (number of papers in parenthesis)</th>
<th>Group</th>
<th>Questions with maximum marks (number of questions in parenthesis)</th>
<th>Clinical anatomy Marks (number of questions)</th>
<th>MCQs</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTR University, Vijayawada, Andhra Pradesh</td>
<td>2.5</td>
<td>50 (2)</td>
<td>1</td>
<td>10</td>
<td>10 (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baba Farid University of Health Sciences, Punjab</td>
<td>3</td>
<td>50 (2)</td>
<td>1</td>
<td>10 (S)</td>
<td>10 (1)</td>
<td></td>
<td>Diagram questions (3X6)</td>
</tr>
<tr>
<td>All India Institute of Medical Sciences/Ansari Nagar, Delhi</td>
<td>3</td>
<td>50 (2)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>Fill in the blanks +</td>
</tr>
<tr>
<td>Srimanta Shankardeva University of Health Sciences, Assam</td>
<td>2.5</td>
<td>50 (2)</td>
<td>1</td>
<td>8 (S)</td>
<td></td>
<td>20</td>
<td>(0.5)</td>
</tr>
<tr>
<td>Hemchandracharya North Gujarat University, Patan</td>
<td>3</td>
<td>50 (2)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3 marks question on family welfare</td>
</tr>
<tr>
<td>Veer Narmad South Gujarat University</td>
<td>2.5</td>
<td>50 (2)</td>
<td>1</td>
<td>2 (3)</td>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Rajiv Gandhi University of Health Sciences, Bangalore</td>
<td>3</td>
<td>100 (2)</td>
<td>1</td>
<td>10 (2) (S)</td>
<td></td>
<td></td>
<td>Paper 1 and 2 may overlap</td>
</tr>
<tr>
<td>Madhya Pradesh Medical Science University</td>
<td>3</td>
<td>50 (2)</td>
<td>1</td>
<td>5 (2) (S)</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Kerala University of Health Sciences, Thrissur</td>
<td>3</td>
<td>50 (2)</td>
<td>2</td>
<td>10 (S)</td>
<td></td>
<td>10</td>
<td>Diagram question (2X4)</td>
</tr>
<tr>
<td>Maharashtra University of Health Sciences, Nashik</td>
<td>2.5</td>
<td>50 (2)</td>
<td>1</td>
<td></td>
<td></td>
<td>20</td>
<td>(0.5)</td>
</tr>
<tr>
<td>Krishna Institute of Medical Sciences University, Karad</td>
<td>2.5</td>
<td>50 (2)</td>
<td>1</td>
<td></td>
<td></td>
<td>30</td>
<td>(0.5) Choice (2 questions) +</td>
</tr>
<tr>
<td>Pravara Institute of Medical Sciences, (Deemed University), Maharashtra</td>
<td>3</td>
<td>75 (2)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All India Institute of Medical Sciences, Rishikesh</td>
<td>3</td>
<td>100 (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Final marks will be reduced for 100</td>
</tr>
<tr>
<td>Sambalpur University, Burla</td>
<td>2.5</td>
<td>50 (2)</td>
<td>1</td>
<td>10 (S)</td>
<td>10 (2)</td>
<td></td>
<td>Fill in the blanks (5)</td>
</tr>
<tr>
<td>Vinayaka Missions University, Salem</td>
<td>3</td>
<td>80 (2)</td>
<td>1</td>
<td>10 (S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pondicherry University (JIPMER)</td>
<td>2</td>
<td>50 (2)</td>
<td>1</td>
<td>10 (2) (S)</td>
<td></td>
<td></td>
<td>LAQ should be from must know</td>
</tr>
<tr>
<td>The Tamilnadu Dr. MGR Medical University, Chennai</td>
<td>3</td>
<td>50 (2)</td>
<td>2</td>
<td>10 (S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRM Institute of Science &amp; Technology</td>
<td>3</td>
<td>50 (2)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Bengal University of Health Sciences, Kolkata</td>
<td>2.5</td>
<td>50 (2)</td>
<td>2</td>
<td>12 (S)</td>
<td>12 (1)</td>
<td></td>
<td>Internal choice for LAQ</td>
</tr>
<tr>
<td>Yenepoya University of Health Sciences, Mangalore</td>
<td>2.5</td>
<td>50 (2)</td>
<td>1</td>
<td>10 (S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manipal Academy of Higher Education, Manipal</td>
<td>3</td>
<td>50 (2)</td>
<td>1</td>
<td>10 (S)</td>
<td></td>
<td>30</td>
<td>(0.33)</td>
</tr>
<tr>
<td>Sri Devaraj Urs academy of higher education and research, Kolar</td>
<td>3</td>
<td>100 (2)</td>
<td>1</td>
<td>10 (2) (S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitte KS Hegde Medical Academy, Mangalore</td>
<td>3</td>
<td>50 (2)</td>
<td>1</td>
<td>10 (1) (S)</td>
<td>10</td>
<td>20</td>
<td>(0.5)</td>
</tr>
<tr>
<td>JSS Academy of Higher Education &amp; Research, Mysore</td>
<td>3</td>
<td>100 (2)</td>
<td>1</td>
<td>10 (2) (S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swami Ramakrishnan University, Dehradun</td>
<td>3</td>
<td>100 (2)</td>
<td>1</td>
<td>10 (1)</td>
<td></td>
<td>20</td>
<td>(0.5)</td>
</tr>
</tbody>
</table>

However, student gets less than two minutes [180 minutes ÷ 100 marks] with question papers of 100 marks for 3 hours. In general, long answer and short answer questions are not completely objective; the disparity of marks and time can lead to differences in evaluation process. It is also possible that, the same question for same marks, when asked in 50 marks question paper enjoys liberal valuation, than when asked in 100 marks question paper. From the student perspective, total number of questions asked in 50 marks question paper is far less than the number of questions in 100 marks question paper. Anatomy being a vast first year subject, it takes more preparation from a student to tackle a 50-mark question paper. This leads to a different viewpoint that a 50-mark question paper, fails to represent all details of learning. Such disparity dilutes the assessment process.

With regard to syllabus division between papers, most of the universities follow a similar pattern with reference to gross anatomy, paper 1 above diaphragm and paper 2 below diaphragm. Above diaphragm [paper 1] includes upper limb, thorax, head and neck and neuroanatomy. To this many universities add general anatomy, general embryology and general histology. Below diaphragm [paper 2] includes abdomen, pelvis, lower limb. To this systemic embryology and systemic histology are added. There are few minor differences in this with regard to histology, embryology and general anatomy. Division of papers with both limbs [upper and lower] in the same paper leads to undue more weightage on other paper. To overcome this, there are attempts to shift thorax [as with Kerala university of health sciences] and abdomen [as with West Bengal and Tamil Nadu Dr. MGR medical university] to paper 1. However, grouping morphologically similar limbs together makes a student to prepare paper 1 better and show subsidiary considerations to paper 2 topics.

There was a notion that theory assessment must include multiple-choice questions [MCQs]. However, with increasing non-feasibility of conduct of exam, many of the universities walked away from the MCQs in theory question paper. Very few despite the difficulty of conducting exams still retain MCQs.

Assessment in anatomy should include clinical aspects. It may be in the form of a clinical case followed by anatomically relevant questions or common and simple clinical conditions having more of applied anatomical basis. Six of the universities explicitly have guidelines for asking clinical anatomy questions. Providing a blueprint increases validity of written assessments.

With the establishment of proposed National Medical Commission [NMC], having an independent under graduate medical education board, that will be framing/reframing the general guidelines, it is the need of the hour to have a uniform, structured, objective and rationale summative assessments in the medical education [and in particular – anatomy subject]. As all students will be writing similar NEET – UG and NEET – PG exams, at the beginning and at the ending of under graduate medical course, it is prudent to have intervening summative assessments also in the similar lines. Such kind of uniform exams punctuating the under graduate medical course can uniformly prepare students for NEET – PG exams. With this review article, the authors declare the need for exemplary blueprint for conduct of summative exams by apex regulatory body.

Limitations: Information from all universities shall make this review complete. For want of time, only 25 universities are included in the review. Similar studies looking for disparity in summative exams in other subjects [both in theory and practical exams] shall bring more lasting regulatory changes in conduct of exams.

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