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Evaluating the content validity of the undergraduate summative exam question papers of Forensic Medicine & Toxicology from 6 medical universities in India

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Abstract

Introduction: Summative assessments play a major role in shaping the student's learning. There is little literature available on validity of summative assessment question papers in Forensic Medicine & Toxicology. This study analyses 30 question papers from 6 reputed universities for content validity.

Methods: A retrospective cross-sectional record-based observational study was conducted where 30 university summative question papers in Forensic Medicine & Toxicology from 6 universities across India were evaluated for content validity. The learning domain assessed, the type of questions asked, and sampling of the content was compared and presented in the results.

Results: From the results of the study, it was noted that 80% weightage was allotted to recall in most papers and only one paper tested for application. 70 to 80% of the marks were allotted to Forensic Pathology leading to disproportionate sampling. Core areas in Toxicology and Medical Jurisprudence were sparsely assessed.

Conclusion: The content validity of the summative question papers in Forensic Medicine and Toxicology was unsatisfactory, emphasising the need for evaluation of the clarity and efficacy of the blueprints being used by the universities. Faculty training to motivate and influence a change in the mindset is necessary to bring about a course correction.

Keywords: *Forensic Medicine & Toxicology, Summative Assessments, University Assessments, Blueprint, Content Validity, Learning Domains*

Practice Highlights

- Content validity of the Forensic Medicine & Toxicology university exam question papers form six universities was studied.
- It was observed that certain subtopics like Forensic Pathology over time have been over value (80% Weightage).
- Core areas in Medical Jurisprudence and toxicology like substance abuse, environmental toxicology, and pharmaceutical toxicity have been undervalued.
- None of the QPs analysed tested for application. Most items in the assessment tested only recall.
- The blueprints for the paper setters, considering the competencies to be assessed must be designed and validated.

I. INTRODUCTION

Reflecting on our learning experience during MBBS, we realised that we have always had issues with the examination system. The questions are vague and clustered around few important topics. Undergraduate students look up to previous examination question papers as references to decide the stake to be allotted to the topics while preparing for examination. Invariable all students attempt to predict the examination pattern and allot appropriate time and efforts to different subjects,

skills, and topics. This reiterates George E Miller's quote "Assessment drives Learning". Summative assessments need to be planned appropriately as medicine has high stakes (Amin et al., 2006). Properly designed and executed assessments are known to have a "positive steering effect on the student's learning. They are also needed to evaluate the programs. Improper assessments can drive a hidden curriculum leading to a completely unintended outcomes (Amin & Khoo, 2003, pp. 260).

Competency Based Medical Education (CBME) model being adopted in India as per the new Graduate Medical Education Regulations 2019, has attempted to bring about a radical change in the educational process. Undergraduate examinations in India are shifting towards a criteria-based process (Aggarwal & Agarwal., 2017; Bhattacharya et al., 2017; Mehta & Kikani, 2019). Outcome based education demands that the examinations be designed to sample and evaluate specific competencies prescribed. The success of these models strongly depended on the validity of the examination process. Summative assessments require that the assessment tool be validated. Key outcomes need to be tested (Amin & Khoo, 2003, pp. 260; McAleer, 2001). Content validity and construct validity are two very important aspect that support the effectiveness of an assessment. Content validity tests the representativeness of the learning objectives in the assessment tool and construct validity represents the congruence of the assessment tool with the intended purpose (Amin & Khoo, 2003, pp. 260).

Forensic Medicine and Toxicology in India, trains the undergraduate to apply their knowledge gained in Medicine for the benefit of law. It is a culmination of Forensic Pathology, Medical Jurisprudence and Toxicology put together. Its key objective is to empower Indian Medical Graduates in handling Medical Legal issues and critically apply their medical skills in delivering justice. Emphasis is also placed on training in etiology, identification, and management of Poisoning (Sharma et al., 2005). Studies on student perception suggest that teaching is significantly teacher centric and theory oriented. Skill training in Medical Jurisprudence and Toxicology is significantly neglected. Students allege though they value the subject, they spend less time as only select concepts are emphasised (Gupta et al., 2017; Parmar, 2018; Sharma et al., 2005; Sudhan & Raj, 2019). As the new CBME UG curriculum 2019 is being rolled out it is necessary that deficiencies in the traditional curriculum be identified in order to deliver an efficient and effective Forensic Medicine & Toxicology curriculum (National Medical Commission, 2018).

Summative theory exams inherently have a challenge with distribution of the items being tested (Aggarwal & Agarwal, 2017; Amin et al., 2006; Amin & Khoo, 2003, pp. 260; Bhattacharya et al., 2017). Validity of the content being tested in examination is always in question. Selecting appropriate questions, question types and domain can make all the difference in the validity of the examination (Amin et al., 2006; Amin & Khoo, 2003, pp. 260; McAleer, 2001). Particularly in Forensic Medicine which is purely application-based course, testing critical thinking and synthesis is necessary. This is found wanting in the traditional curriculum (Parmar, 2018; Sharma et al., 2005; Sudhan & Raj, 2019). Published literature on systematic analysis of summative assessment question papers in Forensic Medicine & Toxicology are sparsely available. In this study, we have analysed and compared undergraduate summative examination question papers of Forensic Medicine & Toxicology from six reputed universities all over India for the distribution of content tested, Domain of learning and Construct of the question.

II. METHODS

A retrospective cross-sectional record-based observational study was conduct at Government Medical College, Bharatpur after obtaining ethical approval from the Institutional Ethics Committee between October to December 2020. For the study, 30 summative exam question papers from six reputed medical universities were selected based on the availability of the University question papers in public domain. The last five-year (2016-20) undergraduate question papers in Forensic Medicine & Toxicology were collected from the university websites and the college records from constituent colleges after thorough web search. The names of the universities have been kept anonymous during the analysis of results. All the data was collected form sources in public domain hence explicit consent was not taken. Two of the selected universities were based in North India and four universities were based in South India. The identity of the Medical Universities was kept confidential during the analysis of the question papers.

The Summative theory examination in Forensic Medicine & Toxicology as per the Medical Council of India (MCI) regulations consists of one theory paper of minimum 40 marks. The question paper consists of essay type questions and objective questions like very short answer questions or Multiple-choice questions depending on the universities (National Medical Commission, 2018).

For analysis, the questions were categorised based on the question type as LEQ (Long Essay Question), SAQ

(Short Answer Question) & VSAQ (Very Short Answer Question including MCQs). The Questions were also categorised based on the domain of learning as Recall Based, Comprehension Based and Application Based Questions.

The Topics in Forensic Medicine & Toxicology can be broadly subdivided into Medical Jurisprudence, Forensic Pathology and Toxicology. These were further subdivided as Six Categories as Legal Procedure, Medical jurisprudence, Forensic Pathology, Forensic Psychiatry, Lab Technique, emerging trends, and Toxicology (Medical Council of India, 1997). Percentage of marks allotted to each of these topics was analysed in each of the papers.

Further, Forensic Pathology was Sub divided into Subtopics like Identification, Postmortem Changes, Mechanical Injuries, Mechanical Asphyxia, Thermal Deaths, Sexual Offences and Medico Legal issues related to Pregnancy, Delivery, Abortion. Toxicology was Sub divided into General Toxicology, Chemical Toxicology, Drug, Pharmacy & Substance abuse Toxicology, Bio toxicology (Medical Council of India, 1997). Percentage allotment of Marks in each of the question papers was analysed for each of the subtopics.

The data thus collected was tabulated in an Excel Sheet and the percentage distribution of marks in various subtopics noted. The SPSS Statistical Software (IBM SPSS Statistics for Windows, Version 23.0) was used to analyse the data. Radar Graphs and line graphs were plotted to represent and compare pattern of distribution of marks in various topics in each question paper. The type of questions asked, the weightage allotted to the subtopics were compared keeping in mind the expected outcomes in the Forensic Medicine & Toxicology curriculum proposed by National Medical Commission and Medical Council of India for content validity (Medical Council of India, 1997; National Medical Commission, 2018). The learning domain targeted in the questions was compared for construct validity of the question papers.

III. RESULTS

In this study, five question papers(n=30) from each university(n=6) were analysed and compared. The data that supports the findings of this study are openly available in Figshare at https://doi.org/10.6084/m9.Figshare.19367864 (Kautilya et al., 2022).

As regulated the university Summative examination in Forensic Medicine & Toxicology consists of one theory assessment and one practical assessment (Medical Council of India, 1997; National Medical Commission, 2018). The theory paper is allotted a minimum of 40 marks. Five universities conducted exam for 40 marks and one university paper was of 100 marks. All question papers had three types of questions, namely Essay questions (Long Answer Questions-LAQs) of 8 to 10 marks each, short essays (Short Answer questions-SAQs) of 3-5 marks each and Objective questions (like Multiple choice questions-MCQs or Very short answer questions- VSAQs) of 1-2 marks each. Table 1 presents the percentage distribution of the marks allotted to each question type.

University	% Marks LAQ	% Marks SAQ	% Marks VSAQ/ MCQ
U1	43	49.5	7.5
U2	25	50	25
U3	20.4	51.2	28.4
U4	25	50	25
U5	25	56	19
U6	42	40.5	17.5

Table 1. University vice distribution marks in the question papers based on the type of questions

Nearly 50% of the marks in all universities is allotted to Short Essay or Short Answer question types. This was followed by Long Answer questions and very short answer questions respectively. Relative to the number of marks allotted to each question type the university question papers consisted of 11 to 22 items or questions in every question paper.

A. Domain of the Learning Tested

Theory questions papers attempt to test the knowledge/ cognition of the students. Limiting the questions to just recall type affects the quality of the question paper. Medicine and Forensic Medicine, requires application of knowledge. Testing of higher order cognition is necessary for the assessment to be Valid. To evaluate this the questions were categorised into Recall type,

Comprehension type and application type. The percentage distribution of marks in each question paper was also analysed and presented in the Line graph (Figure 1).

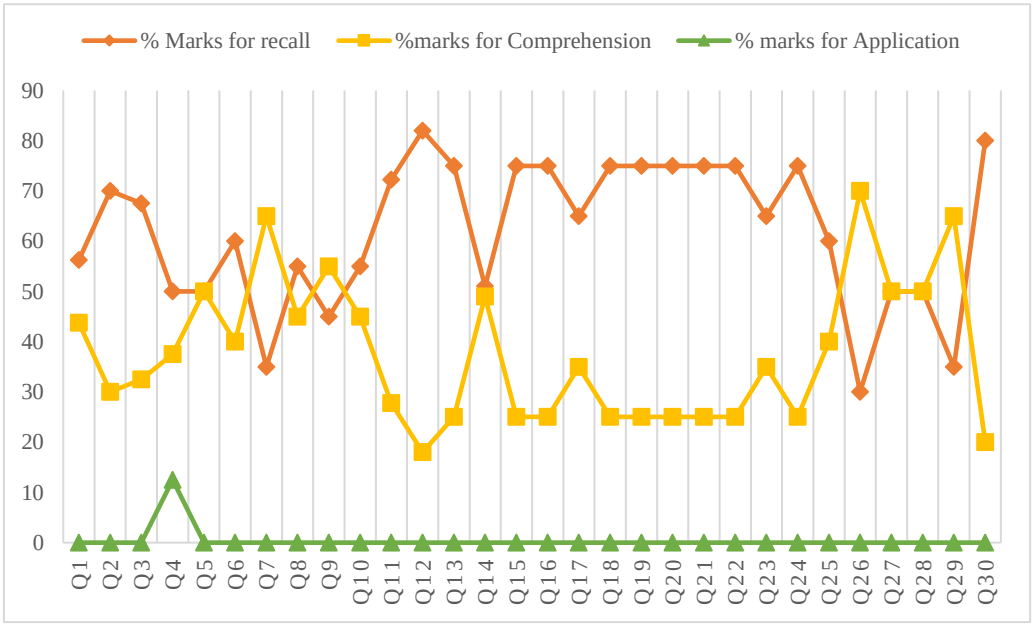

Figure 1. Comparison of percentage mark distribution based on the domain of learning

B. Distribution of Marks Based on the Subtopics

The Graduate Medical education regulation- 2019 further divide the subject of Forensic Medicine and Toxicology into Forensic Pathology, General Information and legal procedures, medical jurisprudence, Forensic Psychiatry, Toxicology, Lab investigations and general trends. The question papers were further analysed for the percentage distribution of marks among these six subtopics and presented in a radar graph in Figure 2.

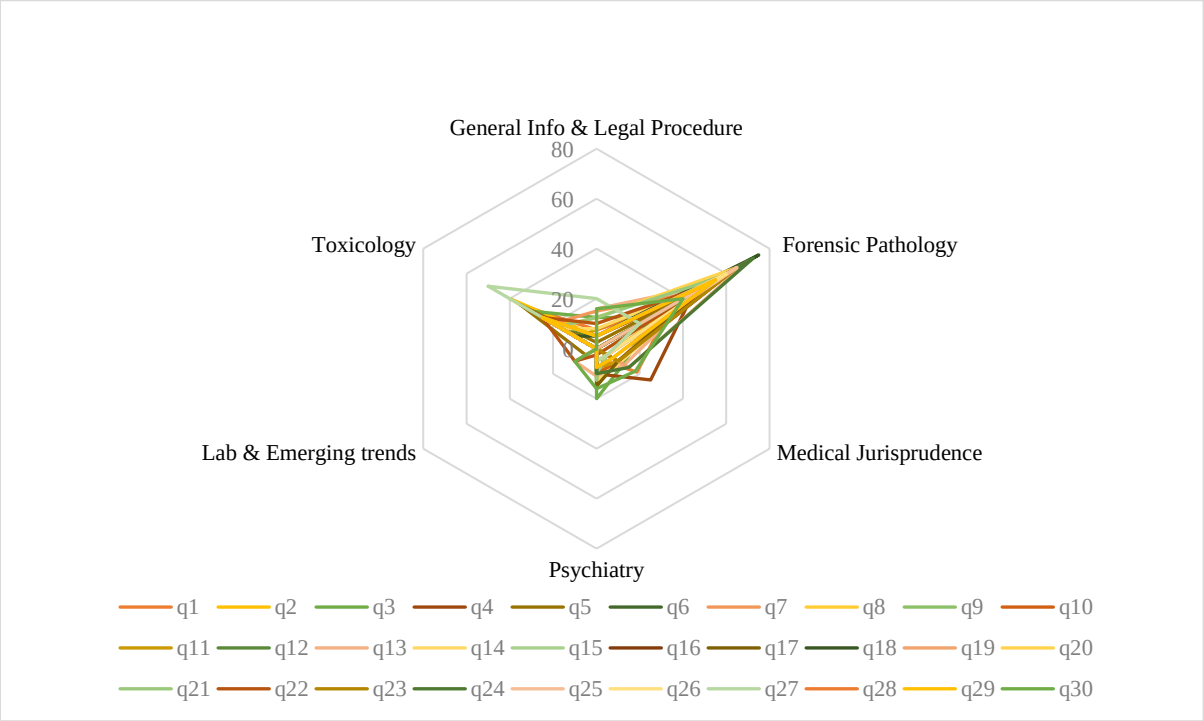

Figure 2. Topic wise distribution of marks (%) in the question papers

From the graph it is noted that Forensic Pathology receives the most attention in almost all the question papers from all the universities. Forensic pathology can further be divided into seven subtopics. From the total marks allotted in each paper for forensic Pathology, percentage marks allotted for each of these subtopics was calculated and presented as a separate radar graph in Figure 3.

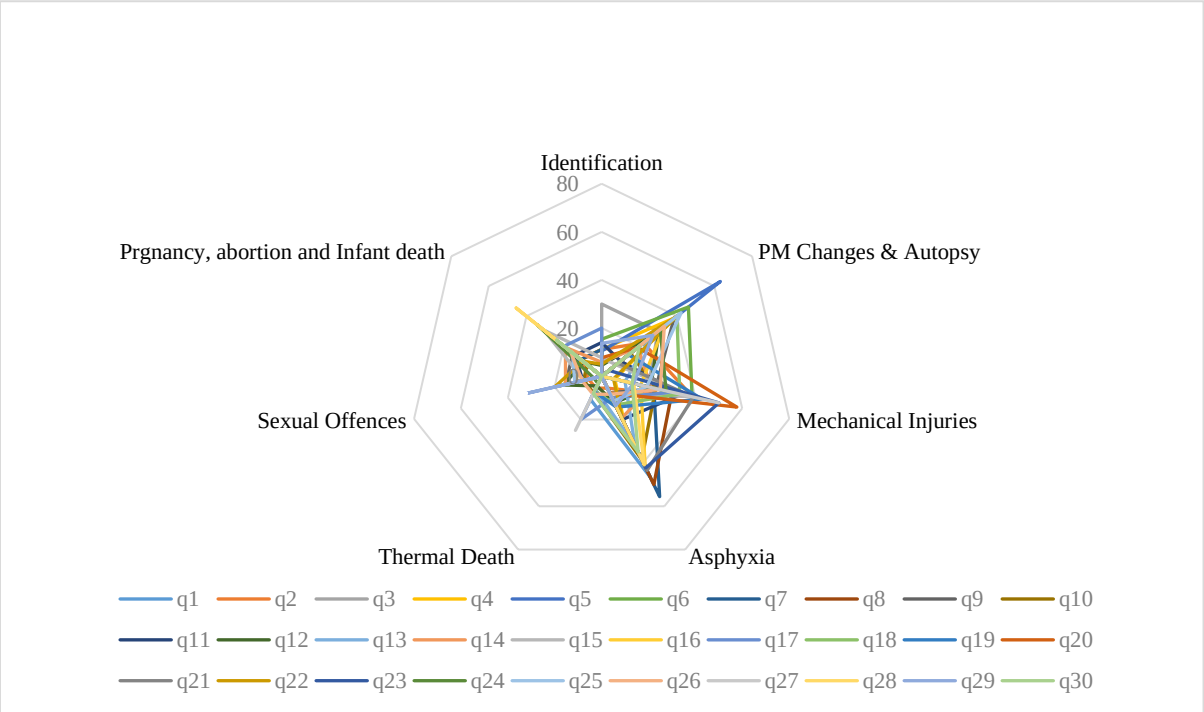

Figure 3. Percentage distribution of marks in Forensic Pathology in the question papers

Toxicology can further be divided into subtopics like General Toxicology dealing with management of poisons, Chemical Toxicology, drug-pharmacy, and substance abuse dealing with pharmaceutical agents and banned substances, Bio and environmental toxicology dealing with snakebite, venomous stings, mushrooms, Food poisoning and plant toxicology etc. From the total marks allotted to toxicology, the percentage distribution of marks allotted to each of these subtopics was analysed and presented in Figure 4.

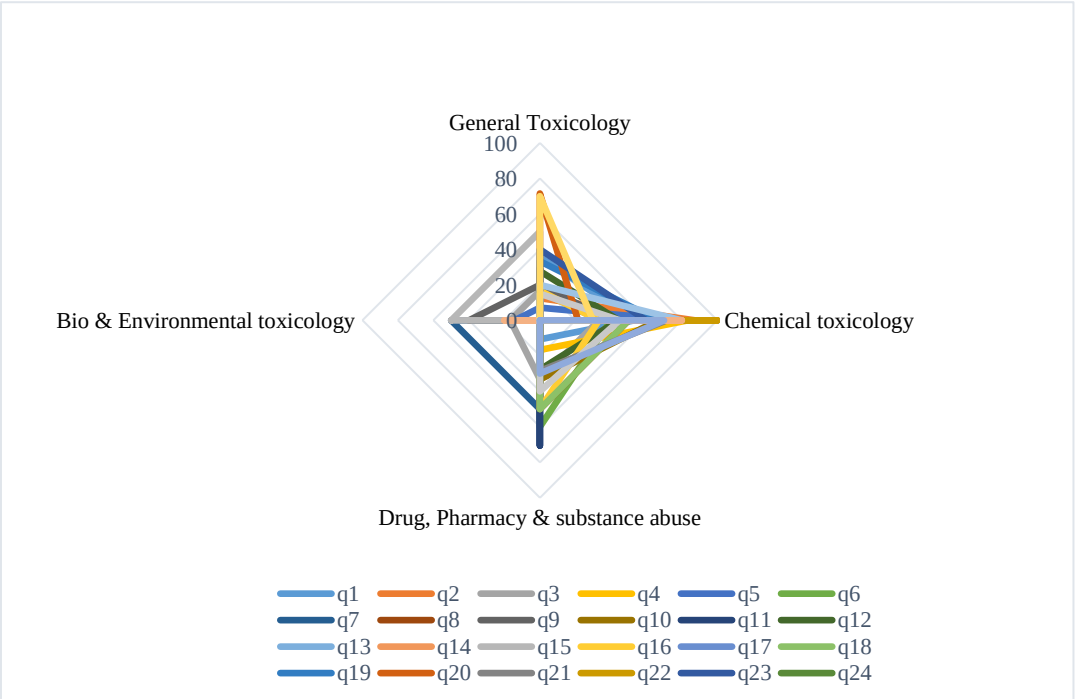

Figure 4. Percentage distribution of marks in Toxicology in the question papers

IV. DISCUSSION

The undergraduate medical education curriculum has been governed by the Graduate Medical Education Rule-GMR 1997 (Medical Council of India, 1997) framed by the Medical Council of India over the last two decades and in 2019, the National Medical Commission adopted a competency-based training model to revamp the medical education in India. The National Medical Commission in its series of reports and documents has attempted to identify the lacuna in the old curriculum. To be able to successfully implement this radically new proposal it is necessary that we understand the limitations of the current curriculum. The Graduate Medical Education Rules 1997, like the newer GMER 2019 provides a clear framework of the Undergraduate curriculum. It lays down guidelines on the standards of implementation. The curriculum framework is designed in a manner that there is significant room for the colleges and the Universities to plan and implement the same as they deem best suits them. This however is not the case always. It has been observed in various previous studies that universities and colleges sometimes fall short of the expectations (Medical Council of India, 1997; National Medical Commission, 2018; Sharma et al., 2005).

Previous studies attempting to gauge the student's perception on the implementation of Forensic Medicine and Toxicology curriculum have raised serious doubts among the academicians. Kumar et al. (2018) in their study of student's perception revealed that 20% of the students felt that autopsy was a mere formality and 64% felt the need for student involvement during the autopsy training. Mardikar and Kasulkar (2015) revealed that 89% of the Interns and 41% of the residents didn't have any exposure to handling medico-legal cases. It was noted that only 14% of the Interns and 21% of the residents were aware of the proper preservatives to be used for body fluids in poisoning. Only 32% of the interns and 46% of the residents were aware of Medical Indemnity Insurance. Only 13% of the interns were aware of the consumer protection act. There is a serious disconnect between the proposed and the implemented curriculum in forensic medicine.

As per the guidelines framed by the Medical Council of India in the GMER-1997, a variety of essay questions and short answer questions are permitted. Objective question like Very Short Answer questions and MCQs are permitted to the extent of 20 % only (Medical Council of India, 1997). Most of the question papers analysed in this study conformed to this regulation. From the Table 1 it can be noted that nearly 50% of the marks were allotted for short essay/Answer questions (SAQ) requiring a descriptive answer. Long Answer Questions (LAQ) requiring an elaborate explanation of the concepts represented about 20% to 42 % of the question paper. The total marks allotted for the individual questions also varied with the LAQs being allotted between 8 to 10 marks each, SAQs being allotted 3 to 5 marks and VSAQs being allotted 1- 2 marks each. Thus, the Number of Items included in each question paper ranged from 11 to 22. This distribution is similar to the analysis published in papers of other subjects like microbiology, Pharmacology, anatomy, Physiology etc (Aggarwal & Agarwal , 2017; Ayub et al., 2013; Bhattacharya et al., 2017; Choudhary et al., 2012; Chowdhury et al., 2017; Mehta & Kikani, 2019; Pichholiya et al., 2021).

With the number of items being limited the chance of certain areas being missed increases. This has a profound influence on the sampling while making the blueprint (Raymond & Grande, 2019). In papers with only 11 Items, there is a definite probability of certain topics being left out compared to papers having 22 items. As Forensic Medicine and Toxicology has only one paper compared to other subjects which have two papers in the second year MBBS, some key topics get left out, adversely effecting its content validity.

A. Analysis of the Domain of Learning Tested

From the Figure No 1, it can be observed that in about 10 of the 30 papers, more than 75% of the questions/ Items tested recall. In only 7 of the 30 papers, more than 50% of the marks were allotted to comprehension. In only one paper the application was assessed to an extant of 12.5%. This is similar studies done in Anatomy, Physiology, Pharmacology, and microbiology (Aggarwal & Agarwal., 2017; Bhattacharya et al., 2017; Choudhary et al., 2012; Chowdhury et al., 2017; Mehta & Kikani, 2019).

This raises a serious doubt on the construct validity of the question papers. Forensic Medicine and Toxicology, an application-based course requires that higher order cognition like application is tested. The current papers fall short of assessing the right competency domains. The Regulations prescribed by the GMER-1997 require that the at least one long answer question (LAQ) of 10 marks (i.e., 25% of the Marks) testing application is asked in the theory question paper (Medical Council of India, 1997). The newer Competency based medical education Regulations prescribed in the GMER- 2019 document also reiterate this fact and in addition suggest that an application based question including Attitude, Ethics and communication skills module be included in every paper (National Medical Commission, 2018). This needs serious introspection in the times to come.

B. Content Validity of the Question Papers

The content validity of a test depends strongly on how well the sample is spread across the syllabus. From the analysis of the percentage distribution of marks allotted to different subtopics presented in figure no 2, it is very clear that in majority of the question papers the bulk of the questions asked are from forensic pathology. There is distinct skewing of the graph toward forensic pathology with an average allocation of 60% of the marks.

This is like studies in physiology with over 42% of the marks being allotted to Cardiovascular system. The observations in the figure no 2 classically suggest that the forensic medicine and toxicology curriculum is a victim of "Carcinoma of the Curriculum" (Abrahamson, 1978). Over a period, certain section of the curriculum takes precedence and are valued more than other equally relevant sections. Core areas like Toxicology and Medical Jurisprudence which are clinically more relevant to the undergraduate students, considering their role as a physician of the first contact, seem to have been blatantly missed and neglected. Faculty should reflect on the factors that might have caused this drift which over time has led to this dangerous disease of the curriculum.

The New Competency based UG curriculum being implemented by the National Medical Commission wonderfully provides a framework of competencies in forensic medicine and toxicology (National Medical Commission, 2018). They serve as guiding milestones to reorient and redistribute the weightage, time and value allotted to certain topics.

From the Percentage marks allotted to each of these subtopics in forensic pathology in Figure no 3 it clearly shows that over 60 to 70% of the marks allotted were distributed among just 3 key topics i.e., Post-Mortem Changes, Mechanical Injuries and Asphyxia. The source of the error in the assessment is this high value allotted to theoretical aspects related to Autopsy and Medical examination. The faculty and the student's attention have shifted towards the conduct of postmortem examination which is generally a high stakes scenario. But only a handful of undergraduates end up doing autopsies in their career. The ability to do autopsy is no doubt an important competency for the Undergraduates but the competencies related to Medical Jurisprudence and Toxicology are equally Important. The competencies related to handling Medico- legal issues related to patient care are encountered more frequently by an undergraduate thus requiring additional attention in the undergraduate curriculum than Forensic Pathology which is a rare or chance encounter for an MBBS graduate in India (Kumar et al., 2018; Medical Council of India, 1997; National Medical Commission, 2018; Sharma et al., 2005).

An Indian Medical graduate needs to make accurate observation, logical deductions and take critical decisions applying medical ethics in patient care. He should be able to diagnose and manage the common cases of poisoning as a physician of the first contact (Kumar et al., 2018; Medical Council of India, 1997; National Medical Commission, 2018; Sharma et al., 2005).

Most of the competencies in Toxicology are covered in the Forensic Medicine curriculum rather than in General Medicine. Hence, the percentage marks allotted for various subtopics of toxicology was also analysed in figure no 4. From figure no 2 it can be noted that about 20% of the marks were allotted to toxicology. Further considering figure no 4 it can be observed that 60-80% of the marks for toxicology was allotted to general toxicology and chemical toxicology showing a skewing in the distribution of marks.

Assessments must complement the roles of the undergraduate after completion of the course. Snake bite, an occupational disease in India, is an emergency frequently encountered by physicians of first contact (Vijay & Hegde, 2019). Substance abuse and pharmaceutical toxicity are also some of the most encountered cases in clinical practice following pesticide abuse (Basu & Mattoo, 1999). As a curriculum planner it is imperative that these factors considered as core in the curriculum (Amin et al., 2006; Amin & Khoo, 2003, pp. 260; McAleer, 2001). The current UG curriculum is deficient as certain areas have been undervalued leading to poor perception about the subject. Students undervalue the subject as the core competencies tested are not relevant considering their role as physician of the first contact. Students allot little time to study as most assessments cover few topics leading deterioration in the quality of teaching and learning in the course (Sharma et al., 2005).

Adult learners value learning bases on its immediate applicability and its use in problem solving. Curriculum must value topic and skill that complement the roles the learner after the training. Medical jurisprudence and toxicology have not been sufficiently assessed in this curriculum.

V. CONCLUSION

From the above discussion, it is reiterated that the university assessments in Forensic Medicine and Toxicology need to be realigned with the curricular

needs. Certain subtopics like Forensic Pathology have been over valued compared to Medical Jurisprudence and Toxicology which have been undervalued. The sampling in Forensic Medicine and Toxicology assessment is not ideal. Application must be tested instead of just recall.

Universities need to periodically Assess their question papers for validity and chalk down clear guidelines for the paper setters. The current blueprints being used must be revalidated to check if there is clarity and scope of improvement. Most importantly, training the faculty and the question paper setters to use the blueprint and value the competencies mandated by the Curriculum lies at the heart of the solution to this problem. Overtime, this curricular malignancy observed, has had a profound effect on the mindsets of the faculty trainers. Faculty Developments activities to motivate and influence these mindsets to bring change is indispensable. The Application centered regulations prescribed by the National Medical Commission provides an excellent opportunity to motivate positive changes leading to the required course correction.

Notes on Contributors

Dr Vijay Kautilya was instrumental in conseptualising the idea, designing the study, data collection, data analysis, drafting and reviewing the manuscript.

Dr Arijit Datta contributed in designing the study, data collection, data analysis, drafting and reviewing the manuscript.

Dr Shruti P Hegde was instrumental in designing the study, data analysis, drafting and reviewing portions of the manuscript.

Dr Preethi Tiwari, contributed in data collection, data analysis, drafting and reviewing portions of the manuscript.

Ethical Approval

Institutional Ethics committee approval was received from the IEC, Government Medical College, Bharatpur where the study was conducted (GMCB/IEC/2020/009 dated 26th September 2020).

Data Availability

Datasets generated and/or analysed during the current study are available from the following DOI.

https://doi.org/10.6084/m9.figshare.19367864

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Declaration of Interest

There is no conflict of Interests to the best of our knowledge.

References

Abrahamson, S. (1978). Diseases of the curriculum. *Academic Medicine*, *53*(12), 951-957. https://doi.org/10.1097/00001888-197812000-00001

Aggarwal, M., & Agarwal, S. (2017). Analysis of undergraduate pharmacology annual written examination papers at Pt. B. D. Sharma University of health sciences Rohtak. *National Journal of Physiology, Pharmacy and Pharmacology*, *7*(5), 509. https://doi.org/10.5455/njppp.2017.7.1236224012017

Amin, Z., Chong, Y. S., & Khoo, H. E. (2006). *Practical guide to medical student assessment*. World Scientific. https://doi.org/10.1142/6109

Amin, Z., & Khoo, H. E. (2003). *Basics in Medical Education*. World Scientific.

Ayub, M., Habib, M., Huq, A., Manara, A., Begum, N., & Hossain, S. (2013). Trends in covering different aspects of anatomy in written undergraduate MBBS course. *Journal of Armed Forces Medical College, Bangladesh*, *9*(1), 75-83. https://doi.org/10.3329/jafmc.v9i1.18729

Basu, D., & Mattoo, S. K. (1999). Epidemiology of substance abuse in India: Methodological issues and future perspectives. *Indian Journal of Psychiatry*, *41*(2), 145-153.

Bhattacharya, S., Wagh, R., Malgaonkar, A., & Kartikeyan, S. (2017). Analysis of content of theory question papers in preliminary examinations and marks obtained by first-year MBBS students in physiology. *International Journal of Physiology, Nutrition and Physical Education*, *2*(2), 856-868.

Choudhary, R., Chawla, V. K., Choudhary, K., Choudhary, S., & Choudhary, U. (2012). Content validity of first MBBS Physiology examinations and its comparison with teaching hours devoted for different sub-divisions of physiology. *Journal of Physiology and Pathophysiology*, *3*(1), 8-11.

Chowdhury, D. K., Saha, D., Talukder, M. H., Habib, M. A., Islam, A. S., Ahmad, M. R., & Hossin, M. I. (2017). Evaluation of pharmacology written question papers of MBBS professional examinations. *Bangladesh Journal of Medical Education*, *8*(2), 12-17. https://doi.org/10.3329/bjme.v8i2.33331

Gupta, S., Parekh, U. N., & Ganjiwale, J. D. (2017). Student's perception about innovative teaching learning practices in forensic medicine. *Journal of Forensic and Legal Medicine*, *52*, 137-142. https://doi.org/10.1016/j.jflm.2017.09.007

Kumar, A., Kumar, S., Goel, N., Ranjan, S. K., Prasad, M., & Kumari, P. (2018). Attitude of undergraduate medical students towards medico-legal autopsies at IGIMS, Patna, Bihar. *International Journal of Medical Research Professionals*, *4*(6), 132-135.

Kautilya, D. V., Datta, A., Hegde, S. P., & Tiwari, P. (2022). Evaluating the content validity of the undergraduate summative exam question papers of forensic medicine & toxicology from 6 medical universities in India. [Data set]. Figshare. https://doi.org/10.6084/m9.figshare.19367864

Mardikar, P. A., & Kasulkar, A. A. (2015). To assess the need of medicolegal education in interns and residents in medical institution. *Journal of Evolution of Medical and Dental Sciences*, *4*(17), 2885-2889. https://doi.org/10.14260/jemds/2015/417

McAleer, S. (2001). Formative and Sumative assessment. In J. A. Dent, & R. M. Harden, *A Practical Guide to Medical teachers* (pp. 293-302). Edinbergh Churchill Livingstone.

Medical Council of India. (1997). *Regulations on Graduate medical education, 1997*. https://www.nmc.org.in/wp-content/uploads/2017/10/GME_REGULATIONS-1.pdf

Mehta, S., & Kikani, K. (2019). Descriptive analysis of II - MBBS university question papers of microbiology subject. *Journal of Education Technology in Health Sciences*, *6*(2), 44-47. https://doi.org/10.18231/j.jeths.2019.011

National Medical Commission. (2018). *Competency based undergraduate curriculum for the indian medical graduate*. https://www.nmc.org.in/information-desk/for-colleges/ug-curriculum/

Parmar, P. (2018). Study of students' perceptions towards case based learning in forensic medicine. *Indian Journal of Forensic Medicine & Toxicology*, *12*(1), 154-160.

Pichholiya, M., Yadav, A., Gupta, S., Kamlekar, S., & Singh, S. (2021). Blueprint for summative theory assessment in pharmacology - A tool to increase the validity as per the new competency based medical education. *National Journal of Physiology, Pharmacy and Pharmacology*, *11*(12), 1345-1355. https://doi.org/10.5455/njppp.2021.11.06170202107072021

Raymond, M. R., & Grande, J. P. (2019). A practical guide to test blueprinting. *Medical Teacher*, *41*(8), 854-861. https://doi.org/10.1080/0142159x.2019.1595556

Sharma, B., Harish, D., & Chavali, S. (2005). Teaching, training and practice of forensic medicine in India-An overview. *Indian Journal of Forensic medicine & Toxicology 27*(4), 247-251.

Sudhan, S. M., & Raj, M. N. (2019). Current status of knowledge, attitude and awareness of medical students on forensic autopsy in Tumkur district of Karnataka. *Indian Journal of Forensic Medicine & Toxicology*, *13*(1), 131-141.

Vijay, D. K., & Hegde, S. P. (2019). Study of snake bite and factors influencing snake bite among the rural population of Kancheepuram district. *Journal of Punjab Academy of Forensic Medicine & Toxicology*, *19*(2), 142-146.

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