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MBBS Curriculum vis-a-vis Toxicological Emergencies and Attitude of Medical Students: An Observational Study.

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ABSTRACT

Background: Toxicological emergencies are considered one among three most common medico-legal emergencies in India which ultimately happens to be a must know subject for medical students.

Objectives: Present study overviews the weightage given to Toxicology in MBBS curriculum in various universities across India and the attitude among the medical students regarding the curriculum.

Material & Methods: Various approaches involved A) Review of profile of poisoning related emergency cases, B) Statistical data from NCRB, C) Analysis of University question papers and D) Interviews with MBBS students.

Results: Percentage of poisoning cases reported to casualty ranges from 12% to 42% and also NCRB data reveals the high incidence of poisoning cases in India. University question papers have topic repetition as well as question repetitions and lack of case-based questions. Almost 82% students reported not reading Toxicology thoroughly.

Conclusion: The present curriculum does not incorporate and doesn't assess enough knowledge of Toxicology to medical students considering the extent of poisoning cases reported at emergency departments.

INTRODUCTION

Paracelsus has said *"Sola dosis facit venenum" which means "What is it that is not poison? All things are poison and nothing is without poison. It is the dose only that makes a thing not a poison."*[1] All such things which can act as a poison are present in our surrounding, we are just not aware of it. In United States alone 2.12 million poison exposure cases were reported in 2017.[2] According to WHO data, an estimated 193,460 people died worldwide from unintentional poisoning in 2012. Among these almost 84% were reported from low and middle-income countries. In the same year, unintentional poisoning caused the loss of over 10.7 million years of healthy life (disability adjusted life years, DALYs).[2] Thus making poisoning a significant global health problem. Considering the above facts, it is presumed necessary for a medical graduate to have minimum acceptable knowledge of toxicology and its medicolegal aspects. In the present study we have made an attempt to know the extent of importance given to toxicology studies by Universities as well as medical students.

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MATERIAL AND METHODS

In the present study various approaches were utilised as follows:

Profile of poisoning related emergency cases: Profiling of toxicology related emergency cases in different parts of India was done after reviewing the relevant literature published in Indexed journals within last five years.

National Crime Records Bureau (NCRB) data: Statistics on poisoning cases published online in 'Crimes in India' reports 2014 and 2015 published by NCRB were reviewed for estimating the problem statement of poisoning cases reported across the nation.

Analysis of Question Papers: University theory examination papers of Forensic Medicine and Toxicology for second year MBBS from different universities across India were reviewed for the questions related to Toxicology. Review of average number of questions asked on Toxicology in each University examination and whether these are sufficient to test the Toxicology knowledge of the students was done. Following different Health Science Universities were included in our study.

a. Gujrat University, Ahmedabad.
b. Maharashtra University of Health Sciences, Nasik.
c. Rajiv Gandhi University of Health Sciences, Bengaluru.
d. The Tamilnadu Dr M.G.R. Medical University, Chennai.
e. Kerala University of Health Sciences, Kerala.
f. Pondicherry University, Puducherry.
g. JIPMER, Puducherry.
h. Madhya Pradesh Medical Science University, Jabalpur.

Data obtained from interaction with students: We conducted a survey about the perception and attitude towards curriculum of Toxicology among MBBS students. We included randomly selected 300 students from third MBBS who have recently passed second MBBS studying from two different medical colleges. These students were given open ended questionnaire about their approach towards Toxicology. Among those, 273 students responded with duly filled questionnaire.

All the above parameters were systematically studied to determine usefulness of current MBBS curriculum for incorporating knowledge of toxicology in medical students.

Table 1: Profile of poisoning related emergency cases

Parameter	Survivors	Non-survivors
1	Malik et al (Haryana) [3]	42%
2	Mina et al (New Delhi) [4]	23.10%
3	Visnurajkumar et al (Puduchery) [5]	18.90%
4	Deelip Kumar et al (Tumkur, KA) [6]	14%
5	Trangadia MM. et al (Gujarat) [7]	11.78%

As shown in table 1, the extent of emergency cases reported at casualty departments of various hospitals ranged from 11.78% to whooping 42% of the total number of emergencies. On an average more than 20% of the cases coming to casualty are due to poisoning.

Table 2: National crime records bureau data [8]

Cause	Year 2014	% share (w.r.t. all India)	Year 2015	% share (w.r.t. all India)
Poisonous liquor	1699	1.5	1522	2.3
Poisoning	20587	17.9	26173	39.1
Drug overdose	874	0.8	750	1.1
Total	23160	20.2%	28445	42.5%

NCRB data for accidental and nonaccidental deaths in India for the year 2014 and 2015 as shown in the table 2 implies that the poisoning cases almost doubled from 20.2% in 2014 to 42.5% in year 2015.[8]

Analysis of question papers of various Health Science Universities: Following terms were used for analysis: a) Question repetition rate: Ratio of number of repeat questions to total number of toxicology questions asked expressed in terms of 100. b) Topic repetition rate: Ratio of number of repeat topics to total number of toxicology topics asked expressed in terms of 100. c) Application question: Case based question. d) Total number of toxicology topics [9]: 15

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Table 3a: Question papers of Gujrat University, Ahmedabad.

Year	Q on Toxicology	Q on FM	Total marks
Jan 2012	15 Marks	25 Marks	40
July 2012	12 Marks	28 Marks	40
Jan 2013	02 Marks	38 Marks	40
July 2013	14 Marks	26 Marks	40
Jan 2014	18 Marks	22 Marks	40

1. Average questions asked on toxicology: 30%
2. Question repetition rate: 14%
3. Topic repetition rate: 52.63%
4. Number of toxicology topics rarely (never?) asked in examination: 7
5. Application questions: No
6. Optional questions: Present

Table 3b: Question papers of Maharashtra University of Health Sciences, Nasik.*

Year	Q on Toxicology	Q on FM	Total marks
Winter 2014	08 Marks	24 Marks	32**
Summer 2015	10 Marks	22 Marks	32**
Winter 2015	10 Marks	22 Marks	32**
Summer 2016	00 Marks	32 Marks	32**
Winter 2016	10 Marks	22 Marks	32**
Summer 2017	06 Marks	26 Marks	32**

1. Average questions asked on toxicology: 21%
2. Question repetition rate:22%
3. Topic repetition rate: 37.5%
4. Number of toxicology topics rarely (never?) asked in examination: 10
5. Application questions: No
6. Optional questions: Present

* 8 Marks of MCQ could not be added here as MCQ papers were not available

Table 3c: Question papers of Rajiv Gandhi University of Health Sciences, Bengaluru.

Year	Q on Toxicology	Q on FM	Total marks
Jan 2008 RS II	21 Marks	79 Marks	100
July 2013	16 Marks	84 Marks	100
Dec2015	20 Marks	80 Marks	100
June 2017	20 Marks	80 Marks	100
Dec 2017	20 Marks	80 Marks	100

1. Average questions asked on toxicology: 19.4%
2. Question repetition rate: 21%
3. Topic repetition rate: 36.84%
4. Number of toxicology topics rarely (never?) asked in examination: 3
5. Application questions: No
6. Optional questions: No

Table 3d: Question papers of The Tamilnadu Dr M.G.R. Medical University, Chennai.

Year	Q on Toxicology	Q on FM	Total marks
Aug 2016	05 Marks	35 Marks	40
Feb 2017	07 Marks	33 Marks	40
Aug 2017	07 Marks	33 Marks	40
Feb 2018	11 Marks	29 Marks	40
Aug 2018	10 Marks	30 Marks	40

1. Average questions asked on toxicology: 19.6%
2. Question repetition rate: 9%
3. Topic repetition rate: 40%
4. Number of toxicology topics rarely (never? asked in examination: 9
5. Application questions: No
6. Optional questions: No

Table 3e: Question papers of Pondicherry University, Puducherry.

Year	Q on Toxicology	Q on FM	Total marks
May 2016	16 Marks	64 Marks	80
Nov 2016	16 Marks	64 Marks	80
June 2017	38 Marks	42 Marks	80
Nov 2017	18 Marks	62 Marks	80
Nov 2018	16 Marks	64 Marks	80

1. Average questions asked on toxicology: 26%
2. Question repetition rate: 35%
3. Topic repetition rate: 71%
4. Number of toxicology topics rarely (never?) asked in examination: 10
5. Application questions: Occasionally
6. Optional questions: No

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Table 3f: Question papers of Kerala University of Health Sciences, Kerala.

Year	Q on Toxicology	Q on FM	Total marks
Feb 2015	04 Marks	36 Marks	40
Feb 2016	09 Marks	31 Marks	40
Feb 2017	11 Marks	29 Marks	40
Aug 2017	09 Marks	31 Marks	40
Feb 2018	03 Marks	37 Marks	40

1. Average questions asked on toxicology: 17.6%
2. Question repetition rate: 33%
3. Topic repetition rate: 45.45%
4. Number of toxicology topics rarely (never?) asked in examination:10
5. Application questions: Yes
6. Optional questions: No

Table 3g: Question papers of JIPMER, Puducherry.

Year	Q on Toxicology	Q on FM	Total marks
June 2014	22 Marks	58 Marks	80
June 2015	16 Marks	64 Marks	80
June 2016	16 Marks	64 Marks	80
Dec 2016	16 Marks	64 Marks	80
June 2017	10 Marks	70 Marks	80

1. Average questions asked on toxicology: 20%
2. Question repetition rate: 30%
3. Topic repetition rate: 50%
4. Number of toxicology topics rarely (never?) asked in examination: 10
5. Application questions: Yes
6. Optional questions: No

As observed from Tables 3a to 3g; Gujarat University has asked more questions from toxicology up to 30% of average while Kerala University asked up to 17.6% questions on toxicology. Question repetition rate was found highest in Gujarat and Pondicherry University (35%) while lowest (9%) in MGR University. Topic repetition rate was found up to 71 % in question papers of Pondicherry University and Gujarat University and lowest (36.84%) in RGUHS question papers. On the same plane, RGUHS has covered almost all topics from Toxicology except rarely asking questions from 3 topics, while all other Universities have almost neglected around 10 topics out of 15. Applied case-based questions are asked only in JIPMER and Kerala Universities but not by other Universities. And only MUHS has the provision for optional questions while other Universities make all questions compulsory.D

Data obtained from interaction with students: Among the 300 randomly selected students 273(91%) responded back with duly filled questionnaire. Among those almost 82% students said that they have not read toxicology in detail during 2nd year. The commonest (68%) reason for not reading toxicology was insufficient weightage in the University examination and 78% students felt that they can pass the subject without reading Toxicology. Other factors included difficulty in understanding (43%) the subject as most of the terms including names of poisons and antidotes need to be recited, while 38% students felt difficulty in remembering the complex terms. Among the study population, 74% students said reading Toxicology and Forensic Medicine together for examination is difficult and 76% students felt that FMT paper should be divided in to paper 1 for Forensic pathology and paper 2 for clinical aspect of FM and Toxicology.

DISCUSSION

In United States, as per the National poison statistics 2017, 2.12 million human poison exposures occurred. Collection of this data was possible because of availability of robust network of poison control centres which has facility to report cases in real time.[2] In lower and middle-income countries number of such poison control centres is either inadequate (absent?) or they are poorly equipped. Thus, the number of human poison exposure reported in such countries may be smaller than the actual number. In the present research we have analysed toxicology related medicolegal data available under public domain reported from almost all parts of India. From table no. 1 and 2, it is clear that minimum acceptable knowledge of toxicology is must for every medical graduate as toxicological cases come under most common 3 major medicolegal emergencies in India. Main aim behind the medical college examinations is to test competency of students in particular subject. In present study we have observed that students read subject not to get sufficient knowledge but to get pass with the aim of scoring 50% marks. As shown in result section, paper set for FMT by different universities examines only 20% of toxicology

on an average. In the undergraduate curriculum forensic toxicology is divided in to approximately 15 topics [9]. In our study we found that some of the topics are almost never asked in the examination while some topics were repeatedly included in examination. Five-year topic repetition rate in almost all universities was more than 50%. So, students are more inclined to not to read toxicology at all or read only repetitive topics/questions instead of focussing on gaining sufficient knowledge on toxicology. Many universities did not include case-based application questions in their exam format except JIPMER where every question paper has got case-based questions.

MCQ and application questions: Many universities have included MCQ in their examination pattern. We think MCQ are not only crude method of examining student but also it puts unnecessary burden of reading very minute but useless details of the subject. In our observation many students while solving MCQ opt for either guessing or some unethical means. We think MCQ should be replaced with case-based questions. Such questions will help in 1) Increasing interest in reading subject 2) Thinking capacity of students 3) Removal of burden of reading unnecessary details of the subject. Findings of our study are similar to the study conducted at Bhopal, Madhya Pradesh.[10]

CONCLUSION

Less weightage, repetitive questions/topics and absence of application questions has made current examination format for Toxicology insufficient to incorporate proper knowledge in medical graduates. With advent of Competency-based medical education (CBME) in India, we hope the new curriculum addresses these lacunae in the present assessment structure and improving these pitfalls might be helpful for equipping the medical graduates with better knowledge and skills in handling poison related emergencies.

Limitations of Study: There are more than 40 Medical Universities in India, and analysing the examination patterns of all those is mammoth task, and hence we included few question papers of seven different Universities.

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