Research Article

Does Uniformity Exist In Present MD Pharmacology Curriculum In India?

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Abstract

Background: In recent years, there has been concern over the existence of non-uniformity in PG practical pharmacology curriculum. In this perspective, practical pharmacology curricula of different universities in India were studied for non-uniformity, if any.

Methods: MD practical Pharmacology curriculum was searched in search engine Google using key words MD Pharmacology, practical, syllabus, curriculum, India. Collected curricula were screened for conformation to following components viz in-vivo experiments, isolated tissue preparations, clinical & chemical Pharmacology exercises, research methodology, computer skills, biostatistics, and teaching skills. A score of one was assigned for each of the components if present in practical curriculum. Teaching skill was further sub-divided into four subparts each with a score of 0.25.

Result: Curricula of seven universities and four medical colleges were included in the analysis. The practical curriculum of JIPMER, Puducherry contained all the study elements (scored 8) followed by FAMS (University of Delhi), MUHS (Maharashtra), and Gujarat University, each with a score of 7.5. All included curricula mentioned animal experimentation as a necessity for training of postgraduate students. However, in MUHS curriculum; in-vivo and in-vitro experiments sections were incomplete. In the present study two curricula did not mention the goals and objectives for the use of computer assisted learning and teaching skills. The curriculum of AIIMS (New Delhi) and Aligarh University were verbatim and lacked computer skill training (scored 6.5).

Conclusions: The present study revealed non-uniformity in the MD practical Pharmacology curricula offered by different medical colleges/universities across the country which can be best addressed by adding missing elements to ensure uniform quality training.

Keywords: MD Pharmacology, practical, syllabus, curriculum, India

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INTRODUCTION

The recent years have witnessed many medical graduates wishing to pursue MD Pharmacology course with the various career options for MD Pharmacologists in, namely, academia, pharmaceutical industry including preclinical toxicity studies and clinical trials, medical writing, pharmacovigilance and clinical research.[1] At present, there are 663 postgraduate seats for MD Pharmacology per year in 229 medical institutes in India.[2] In this perspective, a well-defined curriculum which keeps pace with recent advances in the subject and delivers the needs of the industry, academia and research is needed.

The present curriculum of MD pharmacology in India is based on broad goals laid down by Medical Council of India (MCI) as mentioned in the Postgraduate Medical Education Regulations, 2000, amended up to May, 2013.[3] As per MCI recommendations, the postgraduate curriculum should include conceptual knowledge of the subject, practical/clinical skills, attitudes including communication skills and training in research methodology.[3] However, these guidelines are generalized to all PG courses. In this regard experts in Pharmacology have expressed their concern that in the absence of well-defined subject-oriented objectives and syllabus, there are chances that non-uniformity in teaching pharmacology to PG students across the country.[4,5] Probably such non-uniformity may be easily appreciated in practical pharmacology section. However, a diligent literature search revealed that no study has been conducted till date to unveil such non-uniformity and its extent. In this perspective, the present study was conducted to explore the non-uniformity prevailing in the practical pharmacology curriculum of different universities across the country.

MATERIAL AND METHODS

A bibliometric study was conducted in the Department of Pharmacology of a tertiary care medical college in New Delhi to address the study objectives. A literature search was performed using the key words viz MD Pharmacology, syllabus, curriculum, India. The search engine used was Google (Last accessed on 12.11.2018). The MD Pharmacology syllabus/curriculum of all the medical colleges and universities tracked by the search engine were considered in the study.

The practical pharmacology section of the included syllabus / curriculum was analyzed and compared for similarities and non-uniformities.

Collected curriculums were screened for their conformation to the recommendations of MCI with a special focus on practical pharmacology as per following criteria: These components were also included in a recent review by Badyal DK et al.[2]

A) In vivo experiments:

1. Handling of small animals, collection of blood and urine samples from animal, administration of drugs in animals by iv/ip route.
2. Demonstration of anxiolytic effect, anticonvulsant effect, analgesic effect, motor in-coordination, despair behaviour, antipsychotic effect and anti-inflammatory effect in suitable animal models.

3. To study the effect of unknown drugs on rabbit eye.

B) Isolated tissue preparations:

1. Assembly of organ bath and setting of thermostat, to prepare log dose response curve of a suitable drug for: Guinea pig ileum/ guinea pig tracheal chain /guinea pig vas deferens /frog rectus abdominis /rat colon
2. To perform four-point bioassay of a suitable drug on: Guinea pig ileum / guinea pig vas deferens / rat colon / frog rectus abdominis
3. To study the effect of coronary vasodilator drugs on perfused rabbit heart (Langendroff's technique).
4. Determination of median effective dose (ED 50) of histamine on guinea pig ileum/ frog rectus abdominis muscle.
5. Determination of pD2 values of histamine on guinea pig ileum, frog rectus abdominis muscle.
6. Determination of pA2 value of acetylcholine on guinea pig ileum.

C) Clinical Pharmacology exercises:

1. Recording of ECG and measurement of heart rate, PR interval, QT interval, ST segment in human volunteers.
2. Study of the effect of beta-blockers on exercise tolerance in volunteers using treadmill/bicycle ergometry/Master's two step test.
3. Evaluation of spirometry and respiratory function tests before and after administration of bronchodilators.
4. Psychomotor testing in volunteers with 6 letter cancellation test, digit -letter symbol substitution test.
5. Assessment of analgesic activity in volunteers by soda water bottle cap-BP Cuff pressure test.
6. Training and periodic posting at poison information center/ drug information center.
7. Calculation of Pharmacokinetic estimates from given concentration vs time data
8. Designing and reviewing of protocols

D) Chemical Pharmacology exercises: To estimate levels of various drugs including sulphonamides salicylates and lithium, chemical identification of alkaloids, glycosides and basic chemical parameters like blood sugar levels, blood urea levels, lipid profile etc in biological fluids.

E) Research methodology: Appreciation of different study designs, null hypothesis generation, testing of hypothesis, knowledge about patents, IPRS etc.

F) Biostatistics: Application of basic elements of data collection and presentation of data, measures of central tendency and dispersion non parametric tests, parametric tests, correlation, regression and sample size calculation.

G) Computer skills: Proficiency in using computer aided learning (CAL) programs for demonstration of the effects of various drugs on animals and hands on training on statistical softwares.

H) Teaching skills: Acquiring the skills of microteaching/ teachers oriented sessions (TOS), supervised teaching of undergraduate students, conducting mock

workshop/s and conference/s and group discussion sessions.

In order to objectively assess the curriculum of different universities and medical colleges, we assigned a score of one for each of the essential elements (viz A through G) of practical curriculum. The last element, i.e. teaching skill was further sub-divided into four parts, each with a score of 0.25. Thus, a medical college/university which has incorporated all the eight essential components in their practical curriculum could score a maximum of eight points.

RESULTS

During the study, the syllabus of seven universities and four medical colleges was tracked by our search engine. Amongst the universities, four were from North, one from East, two from West and four from Southern India. Analysis of these curricula revealed that the practical curriculum of JIPMER contained all the essential elements and scored 8 points, followed by FAMS, MUHS, and Gujarat University, each with a score of 7.5 points. In all the curricula included in the study, animal experimentation (both in-vitro and in-vivo) including small laboratory animals was considered a necessity for training of postgraduate students. However, in the MUHS syllabus, in-vivo and in-vitro experiments sections were incomplete as it was just mentioned in the heading without any elaboration. The curriculum of AIIMS and Aligarh University were verbatim so had similar scored a total of 6.5 each, with both lacking computer skill training (Table 1). In the present study, two curricula were found not to have the goals and objectives for the use of CAL. In addition, five study curricula which advocated CAL did not mention the development of computer skills in PG students which is necessary for the implementation of CAL. Two curricula did not mention any intervention to develop teaching skills. (Table 1)

Table 1 Score of medical colleges/ universities in respect to eight essential elements of Practical Pharmacology curriculum

Name of the University	In vivo experiment	Isolated tissue preparations	Clinical Pharmacology Exercises	Chemical Pharmacology exercises	Research methodology	Biostatistics	Computer skills	Teaching skills	Total
FAMS, New Delhi[6]	1	1	1	1	1	1	1	0.5	7.5
Baba Farid, Punjab[7]	1	1	1	1	-	1	1	0.5	6.5
AIIMS, New Delhi[8]	1	1	1	1	1	1	-	0.5	6.5
Aligarh Muslim University[9]	1	1	1	1	1	1	-	0.5	6.5
Sambalpur University[10]	1	1	1	1	1	1	-	0.25	6.25
MUHS,[11]	1	1	1	1	1	1	1	0.5	7.5
Gujarat University[12]	1	1	1	1	1	1	1	0.5	7.5

Name of the University	In vivo experiment	Isolated tissue preparations	Clinical Pharmacology Exercises	Chemical Pharmacology exercises	Research methodology	Biostatistics	Computer skills	Teaching skills	Total
JIPMER[13]	1	1	1	1	1	1	1	1	8
RPGMC, Himachal Pradesh[14]	1	1	1	1	1	1	1	-	7
TNMG[15]	1	1	1	1	-	-	-	-	4
KMC, Bengaluru[16]	1	1	1	1	1	1	-	0.5	6.5

Table 2 Assessment of teaching skills in the practical MD Pharmacology curriculum by medical colleges/ universities

	Microteaching/ TOS	Supervised teaching of undergraduate students	Conducting mock workshop/s and conference/s	Group discussion
FAMS, New Delhi[6]	0.25	0.25	—	—
Baba Farid, Punjab[7]	0.25	0.25	—	—
AIIMS, New Delhi[8]	0.25	0.25	—	—
Aligarh Muslim University[9]	0.25	0.25	—	—
Sambalpur University[10]	0.25	—	—	—
MUHS, Maharahtra[11]	0.25	—	—	0.25
Gujarat University[12]	0.25	0.25	—	—
JIPMER, Puduchhery[13]	0.25	0.25	0.25	0.25
RPGMC, Himachal Pradesh[14]	—	—	—	—
TNMG, Tamilnadu[15]	—	—	—	—
KMC, Bengaluru[16]	0.25	0.25	—	—

DISCUSSION

In the present study, all the curricula of medical colleges and universities tracked by the search engine were considered with special emphasis on practical Pharmacology section. In a recent review on MD Pharmacology curriculum, Badyal et al (2014) opined that there is ambiguity over conduct of animal experimentation for training of PG students.[2] In this perspective, we would like to differ as a careful introspection of the all curricula included in the study revealed that animal experimentation (both in-vitro and in-vivo) including small laboratory animals is necessity for training of postgraduate students. Even the regulatory authority for animal experimentation in India viz. CPCSEA considers it as an integral component in drug research and development. Compliance to CPCSEA guidelines for animal welfare and experimentation ensure that the data obtained from these experiments are accurate, precise and reproducible.[17,18] However, many of the animal house facilities

in country may fail to sustain standards laid down by CPCSEA thus compromising with animal experimentation in PG teaching. It may be prudent to mention here that out of the available curricula, only JIPMER mentioned the "Must do" and "Required" animal experiments to be performed by a postgraduate student. In this regard, the authors are in concordance with Badyal et al who consider this strategy necessary to develop a certain level of expertise and competence that a postgraduate student should possess.[2]

The recent years, postgraduate teaching has witnessed the introduction of CAL, an alternative teaching learning tool to animal experimentations. However, experts have repeatedly expressed their concern that most of the departments are not equipped for alternatives to animal experiments. Further, the alternatives which are available are also varied and not standardized or validated for their educational value.19 This has also been reiterated in the present study where two curricula have not mentioned the goals and objectives for the use of CAL. In addition, five study curricula which advocated CAL did not mention about the development of computer skills in PG students which is necessary for the use of CAL.

In the present study, two curricula did not mention any intervention to develop teaching skills. Even those who mentioned it, referred to traditional methods like microteaching and supervised teaching of undergraduate students. Only JIPMER curriculum elaborates all the components of teaching skills (Table 2). In this regard, it is interesting to note that most curricula mentioned that microteaching was a way of assessing the teaching skills whereas on the contrary it is only a tool to improve components of teaching.[2] Many of the qualified PG students may opt to be a medical teacher; for them development of teaching skills may prove to be more meaningful and hence should be an integral component of the post graduate curriculum.

Thus it is prudent from the present study that practical pharmacology curricula offered by different universities and medical colleges across the country have a great deal of similarity in all the essential elements except for a few universities as evidenced by absence of certain important sections in their curricula. This non-uniformity eventually might affect development of all the components among PG students. In order to bring uniformity, regulators can play a vital role by constitute a panel of experts across the country to frame a single MD Pharmacology curriculum for the whole country. In addition, national professional body of medical pharmacologists can also take initiative to fill this void.

CONCLUSION

The present study revealed non-uniformity in the MD practical Pharmacology curriculum offered by different medical colleges/ universities across the country. A larger study involving different medical colleges/ universities should be conducted to explore the magnitude of this non-uniformity. The findings of such study can further guide to formulate a standardised MD practical Pharmacology curriculum.

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None

REFERENCES

1. Ghosh RK, Ghosh SM, Datta S. Training of postgraduate pharmacologists in India – The need for alignment with the emerging roles in the pharmaceutical industry. J Postgrad Med 2010;56:168-9.
2. Badyal DK, Desai C, Tripathi SK, Dhaneria SP, Chandy SJ, Bezbaruah BK. Postgraduate pharmacology curriculum in medical institutions in India: Time for need-based appraisal and modications. Indian J Pharmacol 2014;46:584-9.
3. Salient features of postgraduate medical education regulations, 2000 (Amended upto May, 2013). New Delhi, India: MCI; 2000. Medical council of India. Available from: http://www.mciindia.org/RulesandRegulations/PGMedicalEducationRegulations2000.aspx. (Accessed on Nov 24, 2018).
4. Dikshit RK. Postgraduate education in medical pharmacology. Indian J Pharmacol 2007;39:171.
5. Gitanjali B. The M.D. (Pharmacology) examinations: A call for better standards. Indian J Pharmacol 2004;36:339-40
6. Syllabus of Pharmacology for Postgraduate Medical Students. Available from: http://www.fmsc.ac.in/curriculum/Curriculum%20for%20PG%20Pharmacology.pdf (Accessed on Nov 23, 2018)
7. Curriculum MD Pharmacology. Baba Farid university of health sciences, Faridkot, Punjab. Available from: http://www.bfuhs.ac.in/Examination/Syllabus/Pharmacology.pdf (Accessed on Nov 23, 2018)
8. Curriculum MD Pharmacology, AIIMS, New Delhi. Available from: http://www.aiims.edu/aiims/academic/aiims-syllabus/Syllabus%20-%20md%20ms%20mds%20mha.pdf (Accessed on Nov 23, 2018)
9. Curriculum MD Pharmacology, Aligarh Muslim University. Available from: http://www.amu.ac.in/syllabus/9989.pdf (Accessed on Nov 23, 2018)
10. Curriculum MD Pharmacology, Sambalpur University. Available from: http://suniv.ac.in/upload/MD%20MS%20Syllabus%20and%20Curriculum%202012.pdf (Accessed on Nov 23, 2018)
11. Postgraduate curriculum in MD (Pharmacology and Therapeutics). Available from: http://www.muhs.ac.in/upload/syllabus/MD_Pharmacology.pdf.12. (Accessed on Nov 23, 2018)
12. MD Pharmacology Syllabus, BJ Medical College. Available from: http:// www.bjmc.org (Accessed on Nov 23, 2018)
13. MD Pharmacology Syllabus, JIPMER, Puduchhery. Available from: http://jipmer.edu.in/wp-content/uploads/2013/01/MD-MS-Curriculum pdf (Accessed on Nov 23, 2018)
14. MD Pharmacology Syllabus. Available from: http://www.rpgmc.ac.in/pharmacology/M%20D%20Pharmacology.pdf (Accessed on Nov 23, 2018)
15. MD Pharmacology Syllabus, The Tamil Nadu Dr. MGR Medical University. Available from: http://web.tnmgrmu.ac.in/syllabus/md/mdpharmacology.pdf (Accessed on Nov 23, 2018)
16. MD Pharmacology Syllabus, Karuna Medical College. Available from: http://karunamedicalcollege.edu.in/files/mdPharmacology.pdf (Accessed on Nov 23, 2018)
17. Committee for the purpose of control and supervision of experiments on animals (CPCSEA). Available from: http://moef.nic.in/modules/divisions/cpcsea/ (Accessed on Nov 25, 2018 Nov 25)
18. Badyal DK, Desai C. Animal use in pharmacology education and research: The changing scenario. Indian J Pharmacol 2014;46:257-65.
19. John LJ. A review of computer assisted learning in medical undergraduates. J Pharmacol Pharmacother 2013;4:86-90.