

ORIGINAL ARTICLE

Perceptions of Medical Students on Research Curriculum: A Cross-sectional Study

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ABSTRACT

Introduction: Medical colleges promote research by incorporating it into the curriculum, which enables students to acknowledge it as a career prospect. The aim of the study was to assess the perceptions of medical students on research curriculum. **Methods:** This cross-sectional study was conducted among 544 medical students (interns and post-graduates) at AIIMS Rishikesh in 2020. Data was collected thorough online self-administered questionnaire. A comparison between groups was made using the Mann-Whitney test or chi-square test $p < 0.05$ was considered statistically significant. **Results:** Out of 544 participants, 218 (40.1%) responded with complete data. The total median score for the self-perceived ability of study participants regarding performing the research tasks differed significantly between interns and post-graduates [29.5 (24.0–34.2) vs 33 (25.2–39.7), $p = 0.03$]. They suggested that mandatory research projects, workshops, and training should be included in the curriculum. **Conclusion:** Feedback from medical students regarding the need for guided research projects, hands-on training, and inclusion of research methodology as a course in UG curriculum and provision of support in the form of incentives, academic credits, and motivation are well noted and guide the resource faculties to modify their teaching and student support programs.

KEYWORDS

Perceptions, Medical Student Research, Self-Efficacy, Research Curriculum

INTRODUCTION

Scientific research is critical for progress in the medical field. In addition, physicians who conduct research (physician-scientists or researchers) are needed as well. To practice

evidence-based medicine, every physician must stay updated with scientific advancements and incorporate knowledge into decision-making. Clinicians and medical researchers are both key human resources for

the development of medical evidence-based practices. However, concerns have been raised about the gap between clinical research and practice, on the one hand highlighting the small number of clinical problems that are translated into research and the failure to integrate recent scientific knowledge into clinical practice on the other (1–3). Concerns have also been expressed about the scholarly future of medicine (4). A declining interest in academic careers and an ageing medical-scientist workforce poses a severe concern.

Exploring the perception of the students regarding the research curriculum is critical for curricular development. Very few studies have been conducted to explore medical students' perceptions regarding research training and curriculum as part of their medical course and how much it has contributed to developing their research aptitude. Hence, this study was conducted at a tertiary care health centre and teaching institute in Rishikesh, Uttarakhand

Objectives of this study to determine the self-perceived ability of medical interns and post-graduate students to perform research tasks and to take their feedback regarding their experiences and desires for undergraduate (UG) research.

MATERIAL & METHODS

A cross-sectional survey, from 1st August to 30th September 2020 was conducted among medical students, at tertiary care hospitals.

Sample and Sampling technique: in the present study, by using total enumerative sampling technique all the 544 MBBS interns and post-graduate medical residents were included. Medical students who were willing to participate in the study were included.

Data collection tools: A questionnaire in English was developed to collect information regarding perception of research curriculum imparted to medical students at the institute. The questionnaire was sent to seven experts for content validation. It was followed by pilot testing among 30 medical students.

The questionnaire consisted of 21 items, divided into three sections. The first section

addressed questions related to students' background information. The second section included 5-point Likert scale questions to assess the self-efficacy of the respondent regarding planning and conducting research. The third section collected information on perceptions and practices towards medical research. An open-ended question was also included to record the suggestions from participants to improve the UG medical curriculum to develop research aptitude among medical students.

Data collection procedure: All students (544) were invited to participate in this study via e-mail. Data were collected from August to November 2020 using Google Forms. Students were requested to fill out the form within ten days of receiving the email. A reminder email was sent once after one month of the previous email to all students, as non-respondents could not be identified.

Ethical considerations: Institutional ethical committee approval was obtained for the study (AIIMS/IEC/20/525). Written consent was obtained from all the study participants.

Statistical analysis: Data were extracted into Microsoft Excel and analyzed using the statistical package of social sciences (SPSS) version-23. The data were described as frequencies and proportions. Self-efficacy scores were generated by adding individual rating scale scores (1 to 5) per item of the questionnaire. A Mann-Whitney test was used to compare self-efficacy scores among group categories. The chi-square test was used to compare proportions among groups. $p < 0.05$ was set as statistically significant. Content analysis was performed for the open-ended question.

RESULTS

Out of 544 participants approached for this study, a total of 218 responded (40.07%) with complete data. Out of 218 participants who completed the survey, out of them 124 (56.88%) were male. The median age of study participants was 26 years. Majority 160 (73.39%) of participants were post-graduate students. (Table-1)

Table 1: Profile of study participants (n=218)

Variables	f(%)
Age (median) in years	26 (IQR: 24-29)
Gender	
Male	124 (56.88%)
Female	96 (44.03%)
Category of Medical Students	
Undergraduate	58 (26.60%)
Post-graduates	160 (73.39%)

IQR=Inter-quartile range

The self-efficacy of the students regarding planning and conducting research, as reflected in their responses to the questions, is presented in Table-2. The total median score for the self-perceived ability of study participants regarding performing the research tasks differed significantly between interns and post-graduates [29.5 (24.0–34.2) vs 33 (25.2–39.7), $p = 0.03$].

Table 2: Comparison of self-efficacy in performing research tasks among interns and post-graduates

S.No.	Research task	Median score, IQR		P-value
		Intern (n=58)	Postgraduate (n=160)	
1	Can frame a research question	3, 2–3	3, 2–4	0.03
2	Capable in doing background search and writing review of literature	3, 2–3	3, 2–4	<0.001
3	Can formulate research plan	3, 2-3.25	3, 2–4	0.14
4	Can appropriately judge the study design to be carried out for a particular study	3, 2-3	3, 2–4	0.31
5	Can judge the sampling strategy to be carried out for a particular study	3, 1-3	3, 2–3	0.09
6	Can develop data collection tools	3, 2-3	3, 2–4	0.06
7	Can conduct research and collection of data	3, 2-3	3, 2–4	0.02
8	Can analyse and interpret data	3, 2-3	3, 2–4	0.88
9	Understanding of statistics and its application in research	3, 3-4	3, 3–4	0.34
10	Can present the result from data	3, 3-3	3, 2–4	0.78
11	Can develop a research protocol	3, 2-3	3, 2–4	0.02

Regarding the perceptions and practices of interns and post-graduate students, it was observed that 77% of the students felt that sensitization during the foundation course for research methodology helped to develop an orientation towards research. The majority (42%) of the students believed that there should be at least two research projects for students in the UG curriculum to get a

thorough understanding of the research process. Students found their community and family medicine classes to be quite helpful for developing an understanding of research. A significantly higher number (95%) of students reported that they get motivated to do research after understanding the research process as per their course curriculum ($p < 0.001$). (Table 3)

Table 3: Perceptions and practices of students regarding research training in their Curriculum

Questions exploring their perceptions and practices		Intern N(%)	Post-graduate N(%)	P-value
Sensitization session during foundation course for research methodology helps develop an orientation towards research	Yes	39 (67.2)	128(80.0)	0.131
	No	5(8.6)	8(5.0)	
	May be	14(24.1)	24(15.0)	
Minimum number of research projects in UG curriculum	One	17(29.3)	47(29.4)	0.846
	Two	22(37.9)	70(43.8)	
	Three	11(19.0)	25(15.6)	
	Four	3(5.2)	9(5.6)	
	Five or more	5(8.6)	9(5.6)	
	Yes	10(17.2)	109(68.1)	

Questions exploring their perceptions and practices		Intern N(%)	Post-graduate N(%)	P-value
Attended workshops for research methodology organized by your institution	No	48(82.8)	51(31.9)	
Workshops helpful in developing skills for planning and conducting research	Not at all helpful	3(5.2)	6(3.8)	<0.001
	Slightly helpful	10(17.2)	22(13.8)	
	Neutral	32(55.2)	45(28.1)	
	Very helpful	10(17.2)	76(47.5)	
	Extremely helpful	3(5.2)	11(6.9)	
What do you think should be the minimum number of such workshops organized in the institute	Zero	2(3.4)	6(3.8)	0.346
	One	5(8.6)	31(19.4)	
	Two	24(41.4)	55(34.4)	
	Three	10(17.2)	31(19.4)	
	Four or more	17(29.3)	37(23.1)	
Do you learn and develop skills to master data entry and analysis using software during your curriculum	Yes	19(32.8)	76(47.5)	0.036
	No	39(67.2)	84(52.5)	
Mastering software is helpful in research	Not at all helpful	0	2(1.3)	0.58
	Slightly helpful	9(15.5)	14(8.8)	
	Neutral	15(25.9)	38(23.8)	
	Very helpful	26(44.8)	83(51.9)	
	Extremely helpful	8(13.8)	23(14.4)	
Community and Family Medicine classes helpful in your understanding of the research process? **	Not at all helpful	6(10.3)	6(3.8)	<0.001
	Slightly helpful	19(32.8)	16(10.0)	
	Neutral	18(31.0)	40(25.0)	
	Very helpful	11(19.0)	72(45.0)	
	Extremely helpful	4(6.9)	22(13.8)	
After completion of the research methodology course, are you motivated in doing research	Not at all motivated	7(12.1)	4(2.5)	0.001
	Slightly motivated	7(12.1)	23(14.4)	
	Neutral	25(43.1)	41(25.6)	
	Very motivated	13(22.4)	73(45.6)	
	Extremely motivated	6(10.3)	19(11.9)	

** Not applicable in 4 participants (1.83%)

A significantly higher proportion of post-graduate students attended workshops for research methodology in the institution as compared to interns and found it helpful in developing skills for planning and conducting research (p<0.001).

The study participants (77/218, 35.3%) recommended various ideas to incorporate while developing the UG curriculum (Table 4 Inter-quartile range). Potential suggestions included increasing the number of trainings and workshops for research methodology and data analysis software, setting a quota for research projects per student in a course year, providing motivational sessions to boost students' interest in research, and many more. An intern said, "There should be a lot of emphasis on research in UG days. Some

minimum numbers of research should be assigned to each student apart from the academic study". Another participant expressed the need for mandatory project work. He wrote, "Every student should be given something to do work with, like a small project for every student, I am an average student, passing the exams used to be a priority but could have done it better if it was kind of compulsory to do". Contradictorily, an intern stated, "Research is really good and required extensive knowledge about the field, but it should be only for those who are interested; we cannot force someone to do research. I suggest, let students decide either they want to conduct research or not because all the students in medical colleges are not going to be doctors or research scholars."

Regarding practical training and workshops, a post-graduate student said, "Workshops should be conducted at least twice a year to develop skills in planning and conducting research." Many of the study participants felt the need for guided project work under a

mentor during their curriculum. An intern stated, "Students are to be given a project and all the help and taught individually under a mentor." Another student said, "There should be guidance sessions at regular intervals to keep one focussed and motivated."

Table 4: Examples of verbatim describing students' feedback for improvement of UG Curriculum and capacity building for research (N=77)

Themes	Category	Code	N (%)
Research Methodology Course	Classes and Teaching	Research should be made a part of UG curriculum	6 (7.8)
		Interactive classes	6 (7.8)
	Practice and Evaluation Workshop and training	Demonstrations	6 (7.8)
		Teach how to read research papers	4 (5.2)
		Use of A-V aids	3 (3.9)
		Sensitize with the process of publication	3 (3.9)
		Small topics per class	2 (2.6)
		Post-class assignment	3 (3.9)
		Separate exam for biostatistics	2 (2.6)
		Semi-annual or more workshops	8 (10.3)
Research Projects & activities	Practical Exposure	Hands-on software training	4 (5.2)
		Practical exposure of Data handling and management	3 (3.9)
		Mandatory research projects for UG	13 (16.9)
		Interest led project activities	2 (2.6)
		Population-based projects	3 (3.9)
Support	Motivating factors	Mandatory Publication	3 (3.9)
		Sessions for experience sharing regarding research activities	4 (5.2)
		Incentives for research work	2 (2.6)
		Extra academic credits	2 (2.6)
		Guidance for project work	2 (2.6)
		Availability of funds for research work	1(1.3)

DISCUSSION

This study examined the perceptions of medical students regarding research during their medical degree courses. It also explored the perceived ability and confidence of interns and post-graduate medical students in performing various research-related tasks. A response rate of 40% was achieved for this study, which is already a great proportion considering that the medical students were engaged in providing COVID care during the study period.

The self-perceived ability of study participants regarding performing the research tasks differed significantly between interns and post-graduates. This may be attributed to the fact that post-graduates have more exposure to research projects during their residency. Siemens et al. reported higher perceived competency in research among later years of

presidentship (5), as reported in other studies as well (6,7). There were no significant gender differences in regard to self-efficacy scores for research tasks in our study, which is consistent with the findings of Pearson and colleagues (8). Feedback for improving curriculum and building capacity for conducting research included conducting research classes, training and workshops, a certain number of mandatory research projects per student, teaching methodology, and supportive provisions to carry out research. Students believed that separate classes and exams for research methodology and biostatistics (especially the software for data analysis) should be a part of the UG curriculum to facilitate interest and early initiation of research aptitude among medical students. There was a mixed response regarding the research projects being made a compulsion for graduation. In countries like Germany and

Finland, medical graduates had to submit a dissertation outlining the results of a research project to pass out with the title "Doctor" (9,10). Some students suggest that research should be interest-led and not a mandatory requirement in fulfillment of a course degree, in contrast, others recommend that doing a certain minimum number of research projects should be a mandatory requirement for every medical student in their academic year and their credits be added to their academic achievements.

Regarding the teaching method, study participants suggested that demonstrations and presentations of already conducted studies; sharing experiences of other doctors related to steps in their research right from planning till the publication of their results would help them in understanding the research process and develop interest and motivation for the same. Bandura's self-efficacy theory foresees that work-related efficacy develops from an individual's experience of task achievement, observing others successfully perform the task, working with others who instruct, critique, and inspire the work, and the feeling of being engaged through psychological and physiological evidence (11). The study respondents also suggested that the students should be involved in doing simple tasks in an already undergoing research and recommended more research training and workshops to be organized for students for capacity building in research. Earlier studies have reported a positive association between medical graduate research training and participation and advancement in learning approaches in the research project at the institution with guided supervision. Previous studies have indicated that rigorous training or exposure of undergraduate medical students to research will increase their chances of pursuing a research career (3,12). According to DeVoe et al. involvement in research activities facilitates the abilities of critical thinking, problem-solving approaches, and analytical skills. They reported that the higher number of research projects completed is a significant indicator for better confidence and self-efficacy for research activities and involvement among

medical students. Research has been viewed as a means to distinguish oneself from others as well as proven to increase the likelihood of matching success in some studies (13).

Other suggestions included a provision of a supportive environment to facilitate research. This includes appropriate funding resources, improving access to supervisors and mentors, and constant motivation. According to Ommering et al., motivation for research could certainly be found as a key outcome to involve students in research activities (14). Previous studies have reported inadequate support by mentors or assistants, concerns about not being able to pursue their preferred topic, and lack of time due to other commitments to be major obstacles that prevent medical students from conducting research (5,15).

THE STRENGTH AND LIMITATIONS OF THE STUDY

Our study determines the overall self-perceived ability of medical students in planning and conducting research. It also records suggestions from students regarding their idea of a model curriculum for research in a medical course. This kind of active feedback would allow the education board to frame a need-based curriculum for medical students to allow them to develop their existing scientific knowledge and skills and make a positive difference through evidence-based patient care delivery and research.

There are a few limitations to this study that need to be considered. First, the results are based on self-report measures and ratings from a single medical institute. While self-report measures are commonly used in this type of study, which can be subject to bias information regarding the accuracy of the reported facts, that may be over or underestimated. Also, the overall response rate of 40%, while projected for this type of research, increases the possibility of responder bias. It was not possible to identify non-responders as there was restriction of physical meeting due to Covid-19 out break and technically not possible to contact telephonically to large number of medical students.

CONCLUSION

Enriching UG students in research skills is essential if we are serious about the competency of the graduates and post-graduates that we produce from the portals of medical colleges. This study helped to understand the limitations and opportunities during UG teaching and enabled the education board to frame a need-based curriculum for medical students. It is worthwhile to mention that improving and maintaining quality education is an essential component for the existence and survival of academic institutes. No formal research methodology training in the MBBS curriculum is the major lacunae in the medical education system. We recommend further exploratory research to be conducted to better understand the lacunae in the medical education system. Feedback from the students will play a very important role in developing insight into the issue. Need-based education will facilitate a conducive environment for medical students to improve their research skills. Promoting research projects at institutional level, explaining the scope of these to students, and involving them is an essential mechanism for achieving this.

LIMITATIONS OF THE STUDY

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AUTHORS CONTRIBUTION

All authors have contributed equally.

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Nil

CONFLICT OF INTEREST

There are no conflicts of interest.

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DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the authors have not used any AI tools or services.

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