



Research at Undergraduate Level: Medical Student's Perspective

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Abstract

Background: Research can be defined as scientific and systemic search for pertinent information on a specific topic. Medical research is essential to address the health problems and needs of the community and to enhance the knowledge of the students to translate into better health care. **Aims and objectives:** The objective of our study is to know the perspective of the medical students towards research and to enlist the factors influencing these attitudes. **Material and Methods:** A cross sectional study was conducted using pre-designed questionnaire that was validated and circulated through online Google forms. Undergraduate medical students of three academic years (2016, 2017, 2018) were the participants. The questionnaire was prepared after reviewing similar studies done previously. **Results:** Two hundred and ninety-two (292) students participated voluntarily in the study. 79.8% of the students showed interest in research. Most common reason cited was improvement in reasoning ability and gaining of deeper knowledge. It was observed that 20% of the respondents were involved in some research projects and most of them showed interest in pursuing research in future. **Conclusion:** Research projects can help students to develop critical analysis skills. Involvement in research will help them to understand the significance of it in finding the solutions to health problems. And in the process, it will enable them to gain deeper understanding of the process and will improve their writing skills and disseminate the knowledge through publication. The diverse burden of disease within India requires physician-scientists to emerge out of future generations of health care professionals.

Key Words

Medical education, Medical students, Publication, Research

Introduction

Research in common parlance refers to a 'search for knowledge'. One can define research as a scientific and systemic search for pertinent information on a specific topic. It is actually a voyage of discovery. We all possess the vital instinct of inquisitiveness for, when the unknown confronts us, we wonder and our inquisitiveness makes us probe and attain full and fuller understanding of the unknown. This inquisitiveness is the mother of all knowledge and the method which man employs for

obtaining the knowledge of whatever the unknown, can be termed as research (1).

Benefits of Undergraduate Medical Research:

Research at undergraduate level plays an important role in enhancing the knowledge of the medical students so that they can improve health care by addressing the health problems and needs of the community. Research activities can help the medical students to develop art of

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critical analysis, thinking and also enhances their skills in searching literature and independent writing. Students should recognize the role of medical research in their practice (2).

Researchers are able to update their knowledge and skill according to the latest approaches in medicine and have the opportunities to explain things concerned with cognition, acquisition and performance, and provides new interpretations of existing facts (3). Research is considered now as a very important part for any educational system; it helps in making doctors richer in thoughts and updates medical students on the latest advances in the medical field (4). Biomedical research activity and production are directly associated with countries and societies prosperity in medical practice and health care delivery (5). Earlier exposure to the basics of research can result in more research intensive careers by medical doctors (6).

Obstacles to Undergraduate Medical Research:

An American Journalist Craig Sager' said "Everyone has to face obstacles. Everybody has to face hurdles. It's what you do with those that determines how successful you're going to be" (7). Medical research is also not free of obstacles, which can hinder the ability of the students to conduct research. Some reported obstacles we can mention here as lack of proper guidance or mentor ship (8), lack of adequate research training (9), time management or lack of time to devote to extracurricular activities, financial restrictions, poor communication skills or communication gap. These obstacles have been found to be more prominent in developing countries (10). This can be due to limited resources in the developing countries.

Future of the medical research is in hands of the students only, whom we consider as a vital force that can effectively participate in establishing an extended increase in research production and activity in India. We believe that undergraduate research helps in building a generation of well educated and scientifically oriented physicians that will definitely help to tackle the long term health consequences.

We as a faculty, need to find the real barriers or hurdles which prevents medical students for choosing research as a carrier in medical field. Thus, our main objective of this study is to know the perspective of the medical college students towards research and to investigate the factors influencing these attitudes. Thus, with the help of our study we can find the barriers responsible for lack of

students' interest in research or hurdles which they are facing after starting some research projects. This will enable us to reduce these hurdles and our study can potentially be used to create an evidence based approach to promote research among medical students in India.

Material and Methods

Study Design and Data Collection:

The present study is a cross-sectional descriptive study where medical students of three academic years (2016, 2017, 2018) of the medical college and hospital are the participants. Our aim was to know the attitudes and opinion of the medical students regarding the research at undergraduate level and about their experience with scientific writing and publications. A questionnaire was designed in English language using online Google forms. Only the students who gave consent, were included in the study. Responses with invalid or incomplete responses were excluded from the study.

A pilot study on 30 MBBS students, with ten each from First year, Second year and Third year belonging to another medical institute was conducted using the online questionnaires. These questionnaires were then validated to enable further improvement before administering to the larger study group of our institute. The students of the pilot study were not the part of the final analysis. The questionnaire covered all areas that we aim to investigate after reviewing similar studies done previously.

Ethical Approval:

Institutional Ethics Committee clearance was obtained prior to releasing the questionnaires (ESICMC/SNR/IEC-F074/01/2019, version no. V01).

Questionnaire Description:

The first section of the questionnaire contained the questions about the demographic characteristics of the participants (gender and year of study) with both the open and close ended questions to know about their interest in research including the factors responsible. The second section contained questions to know the student's attitude towards research and the responses were taken on a 5-point Likert's scale ranging from strongly agree to strongly disagree. Third section included questions for those who were already involved in some research projects to know about their attitude for sustaining interest in research.

Data Analysis:

Responses were received using an online "Google"

survey form created by two authors and data was then entered into XLSX worksheet in WPS office (Version 11.2.0.9107) with a verification of data integrity by two other authors. Participant's responses were reported as frequencies and percentage. For questions with the option of choosing multiple responses, we calculated percentage of students who answered each corresponding question.

Results

General Characteristics:

Out of 293 participants 198 were female and 95 were male. Response rate was 99 per cent for all the batches with all students of 2018 batch participating in the survey (Table 1). 57 (19.45%) students had close relatives as physicians and 19 (6.5%) students had close relatives involved in research (Table 2). It was observed that the students, who had close relatives involved in research, were taking more interest in research activities.

Interest Towards Research:

In the present study, 79.5% students showed interest towards research. In 2016 batch, 78 (81.25%) students, of which 18 (18.75%) males and 60 (62.55%) females showed interest. In 2017 batch, 80 (82.47%) students,

of which 29 (29.9%) males and 80 (82.47%) females were interested. In 2018 batch, 75 (75%) students, of which 21 (21%) males and 54 (54%) females showed their interest towards research (Table 3).

Reasons for Interest Towards Research:

Research improves reasoning and thinking according to 20.90% of students. According to 15.14% students, reason for interest in research was to gain deeper knowledge. According to some (14.29%), research increases sense of responsibility. 12.79% students feel that research can be good for better job opportunities in future. 10.02% students think research is good for appearing in foreign exams (USMLE/PLAB etc.). Few students (4.69%) feel research is good for improving academic profile only (Figure 1).

Majority (27.5%) of the students give lack of related knowledge as reason for lack of interest in research. Some (13.79%) says lack of time as their barrier for interest in research. 12.07% says research needs too much perfection which may not be possible for most of the students. Some (6.9%) students say they don't understand the methodology and statistics and feels it too boring to search and read articles (Figure 2).

Table 1: Showing Percentage of Students Participated in the Study Voluntarily

S. No.	Batch Year	No. of Participants	Total Number	Response Rate
1	2016	96	98	98 %
2	2017	97	100	97 %
3	2018	100	100	100 %

Table 2: Demographic Details of the Participants (MBBS Students)

S. No.	Characteristics	2016 (n=96)	2017 (n=97)	2018 (n=100)	Total n=293 (%)
1	Gender: Male (M)	26	38	31	95 (32.42)
	Female (F)	70	59	69	198 (67.57)
2	Any close relative is physician	20	24	13	57 (19.45)
3	Any close relative in research	7	4	8	19 (6.48)

Table 3: Number of Students Showing Interest Towards Research

Batch Year	No. of Students Showing Interest Towards Research		
	Male	Female	Total (n=293)
2016	18 (18.75%)	60 (62.5%)	78 (81.25%)
2017	29 (29.9%)	51 (52.6%)	80 (82.47%)
2018	21 (21%)	54 (54%)	75 (75%)
Total	68 (23.2%)	165 (56.3%)	233 (79.5%)

Table 4: Showing Response (5 Point Likert's Scale) of Students to Different Parameters

Parameters	Strongly Agree			Agree			Neutral			Disagree			Strongly Disagree		
	2018	2017	2016	2018	2017	2016	2018	2017	2016	2018	2017	2016	2018	2017	2016
1. Research is important to the practice of medicine	43.0 %	47.4 %	50.0 %	53.0 %	40.2 %	38.5 %	4.0%	10.3 %	10.4 %	0.0%	2.1%	0.0%	0.0%	0.0%	1.0%
2. Pursuing Research activities / project should be made compulsory as part of medical curriculum.	14.0 %	17.5 %	16.7 %	47.0 %	39.2 %	37.5 %	34.0 %	33.0 %	30.2 %	3.0%	6.2%	11.5 %	2.0%	4.1%	4.2%
3. Application of bio statistics & research methodology should be a part of undergraduate teaching program.	19.0 %	26.8 %	25.0 %	65.0 %	51.5 %	52.1 %	15.0 %	16.5 %	16.7 %	1.0%	4.1%	5.2%	0.0%	1.0%	1.0%
4. Training of undergraduates for searching and evaluating scientific articles is important.	25.0 %	40.2 %	40.6 %	68.0 %	48.5 %	47.9 %	7.0%	9.3%	9.4%	0.0%	2.1%	2.1%	0.0%	0.0%	0.0%
5. Training of undergraduates for writing a scientific paper is important.	20.0 %	29.9 %	35.4 %	60.0 %	53.6 %	46.9 %	17.0 %	14.4 %	14.6 %	3.0%	2.1%	1.0%	0.0%	0.0%	2.1%
6. Adequate time should be provided to pursue a research.	46.0 %	43.3 %	50.0 %	50.0 %	52.6 %	44.8 %	3.0%	4.1%	3.1%	1.0%	0.0%	2.1%	0.0%	0.0%	0.0%
7. Motivation for research by some faculty of the institute plays a very crucial role.	58.0 %	54.6 %	62.5 %	38.0 %	41.2 %	30.2 %	4.0%	2.1%	5.2%	0.0%	2.1%	1.0%	0.0%	0.0%	1.0%
8. Small projects or thesis writing should be one of the criteria's for passing final MBBS.	12.0 %	12.4 %	24.0 %	36.0 %	29.9 %	34.4 %	35.0 %	41.2 %	24.0 %	13.0 %	11.3 %	8.3%	4.0%	5.2%	9.4%
9. Students should know the ethics of research article publishing.	28.0 %	34.0 %	32.3 %	67.0 %	55.7 %	57.3 %	5.0%	10.3 %	8.3%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%
10. Adequate facility for research should be there at institute level.	42.0 %	46.4 %	52.1 %	54.0 %	47.4 %	42.7 %	4.0%	6.2%	5.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11. Access to important medical journals should be there at medical college library.	36.0 %	50.5 %	52.1 %	61.0 %	46.4 %	44.8 %	3.0%	3.1%	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
12. Research helps students to learn how to work independently.	37.0 %	46.4 %	52.1 %	57.0 %	47.4 %	38.5 %	6.0%	5.2%	7.3%	0.0%	1.0%	1.0%	0.0%	0.0%	1.0%
13. Research builds a self confidence in the student.	42.0 %	45.4 %	51.0 %	56.0 %	46.4 %	41.7 %	2.0%	8.2%	5.2%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%
14. May help in decision making of future career at undergraduate level itself.	29.0 %	40.2 %	46.9 %	61.0 %	48.5 %	33.3 %	9.0%	10.3 %	14.6 %	1.0%	1.0%	4.2%	0.0%	0.0%	1.0%
15. Research can be undertaken irrespective of funding.	8.0%	21.6 %	16.7 %	43.0 %	38.1 %	45.8 %	37.0 %	28.9 %	26.0 %	12.0 %	9.3%	7.3%	0.0%	2.1%	4.2%

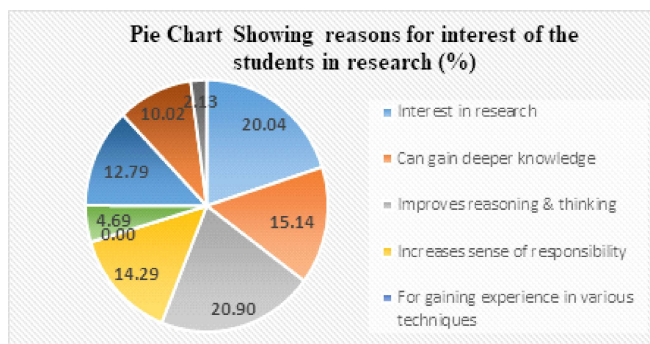


Figure 1: Pie Chart Showing Reasons for Interest of Students Towards Research

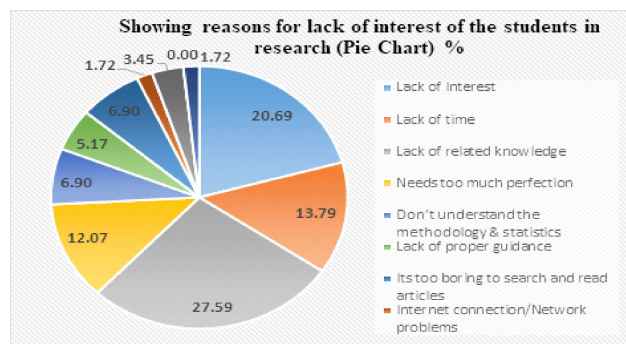


Figure 2: Pie Chart Showing Reasons for Lack of Interest of Students Towards Research

Table 5: Showing Response of Students Who are/were Involved in the Research Projects (n=61)

Response of students who were involved in the research in past (n=61)	Yes			No			Blank		
	2018 (n=12)	2017 (n=25)	2016 (n=24)	2018 (n=12)	2017 (n=25)	2016 (n=24)	2018 (n=12)	2017 (n=25)	2016 (n=24)
Were you able to complete your research project (s) in time frame given?	7	15	12	2	8	11	3	2	1
Did you feel like leaving midway?	2	12	6	7	12	17	3	1	1
Did you gain any experience out of the research activity under taken?	10	22	22	1	2	1	1	1	1
Did you gain deeper knowledge?	9	22	17	1	2	5	2	1	2
Would you like to pursue research in future?	8	19	21	4	5	2	0	1	1

5 Point Likert Scale Response:

Results of the 5 point Likert scale questionnaire regarding the importance of research are shown in *Table 4*. 50% of 2016 batch and 47.4% of 2017 batch strongly agreed and 53% of 2018 batch agreed for the fact that research is important to the practice of medicine. Only 37.5 % of 2016 batch and 39.2% of 2017 batch, and 47% of 2018 batch agree that pursuing research activities / projects should be made compulsory as part of medical curriculum. Most of them thought that application of bio-statistics & research methodology should be a part of undergraduate teaching program (2016 batch- 52%, 2017 batch- 52.5%, 2018 batch- 65%).

Most of the students of all the batches agree that, training of undergraduates for searching and evaluating scientific articles and for writing a scientific paper is important. At the same time, most of the students, strongly agree to agree that adequate time should be provided to pursue a research. About 62.5% of 2016 batch, 54.6% of 2017 batch and 58% of 2018 batch strongly agree for

the fact that motivation for research by some faculty of the institute plays a very crucial role. Most of the student's response is neutral for small projects or thesis writing should be one of the criteria for passing final MBBS.

Many students agreed that, students should know the ethics of research article publishing. About 75% of 2016 batch, 47.4% of 2017 batch and 52% of 2019 batch agreed for research helps students to learn how to work independently. Most of the students strongly agree and agree that research builds self confidence in them. Most of the students agree with the fact that, adequate facility for research should be there at institute level and also access to important medical journals should be there at medical college library. 47% students' of 2016 batch strongly agreed and 48.5% students' of 2017 batch and 61% of 2018 batch agreed for the question that research may help in decision making for their future career at undergraduate level itself. Less than 50% students of all batches felt that, research can be undertaken irrespective of funding.

**Practice Related Questions:**

Only 82 out of 293 (28%) students (among all the three batches) at present have used PubMed for searching scientific literature. Only 24 students (8.2%) have articles published (or going to get published) in a scientific journal at present. Majority (76%) of the students accepted that they are not getting sufficient time to do research work along with undergraduate studies. But maximum number (62%) of students showed their interest in pursuing career in research in future

Students Who Are/Were Involved in Research:

Among three consequent batches of MBBS students of our institute, 61 (24 of 2016 batch, 25 of 2017 batch and 12 of 2018 batch) students were already involved in the research in the past. Overall, 34 students (out of 61) were able to complete their research projects on time. 20 students said they felt like leaving midway as they were not able to give sufficient time to their projects. Most of these students accepted that they were able to gain good experience and knowledge out of the research activity they have under taken. Most of these students (48 out of 61) would like to pursue career in research in future (Table 5).

Discussion

For acquisition of latest updates in health care profession, research plays a crucial role (11). Studies says that research at undergraduate level contributes to the development of a medical student's thinking skills, ability to evaluate the literature, and technical tools to communicate scientific data (12). This would also contribute to an increase in the research productivity at the institution where the medical students are enrolled and would encourage the medical students to get involved in research after graduation (13,14). Some studies says that, only small numbers of medical students and postgraduate physicians takes part in research activities or conduct research independently (15,16). In developing countries, research is not a high priority for health care professionals. This can be due to lack of resources, poor access to the literature, and poor knowledge about the fundamentals of research practice (17). There can be many barriers due to which most of the students or physicians may not be able to participate actively in the research activities.

In the present study, overall, 79.5% students showed interest towards research. In addition, many students agreed for research has important role in medical

curriculum but due to some or the other reasons they are not able to do research or may not be able to complete the projects or research work they have started. The barriers for perusing their research could be lack of related knowledge, lack of time, difficulty in understanding the research methodology and statistics, and some students feel it too boring to search and read articles. These barriers are common for medical students and residents as they were reported in previous studies around the world (15,18, 19). With these findings, we can make out the importance of allocating enough time for medical students to conduct research. In addition, proper guidance and motivation including research opportunities, and training sessions would be necessary and important steps (19). Sheikh *et al.* (3) in their research observed 47.1% cases and 52.9% controls feel overloaded curriculum to be a hurdle in research activities. In present scenario, research is not a part of curriculum in many countries and the course is overloaded due to traditional teaching and learning strategies, thus, students found it difficult to overcome this problem and are unable to start their research activities during their professional educational life (20,21).

In our study, only 28% of our students (among all the three batches) at present using or have used PubMed for searching scientific literature. Only 8.2% students have articles published (or going to get published) in a scientific journal at present. Most of the students agreed that training of undergraduates for searching and evaluating scientific articles and writing a scientific paper is important. At the same time, most of the students strongly agree that adequate time should be provided to pursue a research.

With student's feedback, we can say that, time to time counseling of the students through mentor mentee program will help in motivating the students for participation in research work. They can start from a small project also, where he/she should be guided by some faculty properly to complete the project and get it published. Once they finish one task it builds up confidence in the students. And looking at one student, other students also feel motivated and can show their interest in participating in some research work. We, the faculty plays a very crucial role here as we can guide our students for their bright future. Faculty mentoring is crucial for the youngsters during the journey of their educational life. Mentoring during research is effective in the selection of mentees' carrier in their choice of specialty (22). We can guide students about some



organizations like ICMR, where they can search about the details in their website and can approach any faculty related to their subject of interest and can start some research work. We can encourage our students to participate in the student's conferences, where they can present their research work or single case or case series as oral or poster presentation.

For countries with limited resources, students can be guided to work on small projects that do not need funding or highly equipped facilities, such as survey based cross sectional studies, or "fundless" cohort and case-control studies. Students can also be taught and encouraged to participate in synthesizing medical evidence by conducting and publishing systematic reviews and meta analyses. In addition, writing and publishing review articles or editorials could be a suitable and feasible option to encourage medical students in developing countries to become involved in academic publishing (19,23).

One study says that the role of inadequate mentorship as a cause of the limited involvement of medical students in conducting research (19). This barrier can be reduced by volunteering to share their knowledge and by providing learning opportunities to students. This can be achieved by, for example, online education, distance mentorship, and project collaboration. Encouragement of the students by the faculty has also been cited as an important contributor in motivating students to carry out research (23).

For managing time, we can bring eminent faculties/researchers to our institute to share their experience in the field of medicine, to make them understand the importance of research in medical career. Also, we can keep lectures related to better time management skills. More attention should be given to students in their basic science years of study, to educate them about the importance of research and its impact. Some students feel that, they don't understand the methodology and statistics for which, there can be re evaluation of the curriculum regarding biomedical research education which may be necessary to enhance students' understanding of this important topic in the field of Medicine (19).

Conclusion

Through our study we were able to identify the barriers responsible for lack of students' interest in research for taking up or continuing the research projects. Also, we are able to counsel the students regarding various issues and motivate them to take up or perform research projects.

Hence, we believe that it is necessary to pay more attention to build a new generation of young doctors who are capable of bridging the gap and elevate the current reality of biomedical research to a higher level. Thus, our study can potentially be used to create an evidence-based approach to promote research among medical students in India.

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Conflicts of Interest

There are no conflicts of interest.

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