Original Article

DOI: 10.7860/JCDR/2019/42162.13270

Assessment of Knowledge, Attitude, Perceived Barriers towards Research among First Year Undergraduate Medical Students: A Study from Chennai, Tamil Nadu, India

Physiology Section

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ABSTRACT

Introduction: Developing research skills and attitude to practice health research is an important area to be focused during undergraduate medical education.

Aim: To assess the knowledge, attitude and perceived barriers among first year medical students to practice research skills during under graduate medical course.

Materials and Methods: This survey-based cross-sectional study was conducted among 205 (male: 93, female: 112) first year medical undergraduate students of a tertiary care medical school in Chennai, Tamil Nadu, India. The questionnaire consisted of demographic data, four true or false type, three open-ended questions for knowledge, a Likert's scale of point 1-5 to assess the perceived promoting factors and barriers to taking up research during under graduation and yes or no type questions to assess the practice of research. Analysis of data were done using SPSS version 16.0 and data is expressed in proportions.

Results: The survey results showed 72% of the participants had an acceptable level of knowledge on the basic research concepts and 81% of them had a high positive attitude to practice research during different years of undergraduate medical course. The mainly perceived barriers are lack of time (79%), lack of research skills training (87%) and academic overload to acquire professional skills (50%), to take up research during under graduation.

Conclusion: The study participants are with moderate awareness towards research skills and very positive to take up research during their under graduation period. The structured research skills training and effective support system will help them to overcome the barriers and motivate them to undertake research and also pursue research as a career.

Keywords: Academics, Evidence based practice, Likert scale, Perception

INTRODUCTION

Medicine is an ever-evolving science based on health professional research [1]. Evidence-Based Practice requires conscientious and judicious use of contemporary evidence for diagnosis and management in patient care. It requires competencies like literature review, knowledge on research methods, laboratory skills, critical analysis and interpretation of results etc., [2]. Research training can be an essential tool for developing critical evaluation and analytical skills among medical undergraduates [3]. So, introducing research skills as early as from the first year of medical schooling will aid future Physicians to be an Evidence-Based Practitioner of Medicine (EBM) and also lifelong learner to cope with ever-expanding body of medical knowledge. Previous studies have emphasised that research training can also foster higher-order, clinical reasoning, and communication skills in young medical undergraduates which are important for future best professional practice [4,5].

Promoting scientific research in the medical field will nurture the growth of knowledge on determinants of disease and its management in medical science for improved patient care [1]. So it is mandatory that future generations should be trained to contribute to the expansion and innovations of the medical field. However, the literature review shows [6-8], there is a substantial decrease in Physician scientist in the field of biomedical research due to lack of inclination and inadequate exposure to research skills before career paths are chosen. Developing research skills and attitudes to practice health research is an important area to be focused during undergraduate medical education [9]. There are also not much of Indian studies [10,11] to understand the undergraduate students' knowledge, attitude and perceived barriers towards practising research skills. Hence the present study has been planned to evaluate the knowledge and attitude of first year medical students and the perceived barriers towards conducting research during the course of under graduation.

MATERIALS AND METHODS

Subjects and Methods

Study sample: This survey-based cross-sectional study was conducted among 205 first year medical students of a tertiary level medical school in Chennai. The study was approved by the Institutional Ethics Committee (IEC-NI/14/DEC/44/91) of Sri Ramachandra Institute for Higher Education and Research (SRIHER). Every year the institute have 250 students admitted to MBBS course. The survey was planned to be conducted among 250 first year medical students of the batch 2017-18. After getting the informed consent, the questionnaire was administered to the available students on 2 tutorial sessions to cover 125 students on each session (2 sessions-4 hours) during the first week of January 2018. Participation in the study was made purely voluntary.

Out of 250, only 219 of them were available to fill out the questionnaire (response rate 88%). Fourteen questionnaires (5.6%) were partially completed and therefore excluded from the analysis. The total number of valid questionnaires was 205. out of which 112 female and 93 male students participated in the study. This survey was conducted as a needs assessment process to plan a 'structured research training program' for undergraduate medical students from first year at our University.

Development of questionnaire: The questionnaire was prepared after extensive literature search [3,12-14] for the items which consisted of details on demographic data, four true or false

type, three open-ended type questions for knowledge, Likert scale of point 1-5 to assess the perceived promoting factors and barriers to take up research during under graduation and yes or no type questions to assess the willingness to practice research. The questions were simple and easy to understand for first year students. The questionnaire was validated by internal and external content experts in the field of Physiology, Community Medicine and Medical education. Reliability of the questionnaire was assessed using Cronbach's Alpha (α=0.74).

STATISTICAL ANALYSIS

Analysis of data was done using SPSS version 16.0 and the output is expressed in proportions. The five point Likert's scale scoring has been added to get three point score.

RESULTS

This survey-based cross-sectional study was conducted among 205 first year medical undergraduate students. The study included 93 male and 112 female students in the age group of 18-20 years (mean age: 18.7±1.1) The study participants were from different boards of higher secondary education, Central Board of Secondary Education (CBSE)-57% (117), State board-26% (55) and others, Indian Certificate of Secondary Education (ICSE) and International Baccalaureate (IB)-16% (33) and from different states of India.

The [Table/Fig-1] shows the knowledge score of the participants on scientific research: The knowledge base was tested using items on different steps in conducting research. The very basic item on what do their understanding of the term 'research' was answered by almost 89% of them. The answer code for this item was derived from standard articles and books [15-19]. Almost all of them (97%) have agreed that research is important for the practice of medicine. About 88% of them could name one organisation {Indian Council of Medical Research (ICMR)} which provides research grants for student projects. The knowledge of core topics in conducting research like 'hypothesis testing' and statistical methods was lacking among the first year students. The items on 'Ethics' were also answered fairly well (84%) by the participants.

Parameters on knowledge	Answered correctly (%)
What is research? (in your own words)	89 (182)
Do you think research is important for the practice of medicine? (Yes/No)	97 (198)
Name 2 National organisations which provide research grant for medical research	88 (180)
Hypothesis testing is the key concept of which of the given methods of research (quantitative/qualitative)	12 (24)
Statistical methods are used for data analysis in which of the given methods (quantitative/qualitative)	59 (163)
Ethics approval is not mandatory before the start of any research (true/false)	84 (173)
IEC stands for Institutional Ethics Committee (true/false)	77 (157)

[Table/Fig-1]: Knowledge score of the participants on scientific research.

The [Table/Fig-2] shows the factors promoting a positive attitude to take up research during under graduation. In the participants' understanding research is interesting as it is different from normal curricular learning (97%), almost all of them have agreed that practising research will contribute to innovations in a medical field (99%) and an important tool to practise evidence-based medicine (96%). They felt it will also provide an opportunity to develop interpersonal skills through team based learning approach (88%) and help them to adapt to self-directed learning which is a core skill required among medical students to be a lifelong learner. A 91% of them also felt taking up research will expose them to complex real-life medical problems which will aid them in developing critical thinking.

The [Table/Fig-3] describes the Parameters for perceived barriers. Most of the first year students felt the main barrier was a lack of awareness on basic research skills (87%) and a lack of structured research training (85%). The factors like lack of time (79%) and complexity in understanding the principles of research methodology (69%) were also felt equally as barriers.

Factors that promote research during under graduation	Agree (%)	Disagree (%)	Neutral (%)
It is interesting and different from normal curricular learning.	97 (199)	2 (5)	1 (1)
To contribute to the innovations of the medical field	99 (203)	1 (2)	0 (0)
To improve professional standard as a clinician	95 (194)	1 (1)	4 (10)
Research is a tool for evidence based practice in medicine	96 (197)	1 (1)	3 (7)
Research during under graduation helps me to be a self-directed learner	93 (190)	1 (3)	6 (12)
Research gives an opportunity for team-based learning	88 (181)	8 (17)	4 (7)
Research will promote critical thinking by exposing to complex real-life situations	91 (187)	2 (3)	7 (15)

[Table/Fig-2]: Factors promoting a positive attitude to take up research during under graduation.

Parameters for perceived barriers	Agree (%)	Disagree (%)	Neutral (%)
Lack of awareness of basic research skills	87 (178)	6 (12)	7 (15)
Research is difficult and complex to understand	69 (142)	16 (32)	15 (31)
Lack of structured research training	85 (175)	6 (11)	9 (19)
Research is time-consuming and there is no instant credit	79 (162)	7 (14)	14 (29)
Focusing on acquiring professional skills is more important than research	50 (103)	22 (44)	28 (58)

[Table/Fig-3]: Perceived barriers to take up research during under graduation.

The [Table/Fig-4] shows the parameters promoting attitude to practice research during under graduation. Almost 84% of the participants agreed that research training should be part of the undergraduate curriculum and they all want regular conduct of research training workshops. Almost 50% of the study participants opined that research training can be started as early as from first year of medical schooling and they opted their area of interest in research in different fields, maximum being in Cardiology.

Parameters for practice	(%)
The research training should be part of UG medical curriculum	
Yes (%)	84 (173)
No (%)	16 (32)
Do you want to attend research training workshops	
Yes (%)	94 (192)
No (%)	6 (13)
Your preference for research training is during which year of medical schooling	
The year I (%)	37 (75)
Year II(%)	31 (64)
Year III (%)	8 (16)
Internship (%)	4 (8)
Any year (%)	20 (42)
Main Areas of interest in research (opted by students)	
Cardiology	34 (68)
Genetics	21 (43)
Respiratory medicine	20 (41)
Endocrinology	11 (23)
Community medicine	10 (21)
Neurology	4 (9)

[Table/Fig-4]: Attitude to practice research during under graduation.

DISCUSSION

This survey-based cross-sectional study has assessed the knowledge of basic research skills and the attitude to practice research during under graduation among 205 first year medical students in a tertiary care medical college in Chennai. The knowledge base of first year medical students regarding basic concepts was good except that the items on core research methodology principles like hypothesis testing and statistical methods were not adequate. The first-year medical students were motivated to take up research during different phases of medical course as they opined that conducting research will put them in real-life problem-solving situations which are different from normal curricular learning. They also felt, it is advantageous to involve them in research as it gives them the opportunity to develop interpersonal skills through a team-based approach and life-long learning skills through the self-directed learning. They also felt literature search during the conduct of research will help them to adapt to the method of evidence-based practice which is an essential skill needed to practice medicine. The good level of awareness on research and positive attitude can be attributed to study participants prior experience in research, as 57% (117) and 16% (33) were from CBSE and other boards (ICSE and IB) of higher secondary education. Project Based Learning is part of their curriculum in these boards of higher secondary education as understood essential principle of adults learning is prior experience [20].

Previous studies [12-14] have shown similar results with respect to the knowledge and attitude of the present study participants. Ivana Vodopivec I et al., outlined in his study conducted in first-year medical students where the participants were not aware of basic facts about the scientific methods and communication in medicine, but they had a positive attitude towards scientific research. This he attributed to, as the participants in his study were of high ranked students in the admission test and motivated to do scientific research [12]. Soe HH et al., has reported a moderate level of knowledge and a positive attitude towards the conduct of research among medical and dental students in the private medical college in Malaysia. He could relate the positive attitude of students with Indian ethnicity and moderate knowledge to the higher academic year of study and elder age group [13]. A recent survey by Vairamani CB et al also demonstrated a positive attitude to conduct research among his postgraduates and interns to guide their future career and for improving patient outcomes [14].

The present study reports that the major perceived barriers by participants for conducting medical research are lack of motivation as there is no instant credit, lack of appropriate knowledge and research skills in scientific methods, lack of time and academic overload for the practice of research. The present study results are consistent with the authors' findings in previous studies. Mitwalli HA et al., in his study reported that the main barriers for conducting research among Physicians and residents in Riyadh hospital are lack of research training, lack of time, work-related stress and lack of Mentors to support the research work [21]. Giri PA et al., among his post-graduate participants found lack of financial support which was an added barrier in conducting research on top of the other aforementioned obstacles [22]. Kumar HH et al., in his study among undergraduate medical students brought out those key factors to improve knowledge and basic research skills among undergraduates, is, to adapt to good research skills training within the curriculum. He has also found that providing a good financial support system and structured research training programs could enhance the chances of students involving themselves in research during their under graduation and also pursue research as their career choice [23].

[Table/Fig-5] compares the present study with others on the perceptions and perceived barriers of undergraduate students towards conduct of research during under graduation [3,13,24-27].

Authors	Study participants	Study tool & Sample size	Perceptions on research (positive attitude)	Barriers identified
Shilpashree YD et al., [3]	Medical undergraduates	Self- administered questionnaire 235	✓ useful for medical field ✓ has future career option ✓ better learning of concepts ✓ helps to update	✓ Lack of motivation for doing research ✓ Lack of knowledge about UG research ✓ Research is not a part of curriculum ✓ Lack of interest in doing research
Soe HH et al., [13]	Medical undergraduates	Self- administered questionnaire 360	✓ Prolongs human life ✓ Helps in new discoveries ✓ Better understanding of problems ✓ Makes learning creative	✓ Lack of time ✓ Lack of knowledge ✓ Lack of research funding & facilities ✓ Lack of interest due to lack of rewards ✓ Inaccessibility to resources ✓ Lack of proper mentoring
Pallamparthy S et al., [24]	Medical undergraduates	Self- administered questionnaire 267	✓ Part of medical curriculum ✓ Help in better understanding of subject ✓ Help ones clinical practice later	✓ Lack of time ✓ Lack of awareness ✓ No financial support ✓ Lack of self interest ✓ Lack of faculty encouragement ✓ Difficult to follow-up patients
Ratnakar A et al., [25]	Medical undergraduates	Self- administered questionnaire, 140	✓ useful for future in medical profession for taking PG programs like thesis ✓ essential for patient care and improvement of health care ✓ promotes communication skills ✓ promotes independent learning ability	✓ Lack of research training ✓ Lack of knowledge on research conduction ✓ Lack of time ✓ Lack of financial help/ incentives for research ✓ Lack of motivation ✓ Lack of interpersonal communication ✓ Lack of mentorship
Vallabhajosyula S et al., [26]	Medical undergraduates	Self- administered questionnaire 585	✓ Provides holistic education ✓ Improves patient care ✓ To update knowledge ✓ Provides career opportunities	✓ Lack of financial returns and social status
Siemens DR et al., [27]	Medical undergraduates	Self- administered questionnaire 327	✓ Promotes long term career goals ✓ Mandatory research time in Medical curriculum ✓ Facilitates admission to residency	✓ Lack of adequate time for research ✓ Lack of adequate training for research skills ✓ Lack of opportunities to present research ✓ Lack of opportunities to publish research ✓ Lack of acknowledgment for contributions to research
Present study	Medical undergraduates	Self- administered questionnaire, 205	✓ different from normal curricular learning. ✓ contribute to the innovations of the medical field ✓ tool for evidence based practice in medicine ✓ to be a self - directed learner ✓ opportunity for team-based learning ✓ promotes critical thinking	✓ Lack of research skills ✓ Research is complex to understand ✓ Lack of research training ✓ Time consuming ✓ Academic overload

[Table/Fig-5]: Comparison of perceptions and perceived barriers of undergraduate students towards conduct of research - our study with other authors [3,13,24-27].

This highlights the positive attitude of undergraduates towards health research and also the common barriers to be overcome, to facilitate the conduct of research during under graduation.

To develop an Indian Medical Graduate (IMG) who is a life long evidence-based practitioner in the field of medicine, the medical students should be introduced to practising research skills as early as from first year of the medical course. Student's participation in research will put them on active learning strategies like learning –by doing, team-based approach and self- directed learning which is different from normal pedagogic learning. The process of conducting research will also aid medical trainees to become critical thinkers who can evaluate the complex real-life medical situations and develop higher-order problem-solving skills [4]. It is an essential tool to inculcate interpersonal, leadership and communication skills through collaborative learning among medical students during under graduation [28].

FUTURE RECOMMENDATIONS

It is very much evident from the results of present study that there is a need for a research-driven curriculum for medical undergraduates in India. To promote a positive attitude and to overcome the barriers towards conducting research, a 'structured research training program' for medical undergraduates should be introduced from first year of medical schooling with mentorship guidance and financial incentives for students. There should be a protected time for research activities in the schedule to overcome the main perceived barrier, lack of time. Periodic conduct of research training workshops for both faculty and students will empower and also keep them updated on research skills.

LIMITATION

The limitation of this study is that it involved only the first year medical students from one private medical institution; therefore, the findings cannot be extrapolated to institutions with different academic environments. Multicentric studies involving study participants in different academic set-up, government, and private institutions, and across different years of the medical course will give more understanding on the attitude and perceived barriers among medical undergraduates towards research.

CONCLUSION

The study highlights a need for structured research training program from first year of medical curriculum in India. The study participant's moderate awareness towards research skills and a very positive attitude to take up research during their under graduation can be promoted by periodic research skills training and effective support system including funding. These initiatives will motivate undergraduate medical students to undertake research and also pursue a career in research in future.

ACKNOWLEDGEMENTS

The Authors would like to thank the management of SRU, First year MBBS students and Faculty, Department of Physiology, SRMC& RI for their valuable support during the project. Authors would also like to thank Dr. Anitha, Associate professor, Dept of Community Medicine SRMC & RI for providing guidance in statistical analysis.

REFERENCES

[1] Nayak BK. Why learn research methodology?. Indian Journal of Ophthalmology. 2009;57(3):173.
[2] Sackett DL, Rosenberg WM, Gray JM, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. BMJ. 1996;312:712.
[3] Shilpashree YD, Nusrath A, Rajeshwari A. Perception and concerns of undergraduate medical students toward research: A cross-sectional study. J Med Sci Health. 2016;2(2):19-22.
[4] Ludmerer KM. Commentary: understanding the Flexner report. Academic Medicine. 2010;85(2):193-36.
[5] Frishman WH. Student research projects and theses: should they be a requirement for medical school graduation?. Heart disease (Hagerstown, Md.). 2001;3(3):140-44.
[6] Volpintesta EJ, Homer C, Wolski KP, Allen JC, Kaufmann SH, Cohen SR, et al. The Clinical investigator as an endangered species. New England Journal of Medicine. 1980;302(16):926-28.
[7] Miller ED. Clinical investigators-the endangered species revisited. JAMA. 2001;286(7):845-46.
[8] Neilson EG. The role of medical school admissions committees in the decline of physician-scientists. The Journal of Clinical Investigation. 2003;111(6):765-67.
[9] Aslam F, Shakir M, Qayyum MA. Why medical students are crucial to the future of research in South Asia. PLoS Medicine. 2005;2(11):e322.
[10] Mitra S, Goyal S, Muliyil JP, Jacob KS. Attitude, concerns and conduct of research among medical students. The National Medical Journal of India. 2009;34(4):306.
[11] Kumar HH, Jayaram S, Kumar GS, Vinita J, Rohit S, Satish M, et al. Perception, practices towards research and predictors of research career among UG medical students from coastal South India: A cross-sectional study. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine. 2009 Oct;34(4):306.
[12] Vodopivec I, Vujaklija A, Hrabak M, Lukic IK, Marusic A, Marusic M. Knowledge about and attitude towards science of first year medical students. Croatian Medical Journal. 2002;43(1):58-56.
[13] Soe HH, Than NN, Lwin H, Htay MN, Phyu KL, Abas AL. Knowledge, attitudes, and barriers toward research: The perspectives of undergraduate medical and dental students. Journal of education and health promotion. 2018;7.
[14] Vairamani CR, Akoijam BS. Knowledge, attitude and perceived barriers towards conducting research among students in a medical college, India. International Journal Of Community Medicine And Public Health. 2018;5(2):806-10.
[15] Bonilla-Velez J, Small M, Urrutia R, Lomberk G. The enduring value of research in medical education. International Journal of Medical Students. 2017;5(1):37-44.
[16] Imafuku R, Saiki T, Kawakami C, Suzuki Y. How do students' perceptions of research and approaches to learning change in undergraduate research?. International Journal of Medical Education. 2015;6:47.
[17] Holmes D, Moody P, Dine D, Trueman L. Research methods for the biosciences. Oxford university press; 2017.
[18] Kothari CR. Research methodology: Methods and techniques. New Age International; 2004.
[19] Gurumani N. Research Methodology: For Biological Sciences. MJP Publisher; 2019 Jun.
[20] Knowles MS, Holton E, Swanson R. The adult learner: the definitive classic in adult education and human resource development (6th). Burlington, MA: Elsevier. 2005.
[21] Mitwalli HA, Al Ghamdi KM, Moussa NA. Perceptions, attitudes, and practices towards research among resident physicians in training in Saudi Arabia. EMHJ-Eastern Mediterranean Health Journal. 2014;20(2):99-104.
[22] Giri PA, Bangal VB, Phalke DB. Knowledge, attitude and practices towards medical research amongst the postgraduate students of Pravara Institute of Medical Sciences University of Central India. Journal of Family Medicine and Primary Care. 2014;3(1):22.
[23] Kumar HH, Jayaram S, Kumar GS, Vinita J, Rohit S, Satish M, et al. Perception, practices towards research and predictors of research career among UG medical students from coastal South India: A cross-sectional study. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine. 2009;34(4):306.
[24] Pallamparthy S, Basavareddy A. Knowledge, attitude, practice, and barriers toward research among medical students: A cross-sectional questionnaire-based survey. Perspectives in Clinical Research. 2019;10(2):73.
[25] Ratnakar A, Patil S, Gosavi M, Hungund B, Bannur H. In Search Of Research-Cross Sectional Study To Assess Knowledge, Attitude And Practice Of Research In Undergraduate Medical Students. National Journal of Integrated Research in Medicine. 2016;7(4).
[26] Vallabhajosyula S, Shetty RS, Nair S. Knowledge, attitude and practice towards medical research among students of a medical college in Southern India. Journal of Research in Medical Education & Ethics. 2014;4(2):220-25.
[27] Siemens DR, Punnen S, Wong J, Kanji N. A survey on the attitudes towards research in medical school. BMC Medical Education. 2010;10(1):4.
[28] Nazha B, Salloum RH, Fahed AC, Nabulsi M. Students' perceptions of peer-organized extra-curricular research course during medical school: a qualitative study. PloS one. 2015;10(3):e0119375.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Jun 05, 2019
- Manual Googling: Sep 19, 2019
- iThenticate Software: Oct 09, 2019 (4%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: No
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: **Jun 04, 2019**
Date of Peer Review: **Jun 25, 2019**
Date of Acceptance: **Sep 21, 2019**
Date of Publishing: **Nov 01, 2019**