

ORIGINAL ARTICLE

Knowledge, Attitude and Perceived Barriers Toward Research Among Undergraduate Medical Students

Humera Waqar¹, Tahira Zamir^{2,3}, Madiha Soban³

ABSTRACT:

Objective: To evaluate the knowledge, attitude and perceived barriers toward research among undergraduate medical students.

Materials and Methods: A cross sectional institution based study was conducted from April to June, 2014 on 3rd year MBBS students at Bahria University Medical and Dental College, Karachi, after approval by ERC-BUMDC. Data was collected by administering specially designed questionnaire, filled on one to one basis, after taking verbal consent. Analysis was done by using SPSS version 18.

Results: Out of total 104 students of 3rd year MBBS at Bahria University Medical and Dental College, 96 students participated in the study. Response rate was 93%. The score on knowledge regarding basic concepts of research was found to be on the lower side (3.1+1.4 out of 10 questions). Overall, the students showed positive attitude toward research as majority of students agreed on positive statements toward research. Students highlighted many perceived barriers such as lack of time (92%), 'lack of rewarding and motivational system (86%) followed by inadequate funding and monetary system (79%) for undergraduate research.

Conclusion: This study showed low knowledge score coupled with a positive attitude toward research among undergraduate medical students. This could be related to various perceived barriers for undergraduate research identified by students. These barriers need to be addressed to ensure an improvement in the undergraduate medical research.

Key words: Knowledge, attitude, perceived barriers, research, undergraduate, medical students.

INTRODUCTION:

Research training has been recognized as an important component of medical education as the rapid expansion and progress in biomedical research is expected to transform medical care¹. Researchers play key role in translating progress in basic science into clinical practice by defining physiological and pathological implications at the molecular level, guiding basic sciences research into clinically relevant directions and evaluating new therapies based on basic scientific discoveries.^{2,3,4}. With incorporation of evidence based medicine in current health care arena, it is becoming substantial for health care providers to possess sound understanding of scientific principles and methods⁵. Experiencing research during undergraduate medical studies is associated with continuing professional growth and help in further career decisions. Involvement of medical students in research activities promises better understanding of research specific knowledge, teamwork, time management and critical appraisal. Studies have shown that early involvement in research promotes a tendency to continue the same in later stages of the medical profession⁶. Research experience as medical student does not lead to a career in academic medicine, However the experience

can help improve student's skills in searching and critically appraising the medical literature and independent learning.^{7,8,9}.

Encouraging research and fostering the development of analytical skills among medical students is now a high priority^{10,11}.

In USA, National Institute of Health (NIH) and the Doris Duke Clinical Research Fellowship (CRF) program are responsible for engaging students in medical research and sponsoring¹³.

It is essential to inculcate critical thinking, reasoning skills and developing positive attitudes towards scientific research among medical students. Despite of the recognized importance of research at undergraduate level, studies have been conducted in the past to assess knowledge and attitude toward research among undergraduate medical students^{14,15}.

The objective of this study was thus to assess knowledge, attitude and perceived barriers toward research among undergraduate medical students at Bahria University Medical and Dental college.

Materials and Methods:

This cross sectional institution based study was conducted after approval by ERC-BUMDC at Bahria University Medical and Dental College, Karachi from April to June, 2014. The participants were 3rd year MBBS students. The data was collected by using specially designed questionnaire, adapted from similar studies conducted previously.^{14,15,16} and pretested on a sample of 25 participants for validity and reliability. Modifications were then made to fulfill the objectives of our study. After the informed consent, respondents were given explanation about the purpose of the study. Questionnaire was filled on one to one basis by the investigator by taking oral interview and confidentiality was ensured. A questionnaire was used as the study tool. The details are:

✉ Dr. Humera Waqar

Lecturer Department of Anatomy
Bahria University Medical and Dental College, Karachi.
Email: drhumera_waqar@gmail.com

Dr. Tahira Zamir

Assistant Professor
Department of Pharmacology
Bahria University Medical and Dental College, Karachi.

Dr. Madiha Soban

Lecturer Department of Biochemistry
Bahria University Medical and Dental College, Karachi.

Received: 15-11-14

Revised: 26-12-14

Accepted: 6-1-15

Questionnaire Development:

The questionnaire consisted of two sections:

Section One:

Section one contained the detailed demographic information of the students.

Demographic information:

Name, age in years, gender, academic year in medical college, residential address

Section Two:

Section two consisted of the following three components:

a. Assessment of knowledge toward research: Ten items (MCQ, one correct type, with four options a to d(a-d)

Correct response received a score of one, while wrong answer received a score of zero.

b. Assessment of attitude toward research: 12 items with a Likert scale ranging from strongly agree (1) to strongly disagree (5).

c. Assessment of perceived barriers toward research perceived by medical students: 10 items with Yes or No responses

Statistical Analysis:

Data was entered in Microsoft Excel and analysis was done by using SPSS version 20.

RESULTS:

Out of total 104 students of 3rd year MBBS at Bahria University Medical and Dental College, 96 students participated in the study. Response rate was 93%. The detailed demographic characteristics of participants are shown in (Table 1).

Table: 1
Demographic characteristics of Participants
N=96

Variable	(%)
Mean Age:	21.5 years
Gender:	
Male	33 (36%)
Female	59 (64%)
Educational Level	Undergraduate
Academic Year	3 rd Year M.B.B.S
Resident: Karachi	73 (79.3%)
Others	19 (20.65%)

Table 2 depicts the number of correct responses of medical students of MCQs related to research. An average knowledge score of 3.1± 1.4 toward research was obtained among 3rd year MBBS students. Knowledge regarding basic concepts of research was found to be poor as only 40 students (42%) correctly defined the scientific hypothesis. The same was true for basic statistical concepts like statistical test (n= 15, 16%), relation between sample and representativeness (n=22, 23%), type of scale (n=10, 11%), and type of research study (n=20 21%). Knowledge regarding standard error and variable was (n=40, 42% and n=33, 35 %) respectively. The respondents also showed a poor general awareness of concepts related to scientific paper (n=15, 16% and n= 23, 24%), and Medline (n=15, 16%) (Table2).

Table 2
Assessment of knowledge toward research among undergraduate medical students

Items	Correct responses (N=96)	N (%)
1. How would you define the scientific hypothesis? * An answer or solution to a question which has a capacity of verification or empirical demonstration.	40	42%
2. Statistical test used to compare observed data with data we would expect to obtain according to a specific hypothesis is called *Chi-square	15	16%
3. Representativeness is a key characteristic of : * Sample	22	23%
4. A scale from 1 to 5 (like grades on an examination is called: * Ordinal.	10	11%
5. The aspect of study which deals with distribution of disease is: *Descriptive studies	20	21%
6. What is the standard deviation of a sampling distribution called? *Standard error	40	42%
7. A variable whose value can be expressed numerically is called: *Quantitative variable	33	35%
8. The part of a scientific paper is: * Acknowledgment to persons who assisted you during the research	15	16%
9. MEDLINE is: *Medical database	15	16%
10. All listed rules apply to the process of writing an introduction section of a scientific paper Except: *Make it longer rather than shorter	23	24%

Average knowledge score: Mean± S.D.3.1±1.4

Table 3 shows the responses of medical students towards the attitude items on likert scale. For convenience, the results of agree and strongly agree, and disagree and strongly disagree were combined. Overall, the students showed positive attitude toward research as majority of students agreed on positive statements toward research of the respondents, 98% viewed research as the basis of progress in medical profession, 94 % believed that valid discoveries are impossible without scientifically sound research, 91% agreed that research is relevant to medical education and medical students can plan and conduct research. 89% of medical students thought that research promotes critical thinking while 84% agreed that research facilitates better understanding of health problems. However conducting research was found stressful by 89% of students. Although 67.7% of students agreed on

mandatory research projects during undergraduate medical studies, 89% did not agree that research should be an important criteria for acceptance to residency programs.

Moreover, 99% of students did not agree on research being a long term career goal (Table 3).

Table 3

Assessment of attitude toward research among undergraduate medical students

Sr.#	Items	Responses, N (N %)		
		Agree	Neutral	Not agree
1.	Research is the basis of progress in medical profession	94(98%)	2(2%)	0
2.	Research facilitates better understanding of health problems	80(84%)	14(15%)	2(2%)
3.	Research promotes critical thinking	85(89%)	5(6%)	6(7%)
4.	Knowledge of research methodology is essential for obtaining accurate and objective data	60 (63%)	20(21%)	16(17%)
5.	Conducting research is stressful	85(89%)	4(5%)	7(8%)
6.	Research training should be a compulsory part of medical Curriculum	70(73%)	10(10.4%)	16(16.6%)
7.	Research projects should be mandatory during undergraduate medical study	65(67.7%)	5(5.2%)	26(%)
8.	Research experience should be an important criterion for acceptance in residency	10(11%)	6(7%)	80(84%)
9.	Valid discoveries are impossible without Scientifically sound research	90(94%)	6(7%)	0%
10.	Research is long term career goal	1(1%)	5(6%)	90(94%)
11.	Research is relevant to medical education	87(91%)	3(4%)	6(7%)
12.	Medical students can plan and conduct research	87(91%)	4(5%)	5(6%)

Students identified a number of perceived barriers toward scientific research. 92% students mentioned lack of time due to overburdened with educational activities, including exams. This was followed by management system for

reward and motivation .86% and 79% medical students found inadequate funding and monetary as the third important barrier for conducting research (Table 4).

Table 4

Assessment of Perceived Barriers toward Research among Undergraduate Medical Students

Sr.#	Items	YES Responses, N (%)	NO Responses N (%)
		N= (96)	
1.	You have adequate time apart from educational activities to pursue research at your institute	7 (8%)	89 (92%)
2.	There is adequate training in research methodology at your institute.	77 (81%)	19 (19%)
3.	Research supervisors are easily available at your institute	90 (94%)	6(6%)
4.	Medical journals and other electronically relevant data base to research are easily accessible at your institute	88 (92%)	8(8%)
5.	There is adequate facility in your institute to perform experimental studies e.g laboratory	60 (63%)	36(37%)
6.	There is motivation or reward for doing research in your institute	13 (14%)	83(86%)
7.	Your institute pays you back the allowances you spend in data collection (e.g visiting different institutes)	14 (15%)	82(85%)
8.	Efficient faculty staff/mentors is available to deliver necessary knowledge and skills	77 (81%)	19(19%)
9.	Institute gives you the opportunity to conduct your own research	87 (91%)	9(9%)
10.	Adequate funding system is available for research at your institute	20 (21%)	76(79%)

DISCUSSION:

With increasing emphasis being placed upon evidence-based medicine and the application of scientific research into clinical practice, it is becoming increasingly important for medical professionals to possess sound understanding of scientific principles and methods, and to be skillful at acquisition and critical appraisal of new information.^{17,18} The development of research capacity is imperative at the individual and institutional levels to attain a sustainable improvement in health research.¹⁹

Present study evaluated the knowledge, attitude and perceived barriers toward research among 3rd year MBBS students at Bahria University Medical and Dental College. The score regarding basic concepts toward research was found to be low that is 3.1+1.4 out of 10 questions. This was similar to the average score of knowledge reported by Hren (3.2 + 1.7 out of 8 questions) and Amin (3.6 +1.7 out of 10 questions) in undergraduate medical students.^{20,21} A study from Pakistan by Khan showed mean score on a percentage scale of 49% for knowledge about research among undergraduate medical students¹⁴. However, the knowledge score reported by Vodopivec et al was 2.2 +1.2 out of 8 questions, as the participants were first year medical students¹⁵. In the present study, overall attitude of undergraduate medical students toward research was found to be positive as majority of students agreed on positive statements toward research.

The attitude toward research among undergraduate medical students reported by Hren and Amin were also positive. However, the study conducted by Siemens' et al in Canada showed negative attitude toward research among undergraduate medical students. The negative attitudes of medical students toward research have been found to serve as an obstacle to learning associated with poor performance in research. Lack of student conferences and research workshops are among the common reasons for such negative attitudes²². Khan et al reported mean attitude score of 53.7% on a percentage scale among undergraduate medical students¹⁴.

The principal barriers toward research among undergraduate medical students identified in our study were shortage of time (92%), lack of reward or motivational system (86%) or lack of funding or monetary system (79%). While Hren found lack of time, incentives, research training and mentoring as major barriers toward research among undergraduate medical student²⁰. Whereas Siemen also augmented lack of time as a significant barrier for pursuing research during medical school as only 31% of all respondents felt there was adequate allotted time for research endeavors. Furthermore, only 15% of respondents felt that there was sufficient training in research methodology in medical school, and only 25% agreed that there was adequate training in the critical

appraisal of scientific literature. Another perceived barrier to participation in research was the difficulty in attaining a research supervisor; only 44% of respondents agreed that it was relatively easy to find a research mentor.²² The barriers to participating in research among undergraduate medical students in study conducted by Alghamdi included lack of professional supervisors (84.7%), lack of training courses (88.8%), lack of time (72.3%) and lack of funding (54.1%).²³ The barriers mentioned by the medical students at the three Arab Universities by Amin et al were lack of time(62%), 'lack of rewarding and motivational system' (60%), deficiency of appropriate knowledge and necessary skills (55%) and inadequate mentoring to encourage and guide students in the field of scientific research (54.4%)²¹. Kasulkar also described the same barriers for undergraduate research in her study²⁴.

It is obvious however that some barriers like time constraints are universal and hence research activities are not a priority for undergraduate students, tend to be sidelined. The solution for this would be to attempt to seamlessly integrate research into the undergraduate medical curriculum. Formal research training during the undergraduate period correlates positively with active involvement with research in future professional settings.²⁵

CONCLUSION:

In this study student's positive attitude score towards research was overwhelming, but coupled with a low knowledge score among undergraduate medical students requires learning activities that can enhance knowledge. This could be related to various perceived barriers for undergraduate research. These identified barriers need to be addressed to ensure an improvement in the undergraduate medical research experience.

REFERENCES:

1. Scaria V. Whisking research into medical curriculum: the need to integrate research in Scaria undergraduate medical education to meet the future challenges. *Calicut Med. J* 2004; 2 (1) : e1.
2. Zemlo TR, Garrison HH, Partridge NC, Ley TJ. The physician-scientist: career issues and challenges at the year. *FASEB J* 2000; 14 (2): 221-30.
3. Wyngaarden J.B. The clinical investigator as an endangered species. *Bull. NY Acad. Med.* 1981; 57(6): 415-26.
4. Rosenberg LE. Physician-scientist endangered and essential. *Science* 1999; 283 (5400): 331-2.
5. Bornstein BH, Emler AC. Rationality in medical decision making: a review of the literature on doctor's decision- making biases. *J Eval Clin Pract* 2001;7:97-107
6. Brancati FL, Mead LA, Levine DM, Martin D . Early

- predictors of career achievement in academic medicine. *JAMA* 1992; 267 (10):1372-6
7. Houlden RL, Raja JB, Collier CP. Medical students' perceptions of an undergraduate research elective. *Med. Teach* 2004; 26 (7): 659-61.
 8. Frishman WH. Student research projects and theses: should they be a requirement for medical school graduation? *Heart Dis.* 2001; 3(3):140-4.
 9. Aslam F, Shakir M, Qayyum MA. Why medical students are crucial to the future of research in South Asia. *PLoS Med* 2005; 2(11): e322.
 10. Detsky MED, Detsky AS. Encouraging medical students to do research and write papers. *CMAJ* 2007; 176: 1719-21.
 11. Rivera JA, Levine RB, Wright SM. Completing a scholarly project during residency training. Perspectives of residents who have been successful. *J Gen Intern Med* 2005; 20: 366-9.
 12. Solomon SS, Tom SC, Pichert J, Wasserman D. Impact of medical student research in the development of physician-scientists. *J. Invest. Med* 2003; 51 (3): 149-56.
 13. Gallin EK, Le Blancq SM. Launching a new Fellowship for Medical Students: the first years of the Doris Duke Clinical Research Fellowship Program. *J Invest Med* 2005; 53: 73-81.
 14. Khan H, Khawaja MR, Rauf MA, Fatmi Z. Knowledge and attitudes about health research amongst a group of Pakistani medical students. *BMC Med Educ* 2006; 6: 54. doi:10.1186/1472-6921-6-54.
 15. Vodopivec I, Vujaklija A, Hrabak M, Lukia IK, Marušia A, Marušia M. Knowledge about and attitudes towards science of first year medical students. *Croat Med J.* 2002;43:58-62
 16. Ejaz K, Shamim MS, Shamim MS, Hussain SA. Involvement of medical students and fresh medical graduates of Karachi, Pakistan in research. *J Pak Med Assoc.* 2011; 61:115-20.
 17. Bickel J, Morgan TE. Research opportunities for medical students: an approach to the physician-investigator shortage. *J Med Educ* 1980;55(7):567-73
 18. Byrne E. The physician scientist: an endangered breed? *Internal Medicine Journal* 2004;34(3):75.
 19. Sadna,R.,D'Souza,C.,Hyder,A.A. Chowdhury,A.M., 2004.Imortance of health research in South Asia.*BMJ* 328(7443),826-30.
 20. Hren D, Luki? IK, Maruši?A. Teaching research methodology in medical schools: students' attitudes towards and knowledge about science. *Med Educ* 2004; 38:81-6.
 21. Amin TT, Kaliyadan F, Qattan EAA . Knowledge, attitudes and barriers related to participation of medical students in research in three Arab universities. *Education in Medicine journal.* 2012; 4(1):e43-56. .
 22. Siemens DR, Punnen S, Wong J, Kanji N. A survey on the attitudes towards research in medical school. *BMC Med. Educ* 2010; 10:4. doi:10.1186/1472-6920-10-4.
 23. AlGhamdi KM, Moussa NA, AlEssa DS. Perceptions, attitudes and practices toward research among senior medical students. *Saudi Pharmaceutical Journal* 2013 , <http://dx.doi.org/10.1016/j.jsps.2013.02.006>.
 24. Arti Ajay Kasulkar, Madhur Gupta, Suresh Chari. Assessment of medical students interest in research in Central India. *Journal of Evolution of Medical and Dental Sciences* 2013; 2(29):e 5375-81.
 25. Park SJ, Liang MM, Sherwin TT, McGhee CN. Completing an intercalated research degree during medical undergraduate training: barriers, benefits and postgraduate career profiles. *N Z Med J.* 2010; 123:24-33.