

Perception towards Biomedical Research among Undergraduate Medical Students in a Tertiary Care Institute of Kolkata: A Cross-Sectional Study

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Abstract:


Introduction: Biomedical research at undergraduate level is a novel and important concept. It is believed to effectively foster research-oriented thinking among the students, thereby encouraging them to undertake further research activities in future. **Objectives:** The objectives of this study were to find out the level of perception of undergraduate medical students towards biomedical research, to explore the facilitators and barriers to biomedical research and to identify any associated background information of the students with their perception. **Method:** A cross-sectional study was conducted from December 2022-February 2023, among 298 students belonging to Phase III of MBBS (Part I and Part II) of a Tertiary Care Institute of Kolkata. Complete enumeration method was employed. Perception was assessed using a 5-point Likert Scale. Association of background information of participants with their perception was assessed using Multinomial Logistic Regression. **Results:** Among the students, around 53% had favourable perception (27% highly favourable and 26% moderately favourable) towards biomedical research. Self-interest and improved academics were identified as facilitators while lack of dedicated research time, lack of interest, and lack of assistance from faculties were found to be the barriers. Statistically significant higher odds of 'highly favourable' and 'moderately favourable' perception towards research were found among students from English-medium schools as compared to those who had other languages as medium of instruction in their schools; Part I students had statistically significant higher odds of 'moderately favourable' perception as compared to Part II students. **Conclusion:** Nearly one-third of the participants had highly favourable perception towards biomedical research. Personal interest and lack of dedicated research time were the major factors influencing research.

Keywords: Biomedical Research, Perception, Undergraduate Medical Students

Introduction:

Biomedical research at undergraduate level is an important emerging concept. It is being considered as an effective measure for encouraging and creating research-oriented thinking.^[1] Assessing the perception towards research among

undergraduate medical students is not only important to create awareness and interest, but also to enhance critical thinking. Now a days, Evidence-Based Medicine (EBM) has become an integral part of medical science. In order to establish the importance and practicality of EBM among undergraduate students, formal teaching of EBM has been included

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as part of the undergraduate medical curriculum.^[1] Participation in research is important for developing an insight into evidence-based medicine. But unfortunately, very few research opportunities are available at undergraduate level in India. According to a study conducted by Garg R et al., the reason behind this lacuna is lack of encouragement, lack of basic infrastructure, facilities and structured mentorship programs along with no extra incentives to researchers.^[2] Another reason is lack of writing skills for publication.^[2] Research is a core essential component of evidence-based medicine.^[3] Encouraging research among students early during their undergraduate days is believed to be an effective strategy in stimulating interest in further research. A study conducted by Ngeh EN in Cameroon revealed that poor research infrastructure, poor study facilities, lack of proper mentorship are some of the underlying factors that act as barriers towards biomedical research.^[4] A significant advantage of including clinician-scientists in the biomedical research teams is to utilize their ability to identify patient-oriented problems, distinguish clinically helpful information and address it with their medical knowledge.^[4] It is seen that students who participate in undergraduate research become equipped with better self-evaluation of designing research projects, use of statistical software, making figures and charts, evaluating experimental results and performing experiments than those who do not.^[5] Most students considered research valuable but at the same time they perceived it as stressful and complex.^[6] Although some studies have been done from the southern and northern parts of India, there is paucity of data from eastern India. Hence, the current study aimed at finding out the level of perception towards biomedical research among the undergraduate medical students in a Tertiary Care Institute of Kolkata, the factors influencing their perception towards research and also to identify any associated background information of the participants with their perception.

Method:

A cross-sectional study was conducted among the undergraduate medical students of Phase III of MBBS (Part I and Part II) of Institute of Post Graduate Medical Education and Research (IPGME & R) and Seth Sukhlal Karnani Memorial (SSKM) Hospital, Kolkata, West Bengal. The study was done for a period of 2 months (December 2022- February 2023). All 194 students of Part I and 142 students of Part II of Phase III of MBBS of IPGME & R and SSKM Hospital were included as study participants. Five students from each batch were selected for pre testing of the questionnaire. After excluding them the total participants were 326. Complete enumeration was employed for the study. However, after applying the selection criteria, at the end of the data collection period, the final sample was 298.

An anonymous, predesigned, pretested and structured questionnaire was employed to collect data from the participants. It comprised of the following variables: i) background information of the study participants, ii) knowledge of the study participants regarding biomedical research, iii) their perception towards biomedical research, iv) their practice towards research, v) factors influencing biomedical research. This self-administered questionnaire had a mix of open and close-ended, single and multiple-response questions. The questionnaire was validated for its content by three faculties from the Medical Education Unit (MEU) of the institution and necessary changes were incorporated before pretesting it. All of the study participants were well-versed in English language, so the questionnaire was developed in English and no translation was done.

The students who attended clinical postings/ lecture classes during data collection were administered the questionnaire at the end of their classes or postings and the absentees were called over telephone and told to come the next day. Three

phone calls were made individually and those who did not reply or were absent throughout the data collection period were excluded from the study.

Statistical Analysis:

Data were tabulated in Microsoft Office Excel 2021 (Microsoft Corp, Redmond, WA, USA) and analysed using Statistical Package for the Social Sciences (SPSS) version 25.0. Categorical data were represented as proportions and with the help of suitable diagrams. Continuous data were represented as mean/median and other suitable measures. Perception towards biomedical research was assessed using a 5-point Likert Scale, consisting of 8 items ranging from “strongly agree” (score 5) to “strongly disagree” (score 1). Three questions were reversely scored. The total possible score ranged from 8-40. A score more than 75th percentile of the overall perception score was taken as ‘highly favourable perception’, between 50th-75th percentile as ‘moderately favourable perception’ and less than 50th percentile was considered as ‘low perception’. Association of background information of the study participants with their perception was assessed using Multinomial Logistic Regression. (p-value<0.05 was considered statistically significant).

Ethical considerations:

Anonymity and confidentiality of data were maintained throughout the study. Informed verbal consent was taken from each study participant. Proposal for the study was submitted and clearance was obtained from the Institutional Ethics Committee (IEC) of IPGME&R and SSKM Hospital, Kolkata (IPGME&R/IEC/2023/111).

Operational definition:

Perception: A belief or opinion, often held by many people and based on how things seem to them. ‘Favourable perception’ is a positive emotional disposition or thinking towards the subject.^[7] For the purpose of analysis this was further categorised as ‘highly favourable’ perception and ‘moderately favourable’ perception as explained in the statistical analysis.

Results:

The response rates among the study participants (Part I and Part II) were 96.82% and 83.94% respectively. The mean age of the participants was 22.48 ± 0.14 years. Majority (98%) of them were between 20-24 years of age. Among them, 210 (70.5%) were male students, 183(61.4%) studied in Part I and 115 (38.6%) studied in Part II of Phase III of MBBS. (Table 1) Most of the participants belonged to West Bengal [280 (94%)]. Among them, 207 (69.5%) resided in hostel. The medium of instruction in the schools of 206 (69.1%) participants was English and nearly 172 (57.7%) students passed XIIth standard from West Bengal Council of Higher Secondary Education (WBCHSE), followed by CBSE (41.3%). Only 17 (5.7%) of them were involved in research during school days. (Table 1)

The source of knowledge regarding biomedical research for the students was mainly Community Medicine project at undergraduate level (44.1%), Internet (31%), and medical textbooks (3.4%). Only 32.8% of participants had knowledge about Government-sponsored fellowship for undergraduate medical students in India, while only 48 knew about Indian Council of Medical Research (ICMR) as an organization which sponsors undergraduate biomedical research. Sixty respondents knew about The Lancet as a journal which publishes biomedical research and nearly 12% knew and could name the Institutional journal (Annals of Medical Science and Research). Among the participants, 20 (6.7%) carried out research activity apart from Community Medicine project, out of which, 8 did not publish their studies yet, while 6 students presented their papers in various National and State conferences.

In case of undertaking research in their undergraduate curriculum, nearly 76% of the study participants had a positive approach. Nearly 46% of them had a negative opinion with research being relevant in competency-based medical education.

Almost 36% of the study participants were neutral regarding not being confident enough in writing research methodology and/or analysing results.

Nearly 51% disagreed with the concept that research would not be helpful to develop career as a clinician. (Table 2)

Table 1: Distribution of the study participants according to their background information (N=298)

Variables	n (%)
Age (in completed years)	
20-24	292 (98.0)
25-29	6 (2.0)
Gender	
Male	210 (70.5)
Female	88 (29.5)
Batch of MBBS	
Part I	183 (61.4)
Part II	115 (38.6)
State of Origin	
West Bengal	280 (94.0)
Others	18 (6.0)
Place of current residence	
Hostel Dweller	207 (69.5)
Day scholar	91 (30.5)
Medium of instruction in school	
English	206 (69.1)
Others	92 (30.9)
Board in which passed schooling	
West Bengal Council of Higher Secondary Education (WBCHSE)	172 (57.7)
Central Board of Secondary Education (CBSE)	123 (41.3)
Others (ISC and other state boards)	3 (1.0)
Education of father	
Primary	33 (11.1)
Middle school	52 (17.4)
Secondary and above (H.S./Graduation/Post-graduation)	213 (71.5)
Education of mother	
Primary	26 (8.7)
Middle school	46 (15.4)
Secondary and above (H.S./Graduation/Post-graduation)	226 (75.8)
Occupation of father	
Retired/Unemployed	23 (7.7)
Others	275 (92.3)
Occupation of mother	
Home-maker	226 (75.8)
Others	72 (24.2)
Any previous involvement in research during schooling	
Yes	17 (5.7)
No	281 (94.3)

Table 2: Perception of the study participants towards biomedical research assessed using 5-point Likert Scale (N=298)

Questions	Strongly agree Number (%)	Agree Number (%)	Neutral Number (%)	Disagree Number (%)	Strongly disagree Number (%)
Every medical student should undertake research in their undergraduate curriculum	75 (25.1)	153 (51.3)	59 (19.8)	10 (3.36)	1 (0.3)
Inclusion of short-term research project will enrich their academic knowledge	92 (30.8)	181 (60.7)	23 (7.7)	2 (0.67)	-
Research experience in undergraduate students improves curriculum vitae	92 (30.8)	160 (53.7)	42 (14.0)	4 (1.35)	-
Research stimulates critical thinking	123 (41.2)	151 (50.6)	21 (7.0)	3 (1.01)	-
Research is not relevant in competency based medical education	20 (6.7)	40 (13.4)	101 (33.9)	104 (34.90)	33 (11.0)
Involvement in biomedical research in undergraduate level helps to gain interest in further research	87 (29.1)	173 (58.0)	27 (9.0)	3 (1.01)	8 (2.6)
“I am not confident in writing research methodology and/or analyzing result section”	28 (9.4)	65 (21.8)	106 (35.57)	75 (25.17)	24 (8.0)
Medical research will not be helpful to develop career as a clinician	20 (6.7)	34 (11.4)	81 (27.1)	113 (37.9)	50 (16.7)

Among the participants, 81 (27%) had 'highly favorable' perception, 76 (26%) had 'moderately favorable' whereas 141 (47%) had 'low perception' towards biomedical research. (Figure 1)

The main factors favorable in carrying out research were found out to be personal interest (80.2%), improved academics (70.1%) and career progression (64.4%). (Figure 2)

Some of the factors unfavorable for research obtained were lack of dedicated time to undertake research (87.5%) and lack of assistance from the faculty members (54.7 %). (Figure 3)

Figure 1: Distribution of perception towards biomedical research among the study participants (N=298)

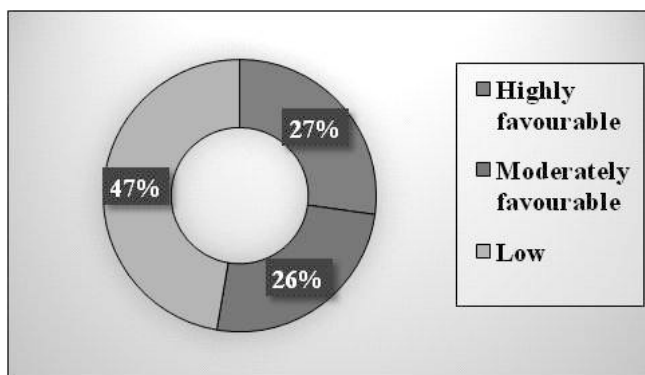
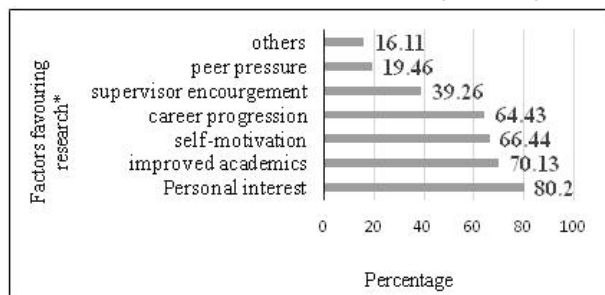
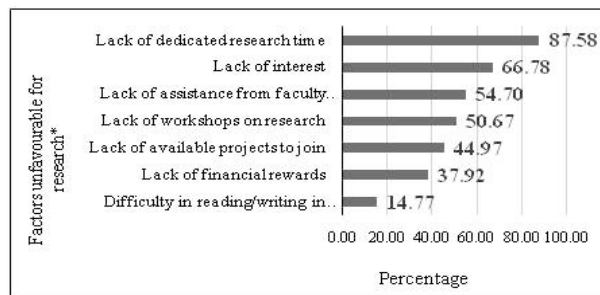


Figure 2: Distribution of responses among the study population regarding factors favourable for research. (N=298)



[*multiple responses]

Figure 3: Distribution of responses among the study population regarding factors unfavourable for conducting biomedical research (N=298)



[*multiple responses]

Table 3: Multinomial Logistic Regression showing association of perception with background information of study participants (N=298)

Background information of study participants	Moderately favourable perception (n= 76)			Highly favourable perception (n= 81)		
	Frequency (%)	OR (95% Confidence Interval)	p value	Frequency (%)	OR (95% Confidence Interval)	p value
Part I of Phase III MBBS	50 (65.8)	1.960 (1.08- 3.56)	0.028	58 (71.6)	1.593 (0.87-2.91)	0.131
Part II of Phase III MBBS	26 (34.2)	Ref.		23 (28.4)	Ref.	
Education of father (Below primary/ primary)	9 (11.9)	3.09 (1.24- 7.77)	0.016	14 (17.3)	1.706 (0.61-4.74)	0.306
Education of father (Middle school)	18 (23.7)	1.57	0.256	15 (18.6)	2.088 (0.98- 4.45)	0.057
Education of father (Secondary and higher)	49 (64.4)	Ref.	-	52 (64.1)	Ref.	-
Education of mother (Below primary/ primary)	11 (14.4)	1.686 (0.54-5.20)	0.363	8 (9.8)	4.086 (1.41-11.80)	0.009
Education of mother (Middle school)	18 (23.7)	1.320 (0.56- 3.08)	0.519	12 (14.9)	2.774 (1.28-6.05)	0.010
Education of mother (Secondary and higher)	47 (61.9)	Ref.	-	61 (75.3)	Ref.	-
Medium of instruction in school studied (English)	58 (76.3)	2.157 (1.12- 4.13)	0.021	62 (76.5)	2.340 (1.20-4.55)	0.012
Medium of instruction in school studied (Bengali and others)	18 (23.7)	Ref.		19 (23.5)	Ref.	

Ref. Cat= 0 (low perception)

Multinomial Logistic Regression revealed statistically significant higher odds of 'highly favourable' (OR= 2.34, 95% CI, 1.20-4.55; p= 0.012) and 'moderately favourable' perception (OR= 2.15, 95% CI, 1.12-4.13; p= 0.021) towards biomedical research among students from English-medium instruction as compared to those who had Bengali or other languages as medium of instruction in their respective schools. There were statistically significant higher odds of 'moderately favourable' perception among Part I students as compared to those of Part II (OR= 1.96, 95% CI, 1.08-3.56; p= 0.028) while statistically significant higher odds of 'highly favourable' perception were found among those students whose mothers had received education till Middle school, than among those whose mothers had received higher education (Class Xth pass and above) (OR= 2.74, 95% CI, 1.28-6.05; p= 0.010). (Table 3)

Discussion:

In this study, 91.6% of the respondents believed that inclusion of short-term research project will enrich their medical education, in contrast to a study conducted by Chatterjee S. et al. in a medical college of Kolkata, where 79.5% believed the same.^[8] In the same study, 63.7% believed that lack of concept and self-confidence was an important unfavourable factor in carrying out research, while in the current study, 87.5% were of the opinion that lack of dedicated research time was the main factor that may hinder research. This can be due to the huge curriculum of MBBS along with the rigorous clinical postings and internal assessments that take up majority of the time of the students. This too can be a reason why students develop lack of interest in carrying out research activities, as obtained from this study (66.7%).

A study conducted by Ibrahim et al. in Egypt, 69% of medical students believed that research helped for their long-term career objective, yet only 11% of them published a paper.^[9] On the contrary, in the current study, 84.5% participants agreed that research activities helped to improve their

curriculum vitae for the long run, while only 6 out of the 20 students, who undertook research during college, presented their papers in National and State conferences. This might be due to less scope for an undergraduate medical student to present a scientific paper in any conferences.

According to a study conducted by Manju L. et al., positive attitude was a highly contributing factor favouring research, whereas the current study demonstrated personal interest was the main favouring factor.^[10]

According to a study conducted by Shahbaz et al. in Lahore, with undergraduate university students, it was found that 86% believed research was an essential aspect of their field of study; however only 33% of them had previous research experience.^[11] Despite positive attitude toward research, the participation in research, presentation and publication were less in another study conducted in Kolar, India.^[12] In present study, only 5.37% had a previous experience of research in school and only 20 out of 298 participants (6.7%) undertook research during MBBS. Lack of self-motivation and shortage of time, along with lack of adequate workshops, difficulty to read/write in English for those who did not have English as the medium of instruction in schools, lack of adequate financial rewards, etc. were identified as some barriers in undertaking research in the present study. Similar findings were noted by the other study where inadequate financial grants to carry out research followed by difficulty in follow-up of patients, lack of time and awareness regarding research.

In a study conducted by Black ML et al., which focussed on the impact of research, self-efficacy among students before and after a summer internship programme, there were no statistically significant associations of improvement in self-efficacy with gender, type of college attended, type of research, or program type, while in the current study, statistically significant higher odds of highly favourable perception among Part I students as compared to those of Part II, those who had studied in

English-medium schools, among those students whose mothers had received education till Middle school, than among those whose mothers had received higher education.^[13]

A study conducted by Sobczuk P et al., lack of time and knowledge on starting a research project were identified as the main barriers to scientific/research work.^[14] Similarly in this study, lack of dedicated time for undertaking research was found as the major hindering factor influencing research work.

Limitations of the study:

The present study was conducted in a single institution situated in a metropolitan city, hence the result might not be generalised to all the undergraduate medical students across the state. Also, the study relied upon self-reported data, which may be subjected to social desirability bias.

Conclusion:

The present study revealed that almost one-third of the study participants had highly favourable perception, while nearly half of them had low perception towards biomedical research. Career progression, improvement in academics and personal interest were some of the favorable factors for carrying out biomedical research, whereas lack of dedicated research time, workshops on research and guidance were identified as barriers for carrying out research.

The findings from this study highlight the need for interventions to enhance students' interest in research and increase dedicated research time to foster research-oriented thinking among them. Awareness could be spread among them about opportunities in biomedical research by organizing workshops and seminars on research methodology involving eminent researchers and providing them assistance to overcome the research related difficulties as mentioned by them.

Declaration:

Funding: Nil

Conflict of Interest: Nil

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