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Readiness of undergraduate medical students to health research and factors influencing it in a medical college – A cross-sectional study

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ABSTRACT

Objectives: Developing, maintaining, and sustaining undergraduate medical students' research involvement will enable future healthcare practitioners to practice more appropriate evidence-based clinical medicine. This study aim to assess the readiness for health research and factors promoting it among Undergraduate medical students.

Materials and Methods: A descriptive cross-sectional study was conducted among undergraduate medical students in Puducherry over 3 months (August–October 2023). Systematic random sampling was applied to recruit 360 study participants. A validated pre-tested semi-structured self-administered questionnaire was used to gather data on sociodemographic, readiness, participation, attitude, perceived motivational factors, and barriers toward health research. Data were entered in MS EXCEL 2019 and analyzed using the Statistical Package for the Social Sciences v16.0. The quantitative variables were represented in mean and qualitative variables in proportion. Chi-square test and logistic regression analysis were applied to identify the factors influencing readiness to health research among undergraduate Bachelor of Medicine and Bachelor of Surgery students.

Results: A total of 360 participants with a mean age of 20.7 ± 0.64 were recruited, demonstrating a nearly equal gender distribution (male 48.3% and female 51.7%). Approximately 76.4% scored ≥60% in their recent university examinations, and 86.7% resided in hostels. While 11.4% reported prior participation in health research, 32.5% expressed readiness to participate, influenced by factors such as the competency-based medical education (CBME) approach and academic performance (P = 0.043). Major barriers identified included lack of funding (88.8%), lack of time (80.3%), and mentorship (52.9%). Logistic regression analysis revealed that higher examination grades significantly increased readiness to research (aOR: 1.936, P = 0.027) and also participation for health research (aOR: 3.366, P = 0.029), while non-CBME participants showed lower odds of participation (aOR: 0.321, P = 0.006).

Conclusion: Medical institutes should implement structured mentorship programs, require research courses as part of the curriculum, and provide sufficient funding for student-led projects. Addressing these strategies within the institutes could foster a research-oriented culture, thus ultimately improve quality patient care and broader medical knowledge.

Keywords: Research, Undergraduate, Medical students

INTRODUCTION

As the world constantly evolves, research becomes increasingly important in creating an evidence-based medical practice and driving scientific innovations, thereby supporting the betterment of society.[1] This is especially pertinent in addressing the dual burden of communicable and non-communicable diseases prevalent in many developing countries, including India.[2] Developing, maintaining, and sustaining undergraduate medical students' research involvement will enable future health-care practitioners to practice more appropriate evidence-based clinical medicine and also prepare students for future roles in academic settings.[3,4] India accounts for about 20% of the global disease burden and makes up around 17% of the world's population but conducts fewer than 1.4% of clinical trials worldwide, indicating a serious lack of interest in research among medical experts.[5] Despite the widely recognized value of research skills, there remains a notable gap in students' involvement in health research; it underscores the importance of continuum research training particularly focusing on curriculum level and exploring innovative educational strategies.[6] Growing emphasis on research within medical curricula globally, in the context of India, the introduction of the competency-based medical education (CBME) curriculum by the National Medical Council aims to bridge these gaps. As part of these reforms, faculty members are now required to be competent to train medical students and also to improve

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their research capacity by completing the Basic Course in Biomedical Research (BCBR) by the Indian Council of Medical Research (ICMR).[7,8] However, despite all these efforts, many postgraduate thesis submissions often remain unpublished due to inadequate research aptitude developed during undergraduate training and failed to transform their knowledge and attitude in actual practices due to the lack of research curriculum and lack of time.[9,10] Literature highlights that exposure to research during undergraduate training can drastically boost awareness and confidence in conducting research. However, obstacles including lack of finances, mentorship, and inadequate training can hinder readiness to participate in health research.[11] Identifying specific barriers to research involvement and facilitators within local contexts can support medical institutes for targeted strategies that promote research culture. Given this consideration, this study aimed to evaluate readiness for health research among undergraduate medical students and identify associated influencing factors in the medical college of Puducherry.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted among 360 Bachelor of Medicine and Bachelor of Surgery (MBBS) students at a single medical college of Puducherry over 3 months (August–October 2023). Considering the proportion of adequate knowledge of medical research as 36.9% (Chellaiyan *et al.*),[9] a margin of error was 5%, confidence interval was 95%, the final sample size was estimated to be 358, and that was approximated as 360. Systematic random sampling was applied to select the 72 eligible students from each academic year, including the students' ongoing internship for equal representation to fulfill the sample size of 360. The sampling frame included all students enrolled from the academic year 2018–2023 and only those who provided consent were included in the final sample. The validated, pre-tested semi-structured study tool was used to collect the data, which was developed based on the studies in the literature.[9,12] A pilot study was conducted with alumni students and the questionnaire underwent content validated by subject experts before the start of the study. The subsections in self-administered questionnaire were about participants' characteristics, readiness to health research, participation in health research, attitude toward health research, and perceived motivational and barrier factors toward health research. Participants' responses were summed as satisfactory readiness to health research; those who scored more than the 50th percentile and those who scored less than or equal to the 50th percentile was classified as unsatisfactory readiness to health research. After explaining the purpose of the study, written informed consent was obtained. The questionnaire was self-administered and potential identifiers of the participants were avoided to obtain the quality data. The data were entered in MS EXCEL 2019 and analyzed using the Statistical Package for the Social Sciences (SPSS) Inc. Released 2007. SPSS for Windows, version 16.0. Chicago, SPSS Inc. The quantitative variables were represented in mean and qualitative variables in proportion. Chi-square test and logistic regression analysis were applied to identify the factors influencing readiness to health research among undergraduate MBBS students.

RESULTS

A total of 360 study participants were recruited with a mean age of 20.7 ± 0.64. The gender distribution was almost equal in proportion (male 48.3% and female 51.7%) of either gender. Around three-fourths (76.4%) of participants scored a grade of ≥60% in the recent university examination. Our participants were from different geographical settings of India so the majority of their residential status was hostel 312 (86.7%). Furthermore, around one-third of our participants, 108 (30.0%) either one of the parents were doctors by occupation [Table 1].

Table 1: Characteristics of study participants: (*n*=360).

Variable	*n* (%)
Age	
<20	186 (51.7)
≥20	174 (48.3)
Medical Education syllabus	
CBME	216 (60.0)
Non-CBME	144 (40.0)
Gender	
Male	174 (48.3)
Female	186 (51.7)
Grade of the participant in recent university examination	
<60%	85 (23.6)
60–75%	217 (60.3)
≥75	58 (16.1)
Residential Status	
Hosteller	312 (86.7)
Non-Hosteller	48 (13.3)
Parents as doctors	
Yes	108 (30.0)
No	252 (70.0)

CBME: Competency-based medical education

The proportion of our students who have already participated in health research either as one of the members in the conduct of the study and/or participation in the webinar/CME/Workshop/course related to research methodology was 41 (11.4%). Interestingly, around 117 (32.5%) expressed their readiness to participate in health research. The factors that drive their readiness to participate in health research were the CBME syllabus, female gender, grade (≥60%), and residential status of the participants (Hosteller) and found to be statistically significant [Table 2]. The important

motivational factors among the 117 (32.5%) participants were academic rewards 97 (82.9%), experience 85 (72.6%), development in career 83 (70.9%), contribution in the field patient care 78 (66.6%), collaboration with faculty/seniors 68 (58.1%), and acceptability gain in competitive entrance examinations/United States Medical Licensing Examinations (USMLE) 44 (24.8%).

Table 2: Factors associated with Readiness to participate in Health Research among Undergraduate Medical Students (*n*=360).

Variable	*n*	Readiness to health research		*P*-value*
		Yes *n* (%)	No *n* (%)	
Age				
<20	186	62 (52.9)	124 (51.0)	0.727 (0.121)
≥20	174	55 (47.1)	119 (49.0)	
Medical Education syllabus				
CBME	216	79 (67.5)	137 (56.4)	0.043 (4.085)
Non-CBME	144	38 (32.5)	106 (43.6)	
Gender				
Male	174	47 (40.2)	127 (52.2)	0.031 (4.624)
Female	186	70 (59.8)	116 (47.8)	
Grade of the participant in recent university examination				
<60%	85	19 (16.2)	66 (27.2)	0.022 (5.225)
≥60%	275	98 (83.8)	177 (72.8)	
Residential status				
Hostelers	312	108 (92.3)	204 (83.9)	0.028 (4.773)
Non-Hostelers	48	9 (7.7)	39 (16.1)	
Parents as doctors				
Yes	108	33 (28.2)	75 (30.9)	0.606 (0.265)
No	252	84 (71.8)	168 (69.1)	

*Chi-square test. CBME: Competency-based medical education

The major barrier toward health research as enumerated by the 117 (32.5%) participants was lack of funds 104 (88.8%) and only 17/117 (14.5%) were aware of the funding agencies that promote health research. Other barriers were lack of time 94 (80.3%), lack of mentorship 62 (52.9%), lack of mandatory training courses in research methods 59 (50.4%), and lack of knowledge 32 (27.3%). In CBME, the proportion of participants involved in actual research among those who are categorized as readiness and unreadiness to research was 37.9% and zero; this was found to be statistically significant ($P < 0.05$, z test).

Table 3 shows logistic regression analysis predicting the relationship between participants' characteristics and their readiness for health research. It depicted that for every 1 unit rise in examination grade, there were 1.93 times odds of increase in being ready for health research, indicating a strong influence of academic performance on readiness.

On logistic regression analysis [Table 4], both medical education syllabus ($P = 0.006$) and grade in previous examinations ($P = 0.029$) were significantly associated with participation in health research activities. The participants with non-CBME curriculum had significantly lower odds of engaging in health research (aOR: 0.321, 95% confidence interval: 0.142–0.726, $P = 0.006$).

Interestingly, participants with higher grades had substantially higher odds of participating in health research, with each unit increase in grade, the odds of participation increased by 3.3 times which was statistically significant ($P = 0.029$).

DISCUSSION

Readiness is a key factor influencing medical students' willingness to conduct health research in the undergraduate period. Although some undergraduate medical programs incorporate research practices, it is not universally adopted. This study sought to assess the readiness, participation, perceived motivation, specific barriers, and factors influencing the research involvement among UG medical students in Puducherry. It revealed that around 117 (32.5%) expressed readiness to participate in health research and nearly doubled to 79 (67.5%) among CBME curriculum compared to the non-CBME curriculum. This finding could be possible because of the differences in the research-related education and activities provided by the CBME curriculum compared to the traditional UG medical curriculum.[7] This finding is almost similar to these studies done in Chennai and Uganda by Chellaiyan *et al.* and Kiyimba *et al.*[9,12] From our study, it was evident that gender does not influence the participation toward research which was consistent with the finding from the study done by Orebi *et al.* among the medical students.[13]

The motivational factors among participants who expressed their readiness were academic rewards, experience, and development in career and the field of patient care. This finding is congruent with studies done among 12 universities in Uganda among health professionals and by Pallamparthy and Basavareddy among medical students in India.[12,14] Research participation and publication rates would be enhanced if students contributing to published articles were incentivized with prizes and awards from their parent universities.[15] Most respondents from our study reported lack of funds, lack of time, and mentorship as the perceived barriers to research readiness. Similar findings were reported in previous studies by Kiyimba *et al.*, Orebi *et al.*, and recent systemic analysis among medical students.[12,13,16] To support this, the ICMR has introduced short-term studentship program, encouraging undergraduate students to undertake 2 months of research in their field of interest along with incentives increased from ₹20,000 to ₹50,000 and also certificates.[17] Giri *et al.* found that medical students who received financial support and sustained guidance in managing their time both in academic and research responsibilities exhibited better research productivity, particularly in completing projects and

Table 3: Logistic regression showing the relationship between study participants' characteristics and Readiness to Health research.

Variable	Beta	S.E	Wald	df	*P*-value	Exp (B)	95% C.I. for Exp (B)	
							Lower	Upper
Age	0.145	0.262	0.307	1	0.579	1.157	0.692	1.934
Medical Education syllabus	0.352	0.263	1.797	1	0.180	0.703	0.420	1.177
Gender	0.309	0.297	1.080	1	0.299	1.362	0.760	2.440
Grade of the participant in previous examinations	0.660	0.299	4.886	1	0.027	1.936	1.078	3.476
Residential Status	0.287	0.300	0.916	1	0.338	1.333	0.740	2.399

C.I.: Confidence interval, S.E: Standard error, df: Degrees of freedom, Exp (B): Exponentiated coefficient

Table 4: Logistic regression showing the relationship between study participants' characteristics and participation to health research.

Variable	Beta	S.E	Wald	df	P-value	Exp (B)	95% C.I. for Exp (B)	
							Lower	Upper
Age	0.058	0.404	0.021	1	0.885	1.060	0.203	2.773
Medical Education syllabus	−1.138	0.417	7.442	1	0.006	0.321	0.142	0.726
Gender	0.191	0.345	0.305	1	0.581	1.210	0.615	2.381
Grade of the participant in previous examinations	1.214	0.554	4.793	1	0.029	3.366	1.136	9.977
Residential status	0.651	0.397	2.680	1	0.102	1.917	0.880	4.178

C.I.: Confidence interval, S.E: Standard error, df: Degrees of freedom, Exp (B): Exponentiated coefficient

publishing papers.[10] In this context, extramural, intramural, and institutional research funds along with a continuum of mentorship from an early stage of curriculum could play a significant role in further promoting research involvement and enabling students to effectively manage their time for research activities and its publications. In addition, enhancing awareness of available financial support is essential. This can be achieved through targeted awareness sessions, workshops, and integrated discussions within the curriculum.

Despite this readiness and attitude, however, only (11.4%) of the participants had participated already in health research. This low participation rate may be attributed to inadequate guidance and insufficient reinforcement of research methodologies within the curriculum. This finding is similar to the previous study done by Chellaiyan *et al.* in Chennai,[9] but in contrast to one by Mubuuke and Businge where 70% had actively engaged in research activities.[18] Implementing medical research courses like BCBR, early in the curriculum, along with mandatory submission of research projects under proper faculty guidance, would help students manage their time more effectively, thereby enhancing both institutional publication rates and national research output.

Our study reported that participants with higher grades are positively correlated with increased readiness and participation in health research. This result supports the theory that student involvement in research is strongly correlated with academic achievement because more accomplished students are more likely to be optimistic and motivated to engage in more intellectual undertakings.[19] The chance of students participating in health research is much lower for those in a non-CBME curriculum than for those in a CBME ($P = 0.006$). This finding aligns with previous research that emphasizes the beneficial effects of competency-based, organized courses on encouraging student participation in research projects.[20] The curriculum changes in CBME that includes two mandatory electives in 4-week blocks, thus allowing medical students to gain transformative experience in basic research through skill-based learning, have increased the student's readiness and participation to health research when compared to non-CBME curriculum. The present study has limitations owing to its cross-sectional design, as it could not explore causal relationships. The study was conducted at a single medical college as these findings might not be generalizable to all medical college students which is a significant limitation. It is recommended that future qualitative research investigate the underlying reasons for non-participation among students expressed readiness for health research.

CONCLUSION

Despite a considerable foundation of readiness among undergraduate medical students for health research, substantial efforts are required to translate this readiness into active participation. Medical institutes can enhance the academic framework by implementing structured mentorship programs that involves academic administrators, faculty members, and department heads; integrating mandatory research methodology courses early in the curriculum; ensuring adequate funding for student-led research projects; and facilitating recognition of students'

contributions to research. By addressing these strategies, medical institutes might promote a research-orientated culture, which will eventually improve patient care and the advancement of broader medical knowledge.

Ethical approval

The study approved by the Institutional Ethics Committee at Sri Lakshmi Narayana Institute of Medical Sciences (SLIMS), number IEC/CP/11/2023, dated 10th August 2023.

Declaration of patient consent

The authors certify that they have obtained all appropriate participants consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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