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Original Article

Barriers and Opportunities in Medical Research among South Indian MBBS Undergraduates: A Cross-Sectional Analysis

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ABSTRACT

Introduction: Research among undergraduates is essential to inculcate critical thinking and reasoning skills and develop positive attitudes toward scientific research among medical students from the beginning of their careers.
Aim: To assess the knowledge, attitude, and practice of medical research among MBBS undergraduate medical students.
Methodology: A cross-sectional questionnaire study was conducted with 750 undergraduate MBBS students selected based on convenience sampling. Data were collected using a pretested, validated, and self-administered questionnaire on research knowledge, attitudes, and practice with a response rate of 58.93%. There were 30 questions in six sections of the study that collected demographic data, along with knowledge and attitude practice questions. Questions on the associated barriers and suggestions for improving research practice were also included, and the collected data were analyzed using SPSS 24.0.
Results: Results showed that 87.5% understood a research hypothesis, and 93.4% recognized the need to state it explicitly. However, only 18.6% had participated in research, and just 4.5% presented at conferences. Knowledge scores improved with academic progression ($r=0.18$, $p=0.001$), while practice scores remained low (0.3 ± 0.6). Significant barriers included time constraints (67.8%) and lack of guidance (66.2%).
Conclusion: While MBBS undergraduates demonstrated high knowledge and positive attitudes toward medical research, their practices were moderate. To improve research participation, implementing mentorship programs and curricular reforms that integrate research training is essential for fostering a research-oriented mindset among future healthcare professionals.

Keywords: Attitude, Knowledge, Medical, Practice, Research, Students.

INTRODUCTION

Research in the medical field is essential for the development of future healthcare, improvement of clinical procedures, and formulation of public health policies.[1] Globally, there has been a unified initiative to include research into undergraduate medical courses to improve the education of future healthcare workers. Organizations like the World Health Organization (WHO) underscore the significance of research training for medical students, promoting curriculum that encourage inquiry and evidence-based practice. Many medical schools in North America and Europe have effectively integrated organized research methodology programs into their undergraduate curricula, underscoring the need for analogous changes in other locations, such as India.[2]

In a country such as India, where a wide range of health problems continue to exist, the requirement for comprehensive medical research has never been more important. Regrettably, India is woefully lacking in its commitment to medical research.[1] The nation is confronted with a wide range of health problems, such as infectious diseases, non-communicable diseases, and growing dangers to public health. The research that medical students conduct is an essential component in addressing these difficulties because they will one day be healthcare providers.[3, 4]

For several reasons, it is crucial to involve medical students in their research efforts. First, it helps develop analytical and critical thinking skills, both of which are essential for efficient clinical implementation. Second, it encourages a culture of

inquiry and evidence-based medicine, both of which are essential for enhancing patient outcomes. Third, the opportunity to apply theoretical knowledge in real-world settings is one of the factors that contributes to the enhancement of the educational journey of medical students through their participation in research experiences.[5–7] In addition, students who are exposed to research may be motivated to seek jobs in academia or to contribute to the development of breakthrough healthcare solutions.

There is a lack of exposure to research activities among a significant number of MBBS students in South India, according to surveys, despite the fact that research participation is widely acknowledged to offer numerous advantages. The lack of formal training in research methodology, absence of significant opportunities for mentorship, and excessive academic workloads that prioritize clinical skills over research involvement are all factors that contribute to this disengagement. Further aggravating the problem is cultural attitudes toward research and perceived limitations such as time constraints and a lack of institutional support.[8,9] These factors further compounded the situation.

It is important to note that the consequences of this study are not limited to specific schools; rather, they add to a more comprehensive discussion on the reform of medical education in India. It is of utmost importance that future medical professionals are not only prepared with clinical skills but also with the capacity to engage critically with scientific literature and contribute to ongoing research initiatives. This is because the difficulties faced by the healthcare industry are constantly evolving.[10, 11]

This study aims to address the critical gap in understanding the knowledge, attitudes, practices, and barriers related to research engagement among MBBS undergraduates in South India. By investigating these factors, we hope to inform educational strategies that cultivate a culture of inquiry and enhance evidence-based practice among future medical professionals. The findings will contribute to broader discussions on reforming medical education in India to ensure that future healthcare providers are equipped not only with clinical skills but also with the capacity to engage critically with scientific literature and contribute to ongoing research initiatives.

MATERIALS AND METHODS

This was a cross-sectional questionnaire-based study conducted among MBBS undergraduate students from a tertiary healthcare center located in Coimbatore, Tamil Nadu. The study was conducted after obtaining clearance from the Institutional Human Ethics Committee (IHEC) with reference number 23/424, and informed consent was obtained from all participants. The participants were included in the study only if they were MBBS undergraduate students above 18 years of age studying in a medical college located in Coimbatore, Tamil Nadu. Participants were excluded if they were not present during data collection or did not provide their consent to participate in the present study. The study included 500 participants who were selected into the study based on convenience sampling.

Procedure: A pretested, validated, and self-administered questionnaire that assesses the knowledge, attitude, and practice of conducting research was used for data collection. This self-administered questionnaire was administered to all selected undergraduates and filled by them. The study tool consisted of 30 questions in six sections. The first part of the questionnaire included general information, such as age, sex, academic year, and occupation of parents. Section II comprises questions that assessed knowledge about medical research, such as research hypotheses, research protocols, and sources of research. Section III assessed attitudes toward medical research using a 5-point Likert scale. Section IV of the questionnaire was framed to evaluate the practice of medical research among medical students by quizzing them if they had conducted any medical research, accessed peer-reviewed journals, attended or presented at any conference, and published their work in any journals. Section V assesses and explores the barriers they face in conducting medical research. Section VI was used to explore suggestions to improve medical research practice from the students' perspective as an open-ended question.

Statistical analysis: Data were documented in Microsoft Excel, and a suitable statistical analysis was performed using IBM SPSS software version 24.0. Categorical variables are presented in a frequency table, and continuous variables are presented as mean ± SD/ Median (Min, Max). The Spearman rank correlation test was used to assess the correlation between the types of outcome. For continuous variables, the normality of data was assessed using the Kolmogorov–Smirnov test, and the independent t-test or Mann-Whitney U test was used to assess the effect between the two groups. For categorical variables, Pearson's chi-squared test was used to verify the relationship between the characteristics of the two groups. When this test did not meet its requirements ($n > 20$, all expected values in the table were greater than 1 and at least 80% of these were greater than or equal to 5), we used Fisher's exact test. Statistical significance was set at $p<0.05$.

RESULTS

The results suggest that 61.5% of the 442 participants were female and 38.5% were male. The majority of the respondents (58.2%) were second-year students, followed by first-year (18.9%), fourth-year (12.5%), and third-year (10.5%) students (Figure 1 and 2).

Table 1 shows that 87.5% of respondents correctly identified a research hypothesis as a testable prediction that was statistically and analytically verifiable. Furthermore, 93.4% understood the need to explicitly state a hypothesis in the study procedure, exhibiting a good understanding of the research methodology. Most respondents (84%) knew that ethics permission was required before starting the research, whereas 8.6% thought it was unnecessary, and 7.4% were unsure. When questioned about the ICMR-STS program, 69.1% said that it was a government-sponsored medical student fellowship. Approximately 30.1% were unaware of the program. Online research tools: 61.1% could name at least one database to search for research articles, 6.6% were not, and 32.4% were unknown.

According to Table 2, 64.5% of the students strongly agreed that research enriches medical education, 47.7% strongly supported incorporating research into the MBBS curriculum, and 34.6% agreed. A total of 53.3% strongly agreed that research helped them comprehend their subjects, and 50% strongly believed it improved clinical practice, demonstrating its academic and professional importance. Although 45.1% were neutral on whether the research was an extra load, 4.3% strongly agreed and 23.8% disagreed, demonstrating that most students did not find it burdensome. Additionally, 39.8% and 17.2% strongly agreed that the research was not a time waster or distraction from the studies. A total of 62.7% strongly agreed that research generates medical science advancements, and 61.7% believed it improves their CV. Only 38.1% firmly considered research as a career possibility, while 34.4% agreed, indicating tempered interest in full-time research. Financial prospects for research were moderate, with 45.7% neutral, 25.6% agreeing, and 17.6% strongly agreeing.

As shown in Table 3, only 18.6% acknowledged participating in the research study, a substantial discrepancy since 81.4% did not. Only 4.5% of the students had presented a scientific paper at a conference, and only 4.1% had published their study in a journal, leaving 95.5% and 95.9% without expertise in these crucial research practices.

MBBS undergraduates perceived considerable hurdles to research, as shown in Table 4. Time was the biggest issue for 67.8% of students, followed by lack of assistance (66.2%), and difficulties in choosing a research topic (77.5%). Half of the respondents reported difficulties in proposal writing (49.2%), data analysis (48.0%), review board acceptance (47.7%), and funding (49.4%). Fewer students had trouble producing reports (33.6%) or found the literature (17.2%). The majority (70.3%) were willing to participate in the study, while 29.7% were uninterested.

Figure 3 shows how students might improve their medical research. The majority (45.6%) stressed Guidance and Mentorship, followed by Awareness and Education (24.9%), and emphasized workshops and seminars. Students' suggestions for research time and curricular integration (16.9%) were particularly concerning. Encouragement and Motivation (5.9%), and Infrastructure and Resources (5.5%) noted the need for money, incentives, and better facilities. Finally, procedural hurdles were lowered by Simplifying Processes (1.3%).

Table 5 indicates that Knowledge scores rise with academic development, from 3.9±1.0 in first-year students to 4.6±0.6 in fourth-year students. This shows that medical students learn about research as they progress. Knowledge and academic year were positively correlated ($r=0.18$, $p=0.001$). Attitude scores remained high, but decreased slightly from 42.5±4.4 in the first-year to 39.9±4.4 in the third-year, and then increased slightly to 41.4±3.9 in fourth-year. Students' research interest may decrease as they develop, according to a weak negative association between attitude and academic year ($r=-0.12$, $p=0.011$). Practice scores were low across all years, increasing slightly from 0.1±0.4 in first-year students to 0.5±0.8 in third-year students. Practice was positively correlated with the academic year ($r=0.15$, $p=0.001$).

From Table 6, the average knowledge score was 4.0±1.1, with 36.9% of students scoring "Good," 32.6% "Moderate," and 30.5% "Poor." The mean attitude score was 41.1±4.4, with 25.4% of students scoring "Good" (>44), 46.7% "Moderate" (39-44), and 27.9% "Poor" (<39). The average practice score was 0.3±0.6, indicating a significant research involvement gap. Most pupils (80.1%) had "Poor" practices, whereas 4.7% had "Good" practices and 15.2% had "Moderate" practices.

Table 7 shows that "Good" knowledge improved from 31.5% in the first year to 62.3% in the fourth year, whereas "Poor" knowledge declined from 34.8% to 4.9%. A chi-square analysis ($\chi^2=29.1$, $p=0.001$) found a strong correlation between academic year and knowledge levels. While most students had "Moderate" attitudes across all years, first-year students (40.2%) had the most "Good" attitudes. Third-year students (15.7%) had the fewest. "Poor" attitudes were more common in second- (29.2%) and third-year (37.3%) students than first- and fourth-years. A significant relationship ($\chi^2=16.41$, $p=0.011$) indicates varying sentiments throughout time. Beginning at 93.5%, first-year pupils were classified as "Poor," declining to 80.3% by the fourth year. Only 8.2% of fourth-year students had "Good" habits, indicating low research commitment. The connection was substantial ($p=0.001$) across academic years.

Table 1: Distribution of study participants according to knowledge about medical research

Knowledge questions	Yes n (%)	No n (%)	Do not know n (%)
A research hypothesis is a specific, testable prediction and is verifiable by statistical and analytical means	427 (87.5%)	87.5 (1.6%)	53 (10.9%)
Research protocol should clearly state the hypothesis	456 (93.4%)	8 (1.6%)	24 (4.9%)

Ethics approval is not mandatory before the start of any research	42 (8.6%)	410 (84.0%)	36 (7.4%)
ICMR-STS is a government-sponsored fellowship offered to medical students	337 (69.1%)	4 (0.8%)	147 (30.1%)
Can you name one online database where you can search for research articles?	298 (61.1%)	32 (6.6%)	158 (32.4%)

Table 2: Distribution of study participants according to attitude towards medical research

Attitude questions	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Research enriches medical education	-	-	15 (3.1%)	158 (32.4%)	315 (64.5%)
Research should be part of MBBS curriculum	-	6 (1.2%)	80 (16.4%)	169 (34.6%)	233 (47.7%)
Research will help in better understanding of subject	1 (0.2%)	2 (0.4%)	36 (7.4%)	189 (38.7%)	260 (53.3%)
Research will help ones clinical practice later	1 (0.2%)	9 (1.8%)	67 (13.7%)	167 (34.2%)	244 (50.0%)
It is an extra burden to do research	42 (8.6%)	116 (23.8%)	220 (45.1%)	89 (18.2%)	21 (4.3%)
It is not waste of time and does not disturb studies	3 (0.6%)	39 (8.0%)	168 (34.4%)	194 (39.8%)	84 (17.2%)
Research contributes to innovations in medical science	-	1 (0.2%)	21 (4.3%)	160 (32.8%)	306 (62.7%)
Research helps in the improving one's curriculum vitae	-	2 (0.4%)	23 (4.7%)	162 (33.2%)	301 (61.7%)
Can consider medical research as an exclusive future job career option after medical school completion	2 (0.4%)	19 (3.9%)	113 (23.2%)	168 (34.4%)	186 (38.1%)
Financial prospects are good for research career	14 (2.9%)	40 (8.2%)	223 (45.7%)	125 (25.6%)	86 (17.6%)

Table 3: Distribution of study participants according to practice of medical research

Practice questions	Yes n (%)	No n (%)
Are you involved in a medical research project?	91 (18.6%)	397 (81.4%)
Have you done a scientific paper presentation in a conference?	22 (4.5%)	466 (95.5%)
Have you published any of your research studies in a journal?	20 (4.1%)	468 (95.9%)

Table 4: Distribution of study participants based on opinion toward barriers associated with medical research

Perceived Barriers questions	Yes n (%)	No n (%)
Difficulty in choosing topic	378 (77.5%)	110 (22.5%)
Difficulty in writing proposal	240 (49.2%)	248 (50.8%)
Difficulty in data analysis	234 (48.0%)	254 (52.0%)
Difficulty in writing report	164 (33.6%)	324 (66.4%)
Approval from review boards	233 (47.7%)	255 (52.3%)
Lack of proper guidance	323 (66.2%)	165 (33.8%)
Lack of interest	145 (29.7%)	343 (70.3%)
Inaccessible to literature	84 (17.2%)	404 (82.8%)
Lack of funding	241 (49.4%)	247 (50.6%)
Lack of time	331 (67.8%)	157 (32.2%)

Table 5: Mean score of Knowledge, Attitude and Practice to research based on academic level of respondents

	Knowledge	Attitude	Practice
First Year	3.9 ± 1.0	42.5 ± 4.4	0.1 ± 0.4
Second Year	3.8 ± 1.1	40.9 ± 4.4	0.3 ± 0.6
Third Year	4.1 ± 0.9	39.9 ± 4.4	0.5 ± 0.8
Fourth Year	4.6 ± 0.6	41.4 ± 3.9	0.3 ± 0.7
	r = 0.18*, P-value = 0.001#	r = -0.12*, P-value = 0.011#	r = 0.15*, P-value = 0.001#

* Spearman rank correlation test; # indicates statistical significance.

Table 6: Knowledge, attitudes, perceived barriers toward research among medical students

Variables	Frequency (%)
Knowledge	
Mean (SD)	4.0 (1.1)
Good (5)	180 (36.9%)
Moderate (4)	159 (32.6%)
Poor (<4)	149 (30.5%)
Attitudes	
Mean (SD)	41.1 (4.4)
Good (>44)	124 (25.4%)
Moderate (39 – 44)	228 (46.7%)
Poor (<39)	136 (27.9%)
Practice	
Mean (SD)	0.3 (0.6)
Good (>1)	23 (4.7%)
Moderate (1)	74 (15.2%)
Poor (0)	391 (80.1%)

Table 7: Knowledge, attitudes, perceived barriers toward research among medical students

Variables	**Sub-Category**	**Academic Year**				**Result**
		First Year	Second Year	Third Year	Fourth Year	
Knowledge	Poor (<4)	32 (34.8%)	100 (35.2%)	14 (27.5%)	3 (4.9%)	Chi – square value = 29.1, DF = 6, P-value = 0.001*#
	Moderate (4)	31 (33.7%)	92 (32.4%)	16 (31.4%)	20 (32.8%)	
	Good (5)	29 (31.5%)	92 (32.4%)	21 (41.2%)	38 (62.3%)	
Attitudes	Poor (<39)	19 (20.7%)	83 (29.2%)	19 (37.3%)	15 (24.6%)	Chi – square value = 16.41, DF = 6, P-value = 0.011*#
	Moderate (39 – 44)	36 (39.1%)	135 (47.5%)	24 (47.1%)	33 (54.1%)	
	Good (>44)	37 (40.2%)	66 (23.2%)	8 (15.7%)	13 (21.3%)	
Practice	Poor (0)	86 (93.5%)	223 (78.5%)	33 (64.7%)	49 (80.3%)	P-value = 0.001**#
	Moderate (1)	4 (4.3%)	48 (16.9%)	15 (29.4%)	7 (11.5%)	
	Good (>1)	2 (2.2%)	13 (4.6%)	3 (5.9%)	5 (8.2%)	

Abbreviations: * Pearson's chi-square test, ** Fisher's exact test; # indicates statistical significance.

FIGURES

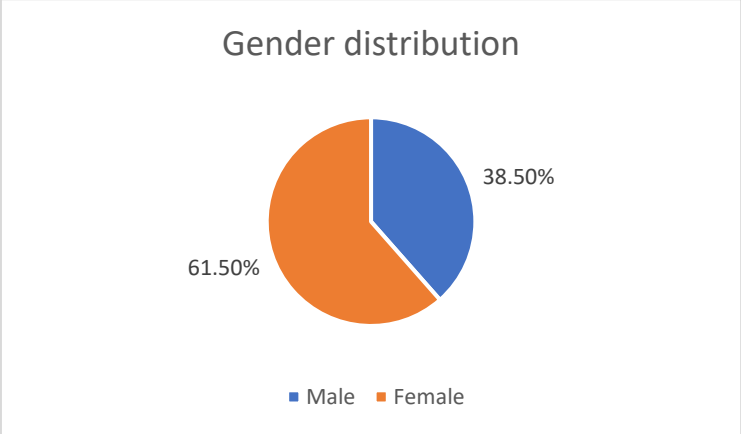

Figure 1: Distribution of participants based on gender

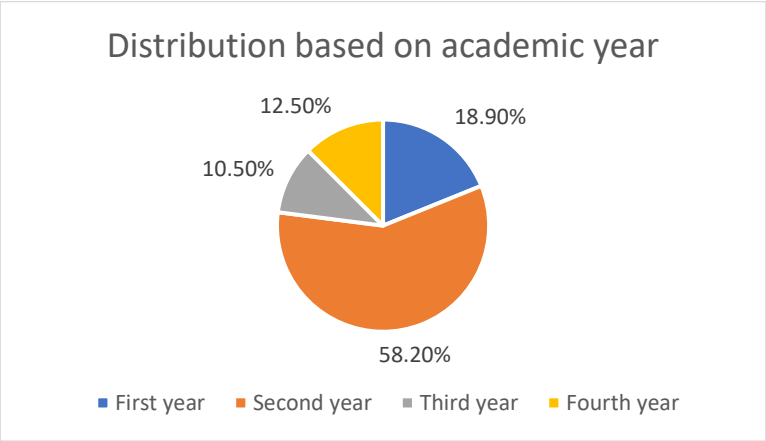

Figure 2: Distribution of participants based on academic year

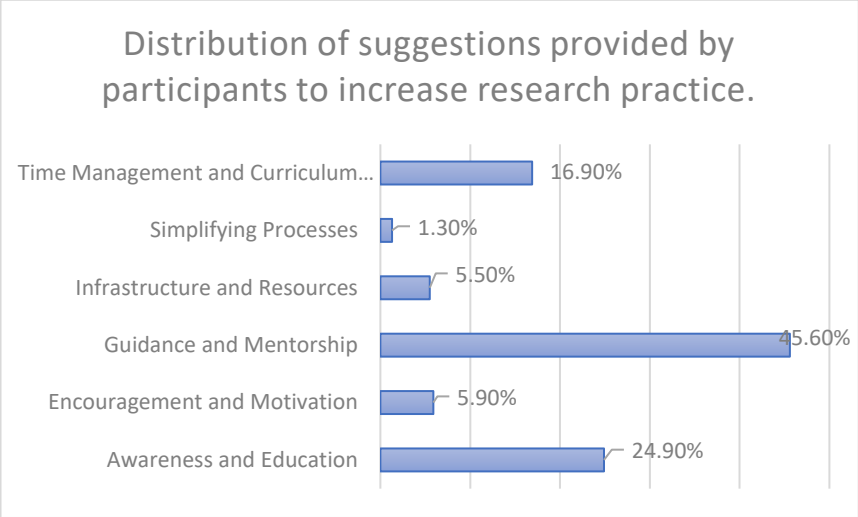

Figure 3: Distribution of various suggestions given by participants to increase research practice amongst medical students.

DISCUSSION

Over the past 25 years, there has been a serious decrease in the number of medical graduates choosing clinician scientist careers. Encouraging research to integrate analytical skills among medical students needs to be addressed.[12, 13] The present study was conducted to provide insights into the reasons for this decrease among undergraduate MBBS students. The results suggested that the majority of the participants were female, and most of the responders belonged to the second year. Recent figures indicate a notable gender discrepancy in the medical profession, accompanied by an increase in the number of female medical students. A study from Maharashtra indicated an increase in female enrollment in MBBS programs, although issues remain concerning their representation in advanced specialties. This trend is reflected nationwide, with female students now comprising a significant proportion of medical school enrollments, frequently surpassing their male counterparts in numerous schools.[14] The majority of female participants in this study indicates a broader trend and suggests a movement toward enhanced gender equity in medical education.

A large majority correctly identified a research hypothesis as a specific, testable prediction verifiable through statistical and analytical means, and acknowledged the importance of clearly stating a hypothesis in a research protocol, demonstrating strong research methodology knowledge. Many participants understood ethical approval, whereas others were misinformed. Although there is a knowledge vacuum, research ethics are generally well-understood. 69.1% knew the ICMR-STS program is a government-sponsored medical student fellowship. The fact that 30.1% were ignorant of this programme suggests that research opportunities should be promoted. Among the online research tools, 61.1% named a database searching for research publications. These results showed that the level of knowledge among the participants was good. A previously conducted study by Rani VV reported that the knowledge level of second year MBBS students was moderate and this is in conflict with the results obtained in the present study.[15] A study conducted among medical students from six Arab countries reported that the knowledge levels related to research were poor, the contrasting results can be credited to the different populations involved along with the large difference in sample size.[16] A South Indian study conducted by Pallamparthy S et al showed that the medical students had a good level of knowledge related to research and expected it to be included in the learning curriculum which is similar to the results obtained in the present study.[17] However, a study conducted by Giri PA et al among postgraduate students showed low level of knowledge

related to research, this can be explained by changes in importance shown toward research at undergraduate level as well as improved awareness toward research.[18] Another study by Sharma SK et al reported good level of knowledge among medical students related to research which help in implying that the knowledge levels could be college specific.[19] Previously conducted studies by Deodurg PM et al and Goli S et al showed that educational handouts and lectures on the topic of research as an intervention can help in drastically increasing the knowledge level among medical students ($p<0.05$).[12,20]

Most students strongly agreed that research strengthens medical education, and 47.7% highly favored integrating research into the MBBS curriculum. Most of them firmly agreed that research helps clinical practice and understanding of their subjects, demonstrating its academic and professional significance. Although 45.1% were neutral on whether the research was an extra load, 4.3% strongly agreed and 23.8% disagreed, demonstrating that most students did not find it burdensome. Further, 39.8% and 17.2% strongly agreed that research is not a waste of time or a distraction from studies, confirming its positive reception. Most agreed that research advances medical science and improves the CVs. Only 38.1% firmly considered research as a career possibility, while 34.4% agreed, indicating tempered interest in full-time research. Financial prospects for research were moderate, with 45.7% neutral, 25.6% agreeing, and 17.6% strongly agreeing. The results of the present study show a favorable attitude toward research, which is in contrast with the results of a previously conducted study that reported that most second-year MBBS students had a good attitude toward medical research but showed reservations on the overall benefit of research toward patients.[15] Studies have reported participants wherein the knowledge levels of the participants were low showed a very positive attitude toward research; this gap in knowledge can be bridged with the help of classes and interventions directed at increasing knowledge.[16,21] A study conducted by Sharma et al. also reported that medical students from Nagpur, India showed a positive attitude toward research, which was similar to the results obtained in the present study.[19]

The responses to practice-related questions revealed limited involvement of undergraduates in medical research activities, with only 18.6% reporting being involved in a research project, highlighting a significant gap. Similarly, only 4.5% of students presented a scientific paper at a conference, and an even smaller proportion (4.1%) published their research in a journal, leaving a large proportion without any experience in these critical aspects of research practice. A previous study also reported a good level of practice among undergraduate students at all research levels.[17] The low research practice scores among MBBS undergraduates can be attributed to several factors, including time constraints due to heavy academic workloads, inadequate training in research methodologies, and lack of mentorship. Financial limitations and difficulties in selecting research topics further hinder participation. Addressing these barriers through curriculum integration, workshops, and mentorship programs is essential for enhancing student engagement in medical research.

A participant said that time was the biggest barrier to research, followed by lack of advice and difficulties in choosing a topic. Approximately half of the respondents reported difficulties with proposal drafting, data analysis, and review board approval, and funding. Fewer pupils had trouble producing papers or finding literature. Most respondents were willing to participate in the study, with only 29.7% citing lack of interest. Additional findings identified critical areas for improving students' medical research. The majority stressed mentorship, followed by awareness, and education through workshops and seminars. The students also wanted research time and curriculum integration. Encouragement and Motivation (5.9%), and Infrastructure and Resources (5.5%) noted the need for money, incentives, and better facilities. Finally, procedural hurdles were lowered by simplifying the process (1.3%). This was also observed in a previously conducted study wherein the common hurdles were reported to be insufficient training in medical research, lack of sufficient research opportunities, and lack of stimulation and support from faculty.[22] Lack of access to lab equipment for research, priority of education over research, and lack of time because of educational tasks were the most commonly perceived barriers in another study.[17] Similar to other studies as well.[18-21]

The study also indicated that knowledge scores increased with academic progression, from 3.9±1.0 in first-year students to 4.6±0.6 in fourth-year students with them being positively correlated ($r=0.18$, $p=0.001$), showing that medical students learn research over time. This result was further strengthened by a study conducted in Jordan by Abusamak et al., wherein the knowledge level of medical students was found to increase with advanced academic years ($p<0.001$.[22]

The decrease in attitude scores from first-year (42.5±4.4) to third-year (39.9±4.4), followed by a modest recovery in fourth-year (41.4±3.9), suggests a complex link between academic advancement and research interest. This pattern may signify the increasing academic constraints and clinical obligations faced by students as they advance their studies, thereby eroding their enthusiasm for research. A similar tendency was noted in a study by Alshahrani et al., which revealed that medical students often experience a decline in research interest as they progress through their training, due to the demands of clinical rotations and examinations.[23] The low practice scores, reflecting a slight improvement from first-year (0.1±0.4) to third-year (0.5±0.8), underscoring a significant discrepancy in research participation across students, despite some favorable connections with academic advancement ($r=0.15$, $p=0.001$).

A mean knowledge score of 4.0±1.1, with 36.9% of students attaining a "Good" rating, indicates a necessity for improvement in research education for MBBS undergraduates. The rise in "Good" knowledge from 31.5% in the first

year to 62.3% by the fourth year signifies improved educational outcomes; yet, almost one-third of students still classified their knowledge as "Poor," indicating that foundational knowledge is not universally attained. A chi-square analysis (χ^2=29.1, p=0.001) revealed a substantial link between academic year and knowledge level, indicating that familiarity with research themes escalates over time. This highlights the importance of early intervention techniques in improving the understanding of medical education. Students demonstrated a mean attitude score of 41.1±4.4 toward research, reflecting moderate attitudes, with opportunities for enhancement in cultivating favorable beliefs. The reduction in "Good" attitudes from the first year (40.2%) to the third year (15.7%) indicates that students may experience disillusionment or view research as less relevant to clinical training. The figure reveals that 80.1% of students demonstrated "Poor" research habits, highlighting the imperative for institutional improvements to enhance research involvement. The minimal percentage of students reporting "Good" behaviors (4.7%) signifies a problem with research engagement among medical education students. The notable association across academic years (p=0.001) indicates that, while knowledge may be enhanced, practical application remains insufficient without structured programs and coaching.

A needs assessment conducted across 26 countries indicated that 87.1% of medical students showed interest in research; nevertheless, many cited insufficient formal training and considerable obstacles to involvement, reflecting the results of the current study.[24] Moreover, studies indicate that medical students' enthusiasm for research diminishes as they advance in their education, a pattern observed in other nations.[25] This loss underscores the necessity for systematic initiatives, including curricular modifications and workshops, to maintain student engagement in research activities worldwide.[26] Moreover, global research underscores prevalent obstacles encountered by medical students, such as time limitations, lack of mentorship, and inadequate institutional assistance.[25] Implementing focused solutions to address these difficulties can cultivate a more resilient research culture in global medical education. This single-center study may have restricted the external validity, thereby limiting the generalizability of its findings to other institutions. A homogeneous student body may yield biased results that do not accurately reflect broader trends in medical education. Moreover, reliance on self-reported data may result in a response bias, as students may exaggerate their knowledge and participation in research activities. Despite these constraints, this study systematically assessed various aspects of medical research involvement via a structured questionnaire, providing substantial insights into students' viewpoints and challenges. The results may inform curriculum development and targeted activities to boost research engagement, ultimately raising capabilities among future healthcare providers and improving patient outcomes through evidence-based practice.[27] To augment research involvement among MBBS undergraduates, targeted interventions should be instituted, such as mentorship programs linking students with seasoned researchers, structured research electives incorporated into the curriculum, and financial incentives to facilitate student-led initiatives. Moreover, offering workshops on research methodology might furnish students with vital skills, cultivating a more vigorous research culture inside medical school.

CONCLUSION

In conclusion, this study indicated that while MBBS undergraduates exhibited substantial knowledge and favorable attitudes toward medical research, their levels of practice were moderate. To foster a stronger research culture, actionable strategies are essential. Institutions should consider integrating research components into the curriculum, offering workshops to enhance research skills, and establishing mentorship programs to provide guidance and support. Additionally, creating dedicated time for research activities within the academic schedule can alleviate time constraints. Future research should explore longitudinal studies to assess the impact of these interventions on students' engagement in research. By implementing these strategies, we can significantly enhance research practices among medical students and ultimately improve healthcare outcomes.

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