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Challenges and Barriers Towards Medical Research Among Medicaland Dental Students of Public Sector Medical College

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ABSTRACT

Objectives: This study aims to identify challenges and attitudes of undergraduate medical students during research engagement and propose strategies to overcome them.
Study Design: The study is a cross-sectional study.
Place and Duration of Study: The study was conducted in the Medical and Dental departments of Army Medical College Rawalpindi. Duration of the research spanned from March 2023 to May 2023, following approval from the Ethical Review Committee of Army Medical College (ERC/ID/264 Dated: 03 March 2023).
Patients and Methods: A 29-item questionnaire for the quantitative cross-sectional study was adopted from another study and was further validated by a panel of 06 experts in the field of medical education and research. A pilot test was conducted to verify the construct of the adopted tool. A random sampling technique was employed to select the participants. The inclusion criteria were undergraduate medical students who have studied medical research modules. Non-respondents and unwilling participants fall under the exclusion criteria of the study. Analysis was conducted using the Statistical Package for Social Sciences (SPSS) program, Version 26.
Results: Out of a total of 135 participants, 94.1% belonged to MBBS and 5.9% were in the BDS training program. Female turnover was 59.3% and male participants were 40.7%. Common barriers reported by the participants were "lack of information" (28.1% strongly agree, 38.1% agree), "limited time" (24.4% strongly agree, 28.9% agree), "inadequate research skills" (23% strongly agree, 28.9% agree), "difficulty in data analysis" (9.6% strongly agree, 31.1% agree), "lack of interest" (11.9% strongly agree, 27.4% agree), and "challenges in writing research reports" (9.6% strongly agree, 34.1% agree).
Conclusion: Despite barriers, a significant proportion of participants actively engaged in research, with high publication rates (81.5%) and recognition (76.3%). While the majority recognized the importance of medical research (88.1%), but a significant proportion of students lacked a positive attitude (63%). It is recommended to incorporate strategies to identify barriers, promote research-oriented mindsets, and foster a supportive environment for medical research.

Keywords: Barriers, Challenges, Engagement, Medical, Research, Students, Undergraduate

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INTRODUCTION

In the current revolutionary era of medical education, research skill enhancement is essential for upgrading foundational knowledge and cultivating critical thinking, evidence-based practice, and innovations in transformative and collaborative learning around the globe.[1] Medical research is a methodological approach for constructing foundational to advanced knowledge based on foundational concepts to address challenges in diagnosing, discovering the latest and most effective treatments for diseases, and preventing illnesses.[2,3] Research methodologies have been integrated into spiral medical curricula at various levels to develop inquiry-based competency in undergraduate medical students.[4] Despite this significance, medical students face challenges while learning research skills that result in demotivation. Literature has reported limited evidence on reasons for the demotivation of undergraduate students to engage themselves in research.[5]

Research is a skill that a medical student should acquire as it plays a pivotal role in shaping their careers as competent future researchers.[6] Literature has proven that early participation of undergraduate medical students in the research will develop an inquiry-based approach in students and will also empower them to develop lifelong research aptitude. Research knowledge increases the ability to make real-time evidence-based decisions during clinical practices.[6] Most undergraduate medical students

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should invest their time and effort in conducting meaningful research in their relevant field of interest to investigate the weaknesses and strengths of the workplace and academia. In doing so, students encounter some barriers and challenges that affect their motivation to take the initiative in acquiring foundational knowledge to conduct impactful research.[7] Literature has shown that an overwhelming number of students believe that organizing research is both a strenuous and tedious task with restricted access to authentic sources and an absence of skill in scientific writing.[5] Mostly these obstacles are reported in progressing countries where grasping research as a competency is still subpar.[8]

It was crucial to identify these hindrances faced by students conducting research and to recommend probable solutions. Limited skills in research methodologies, restricted access to relevant information sources, and inadequate facilities are prime obstacles to effective research for medical undergraduates.[8,9] In the proposed strategies to overcome these obstacles and reduce the complexity of medical research, institutions are required to take a proactive approach at various levels. It is ideal to integrate research as a distinctive course in the undergraduate medical curriculum.[10] The aim of the study is to identify the barriers and challenges faced by undergraduate medical and dental students while conducting medical research. The study also assesses how frequently these obstacles occur and are faced by the students while carrying out research and highlights the potential reasons that obstruct the process of executing research.

METHODOLOGY

This cross-sectional study was conducted from March 2023 to May 2023. The target population comprised medical students associated with undergraduate medical and dental programs of Army Medical College, NUMS. The equation used to estimate the sample size was n = (Za/2)2 s2/d2, where s is the standard deviation obtained from a previous study, and d is the accuracy of the estimated score displaying how close the inferred values are to the true mean. A normal deviation for the two-tailed alternative hypothesis at a level of significance was represented by Za/2. The maximum p-value was set at 0.5, the confidence level was at 95%, and 5.37% was the estimated error.

The final sample size was determined to be 135 and the subjects were selected by simple random sampling technique and randomization was done through a random number generator. The participants were chosen from the years in which the medical research course is being instructed and assessed. Additionally, an experienced student participating in diverse research activities such as presenting papers at national and international conferences, and publishing articles in relevant journals were also included in the study's inclusion criteria.

Students were approached for data collection during their academic activities with prior permission from the course coordinators and the head of the Research Department. Preference was given to the voluntary participation of respondents with an assurance of confidentiality and anonymity. Consent forms were signed by the volunteer participants with an assurance that their identities will remain confidential. The inclusion criteria were undergraduate medical students who have studied medical research modules. Non-respondents, unwilling participants, postgraduate students, and undergraduate medical students who had no prior experience in research fall under the exclusion criteria of the study.

The data was collected using a triple-section questionnaire as the instrument of the study which was adopted from another study after obtaining the author's permission. An extensive literature search aided in the development of the questionnaire. The study design with the use of this self-administered questionnaire of another study with permission taken from the author adheres to the external validity of the tool.[11] The first part of the 29-item questionnaire has the socioeconomic data of the respondents, the 15-item second part concerns barriers faced by medical students in conducting research, and the 14-item last part concerns the attitudes of the students toward research. Besides demographic data, the scores of the section exploring "barriers" are marked using a 4-point Likert scale ranging from "completely agree" to "completely disagree" and the items under the construct of "attitude" were dichotomous.

The level of difficulty represented difficulty in understanding statements, the degree of relevance of data, and potential misinterpretation of the data received in the pilot study. A panel of experts comprising 05 members discussed the statements and removed the statements exhibiting repetition of the construct.

The positive items of attitudes were marked as five for strongly agree and one for strongly disagree. Meaning thereby, the higher the score the better the attitude. In contrast, the negative items of perceived barriers were scored in reverse order: strongly agree was scored one, and strongly disagree was scored five. This means that the higher the score less the barrier perceived by the students. The attitude was categorized into three levels such as strong (>80% of the maximum possible total score), moderate (60–80%), and poor (<60%).

To validate the content: the items of the questionnaire were analyzed by five faculties to verify the level of difficulty of the content expressed in statements and to assess the clarity and relevance of the content that is being studied.

To determine reliability: A reliability method used for this study was the test-retest method. For this purpose, the initial administration of the questionnaire was done with a group of seventeen. Then with an interval of 10 days, the same group of participants took the questionnaire again. The responses from both administrations were compared to verify the consistency of the items. The comparison of the scores of the 2 responses produced a correlational coefficient of 0.76 thus ensuring that the questionnaire accurately measured the intended construct of the items.

In addition to this, pilot testing was conducted on 22 participants to verify the construct of the items was aligned with the content of the research study.

The Statistical Package for Social Sciences (SPSS) program (V. 16.0, SPSS Inc., Chicago, IL, USA). was used to analyze the findings. The analysis was descriptive statistics in which mean, standard deviation, frequency, and percentages were calculated. The level of significance was set at $p<0.05$.

The scoring was calculated as the total for each item to evaluate the relationship between barriers in conducting research. The higher numerical value signified an agreement between barriers faced by students and the research they conduct. A high numerical value represents greater agreement of barriers to research work.

The sum of the scores of all items was computed for descriptive analysis.

RESULTS

A total of 135 students participated in this study, and the response rate was 100%. Among them, 59.3% are females, 40.7% are males, and the average age of the respondents was 20.92%. 94.1% of respondents were in the undergraduate MBBS program and 5.9% were from the BDS undergraduate degree program. (Table I)

In this study, only 34.8% of the students had few handicaps, so they faced minor limitations while conducting and learning research. On the contrary, 10.4% reported major handicaps. Nevertheless, the majority (54.8%) percentage of the sample population presented with moderate levels of difficulties while developing skills for conducting medical research. The data received concerning the attitudes of the subject population toward research is that 16.29% of the students displayed poor behavior. In comparison, 22.22% of the sample population exhibited good behavior, but the majority (61.48%) exhibited a moderate level of inclination toward learning research. (Table II)

The percentage of statements reflecting the barriers perceived by undergraduates is shown in Figure 1, where all items are assessed between Strongly disagree and strongly agree. The data was analyzed by summing the agree and strongly agree columns, showing that statements of perceived barriers ranged between 38% - 52%, thus highlighting the need to focus on workable solutions. The statement "inadequate skills for doing research" was the most frequently perceived barrier (51.9%) and finding a supervisor for the project was the least frequent barrier (38.5%)

Table I: Demographic Data of Undergraduate Medical and Dental Students (n=135)

Variables		Frequency (%)
Gender	Male	55(40.7%)
	Female	80(59.3%)
Mean Age (Years)		20.92±1.03
Degree	MBBS	127(94.1%)
	BDS	8(5.9%)

Table II: Scoring In Perceived Barriers And Attitudes Faced By Students Toward Research

Variables in frequency (n=135)			
Perceived Barriers of medical students towards research		Attitudes of the students toward research	
Poor	47(34.8%)	Poor	22(16.29%)
Moderate	74(54.8%)	Moderate	83(61.48%)
Good	14(10.4%)	Good	30(22.22%)

Figure 2 indicates scores received in the students' attitudes and all items appeared as dichotomous scale. The scores exhibited a positive attitude in

acknowledging the importance of medical research in most of the students (88.1%). Additionally, 63% of respondents have shown a pragmatistic approach in their peers towards learning and conducting research. On the contrary, 89.6% of respondents reported not being rewarded for their efforts. Total of 62.3% of respondents have never attended a research workshop. These results can significantly affect the motivation of students who have a positive attitude to learn and conduct medical research at the undergraduate level.

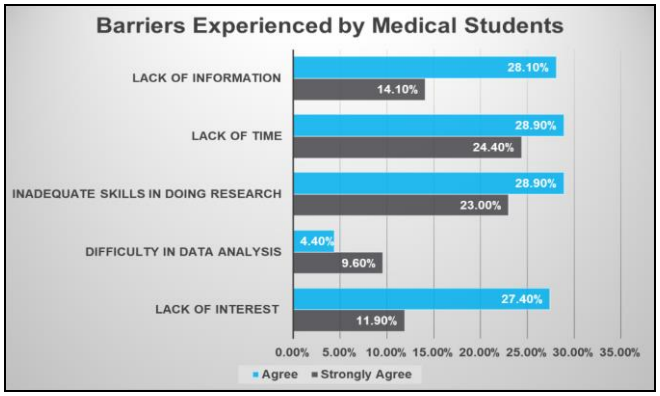

Figure 1: Barriers Experienced by Medical Students In Conducting Research (N=135)

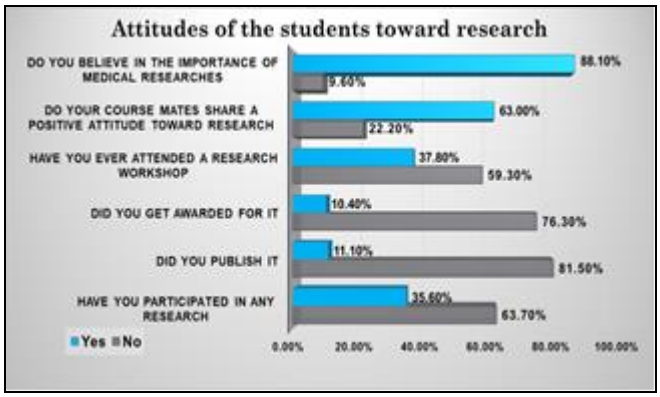

Figure 2: Attitudes of Students Toward Research

DISCUSSION

The study aimed to explore the attitudes of students and hindrances faced by undergraduate medical and dental students while learning and conducting scientific research at a public medical & dental college. An understanding of scientific methods in various paradigms of research has now become a critical component of the medical profession. To understand the nature of barriers that would eventually help in devising potential strategies to overcome the obstacles. Institutions can upskill their fresh graduates and junior faculty members by creating opportunities for them to enroll as research team assistants in methodology courses. They should be approachable and responsive to providing them with the required facilities/equipment as proactive student-supportive team members.[12]

Students face prominent challenges while conducting medical research, including a lack of time and financial resources, an absence of inter-departmental coordination, and inadequate documentation of patient records.[13] Recognizing these obstacles will favor institutional authorities in devising a structured framework conducive to learning research. Lack of knowledge, time, guidance, and funding have been the most frequently perceived hurdles that have impeded a positive attitude towards learning research as a competency but learners having prior exposure to research have shown confidence and motivation to upgrade their knowledge about medical research.[14]

Despite the significance of medical research exclusively in the transformative era of medical education, institutions have been unable to effectively engage undergraduates to actively participate in research training courses[15] Notably, no previous research has been conducted in medical institutions highlighting the obstacles faced by undergraduate medical students. Thus, this research addresses the literature gaps and provides rational causes that impede the conduct of the research. The identified barriers strongly advocate for a robust change required in devising research strategies to effectively engage and motivate students to conduct research aligned with national and international standards.[7,16]

Like previous studies, high confidence and positive attitudes were received toward conducting research activities such as literature review aligned with international standards, framing research questions aligned with research objectives, understanding the methodology of various research designs, and mastering the technique of analyzing the data under the scope of stated learning objectives.[9-17] On the contrary, little or no interest in learning research as a part of the curriculum was also perceived. The study aimed to recommend strategies to identify the best practices for overcoming hurdles and enhancing motivation among willing researchers. Undergraduate healthcare professionals are eager to be involved in medical research and they have acknowledged their capacity to engage in research activities either individually or as a team of authors.[18]

Literature has proven various workable strategies to overcome the difficulty score in research as it has decreased significantly with an increase in the number of research workshops provided by the institutions.[10,12] Lack of information had been exposed with the highest percentage and is most likely to be the fundamental cause of demotivation among many undergraduates. This needs to be addressed at the institutional level either by providing opportunities within the institution or by communicating the platforms for research skill development.[19]

The third most intriguing barrier is the lack of reward or acknowledgment for conducting research. This obstacle can have a negative impact far beyond research skills, as undergraduates are in a phase of learning and developing as professionals. Lack of appreciation has a compound effect on motivation which will eventually result in poor academic performance.[14] Empowering our stakeholders through reward and appreciation is a major factor in personal and professional development. Institutions have to devise strategies to incentivize their students, and junior doctors, as a motivating factor to enhance a proactive approach to conducting meaningful research.

A medical doctor is always directly or indirectly engaged with research, and one should have sound foundational research knowledge to either conduct research or be well-prepared to review articles critically in scientific journals.[17] Research funding should be augmented through a multiple reward system for all stakeholders exclusively undergraduate medical students and clinicians enrolled in post-graduation training programs is imperative to evidence-based practices.[11] Investigation of factors or aspects hampering the potential of learners to conduct meaningful research requires further in-depth analysis through various research designs.[1] This survey data with a small sample size was used in this cross-sectional study; therefore, limiting the generalizability of the findings. A single study setting also allows future research to be conducted in a multi-setting design to measure the scope of influencing obstacles as demotivating factors, and hence, more generalizable results will be possible. Devising new frameworks as potential solutions to the highlighted problems can be further investigated as true interventional studies.[8]

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the National University of Medical Sciences. The patients/participants provided their written informed consent to participate in this study.

CONCLUSION

The attitudes and perceptions of undergraduate medical and dental students toward research revealed a moderate level of positive sentiment despite the barriers they've encountered. To cultivate more research-oriented medical students, the implementation of targeted interventions is recommended. These include workshops, skill development programs, seminars, conferences, and journal clubs designed to equip students with research knowledge and skills. Addressing these challenges and providing robust support can foster a more critically thinking research-active student population capable of contributing meaningful advancement to medical science.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

UMO & MAA: Data acquisition, data analysis, critical review, approval of the final version to be published.

AUR & SNQ: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MT & KZ: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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