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EXPLORING RESEARCH-RELATED CHALLENGES: A COMPARATIVE ANALYSIS OF UNDERGRADUATE MEDICAL STUDENTS AND POST GRADUATE TRAINEES IN PESHAWAR, PAKISTAN

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ABSTRACT

Background: Medical research and its role in healthcare and medical education are of paramount importance. Early exposure to research during undergraduate and postgraduate medical programs can significantly enhance students' scientific skills and knowledge.

Objectives: The objective of this study was to assess the barriers encountered in pursuing research activities by undergraduate medical students and postgraduate trainees in Peshawar, Pakistan.

Methodology: This observational, cross-sectional study was conducted from March to August 2023, involving a total of 1000 participants, comprising 650 undergraduate medical students and 350 postgraduate trainees. Data was collected through questionnaires and Google forms, and the analysis was performed using SPSS version 26. The study focused on demographic information, research experience, and various barriers to research.

Results: A total of 1000 (100%) participants including 650 (65%) undergraduate medical students and 350 (35%) postgraduate trainees were involved in the study. The study found that 46.3% of undergraduate medical students and 68% of postgraduate trainees had prior research experience, with 27.2% of undergraduate medical students and 55.1% of postgraduate trainees having attended a medical research conference. Lack of time was a common barrier cited by both groups (P-Value=0.034), and there were significant differences in perceived barriers related to insufficient research knowledge (P-Value=0.025), scientific complexity(P-Value=0.032), lack of motivation (P-Value=0.031), topic selection (P-Value=0.024), proposal development (P-Value=0.003), statistical analysis(P-Value=0.011), and concerns about sexual harassment in research settings (P-Value=0.000). However, no significant differences were observed in difficulties related to data

collection, report drafting, and database restrictions. Institutional and mentor-related barriers were also identified. Additionally, research publications and presentations barriers were also significant.
Conclusion: This study highlights the significant challenges faced by undergraduate medical students and postgraduate trainees in Peshawar, Pakistan when it comes to engaging in research activities. Differences in barriers exist, with negative mentor encounters and curriculum gaps being prominent issues. Institutional barriers such as funding and ethical approval also hinder research efforts.

Keywords: Medical Research, Research Challenges, Post Graduate Trainees, Undergraduate Medical Students, Peshawar, Pakistan.

INTRODUCTION:

Medical research and technological advancements are presently guiding patient care and have grown into a vital element of medical education. (1) Research is defined as structured creative endeavors carried out with the goal of expanding knowledge and setting up new applications. It happens to be one of the most reliable indicators of a country's scientific progress. (2) Health research can be grouped as basic, applied, or translational research, with the goal of advancing understanding within all areas of medical care. (3) Early exposure to healthcare research is advisable for present-day undergraduate programs, (4) because it has been seen that students participating in research during their education acquire expertise along with developing habits of scientific and analytical reasoning, boosting their research efficiency later in their medical career. (5) For this reason, studies around the globe have been conducted, showing positive attitude of health students towards medical research. (6–11) A number of currently faced barriers and challenges have been highlighted in the literature, like lack of data sources, deficiency in English proficiency, lack of proper guidance and mentoring, lack of time, inadequate research budgets, and the inability to draught formal research proposals. (1-3, 12, 13) Undergraduate medical research is an emerging need in the medical profession; however, despite its importance, it has received little attention. The purpose of this study was to determine the barriers encountered in pursuing research activities by undergraduate medical students and postgraduate trainees in Peshawar, Pakistan.

METHODOLOGY:

This observational, cross-sectional study was conducted from March 2023 to August 2023. Unless otherwise specified, the sample size was calculated using the OpenEpi formula for a population size of 1 million, a confidence level of 99.9%, and an anticipated response frequency of 50%. The calculated sample size was 1082. However, the final dataset consisted of 1000 participants due to the non-compliance of 82 individuals, who either did not return the questionnaire or submitted incomplete responses. Among the total 1000 responses 350 were collected from postgraduate trainees and 650 from undergraduate medical students. Data were collected using a non-probability convenient sampling technique. Before signing up for the study, each participant was informed of the study's aims and objectives and provided verbal informed consent. The study design received ethical approval from the Medical Research Board and Ethical Committee of the Northwest School of Medicine, Peshawar, KPK, Pakistan. A self-designed questionnaire, meticulously crafted subsequent to an exhaustive literature exploration in prominent databases including Google Scholar, PubMed, Web of Science, and Scopus, was employed as the data collection instrument. The questionnaire included basic demographic questions about gender, age, education, previous experiences, and the challenges that undergraduate medical students and postgraduate trainees face in developing a research culture. The study included undergraduate medical students currently enrolled in medical programs and postgraduate trainees receiving training in healthcare facilities in Peshawar who expressed interest in participating in the research. Exclusion criteria included residence outside of Peshawar, lack of active enrollment in medical education or training, and refusal to participate. Data analysis was performed using SPSS version 26. Descriptive statistics

(means, standard deviations, frequencies, and percentages) were used to analyze the variables. Pearson's Chi-square test, with a preset significance of 0.05, was used to identify the common barriers to research.

RESULTS:

The study involved a total of a thousand participants including 350 (35%) postgraduate trainees and 650 (65%) undergraduate medical students. (Table No.1) The mean age of the participants was 22.96 ± 3.052 (18 – 50 years). With majority belonging to the age group 21-25 years. (Table No.2) Among the postgraduate trainees, 185/350 were males and 165/350 were female. And 268/650 of the undergraduate students were male, with the remaining 382 being female undergraduate students. (Table No.1)

Table No. 1: Gender-based distribution of the participants

Group	Males (%)	Females (%)	Total (%)
Post Graduate Trainees	185 (52.9)	165 (47.1)	350 (100)
Undergraduate Medical Students	268 (41.2)	382 (58.8)	650 (100)

Table No 2: Age of the Participants

Age Categories	Frequency (%)
15 – 20 Years	206 (20.6)
21 – 25 Years	636 (63.6)
26 – 30 Years	143 (14.3)
31 – 35 Years	12 (1.2)
38 Years	1 (0.1)
40 Years	1 (0.1)
50 Years	1 (0.1)
Total	1000 (100)

After being inquired about prior research experience, 238 (68%) and 301 (46.3%) of the Postgraduate trainees and undergraduate medical participants had previous research experience respectively. (P-Value=0.000) Also, 193/350 postgraduates and 177/650 undergraduates have been to a research conference. (P-Value=0.000) (Table No.3)

Table No. 3: Participants' prior experience in the field of research

Variable	Yes (%)	No (%)	Total (%)	P – Value	X^2 Value
Do you have any prior research experience?					
Post Graduate Trainees	238 (68)	112 (32)	350 (100)	0.000	43.083
Undergraduate Medical students	301 (46.3)	349 (53.7)	650 (100)		
Have you ever been to a medical research conference?					
Post Graduate Trainees	193 (55.1)	147 (44.9)	350 (100)	0.000	76.037
Undergraduate Medical students	177 (27.2)	473 (27.8)	650 (100)		

Lack of time was cited as a barrier to research activities by 76.3% of postgraduate trainees and 70% of undergraduate medical students (P-Value=0.034). When inquired about barriers, there was a significant statistical difference when it came to insufficient knowledge about research (P-Value=0.025), scientific intricacy (P-Value=0.032), lack of motivation (P-Value=0.031), difficulty in selecting topic (P-Value=0.024), developing proposal (P-Value=0.003), difficulty in statistical analysis (P-Value=0.011), and sexual harassment in research environments (P-Value=0.000). However, no statistical significance was discovered when asked about difficulty in data collection

(P-Value=0.910), report drafting (P-Value=0.137), and databases restriction (P-Value=0.243). (Table No.4)

Table No. 4: Barriers perceived at individual level towards research

Variable	Agree (%)	Disagree (%)	Total (%)	P – Value	X^2 Value
Inadequate time to engage in research activities.					
Post Graduate Trainees	267 (76.3)	83 (23.7)	350 (100)	0.034	4.478
Undergraduate Medical students	455 (70)	195 (30)	650 (100)		
Inadequate knowledge about research activities.					
Post Graduate Trainees	181 (51.7)	169 (48.3)	350 (100)	0.025	5.018
Undergraduate Medical students	384 (59.1)	266 (40.9)	650 (100)		
Due to the scientific intricacy of research, there is a lack of interest in research activities.					
Post Graduate Trainees	164 (46.9)	186 (53.1)	350 (100)	0.032	4.582
Undergraduate Medical students	259 (39.8)	391 (60.2)	650 (100)		
Lack of motivation to participate in research projects.					
Post Graduate Trainees	203 (58)	147 (42)	350 (100)	0.031	4.652
Undergraduate Medical students	422 (64.9)	228 (35.1)	650 (100)		
Difficulty in selecting a topic for a research project.					
Post Graduate Trainees	189 (54)	161 (46)	350 (100)	0.024	5.121
Undergraduate Medical students	399 (61.4)	251 (38.6)	650 (100)		
Difficulty in developing a proposal.					
Post Graduate Trainees	104 (29.7)	246 (70.3)	350 (100)	0.003	8.953
Undergraduate Medical students	255 (39.2)	395 (60.8)	650 (100)		
Data collection is difficult.					
Post Graduate Trainees	164 (46.9)	186 (53.1)	350 (100)	0.910	0.013
Undergraduate Medical students	307 (47.2)	343 (52.8)	650 (100)		
Samples (general population/patients) are difficult to find.					
Post Graduate Trainees	152 (43.4)	198 (56.6)	350 (100)	0.936	0.006
Undergraduate Medical students	284 (43.7)	366 (56.3)	650 (100)		
Statistical analysis is difficult.					
Post Graduate Trainees	180 (51.4)	170 (48.6)	350 (100)	0.011	6.388
Undergraduate Medical students	280 (43.1)	370 (56.9)	650 (100)		
Report Writing is difficult.					
Post Graduate Trainees	139 (39.4)	212 (60.6)	350 (100)	0.137	2.215
Undergraduate Medical students	288 (44.3)	362 (55.7)	650 (100)		
Concerned about sexual harassment in the research environment.					
Post Graduate Trainees	14 (4)	336 (96)	350 (100)	0.000	16.931
Undergraduate Medical students	77 (11.8)	573 (88.2)	650 (100)		
Database access is restricted.					
Post Graduate Trainees	181 (51.7)	169 (48.3)	350 (100)	0.243	1.362
Undergraduate Medical students	311 (47.8)	339 (52.2)	650 (100)		

Among the participants collectively 28.3% had negative previous encounters with mentors and co-authors (P-Value=0.045). With a P-value of 0.000, the participants identifies that the curriculum lacks formal research courses. According to 56.9% postgraduate trainees and 45.4% undergraduate medical students there is a scarcity of research mentors (P-Value=0.001) Participants also highlighted institutional barriers such as a lack of funding (P-Value=0.032) and difficulty in obtaining ethical approval (P-Value=0.003). (Table No. 5)

Table No. 5: Research Barriers: Institutional and Mentors

Variable	Agree (%)	Disagree (%)	Total (%)	P – Value	X^2 Value
Previous negative research encounters with project mentors/co-authors.					
Post Graduate Trainees	88 (25.1)	262 (74.9)	350 (100)	0.045	6.195
Undergraduate Medical students	195 (30)	455 (70)	650 (100)		
Inadequate research opportunities.					
Post Graduate Trainees	186 (53.1)	164 (46.9)	350 (100)	0.025	5.057
Undergraduate Medical students	297 (45.7)	353 (54.3)	650 (100)		
Curriculum lacks formal research courses.					
Post Graduate Trainees	217 (62)	133 (38)	350 (100)	0.000	14.567
Undergraduate Medical students	321 (49.4)	326 (50.6)	650 (100)		
A scarcity of research mentors.					
Post Graduate Trainees	199 (56.9)	151 (43.1)	350 (100)	0.001	11.979
Undergraduate Medical students	295 (45.4)	355 (54.6)	650 (100)		
A lack of an effective research committee.					
Post Graduate Trainees	195 (55.7)	155 (44.3)	350 (100)	0.001	10.910
Undergraduate Medical students	291 (44.8)	359 (55.2)	650 (100)		
Lack of funds to carry out a research study.					
Post Graduate Trainees	202 (57.7)	148 (42.3)	350 (100)	0.032	4.604
Undergraduate Medical students	329 (50.6)	321 (49.4)	650 (100)		
Lack of equipped fundamental scientific laboratories on campus.					
Post Graduate Trainees	213 (60.9)	137 (39.1)	350 (100)	0.288	1.131
Undergraduate Medical students	373 (57.4)	277 (42.6)	650 (100)		
Lack of support to participate in research activities.					
Post Graduate Trainees	183 (52.3)	167 (47.7)	350 (100)	0.027	4.883
Undergraduate Medical students	387 (59.5)	263 (40.5)	650 (100)		
Inability to find a research mentor of the same gender.					
Post Graduate Trainees	74 (21.1)	276 (78.9)	350 (100)	0.555	0.348
Undergraduate Medical students	148 (22.8)	502 (77.2)	650 (100)		
Ineffective collaboration with research supervisors and co-authors.					
Post Graduate Trainees	202 (57.7)	148 (42.3)	350 (100)	0.022	5.218
Undergraduate Medical students	326 (50.2)	324 (49.8)	650 (100)		
Mentors provide insufficient assistance.					
Post Graduate Trainees	147 (42)	203 (58)	350 (100)	0.008	7.028
Undergraduate Medical students	218 (33.5)	432 (66.5)	650 (100)		
Difficulty in obtaining approval from the review and ethical committees.					
Post Graduate Trainees	143 (40.9)	207 (59.1)	350 (100)	0.003	8.707
Undergraduate Medical students	205 (31.5)	445 (68.5)	650 (100)		

Apart from the above-mentioned barriers, other barriers such as lack of authorship in research project (P-Value=0.012), difficulty in research publications (P-Value= 0.049) and inability to participate in research conferences (P-Value=0.040) were identified as barriers by the postgraduate trainees and undergraduate medical students towards conducting research studies. (Table No. 6)

Table No. 6: Participants' perceptions of barriers in Research publications and presentations

Variable	Agree (%)	Disagree (%)	Total (%)	P – Value	X^2 Value
Lack of authorship when participating in research projects.					
Post Graduate Trainees	137 (39.1)	213 (60.9)	350 (100)	0.012	6.347
Undergraduate Medical students	203 (31.2)	447 (68.8)	650 (100)		
There is a scarcity of research publications.					
Post Graduate Trainees	149 (42.6)	201 (57.4)	350 (100)	0.049	3.867
Undergraduate Medical students	319 (49.1)	331 (50.9)	650 (100)		
Research presentation participation in research conferences is lacking.					
Post Graduate Trainees	118 (33.7)	232 (66.3)	350 (100)	0.040	4.198
Undergraduate Medical students	262 (40.3)	388 (59.7)	650 (100)		

DISCUSSION:

Research has been instrumental in driving medical research forward and improving patient care outcomes. This article delves into the research-related challenges faced by two distinct groups within the medical education spectrum: undergraduate medical students and postgraduates in training. By comparing these challenges and learning from past studies, we can identify strategies through which medical education programs can enhance their ability to assist these populations in carrying out research proficiently. In Pakistan, postgraduate trainees and undergraduate medical students face several difficulties while involved in research activities, according to past investigations. Some of the primary challenges include limited time, resources, guidance, and skill sets. Women healthcare professionals face additional challenges, such as childcare and cultural beliefs. Overcoming these hurdles is essential to encourage more healthcare professionals to participate in research projects. This will enhance healthcare quality in Pakistan and contribute to the broader understanding of health issues worldwide. In the current study, for undergraduate and postgraduate participants, respectively, the proportions of individuals with prior research experience were determined to be 68% and 46.3%. In three medical schools in Ontario, second and fourth-year students were given an anonymous, cross-sectional self-report questionnaire. Despite the fact that 87% of respondents said they had participated in research to some extent before attending medical school, 43% said they had not participated in research activity significantly while in medical school, and 24% said they had no interest in taking part. (14) Seventy-six percent of undergraduate medical students and seventy-six percent of postgraduate trainees mentioned lack of time as a hindrance to research activities in the current study. A study conducted on 679 graduates from Taiwan University Medical college included 29 (10.8%) females and 239 (89.2%) males were present. Of the respondents, 97 (54.9%) held a PhD degree, 98 (36.5%) had a Master's degree, and 23 (8.6%) had both. In response to inquiries about specific barriers to research, 74.3% of the participants mentioned a lack of time. (15) In this study undergraduate medical students and postgraduate trainees differed significantly in their research knowledge, scientific understanding, motivation, ability to choose a research topic and develop a proposal, statistical analysis skills, and experiences of sexual harassment in research settings. When questioned about the difficulties of data collection, report writing, and database restrictions, no statistical significance was found. A cross-sectional survey conducted among the dental postgraduate trainees of all specialties in Bengaluru city showed that the lack of institutional financing was the most often cited obstacle to performing research (15.7%), followed by workload and time constraints (15.0%). The most common obstacles to publication (23.3%) were a lack of training and effective mentoring, followed by a high publication price for indexed journals (17.9%). (16) The perceived obstacles that medical students at Alfaisal University—College of Medicine faced when trying to participate in undergraduate research projects were studied by Razzan Kharraz et al. "Lack of time" (77.4%), "lack of formal research courses in the curriculum" (76%), "lack of supervising mentors" (70.1%), and "lack of opportunities" (67.4%) were the top four obstacles. (17) Furthermore, the postgraduate trainees and undergraduate medical students identified additional barriers to conducting research studies, including lack of authorship in research projects, difficulties publishing research findings, and inability to attend research conferences in our study. Prior studies have demonstrated a correlation between faculty members who do not participate in research and uncooperative behavior, a lack of incentives and motivation, an overabundance of curricula, and ignorance as research barriers. (18-20)

Study Limitations: This study, while providing valuable insights into the challenges faced by undergraduate medical students and postgraduate trainees in Peshawar, Pakistan regarding research engagement, has certain limitations. The use of a non-probability convenient sampling method, self-reported data, and a regional focus on Peshawar may limit the generalizability of the findings. The gender imbalance and sample disproportion among participants, potential and the absence of qualitative data also need to be considered. Despite these limitations, the study highlights the need

for improvements in research support systems and curriculum enhancements to promote research involvement among undergraduate medical students and postgraduate trainees in Pakistan.

CONCLUSION:

In conclusion, the study revealed several significant findings about research experiences and barriers among postgraduate and undergraduate participants. A notable percentage had prior research experience, while many faced common barriers, including a lack of time and insufficient knowledge about research. Differences in barriers were statistically significant, with negative mentor encounters and curriculum gaps being prominent issues. Institutional barriers, such as funding and ethical approval, also hindered research efforts, highlighting the need for improvements in research support systems.

Recommendations: Recommendations to improve research experiences for postgraduate trainees and undergraduate medical students include enhancing the curriculum with research courses, establishing mentorship programs, offering research workshops, streamlining ethical approval processes, providing research funding, fostering a supportive research culture, addressing time constraints, and promoting inclusivity to create a more conducive research environment.

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