



## Assessing the Need of an Integrated Research Assistance Program towards Aiding Students in the Progress of Medical Research during Undergraduate Studies, Riyadh, Saudi Arabia

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### ABSTRACT

**Aim:** To assess the need of medical students for a research assistance program. **Design and methods:** This study was conducted at a medical college in Riyadh, Saudi Arabia. A cross-sectional study was conducted utilizing an online questionnaire consisting of three parts: student demographics, students' research proficiency, and problems faced when conducting research. **Analysis:** Data from the collected information was analyzed and all values of  $p < 0.05$ , 95% confidence intervals for odds ratio that did not cross 1.00 were considered to indicate statistical significance. **Results:** Students who participated in this study were 228 (response rate=57%). 60.5% ( $n=138$ ) were male, and 28% ( $n=64$ ) were in their first year of medicine. The majority were working on at least one to two researches, 81.1% ( $n=185$ ), with 5.3% ( $n=12$ ) having a study published. 83% of participants reported to be skillful at data collection and data entry. Devising a research idea was measures most difficult (49%). More female students were able to write a research proposal ( $n=57$ ; 63.3%.  $p=0.022$ ), and seniors were more capable in research than freshmen ( $p < 0.001$ ). **Conclusion:** Results demonstrated that students are active and well acquainted with research activities; 81.1% ( $n=185$ ). In order to enhance research performance, we recommend offering the opportunity to share efforts with senior students or professionals to be appraised, be provided with information regarding supervisors' research interests, and creating online platforms for improved knowledge transfer and communication between the parties involved.

**Keywords:** Medical Research, Research assistance program, Medical schools, Clinical skills

### INTRODUCTION

According to a study published in the journal, Medical Teacher [1], the generally accepted minimum for medical curriculum duration is four years with a maximum of eight years. Within this academic timeframe, a certain number of years are based on attaining knowledge in the basic sciences, after that comes a period of usually two years or more in clinical teaching, and finally a single year of an internship in a health institution. Throughout this period of time, students are commonly required to accumulate an increasing amount of requirements for graduation in addition to some supplements for acceptance into various specialties and residency programs across the globe [2]. A very common requirement to graduate many medical schools around the world is completing a medical research [1].

Medical Research is differentiated from scientific research in that the former concentrates more towards aiding the development of knowledge in the medical branches of science. Medical Research can be subdivided into many sub-categories (clinical, basic medical sciences, health education, translational research etc.) that chaperone medicine to the prolongation of human lives and the increase in quality of lives. Research is an integral and essential part of many medical students' academic pursuit.

In many medical schools around the world, conducting a medical research; be it based on clinical sciences, basic sciences, or laboratory work, is a requirement to graduating from said school [1]. However, with the constant race for academic achievement and excellence [3] in the general population of medical students, conducting any kind of

research is not something students are accustomed [2]. To elaborate, many students fear the thought of working on a research project as they assume it would not be such an easy and fluid task as is studying for an exam or practicing clinical skills perhaps [3].

The basic steps required to conduct and write-up an ideal medical research can be simplified into the following; choosing a topic, finding a mentor, reviewing the literature, writing a research proposal, assessing the objectives, collecting the data, thoroughly analyzing the data, and producing a viable proposal and a reproducible manuscript [4]. However, with the many different methods of carrying out the aforementioned steps, students often find themselves lost between a number of mistakes that can lead to negative overall performance in research. Some of these could include incorrectly reviewing literature and time that is on analyzing data that is not needed in their respective researches [3].

Measures are taken in medical schools to tackle any incompetence in conducting research with medical students through educational lectures on how the basic steps of conducting a research should be carried out. Specifically, most schools tend to give students lecture-courses on several important skills, including but not limited to, how to properly cite information on their research, how to access medical libraries, and how to use statistical analysis tools [2].

With many efforts across medical schools around the world to overcome the obstacles of medical research's difficulty on students, some noticeable benefit was shown on research conducting performance [2,3,5]. Nevertheless, the main issue that students still face regardless of their knowledge on the steps of conducting a medical research was that the communication and level of interest between them and their respective investigators was not sufficient for a successful research project [2].

As a preliminary approach to solve the difficulties faced in the process of a student conducted research, several medical schools [5] across the globe have worked towards creating a research assistance tool to guide undergraduate students in their pursuit of managing and accomplishing research projects. One example of which was termed as UROP (Undergraduate Research Opportunities Program); this program provides the opportunity for undergraduate students to work alongside academic research personnel on projects for a previously agreed upon period of time. Under the supervision of the students' respective academic institutions, UROP was repeatedly proven to be beneficial in a number of studies performed in North America and the UK [5].

Stressing the notion that students of all academic levels face certain concerns in the process of conducting research, the implementation of a research assistance tool within this study's setting can be of a major benefit to the students in the setting. What difficulties do students face while working on research in our study setting? What is the current status of research accomplishment within this study's setting? And will the implementation of a 'UROP like system' be beneficial to a medical school without similar schemes? In this study, a calculated attempt is made to find the specific areas of research achievement that will be most favorably met for maximum quality of outcomes. Thus, the objectives of this study are to assess the specific research-helping needs of students in the College of Medicine in their respective process of conducting research, to determine the difficulties medical students face in conducting their research and to evaluate the overall outcomes of student research efforts shown by the number of studies completed in their respective tenures throughout their undergraduate education courses.

## SUBJECTS AND METHODS

### Sample

All students who participated in this study were medical students. Students were sent a link to an online survey (Google Form) by means of a convenience sampling method of mass distribution through email. The emails of the aforementioned group of students were provided by the university's faculty. Through the use of a Raosoft Sample Size Calculator [6], a forecast of 278 students was computed for the study to reach a response distribution of 50% with a 95% confidence level and a confidence interval of 5%. The population size used to predict this calculation was set at 1000 students. A mass messaging system expedited the sending of the link of the survey to an estimated number of 400 students; the available information of students in the college of medicine that meet the inclusion/exclusion factors. The Inclusion criteria comprised all medical students from the first year to the fifth year of the College of Medicine at a university in Riyadh, Saudi Arabia during the time of the survey; the number of students was about 955 students. There were no exclusion criteria.

### **Instrument**

This study utilized an online questionnaire that consisted of three parts: the first demonstrates students' gender and academic level, the second explored students' proficiency in research, and the third inquired about obstacles students face when conducting research and who, in their opinion, is a helpful supervisor and why. Students were asked five multiple choice questions relating to their proficiency in conducting research. Students were allowed to choose all applicable answers to each question. After completion of this section, students were asked one question regarding the obstacles they are facing, which included: "could not contrive a research idea", "I have enough research projects", "I need to focus on my academic studies", "I have not found the right supervisor", "I have not found a team of students to help me", and "I did not consider to start a research project". The final section included inquiry about what constitutes a good supervisor. The questionnaire had its internal consistency tested using Cronbach Alpha scoring 0.6. The questionnaire was piloted on fourteen conveniently selected students, half of whom were male and half were female, and no major changes were made.

### **Data Management and Statistical Plan**

Data from the collected information throughout the surveys was analyzed and replies imported into Microsoft Excel 2016 for statistical analysis. A statistical analysis covering relevant aspects was performed by Excel. All values of  $p < 0.05$ , 95% confidence intervals for odds ratio that did not cross 1.00 were considered to indicate statistical significance.

### **Ethical Considerations**

Ethical approval was granted by King Abdullah International Medical Research Center's Institutional Review Board. All willing participants were given a brief summary of the study's aim attached to the consent sheet. Complete confidentiality was ensured, and participants were informed that they could withdraw themselves from the survey at any given time. Participants also received a faculty member's contact information in case they had any questions regarding the study later on. Supervisor helpfulness information was kept confidential and is used to contact mentioned supervisors to participate in ResearchHub, the undergraduate research online portal, to aid students when needed.

## **RESULTS**

The gender and academic level of all students who partook in this study is shown in Table 1. The number of students who partook in this study was 228 from the College of Medicine. Gender distribution was at 60.5% male students and 39.5% female students. Senior (medical interns and students in their last medical academic year), junior (students in their second and third medical academic year), and freshman (students in their first medical academic year) participated in this study. Out of all the students who participated, 78 students did not disclose their academic level.

Results for number of currently active, completed, and published student research papers are demonstrated in Table 2, and results for students' research skills proficiency are shown in Chart 1. An overwhelming majority of students had at least one active research project (81%); even so, only a minority had published their manuscript in a journal (5.3%). Most students reported that they were proficient in data collection at (83%), followed by data entry (58%) and research proposal writing (54%). The least reported skill students found themselves good at doing was data analysis at (26%).

Students mostly reported difficulty in devising a research idea (49%), followed by difficulty in finding a supervisor (44%), inability to find a helpful research team (36%), the need to focus on academic studies (33%), inconsideration towards conducting research (14%), and a few reported having enough research projects (4%).

Table 3 shows differences in male versus female proficiency in research, and Chart 2 demonstrates how students from varying academic levels differ in skillset. Female students were significantly better at writing the research proposal ( $p=0.022$ ). Female students also had a different outcome when it came to writing the manuscript; however, this was not statistically significant. Senior students exhibited significantly better proficiency when compared to junior and freshman students in multiple aspects of research; writing the proposal ( $p < 0.001$ ), writing the manuscript ( $p < 0.001$ ), and literature review ( $p < 0.001$ ).

Table 1 Student demographics

Variables		n	Percentage (%)
Gender	Male	138	60.5%
	Female	90	39.5%
Student level	Senior	33	14.4%
	Junior	53	23.4%
	Freshman	64	28%
	Unknown	78	34.2%

Table 2 Student research activity: ongoing, completed, and published papers, along with conference presentations

Variables		n	Percentage (%)
How many studies are you currently working on?	0	20	8.8%
	1 or 2 research	185	81%
	3 or more	23	10.1%
Have you previously published a study?	Yes	12	5.3%
	No	216	94.7%
Have you ever presented a study at a conference?	Yes	40	17.5%
	No	188	82.5%
How many studies have you completed?	0	162	71.1%
	1 or 2 research	60	26.3%
	3 or more	6	2.6%

Table 3 Male students versus female students: comparison between research skills expertise

Research skills expertise	Gender				p-value
	Male		Female		
	n	Percentage (%)	n	Percentage (%)	
Literature review	65	47.1%	46	51.1%	0.55
Writing the research proposal	66	47.8%	57	63.3%	0.02
Data collection	113	81.9%	75	83.3%	0.77
Conducting lab experiments	46	33.3%	36	40%	0.3
Data entry	77	56.2%	55	61.1%	0.46
Data analysis	37	26.8%	23	25.6%	0.83
Writing the manuscript	33	23.9%	32	35.6%	0.05

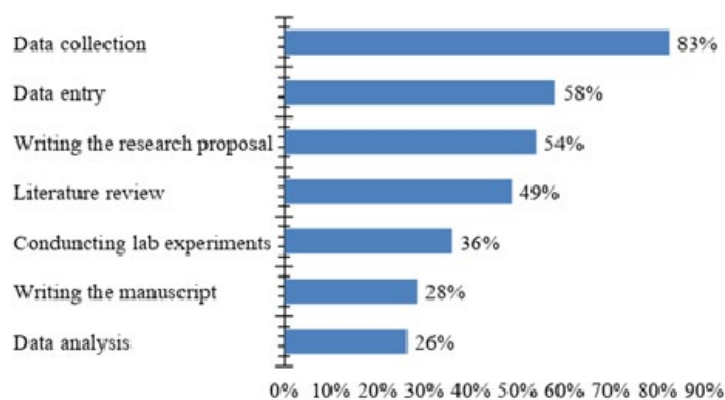
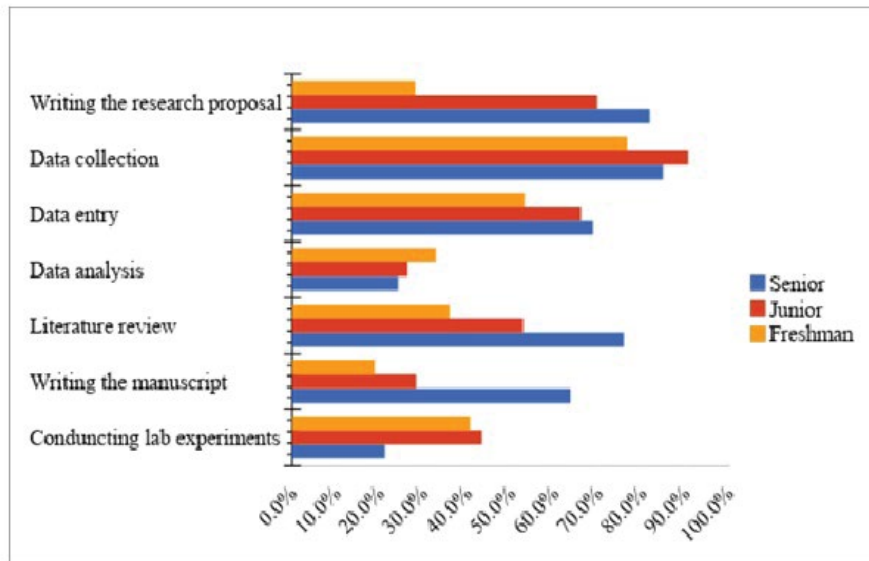


Chart 1 Percentage of results for students research skill proficiency



**Chart 2 Percentage of how students from varying academic levels differ in skillset**

## DISCUSSION

Conducting any research in the level of medical school can always be a difficult task for students who are naturally competitive in their academic ventures [7,8]. This difficulty contributes immensely to the relatively low output of published studies produced by students whilst still in medical school [8]. When compared to the efforts being implemented into producing a high output of studies (aforementioned UROP-like systems, improving student to research investigator ratios, and research assisting lectures), our investigations show that the number of publications from currently enrolled students barely hovers above (5.3%), as portrayed in Table 2.

Difficulties here culminate when medical students are faced not with new tasks, but with the perception of being lost. Students in our study's setting have reported the following obstacles faced throughout conducting research -difficulty in contriving a research idea (49%) and difficulty in finding a supervisor (44%). Furthermore, difficulty in finding a research idea can possibly be a blockade in the student's pursuit of excellence. As for the difficulty felt by students when trying to find a supervisor for their respective researches, this task can be overwhelmingly daunting to a young striving medical student [9].

Students have the perception that when a supervisor disagrees with them, it will be with a clear justification; however, we argue that this is questionable. Students can be found either switching, and swapping between different supervisors or for the more lucked out student, under the supervision of a more guiding and understanding supervisor.

After a student overcomes the somewhat inevitable hurdles of contriving a suitable research idea and finding a supervisor to join the team, comes a series of technical difficulties that are more objectively tackled and overcome [2].

In Table 3, it is clearly shown that there is a divide in the respective 'research conducting' proficiency between males and females in the study setting. This can be attributed to many factors including but not limited to, societal gender roles, student to supervisor ratio, and the frequency of research-enhancing lectures between males and females [9]. These factors have contributed to make females significantly more apt in writing both the research proposals and research manuscripts. However, amongst other factors being tested here, all but "Data Analysis" were reported to be more proficient in females, but not to a significant degree. Results like these cannot be generalized to a more internationally diverse population, due to the obvious variation in factors that divide genders in different cultures and societies.

In Chart 2, the detailed differences between students' competence in research skill sets is shown according to their

academic year. This is stratified into three groups; Freshmen, Juniors, and Seniors. As is described, and unsurprisingly, more experienced students - seniors - in our setting reported to have a better understanding of most skills described. Seniors were significantly better in the essential and more seminal part of any study, 'Reviewing the Literature'. Because of the more experienced nature a 'senior' has when conducting any research, they are more perceptive to the importance of reviewing literature before beginning the strenuous process of writing and completing both research proposals and manuscripts. Another factor unaccounted for was that seniors had a better student-to-supervisor ratio in their earlier years in the college, therefore, had more exposure to the details and technicalities of conducting medical research. This, along with the more exposure seniors had throughout their years has undoubtedly given them a significant edge when compared to their younger colleagues [10]. When comparing our results with a similar study, one can find that the latter differs from our study in that it explicitly cites no significant difference between genders [10].

### **Limitations of the Study**

As a convenient sampling study, this study is highly vulnerable to have biases that both over- and under-represent the overall population as well as selection bias. The sample studied represents students from one institute, this may affect the generalizability of our results and may not be representative of other institutes. Finally, the use of an online survey could present a self-selection bias towards repeated entries.

### **CONCLUSION**

Tackling issues that students face in the process of conducting medical research, with a clear and significant gap between how different academic levels (age) and gender, can be done through specific measures that eliminate the problems most significantly affecting research conducting for students. Between the differences demonstrated in our study, a similar study contrasts in that it cites no significant difference between gender specifically. Issues found in our study to be affecting students the most were disorganization, lack of knowledge, and wasted time, this is also supported in similar studies.

A suggested model to overcome said obstacles is summarized in the following:

All students must have a clear and transparent appraisal of their work before being asked to conduct a graded research. The Appraisal can be anonymous, and is purely for educational purposes

The ratio of students to supervisors must be adjusted tremendously. The opportunity for non-clinical or lab-based researches must be allowed for a wider variety of research

An online platform to share experience and interests must be created to decrease wasted time commuting between supervisors. Ideally, such platform would also give students and supervisors the opportunity to anonymously rate research. The difficulties faced by students can be through the aforementioned organizational steps

Students will always be expected to have the drive and initiative towards excelling in their academics. Through the creation of an integrated research assistance tool, it will diminish wasted time by reviewing respective interests and offered skillsets online, efficiently, and anonymously. Thus, creating a streamlined process of sharing knowledge, reviewing ideas, creating research teams, and conducting medical research spreading awareness regarding obstacles that students are facing, and ways of improving hardships and overall student efforts on research topics can motivate and enhance students to apply critically important research questions. This can easily be achieved through the implementation and use of ResearchHub.

### **DECLARATIONS**

#### **Conflicts of Interest**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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