Original Research Article

KNOWLEDGE, ATTITUDES, PRACTICE, AND BARRIERS RELATED TO THE INVOLVEMENT OF MEDICAL AND NURSING STUDENTS IN MEDICAL RESEARCH

ABSTRACT

Background: Adequate knowledge and a positive attitude toward research are essential components of medical education, however, undergraduate involvement in research has been on the decline due to time constraints, heavy curriculum, and poor exposure to research methodology. This study aims to evaluate this.

Methodology: A total of 70 students from All Saints University Dominica participated; 72.9% (n=51) were females while 27.1% (n=19) were males. It was also observed that 37.7% (n=26) of the study population had already commenced clinical rotations with 20.0% (n=14) being in the basic science (MD) class, 8.6% (n=06) from the nursing department and only 2.9% (n=02) of the residents were from the Pre-Med class. This study involved the use of a self-designed, structured questionnaire that was electronically distributed to students and analyzed using SPSS version 23.

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Results: It was revealed that 67.1% (n=47) of the study population demonstrated good knowledge of research, with 92.9% having a positive attitude pattern toward research. 71.4% believe that research will help them in understanding subjects better; 64.3% believe that research will help their clinical practice later while 34.8% believe that it is an extra burden to do research and 30.0% share the belief that research is time-consuming and disturbs/distracts from studies. Few of the findings include a positive association between gender and previous research participation (p=0.019), gender and lack of motivation from fellow students (p=0.021), gender and lack of proper mentorship/guidance by faculty (p=0.019), gender and difficulty obtaining approval from research committee (p=0.036).

Conclusion: The study shows that the student's knowledge of research was only above average and students' positive attitudes do not translate into actual knowledge and practice of medical research. Barriers to research included lack of time, lack of access to resources, and lack of mentoring and motivation by faculty. Medical students could benefit from proper integration of research into curricular and extracurricular activities with proper mentoring from faculty.

Keywords: Knowledge, Attitude, Practice, Barriers, Medical Students

Introduction

As defined by Çaparlar&Dönmez (2016), scientific research is a planned study with a systematic collection of data that is interpreted and evaluated. Over the years, there has been a weighty increase in scientific research, accounting for several new developments in the medical world (Re, 2006). Research is the bedrock of future medicine and has provided more evident perspectives in medicine (Dellis et al., 2014; Pallamparthy&Basavareddy, 2019). Despite this,

there has been a documented decline in physician-scientists in medical practice (AlGhamdi et al., 2014). Postulated explanations for the decline include fewer financial incentives, family pressures, practice philosophy, and inadequate exposure to research before career paths are determined (AlGhamdi et al., 2014).

A continuous decline could pose a severe threat to the future of academic medicine. A loss in medical discoveries and innovations could eventually influence the effective practice of clinical medicine. Thus, the essential nature of scientific research in medicine creates the need for potential solutions to the loss of physicians in academia. One such solution is the approach of investing in future academic physicians. Several studies highlight the need for proper mentorship in clinical research for medical students (Bruekner Collins et al., 2018: Hernandez et al., 2009; Areephanthu et al.,2015). The goal would be to create awareness of medical research and its importance and garner career interest.

A cross-sectional study in a medical school in Egypt carried out by Ibrahim Abushouk et al. (2016) showed that a majority of students expressed a favorable attitude toward medical research. However, the study showed minimal engagement in research activities, which was attributed to needing more research knowledge and the absence of mentorships in clinical research. Similar findings were also demonstrated by Vairamani&Akoijam (2018), where students also showed a favorable attitude toward research. However, this study indicated that students had inadequate knowledge of clinical research. The study suggested that the medical curriculum in India, where theoretical knowledge is emphasized more, and only a little attention is given to medical research, could be contributory (Vairamani&Akoijam, 2018). These studies show that medical students may exhibit a positive disposition towards research but be limited by other factors that must be addressed. Exploring and addressing all potential limiting factors would enable proper discourse and solutions to be created.

With the many benefits that medical research has brought to humanity, such as the development of vaccines, drugs, and life-saving medical procedures, the importance of the early introduction of medical research in medical curriculum and clinical practice cannot be overemphasized. Determining the levels of knowledge and the attitudes of medical students towards medical research while also exposing challenges that students face in carrying out research could illuminate possible solutions to encourage more medical and nursing students into the field. In spite of the wealth of knowledge that has been discovered, there is, however, limited information concerning the attitude and barriers to the practice of clinical research amongst Caribbean medical and nursing students. This study intends to analyze the knowledge, attitude, practice, and barriers related to the involvement of medical and nursing students in clinical research while aiming to contribute data concerning this particular demographic.

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Materials And Methods

Study Population: The study population comprised registered medical students and nursing students, between the ages of 18-40 years old, from All Saints University School of Medicine, Commonwealth of Dominica. This study population comprised nationals from different countries.

Ethical Considerations: All participants recruited for this study provided written informed consent for their data to be used for medical research. Also, the research proposal was approved by the University's ethical committee.

Data Collection Procedure: Data was obtained from the study participants via a structured web-based questionnaire with no identifiers, ensuring the confidentiality and anonymity of the respondents. This questionnaire included questions addressing the demographic characteristics of the respondents as well as different components of the research topic. Only respondents who voluntarily gave their informed consent were recruited into the study.

The data from the web-based questionnaires were analyzed via the Statistical Package for Social Sciences (SPSS) version 23.0 software, with P-values less than 0.05 deemed significant. Descriptives were done, and levels of statistical significance were tested using the Chi-square test. A confidence interval of 95% was determined using appropriate statistical tests. Observations were summarized in frequencies and percentages. Relationships between variables were determined using the chi-square test. While comparison of the scores of participants was made using a T-test and ANOVA where appropriate.

RESULTS

This study sought to determine the knowledge, attitude, practices, and barriers hindering medical students from participating in research. A total of 70 students were recruited for the study. There was a preponderance of female participants recruited into the study as 72.9% (n=51) were females, and 27.1% (n=19) were males. Table 1 describes the breakdown of the frequency distribution of the demographic characteristics of the study participants. Students within the 20-25 age range had the predominant age range among the study population, with 20% of the research subjects being 26-30 years old and only 5.7% aged under 20 years.

It was also observed that 37.7% of the study population had already commenced clinical rotations, with 20.0% in the basic science (MD) class and only 2.9% hailing from the Pre-Med class. It was also observed that the highest frequency (17.6%) of the study population was admitted in 2015, while the lowest frequency was admitted in 2022.

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Must separate between Descriptive and Inferential data analysis.
Relationships between qualitative variables were examined using the chi-square test... this test is specific to analysis only relationship bwtween categorical variables.in this Manuscript it is clear.
T test is used to mean comparation when the variables are quantitative and normal distribution (Guassian curve).
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TABLE 1: FREQUENCY DISTRIBUTION OF THE DEMOGRAPHIC CHARACTERISTICS

VARIABLES	FREQUENCY	PERCENTAGE (%)
AGE GROUP		
< 20	04	5.7
20-25	46	65.7
26-30	14	20.0
31-35	03	4.3
36-40	02	2.9
Above 40 years	01	1.4
GENDER		
Male	19	27.1
Female	51	72.9
CLASS		
Pre-med	02	2.9
Md	14	20.0
Between MD and Clinicals	13	18.6
Clinical rotations	26	37.7
Medical graduate	06	8.6
Nursing	06	8.6
Graduate nurses	02	2.9
YEAR OF ADMISSION		
Before 2015	09	12.9
2015	12	17.1
2016	07	10.0
2017	06	8.6
2018	05	7.1
2019	08	11.4
2020	09	12.9
2021	10	14.3
2022	02	2.9

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Figure 1 indicates the overall rating of participants' knowledge about research, while figures 2 and 3 describe the pattern of attitude towards research. These results were obtained by rating participants' responses. Correct responses to the questions on knowledge were given a mark of 1, while incorrect responses were zero. Overall scores were calculated. Participants with scores between 1-4 were rated poor, 5-7 rated average, and 8 and above were rated good. For the attitude, scores were given as follows, Agree = 2, Neutral = 1, Disagree = 0 (in case of questions with a positive disposition. This was reversed if the expected outcome was negative). A total score of more than 50% was categorized as a positive attitude, while those less were considered a negative attitude.

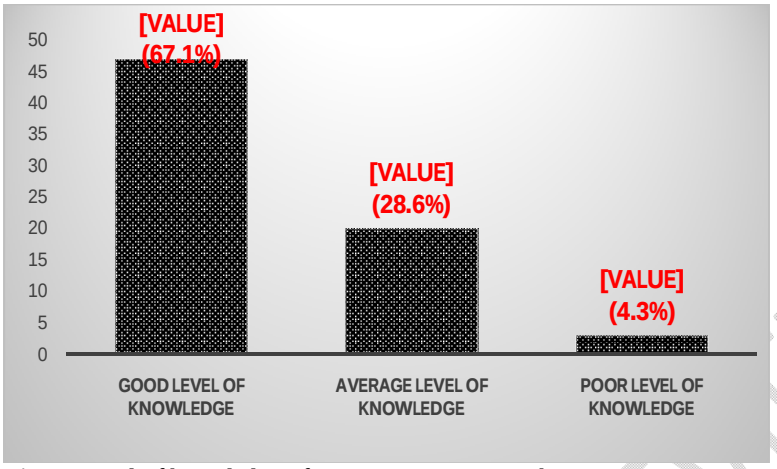

Fig. 1: Level of knowledge of participants in research

It was revealed that 67.1% of the study population demonstrated a good knowledge of research, with 28.6% of the study population having an average knowledge of research and only 4.3% of the study population having poor knowledge of research (Fig. 1).

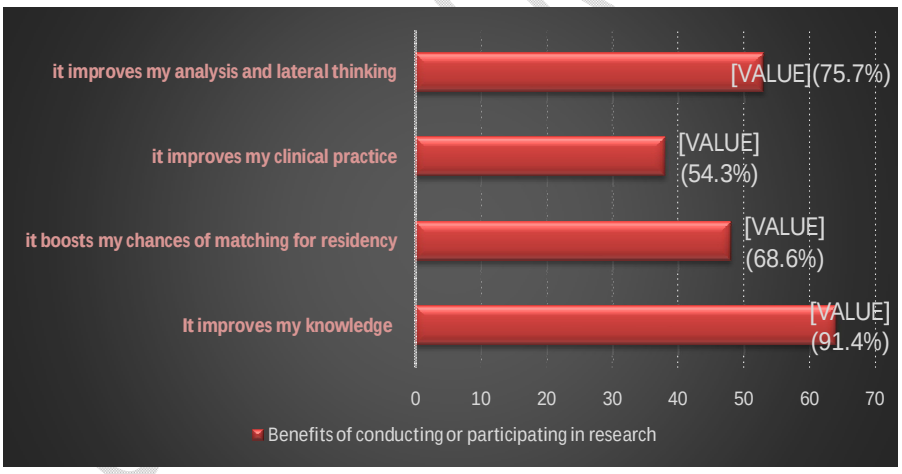

Figure 2: Distribution patterns of the attitude of respondents toward research

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Regarding their pattern of attitude, 92.9% of the study population had a positive toward research, while 7.1% of the study population had a negative attitude toward research (Figure 3).

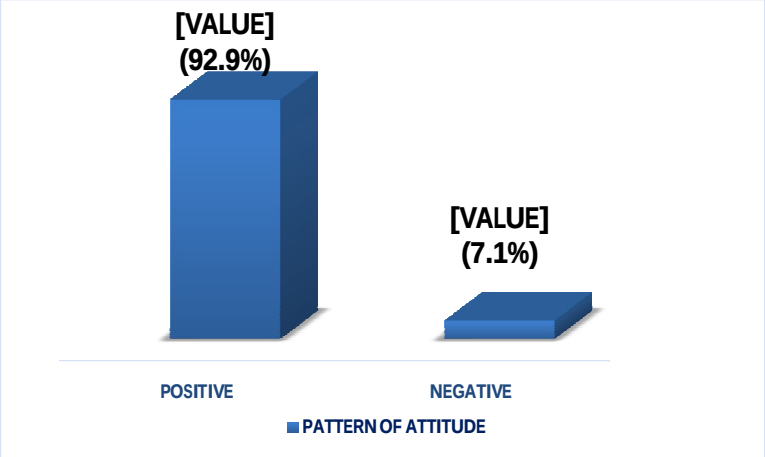

Fig. 3: Pattern of respondents' attitude towards research

Regarding the questions asked to determine the attitude of the study population, it was observed that 88.6% of the respondents agreed that being knowledgeable about research enriches medical education, while 11.4% were neutral. Also, 91.4% agreed that research helps improve one's curriculum vitae, with 2.9% disagreeing and 5.7% neutral. In addition, 94.3% of respondents thought that research contributes to innovations in the medical field, with 1.4% disagreeing and 4.3% neutral. Though 15.7% of the study population were indifferent about medical research being a part of the medical curriculum, most (81.4%) of the respondents were in agreement, while 2.9% of them disagreed.

Furthermore, 71.4% believe that research will help them understand other subjects better, with 22.9% being neutral and 5.7% in disagreement. On the other hand, 64.3% believe that research will help one's clinical practice later, 34.8% believe that it is an extra burden to do research, and 30.0% share the belief that research is time-consuming and disturbs/distracts from studies. 37.1% think that the financial prospects are good for a career in research, while 30.0% believe they can consider a career in medical research after completion of medical school

TABLE 2. Frequency distribution of the participants on research attitude

ATTITUDE STATEMENTS	AGREE	NEUTRAL	DISAGREE
1. Research enriches medical education	88.6%	11.4%	-------
2. Research helps in improving one's curriculum vitae	91.4%	5.7%	2.9%
3. Research contributes to innovations in the medical field	94.3%	4.3%	1.4%
4. Medical research should be a part of the medical curriculum	81.4%	15.7%	2.9%
5. Research will help in understanding subjects better	71.4%	22.9%	5.7%
6. Research will help one's clinical practice later	64.3%	31.4%	4.3%
7. It is an extra burden to do research	34.8%	33.3%	31.9%
8. Research is time-consuming and disturbs/distracts studies	30.0%	37.1%	32.9%
9. Financial prospects are good for a research career	37.1%	54.3%	8.6%
10. I can consider medical research as an exclusive future career option after completion of medical school	30.0%	31.4%	38.6%

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I have not doubt that theses results are very inconsistency. The distribution of this frequences, is inadequate using the chi-squared test.
This comment is valid to Tables 3,4,5,6,7and 8.

TABLE 3: Relationship between gender and age characteristics vs knowledge rating

VARIABLES	Good level of knowledge	The average level of knowledge	Poor level of knowledge	χ^2	P-VALUE
AGE (YEARS)					
Less than 20 yrs	3 (75.0%)	1 (25.0%)	0 (0.0%)		
20-25 yrs	29 (63.0%)	16 (34.8%)	1 (2.2%)	7.367	0.690
26-30 yrs	10 (71.4%)	2 (14.3%)	2 (14.3%)		
31-35 yrs	2 (66.7%)	1 (33.3%)	0 (0.0%)		
36-40 yrs	2 (100.0%)	0 (0.0%)	0 (0.0%)		
Above 40 yrs	1 (100.0%)	0 (0.0%)	0 (0.0%)		
SEX					
MALE	13 (68.4%)	6 (31.6%)	0 (0.0)	1.207	0.547
FEMALE	34 (66.7%)	14 (27.5%)	3 (5.9%)		

*Statistically significant at $P < 0.05$. The results displayed above indicate no statistically significant association ($P > 0.05$) between gender, age, and knowledge of research.

TABLE 4: Gender and Age Characteristics of a pattern of attitude

VARIABLES	Positive	Negative	χ^2	P-VALUE
AGE (YEARS)				
Less than 20 yrs	4 (100.0%)	0 (0.0%)		
20-25 yrs	42 (91.3%)	4 (8.7%)	0.936	0.968
26-30 yrs	13 (92.9%)	1 (7.1%)		
31-35 yrs	3 (100.0%)	0 (0.0%)		
36-40 yrs	2 (100.0%)	0 (0.0%)		
Above 40 yrs	1 (100.0%)	0 (0.0%)		
SEX				
MALE	18 (94.7%)	1 (5.3%)	0.139	0.709
FEMALE	47 (92.2%)	4 (7.8%)		

*Statistically significant at $P < 0.05$

The results above indicate no statistically significant relationship ($P > 0.05$) between gender, age, and attitude toward research.

TABLE 5: Class characteristics of knowledge rating

VARIABLES	Good level of knowledge	The average level of knowledge	Poor level of knowledge	χ^2	P-VALUE
CLASS					
Pre-Med	2 (100.0%)	0 (0.0%)	0 (0.0%)		
MD	8 (57.1%)	6 (42.9%)	0 (0%)	12.470	0.569
MD-Clinicals	6 (46.2%)	5 (38.5%%)	2 (15.4%)		
Clinical	19 (73.1%)	6 (23.1%)	1 (3.8%)		
Rotations	6 (100.0%)	0 (0.0%)	0 (0.0%)		
Med Graduate	4 (66.7%)	2 (33.3%)	0 (0.0%)		
Nursing	1 (50.0%)	1 (50.0%)	0 (0.0%)		
Nursing Graduate					

*Statistically significant at $P < 0.05$

The results displayed above indicate no statistically significant relationship ($P > 0.05$) between class and knowledge of research.

TABLE 6: Class characteristics of the pattern of attitude

VARIABLES	Positive	Negative	χ^2	P-VALUE
CLASS				
Pre-Med	2 (100.0%)	0 (0.0%)		
MD	12 (85.7%)	2 (14.3%)	3.176	0.868
MD-Clinicals	12 (92.3%)	1 (7.7%)		
Clinical Rotations	25 (96.2%)	1 (3.8%)		
Med Graduate	6 (100.0%)	0 (0.0%)		
Nursing	5 (83.3%)	1 (16.7%)		
Nursing Graduate	2 (100.0%)	0 (0.0%)		

*Statistically significant at $P < 0.05$

The results above indicate no statistically significant relationship ($P > 0.05$) between class and attitude toward research.

TABLE 7: Year of admission Characteristics of knowledge rating

VARIABLES	Good level of knowledge	The average level of knowledge	Poor level of knowledge	χ^2	P-VALUE
YEAR					
Before 2015	6 (66.7%)	2 (22.2%)	1 (11.1%)		
2015	9 (75.0%)	3 (25.0%)	0 (0.0%)	14.629	0.687
2016	4 (57.1%)	3 (42.9%)	0 (0.0%)		
2017	4 (66.7%)	2 (33.3%)	0 (0.0%)		
2018	2 (40.0%)	2 (40.0%)	1 (20.0%)		
2019	3 (37.5%)	4 (50.0%)	1 (12.5%)		
2020	8 (88.9%)	1 (11.1%)	0 (0.0%)		
2021	8 (80.0%)	2 (20.0%)	0 (0.0%)		
2022	2 (100.0%)	0 (0.0%)	0 (0.0%)		

*Statistically significant at $P < 0.05$

The results displayed above indicate no statistically significant relationship ($P > 0.05$) between the year of admission and knowledge of research.

TABLE 8: Year of admission Characteristics of a pattern of attitude

VARIABLES	Positive	Negative	χ^2	P-VALUE
YEAR				
Before 2015	9 (100.0%)	0 (0.0%)		
2015	12	0 (0.0%)	10.697	0.297
2016	(100.0%)	0 (0.0%)		
2017	7 (100.0%)	1 (16.7%)		
2018	5 (83.3%)	0 (0.0%)		
2019	5 (100.0%)	2 (25.0%)		
2020	6 (75.0%)	0 (0.0%)		
2021	9 (100.0%)	2 (20.0%)		
2022	8 (80.0%)	0 (0.0%)		
	2 (100.0%)			

*Statistically significant at P < 0.05. The results displayed above indicate that there is no statistically significant relationship (P >0.05) between the year of admission and attitude toward research

Table 9: Comparison of gender vs research barriers and practices

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Practices	P-value
The research will help my clinical practice later	**0.026***
Research is time-consuming and a distraction from studies	0.983
Have you participated in or conducted any research studies before	**0.019***
Have you written any scientific paper	**0.000***
Have you attended any workshops on research methodology	0.391
Will you be interested in attending any workshops on research methodology	0.826
Barriers	
Lack of awareness	0.109
Lack of motivation from fellow medical students	**0.021***
Lack of time	0.144
Difficulty in choosing a research topic	0.335
Difficulty in analyzing data	0.741
Difficulty in obtaining approval from ethical review boards	**0.036***
Lack of proper guidance/support/mentorship from faculty	**0.011***
Lack of interest in research by faculty	0.252
Inadequate facilities and funding for research	0.229

*Statistically significant at P < 0.05

Table 10: Comparison of class vs research barriers and practices

Practices	P-value
Research experience will boost my chances of matching for residency	**0.001***
Lack of knowledge about research	0.072
Have you participated in or conducted any research studies before	0.753
Have you written any scientific paper	0.146
Barriers	
Lack of awareness	**0.049***
Difficulty in choosing a research topic	**0.024***
Lack of proper guidance/support/mentorship from faculty	**0.038***
Lack of school curriculum on research	**0.001***
Lack of interest in research by faculty	**0.000***
Inadequate funding for research	**0.000***
Lack of exposure and opportunities	**0.000***
Lack of incentives	**0.000***
Inadequate facilities for research	**0.002***
Difficulty in analyzing data	0.419
Difficulty in writing research proposals	0.364
Lack of motivation from fellow medical students	0.879
Lack of time	0.484

*Statistically significant at $P < 0.05$

DISCUSSION

Research has been instrumental in the growth of the healthcare system. On several occasions, medical research has helped realize and address patterns in the medical field, develop solutions to medical problems, and improve medicine. Hence, the vitality of research for medical professionals. Although not all medical professionals are inspired to carry out research, there must be proper awareness and knowledge of the principles of scientific research. (Amar-Singh et al., 2011) To carry out research, a wealth of knowledge, a positive attitude, and appropriate skills are necessary (Pallamparthy&Basavareddy, 2019).

This study intended to investigate the knowledge, attitudes, practice, and barriers related to the involvement of medical and nursing students of All Saints University, School of medicine, in medical research. In this study, 92.9% of the population showed a positive attitude towards research, with a much lower percentage of 67.1% demonstrating adequate knowledge. This finding is consistent with a study carried out by the Faculty of Medicine, Ain Sham University, Egypt which showed a gap between a positive attitude towards research and adequate knowledge of medical research. They attributed this gap to barriers such as; lack of mentoring, funding, and time (Ibrahim abushouk et al., 2016). Similar studies carried out in the Department of Pharmacology, Sri DevarajUrs Medical College, India (Pallamparthy&Basavareddy, 2019) and amongst dentists and dental students in the western region of Saudi Arabia showed a gap between attitude and knowledge of medical research (Abdulrahman et al., 2020).

In addition, 71.4% (50) of students believe that research will help them understand subjects and concepts taught in school much better, which is consistent with the study done by the Department of Community Medicine, Government Medical College Nagpur, India (Sharma, &Thatikonda, 2021,) and 64.3% (45) believe that research will help their clinical practice later in the future. However, 34.8% (24) of these students believe carrying out research work is an extra burden to other academic work they need to do, and 30.0% (21) of the total students also share the belief that research is time-consuming and disturbs/distracts from studies. This could be attributed to the accelerated medical program requiring more volume of work within a shorter time at the University.

The study revealed no significant gender-based effect on good research knowledge and attitudes toward research. In this research, males showed higher levels of good research knowledge, with a gender percentage score of 68.4%, and higher positive attitudes and perceptions towards research, with a gender percentage score of 94.7%. However, the p-values for gender-based knowledge and attitudes were estimated to be 0.547 and 0.709, respectively, rendering the above findings statistically insignificant. These findings are inconsistent with the studies conducted by the Department of Pharmacology at The Sri DevarajUrs Medical College in Tamaka, Kolar (Pallamparthy et al., 2019) and a multi-center cross-sectional study conducted on medical students from 6 Arab countries (Assar et al., 2022) which both show a female predominance in attitudes towards research.

The study also revealed that the research knowledge base increased based on education level. The Clinical students reported statistically higher research knowledge percentages than the MD students. This results are simliar to the findings of a study done on medical students of Aga Khan University (AKU) in Karachi, Pakistan (Khan et al., 2006) and a study done by the Faculty of Medicine, Ain Shams University, Egypt (Abushouk et al., 2016) which shows the exact correlation between study level and research knowledge. This could be due to an increased

awareness of the importance of research as a resume booster for residency applications as the level of classes increases.

The study also revealed a greater positive perception of research in the pre-med population over the MD classes. This finding is consistent with findings reported in a cross-sectional study conducted by the Department of Nutrition and Dietetics, American University of Beirut (Achi et al., 2020). This similarity could be due to the increased curriculum-based workload and time constraints in the MD classes compared to the Pre-med classes. The barriers to research that the participants in this study listed included: lack of time to conduct research, difficulty in following up with research participants, in research procedures such as choosing a topic, result collection, data analysis, and ethics board approval processes. These reflect the need for a comprehensive research-based module to be drafted and incorporated into the medical school curriculum.

Lack of proper mentorship and research facilities were also cited as barriers. This is potentially due to the school's location in a developing area. The limited facilities for research could be overcome by encouraging students to pursue and engage in more community-based research, which would abound in opportunities in an environment like this. A similar suggestion was made in the cross-sectional study done by the College of Medicine of three respective universities in Saudi Arabia, The State of Kuwait, and the Kingdom of Bahrain (Amin et al., 2012).

CONCLUSIONS AND RECOMMENDATIONS

Comment [f11]: Many epidemiology studies general, is necessary to include two opposite points (Limitations and Strengths)

In our current study, the knowledge regarding research amongst the medical students was good, and the attitude regarding involvement in research activity was highly encouraging. This study found positive associations between gender and previous research participation, lack of motivation from fellow students, lack of proper mentorship/guidance by faculty, and difficulty obtaining approval from the research committee. There were also positive relationships between class of study and lack of awareness of research resources available in the school and lack of interest in research by faculty, lack of exposure/research opportunities, and lack of academic curriculum for research. The main barriers to research included lack of time, lack of access to resources, and lack of mentoring and motivation by faculty. The students' positive attitudes do not translate into actual knowledge and practice of medical research. Medical students would benefit from proper integration of research into curricular and extracurricular activities with proper mentoring from faculty.

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