



# Knowledge, Attitudes, and Barriers Regarding Health Research among Medical Students in Saudi Arabia

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## Abstract

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**BACKGROUND:** Research is the basic component of health science curriculum.

**AIM:** The objective of the study is to determine the knowledge, attitude, and barriers regarding health research among health science students.

**METHODS:** It is a cross-sectional study and 294 study participants were selected through stratified random sampling from different health science colleges (medicine, dental, nursing, and applied science). A validated, structured, and pre-tested questionnaire was used. Knowledge and attitudes were determined through scales. Analysis of variance and t-test were applied to determine the mean scores of knowledge and attitude, and multiple regression analysis was used to determine the factors which affect on knowledge and attitude.

**RESULTS:** Knowledge and attitude mean scores were  $4.36 \pm 2.44$  and  $2.74 \pm 1.17$ , respectively. Knowledge and attitude were increase significantly with increasing academic year of study in all health science colleges (Regression coefficient 0.043 [p = 0.032] and 0.005 [p = 0.040] for knowledge and attitudes, respectively). Most common barriers for research were lack of proper mentoring from the faculty staff and lack of time due to over burden with educational activities

**CONCLUSION:** Health science students had moderate level of knowledge and attitude toward health research with common barrier which was lack of proper mentoring from the faculty. There is need for address the barrier for research and more integration of curriculum with research which improved the knowledge and attitude level.

## Introduction

Research is the basic component in the curriculum health science education [1]. There are two basic skills required for research which are reasoning skills and critical thinking skills. These skills develop positive attitude toward scientific research [2]. There are different studies proved that research skill is strongly associated with postgraduate research activities and research project in professional life of students [3], [4]. The most of health science professionals were lack of research skills and there is a need of competent health professionals who have strong research skills.

The undergraduate students have a potential to learn the basic research skills, therefore, there is a need for developing the curriculum in which research components should be high priority. Motivating students were involved in research activities and acquire the research skill which will helpful in their professional life. This workforce helps in countries to achieve the self-dependence in research and science [5], [6].

There are innovative trends in science education which focus on acquiring the knowledge, attitude, and skills toward research which is also called as evidence-based learning [7]. Different creative methods of learning have adopted which help the students for self-directed learning skills which is lifelong competency developed in the students. The most common learning approach is problem-based learning (PBL), which is good learning strategy among science institutions throughout the world. It is helpful the students to improve the critical thinking ability which is used in research [8].

There is different level of research components in health science curriculum in different countries. The primary objective of study is to determine the knowledge, attitude, and barriers related to participation of research among undergraduate health science in Kingdom of Saudi Arabia. This is the indicators of student's awareness and recognition of innovative knowledge getting capacity to impact health science. The secondary objective of this study was to identify the factors such as gender, age, and year of study at university which are associated with student's knowledge and attitude toward scientific research.

## Methods

### Study setting, study participants, and study design

In university, there are 4-year program in different health science (bachelor of medicine; bachelor of dental surgery, bachelor of nursing, and bachelor of applied sciences). All 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> years students of different colleges were included. It is a cross-sectional study.

### Sampling technique and sample size

The participants were selected through stratified random sampling. The participants of study were randomly selected according to the proportion of students in the classes. Sample size was calculated from the World Health Organization health studies software, 5% margin of error with 95% confidence interval and assuming 25.7% prevalence of good knowledge from the previous study [7], 5% bond-on error, the required sample size is 294.

### Data collection procedure

After getting permission from dean of colleges, the questionnaires were distributed among study participants with written consent form. Study participants were requested to return from within a week.

### Questionnaire

A validated and structured questionnaire was used [8]. The questionnaire was pretested and find out any inconsistency of responses and modification of questionnaire according to response from study participants and build a final version of questionnaire.

The questionnaire has four parts; the first part is comprised sociodemographic characteristic of study participants, the second part is student's knowledge, the third part is attitudes toward research, and the fourth part is barrier to research. Demographic section included age, gender, type of high school course, year of study and mode of learning at medical school (PBL vs. lecture-based learning [LBL]), and place of origin. Learning style classifies into traditional LBL and PBL.

The second section is knowledge which comprised 10 questions. Right answers as percentage were calculated as a of knowledge score and third section attitude which comprised of Six questions and right answer were scored on a scale of 0.0 (unfavorable attitude) to 1.0 (favorable attitude) and each individual score of individual questions was summed and then transformed into proportion to characterize the attitude score and the fourth section which is comprised of 10 questions of barrier to research section.

## Statistical analysis

EpiData software was used for data entry. Data were entered into Statistical Package for the Social Sciences version 24 (SPSS, Inc., Chicago, IL, USA). Descriptive statistical analysis was calculated for mean scores and proportions. Inferential statistical analysis was used by multiple linear regression models which were used to test association of age and year of study with the knowledge and attitude. Analysis of variance and t-test were used to look for similar putative associations of type of high school, mode of study, and gender.  $p < 0.05$  was considered as statistical significance. Multiple linear regressions were applied to determine the predictors which affect the knowledge and attitude toward research.

## Results

Mean age of participants was  $21.53 \pm 1.05$  years. Most (52.8%) of the study participants were male, 60.2% of students were scored good grade point average, and 64.6% of students were learned from LBL (Table 1).

**Table 1: Sociodemographic characteristics of study participants (n=294)**

Characteristics	Frequency (%)
Age (years) (Mean $\pm$ SD)	21.53 $\pm$ 1.05
Gender	
Male	155 (52.8)
Female	139 (47.3)
Marital status	
Single	48 (16.3)
Married	246 (83.7)
Colleges	
Medicine	101 (34.3)
Dental	98 (33.3)
Nursing	65 (22.1)
Applied medical science	30 (10.2)
Academic year of study	
1 <sup>st</sup> year	34 (11.6)
2 <sup>nd</sup> year	196 (66.7)
3 <sup>rd</sup> year	62 (21.1)
4 <sup>th</sup> year	2 (0.7)
Academic score (grade point average)* (last semester)	
Average	117 (39.8)
Good	177 (60.2)
Mode of learning	
Problem based	104 (35.4)
Lecture based	190 (64.6)

\*Average 2-4, Good>4.

Females scored better on knowledge scale, college of medicine students were better score on knowledge and attitude scale, and this difference was statistically significant. Academic year and academic scores were not a significant predictor of knowledge or attitude about research. PBL was associated with a better score on both knowledge and attitude scales (Table 2).

Age was not a statistically significant factor in determining scores on knowledge scales. After adjusting of covariate, the academic year was the significant predictor on both knowledge and attitude scores. Increase in duration of study by 1 year increased the knowledge score by 0.04% with a correlation coefficient (r) of 0.058 ( $p = 0.001$ ). Similarly, increase in duration of study by 1

year was increased the attitude score by 0.05% with a correlation coefficient ( $r$ ) of 0.012 ( $p = 0.042$ ), (Table 3).

**Table 2: Knowledge and attitude toward research according to gender, colleges, mode of learning, academic year, and academic score at medical school (n = 294)**

Characteristics	Knowledge Mean $\pm$ SD (p-value)	Attitude Mean $\pm$ SD (p-value)
Gender		
Male	4.05 $\pm$ 2.48	9.67 $\pm$ 2.32
Female	4.71 $\pm$ 2.34 (0.022)	9.52 $\pm$ 1.93 (0.021)
Colleges		
Medicine	5.22 $\pm$ 2.39	10.23 $\pm$ 2.19
Dental	4.28 $\pm$ 2.49	9.71 $\pm$ 2.34
Nursing	3.30 $\pm$ 2.21	8.81 $\pm$ 2.41
Applied medical science	4.03 $\pm$ 1.88 (0.033)	9.82 $\pm$ 1.81 (0.005)
Mode of Learning		
Problem based	4.58 $\pm$ 2.60	9.51 $\pm$ 2.22 (0.043)
Lecture based	4.24 $\pm$ 2.34 (0.058)	
Year at College		
1 <sup>st</sup>	3.79 $\pm$ 1.96	10.00 $\pm$ 2.01
2 <sup>nd</sup>	4.41 $\pm$ 2.54	9.47 $\pm$ 2.08
3 <sup>rd</sup>	4.59 $\pm$ 2.32	9.82 $\pm$ 2.43
4 <sup>th</sup>	5.21 $\pm$ 1.65 (0.223)	8.50 $\pm$ 0.70 (0.397)
Academic score		
Average	4.44 $\pm$ 2.42	9.74 $\pm$ 2.14
Good	4.24 $\pm$ 2.47 (0.496)	9.39 $\pm$ 2.15 (0.865)

The proportion of each question of knowledge section was determined through descriptive statistics (Table 4).

**Table 3: Predictors of score on the knowledge and attitude scales among Saudi health science students**

Predictors	Regression coefficient (b) (p values)	Correlation coefficient (r) (p values)
Knowledge		
Academic year	0.043 (0.032)	0.058 (0.001)
Age	0.024 (0.741)	0.051 (0.611)
Attitude		
Academic year	0.005 (0.040)	0.012 (0.042)
Age	-0.055 (0.716)	-0.024 (0.340)

**Table 4: Proportion of health science students with correct answers for questions of knowledge**

Questions	Frequency (n)	Proportion (%)
1. How would you define the scientific hypothesis? An answer or solution to a question which has a capacity of verification or empirical demonstration*	135	45.9
2. How would you define scientific theory? System of hypotheses logically connected to one another, with common background, some of which have been verified*	116	39.5
3. How would you define the scientific truth? Consensus of competent experts *	39	13.3
4. The essential characteristic of science is: All scientific conclusions are temporary*	140	47.6
5. A scale from 1 to 5 (like grades on an examination) is called Ordinal *	166	56.5
6. Representativeness is a key characteristic of a Sample*	167	56.8
7. MEDLINE is: Medical database*	82	27.9
8. In the previous year, you have published a paper in a prestigious Journal of Immunology. Now you want to check the number of citations your paper has received. The best way to do it would be to search the: Citation index of the Science Citation Index database*	162	55.1
9. The part of a scientific paper is: Acknowledgment to persons who assisted you during the research*	134	45.6
10. All listed rules apply to the process of writing an introduction section of a scientific paper except: d. Make it longer rather than shorter*	143	48.6
Mean score ( $\pm$ SD)	4.36 $\pm$ 2.44	

Questions used with permission of Vodopivec *et al.* [8], \*correct.

Out of 294 students, 75.5% were think that undergraduate students should participate in research

and 62.9% were belief that undergraduate students can plan and conduct a research project and write a scientific paper (Table 5).

**Table 5: Responses to questions determining attitudes of health science students toward scientific research**

Statement	Yes	No	Undecided
1. Do you feel confident in interpreting and writing a research paper?	158 (53.6)	54 (18.4)	82 (27.9)
2. Have you ever participated in a research project (apart from mandatory academic projects)?	138 (46.9)	131 (44.6)	25 (8.5)
3. Have you ever written a scientific paper?	133 (45.2)	122 (41.5)	39 (13.3)
4. Do you think undergraduate students should participate in research?	222 (75.5)	50 (17)	22 (7.5)
5. Do you think undergraduate students can plan and conduct a research project and write a scientific paper?	185 (62.9)	72 (24.5)	37 (12.6)
6. Medical students can plan and conduct research project without supervision	105 (35.7)	157 (53.4)	32 (10.9)
Mean score ( $\pm$ SD)	2.74 $\pm$ 1.17		

The most (74.1% and 71.4%) common barriers for health research were lack of time due to over burden with educational activities including examination and lack of proper mentoring from the faculty staff (Table 6).

**Table 6: Perceived barriers toward participation in scientific research as stated by the included medical students**

Perceived barriers	Frequency n (%)
Lack of proper mentoring from the faculty staff.	210 (71.4)
Our faculties do not give the opportunity to conduct our own research	184 (62.6)
Lack of time due over burden with educational activities including examinations.	218 (74.1)
Lack of proper laboratory and other facilities	171 (58.2)
Inefficient faculty staff to deliver necessary knowledge and skills	168 (57.1)
Inaccessibility to the medical and other electronically relevant data bases	143 (48.6)
Lack of rewarding and/or motivation	175 (59.5)
Lack of proper funding and monetary problems.	180 (61.2)
Lack of appropriate knowledge and necessary skills.	192 (65.3)
Lack of interest	168 (57.1)

## Discussion

The present study found that health sciences students had moderate level of knowledge and attitude toward health research (mean score of knowledge 4.36 out of 10 and mean score of attitude 2.74 out of 6, respectively). Result of this study is consistent with the other study results which were conducted on Croatian medical students [8]. Our study results showed that men score of knowledge was 4.36 and Croatian student's knowledge score had 4.43 but attitude score was 6.0 which was higher to our study attitude mean score (2.74). However, only 53% of health sciences students felt confident in interpreting and writing a research paper and only 35.7% claimed the ability to do research without any supervision.

Health science student's knowledge and attitude regarding health research enhanced with increasing years of academic at college. This means that curriculum of health sciences colleges has well developed in developing research skills and structured training program. Health science students are taught basic research methodology which includes statistics,

epidemiology during the semester. Health science students are taught basic research methodology which includes statistics, epidemiology during the semester and in higher academic year extensive research projects which was based on community visits. In these projects, students were involved in data collection, data analysis, writing research report, and present the results of their projects. After that, it is a mandatory to publish the research in the high indexed journals. This activity of students was helped to developed research skills and good knowledge and attitude regarding health research [9].

The previous study found that attitude and knowledge level were significantly improved by increasing year of academics [10]. Another study found that students at the 2<sup>nd</sup> year of academics had the highest level of knowledge and attitude compared to previous year of academics [4].

Gender was the significant predictor regarding knowledge and attitude level among health science students. Females had significantly higher mean score of knowledge and attitude. This results contrast with other study which found that gender was not significant predictor [10]. The reasons for females were more knowledgeable due to higher numbers of female's enrolment in the colleges.

Medical college students were significant higher knowledge and attitude score compared to other colleges students. The reason for this result was because curriculum of college of medicine was more research oriented compared to other college's curriculum. This result was consistent with other study results [11], [12].

This study results found that knowledge and attitude scores were significant difference between LBL and PBL students. Year of academics variable is the confounder of knowledge and attitude score because the higher study commonly used PBL. Other studies have found that there were no differences of knowledge and attitude score between modes of learning of students [13].

The study results found that several factors called as barriers for student's participation in research. The important factors identified as barriers were lack of training, no incentive, lack of supervision, and skills. The previous study [14] showed that participate in the workshops on research methodology had good impact on students attitude toward research. Other study shown that students were involved in intercalated research projects feels that it was worthless knowledge of various issues such as interfering with social activities and social interactions [15].

Participation of students in health research was average (45.2) in the study results. The reason for this result was due to low motivation of students toward research. The results are similar to other study results which found that few students were published paper in

scientific journal [16].

There are several limitations for this study, first, this is the cross-sectional study which cannot determine the temporality of outcome and independent variables. Second, there are a significant difference of curriculums between colleges, we cannot determine the factor in this study. Third, others factors not evaluated which affect the knowledge and attitude toward research such factors were funding opportunity, research infrastructure, and cost of education.

## Conclusion

Knowledge and attitude toward research were average among health science students. There are several factors which associated with barriers from participation in health research. There is a need for further research to explore factors associated with barriers to participation in health research. Furthermore, its need to revise the curriculum which should be robust in health research which demands of the community.

## Authors' Contributions

MZ and AK conceived and designed the study. AK, AF, RF, and WS administered questionnaires. AK, AF, and MZ managed analyzed and interpreted data. MZ prepared the manuscript. All authors approved the final manuscript.

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