Original Article

Assessment of the research-oriented knowledge, attitude and practice of medical students and interns of the King Abdulaziz University, Jeddah and the adoption of a research-intervention educational program

Nahla Khamis R. Ibrahim[1,2], Dina M. Fetyani[1], Jamil Bashwari[1]

[1] Departments of Family and Community Medicine, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia
[2] Department of Epidemology HIPH, Alexandiria University, Egypt.

ABSTRACT

Objectives:To determine knowledge, attitude and practice of medical students and interns towards research, to identify factors affecting research knowledgeand to improve research knowledge among a group of new graduates through a research methodology educational intervention course.
Methodology: Both cross- sectional study and intervention educational program were conducted in King Abdulaziz University, Jeddah in 2012. A total of 260 medical students and interns were selected usingmultistage stratified random sample. A pre-constructed,confidential, validated, self-administered questionnaire inquiring about research's knowledge, attitudes and practice was used. Pre-test and Post-Test assessment were done for 33 newly graduates.

Results: The cross-sectionalstudy revealed that knowledge about research was generally low. Study participants who received research training and conducted researches had significantly higher knowledge score compared to others (p<0.05). Positive research attitude was present. Regarding practice, 38.1 % of medical students and interns participated in researches and 5.8 % published a scientific paper. Marked improvement of mean knowledge score occurred after the educational program (p<0.001).
Conclusions: Low knowledge, positive attitudes and fair practice prevailed from the cross-sectional part. Intervention program was successful in improving research knowledge. (Rawal Med J 2013; 38: 432-439).
Key words: Knowledge, Attitude, Practice, Research, Medical students, Intervention.

INTRODUCTION

Medical teaching aims to develop attitudes and behaviours that provide professional competence of future physicians.[1]To carry out our daily work, as professionals, we must conduct a certain amount of research[2,3] with adequate knowledge of the essentials of research, medical students are not only more likely to read research but also more likely to understand it.[4] Research is an extremely crucial element for improving the health care and plays a crucial role in the medcial development.[5,6] Becoming a consumer of research should be a goal for all medical students and graduates.[4] Research training is a vital constituent of medical education, and an essential exercise to help in developing physicians' research skills.[3,7-10] Many skills as critical thinking and communication skills are vastly enhanced as a result of participation in research.[5,6]

Equipping students in different healthdisciplines with information and skills essential for efficient research will not only enable them to createresearch that responds to their communities' needs, but also can be useful in attracting more economic support from research agencies, industry, government agencies and the public.[8] Studies have shown that research experiences during medical school are strongly associated with post-graduate researches and future medical career achievements.[2,7,8,11]
The development of research capacity is crucial at both individual and institutional levels.[12] Goto, et al conducted research training at Universities in Vietnam and reported that training was a Valuable and sustainable approach.[13] Scanty comprehensive epidemiological studies have been done to assess knowledge, attitude and practice of

medical students and interns about research, especially in Jeddah.So, such a study was urgently needed. The aim of this study was to determine knowledge, attitude and practice regarding research, to identify factors affecting research knowledge among medical students and interns and to improve research knowledge through implementation of a research methodology training course for a group of new graduates from King Abdulaziz University, Jeddah.

METHODOLOGY

The study was conducted in two phases during 2012. The first phase was done through a cross-sectional study. It included medical students who completed the freshman year (Second – sixth year) and interns. Multi-stage stratified random sample method was used and putting into consideration both the gender and the educational year. The students' sample was calculated with the following equation:[14]

$$[(Z^2 XpXq) / d^2].$$

As the previous prevalence of knowledge, attitude and practice regarding research among medical students in Jeddah is unknown,the prevalence was considered to be 0.5, q=1-p=0.5 & the value of 0.06 was chosen as an acceptable limit of precision (d). At 95% confidence limit the calculated size was 266.

In the first phase of the study, the cross sectional study, a pre-designed, validated, confidential, anonymous, self-administered questionnaire was used. Estimation of internal consistency reliability was calculated by Cranach's alpha.

The questionnaire was used to collect personal, socio-demographic data and information about receiving previous research courses or training. Knowledge about research was assessed through10 Multiple Choices Questions (MCQs) inquired about the components of a research,hypothesis, objective, sampling, pilot study, methodology, clinical trials and the results section. Student's self- reported practice was inquired by asking about his/her participation in research, conduction of research, publishing a scientific paper and/or research presentation. Participants were also asked to give scores using a 3 points Likert scale on statements of their perception concerning their attitudes towards research, obstacles for conduction of research and suggested solutions for improving research conduction. Available opportunities for enhancing students' research were also inquired.

The second phase aimed at increasing knowledge of a group of new graduates about research. A workshop was organized on research methodology for 40 newly graduated students; to prepare them for post-graduate study. After the invitation to participate in the research, 33 new graduates agreed to participate in the study and complete bothPre and Post-tests. The participants attended training workshops for 4 weeks, from May to June 2012. It was done in 16 sessions; 2 hours/session with a total of 32 hours. Implementation and evaluation of the research methodology educational program was done through its 3 basic pillars pre-test, delivery of the intervention and the post-test. In Pre-test assessment, participants completed a questionnaire consisting of 10 questions with multiple-choice questions to assess knowledge about research. The workshop was delivered through interactive presentations with opportunities for questions and discussion. The participants were divided into working groups (4- 5 participants/group). In Post-test, the same questions as pre-test were completed at the end of the program. The research was carried out in compliance with the ethical principles of Helsinki Declaration, 1975.

The study protocol was assessed and approved by the Institutional Review Board of the Faculty of Medicine, King Abdulaziz University Hospital, Jeddah, KSA.

An informed consent was taken from each student. Statistical analysis: Analysis of data was done with SPSS version 16.(SPSS Inc, Chicago, Ill.,USA).[15] For calculation of knowledge score, each knowledge item obtained a score of "1" for the correct answer and "0" for wrong or do not know answers. A total score (of 10 grades) was calculated and was then divided into:

Poor score < 5, fair score: 5 - < 7 &
Satisfactory score ≥7.

Chi-square test was used to determine the association between the association between the outcome variable (knowledge about research) and the variables related to study participants.

Fisher's exact test was used if any of the cells has expected count less than 5.
The paired t-test was used for comparison between mean students' total knowledge before and after the intervention program. Paired x^2 (McNemar's test) was used to compare proportions of different knowledge scores (poor, fair and satisfactory) before and after the program. A p <0.05 was considered statistically significant.

RESULTS

Analysis of the cross-sectional part showed that the participants' response rate was 97.7%.
Their ages ranged from 19-27 years with a mean of 21.1±1.4 years. Regarding the fathers' occupation, more than half (51.9 %) of students' fathers had a professional career while more than one-third of the students'mothers had the same career (38.8 %).
Regarding the intervention study, the age group of participants ranged from 23-28 with the mean of 25.21±1.5 years. A total of 33 participants completed both the pre-test and post tests; with a response rateof 82.5 %.

Table 1: Responses of participants to different knowledge questions.

Questions	Correct answers		Wrong and Don't know answers	
	No.	%	No.	%
Components of a scientific research	89	34.2	171	65.8
Contents of abstract	87	33.5	173	66.5
Average number of words in abstract	35	13.5	225	86.5
Definition of research hypothesis	97	37.3	163	62.7
Sample must be reprehensive	30	11.5	230	88.5
Objective of a research	95	36.5	165	63.5
Uses of a pilot study	28	10.8	232	89.2
Contents of methodology section of a research.	50	19.2	210	80.8
Characteristics of a good clinical trial	98	37.8	162	62.3
Composition of result section of a research	28	10.8	232	89.2

Only about one- third of participants answered correctly on questions about the components of a scientific research (34.2 %), contents of the abstract (33.5 %), definition of a scientific hypothesis (37.3 %), objective of the study (36.5 %) and the characteristics of a good clinical trial (37.8 %). On the other hand, only about one- tenth of the sample knew the average number of words in an abstract (Table 1).

Table 2: Relationship between research knowledge and the studied variables.

Knowledge score Variable	Poor		Fair		Satisfactory		X	P
	No.	%	No.	%	No.	%		
Gender:								
Male	49	81.7	9	15	2	3.3	0.110	0.94
Female	167	83.5	27	13.5	6	3		
Age:								
< 22	123	80.9	25	16.4	4	2.6	2.229	0.32
≥ 22	93	86.1	11	10.2	4	3.7		
Educational level								
Students	183	82.8	33	14.9	5	2.3	4.44	0.108
Interns	33	84.6	3	7.7	3	7.7		
Type of high school:								
Governmental	145	85.8	20	11.8	4	2.4	2.633	0.26
Private	71	78.0	16	16.6	4	4.4		
Received training in research:								
Yes	58	78.4	10	13.5	6	8.1	8.79	0.01*
No	158	84.9	26	14	2	1.1		
Conducted a research:								
Yes	77	7.8	15	15.2	7	7.1	9.03	0.01*
No	139	86.3	21	13.0	1	0.6		
Presented a research in a scientific conference:								
Yes	22	68.8	6	18.8	4	12.5	12.1	0.002*
No	194	85.1	30	13.2	4	1.8		

* Presence of statistical significant difference

Calculating the total knowledge score revealed that knowledge about research was generally low among medical students and interns. The mean score on the knowledge test was 2.44±1.96 on 10 knowledge questions. The majority of the medical students and interns (83.1 %) obtained poor knowledge score. While only 13.8 % and 3.1 % obtained fair and satisfactory knowledge scores, respectively.

Table (2): Attitudes of medical students & interns towards research.

Level of agreement / Statement	Agree		No opinion		Disagree	
	No.	%	No.	%	No.	%
Undergraduates should participate in researches	219	88.0	18	7.2	12	4.8
Undergraduates can carry out a research and write a paper	176	70.7	42	16.9	31	12.4
Conduction of research is difficult	153	61.4	56	22.5	40	16.1
Importance of studying compulsory research methodology course	196	78.7	32	12.9	21	8.4
I feel confident in interpreting and writing papers	88	35.3	62	24.9	99	39.8
Research is useful for my future profession	214	85.9	28	11.3	7	2.8
Research conduction secures better residency positions	181	72.7	63	25.3	5	2.0
Research conduction secures better chance for taking postgraduate programs	201	80.7	44	17.7	4	1.6
Research conduction help in selection of future specialty	188	75.5	42	16.9	19	7.6
Research is essential for improving health care	223	89.6	22	8.8	4	1.6
Research improves patients' care	211	84.7	29	11.7	9	3.6
Research promotes critical thinking	197	79.1	43	17.3	9	3.6
Research improves searchingskills	221	88.8	21	8.4	7	2.8
Research improves communication skills	190	76.3	44	17.7	15	6.0
Research improves critical appraisal skills	193	77.5	52	20.9	4	1.6
Research improves independent learning ability	218	87.6	25	10.0	6	2.4

N.B. Each question was separately asked. 11 Students missed these question, total 249 fill them

Those who received research training and those who previously conducted researches or presented a research in local or international conferences had significantly ($p < 0.05$) higher research knowledge score compared to others There were no statistical significant differences ($p > 0.05$) between knowledge score about research and participants' age, level of education, gender & the type of high school (Table 2). The majority of the participants agreed that the undergraduate medical student should participate in researches (88.0 %) and can carry out a research (70.7 %). Most of the students and interns approved that research is useful for their future career (85.9%), for securing better residency (72.7%) and for a better chance for postgraduate programs (Table 3).

Most of the students and interns agreed on that the main barriers to students' researches are lack of training (76.7 %), lack of time (74.3 %), heavy educational or clinical load (69.5 %)and lack or insufficient mentorship (Table 4).

Table (5) demonstrates the suggested solutions for solving obstacles to research conduction. Most of the participants agreed that provision of more research projects (74.1 %), research training (79.8 %), engaging medical students in mentored research (78.1 %) and provision of mandatory courses on research methodology (71.7 %) are the main solution (Table 5).

Table 4: Perceptions regarding barriers against students' research.

Level of agreement / Statement	Agree		No opinion		Disagree	
	No.	%	No.	%	No.	%
Lack of research training	191	76.7	38	15.3	20	8.0
Lack of time for research conduction	185	74.3	46	18.5	18	7.2
Heavy load (educational or clinical)	173	69.5	57	22.9	19	7.6
Financial constraints	140	56.2	86	34.5	23	9.3
Lack of interest in research	136	54.6	56	22.5	57	22.9
Lack of motivation	152	61.0	67	26.9	30	12.1
Lack of time for conduction of research	185	74.3	46	18.5	18	7.2
Lack of mandatory courses on research methodology	164	65.9	64	25.7	21	8.4
Lack of compulsory community projects	152	61.0	73	29.3	24	9.7
Lack of statistical support	176	70.7	57	22.9	16	6.4
Lack of (insufficient) mentorship	152	61.0	76	30.5	21	8.5
Lack of interpersonal communication	137	55.0	84	33.7	28	11.3
Lack of incentives for research	125	50.2	111	44.6	13	5.2

N.B. Each question was separately asked. 11 Students missing these question, a total 249 fill them

Regarding self-reported practice, the study revealed that 28.4 % of the study the sample received previous research training. Two-fifths (38.1 %) of medical students and interns participated in researches, 12.3 % presented their research at a scientific conference and 5.8 % published a scientific paper in a medical journal (Fig 1).

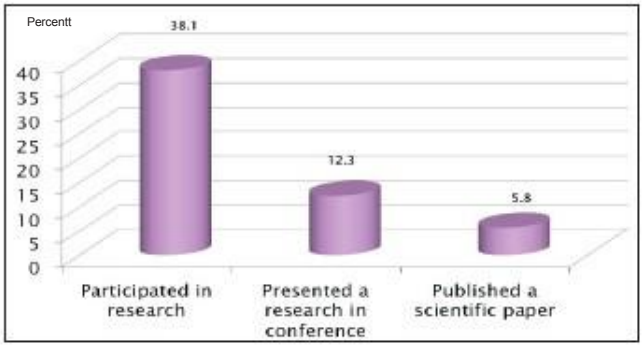
Table 5: Perceptions regarding suggested solutions for improving research.

Level of agreement / Statement	Agree		No opinion		Disagree	
	No.	%	No.	%	No.	%
Provision of more research projects	185	74.3	52	20.9	12	4.8
Provision of more research training	199	79.9	36	14.5	14	5.6
Provision of mandatory courses on research methodology	179	71.9	47	18.9	23	9.2
Engaging medical students in mentored health research	195	78.3	43	17.3	11	4.4
Boosting more funds for research	168	67.5	71	28.5	10	4.0
Targeting medical students to research early	175	70.3	45	18.1	29	11.6
Provision of community projects	156	62.7	76	30.5	17	6.8
Conduction of more students' conferences	189	75.9	47	18.9	13	5.2
Conduction of research methodology workshops	199	79.9	44	17.7	6	2.4

N.B. Each question was separately asked. 11 Students missing these question, a total of 249 fill them

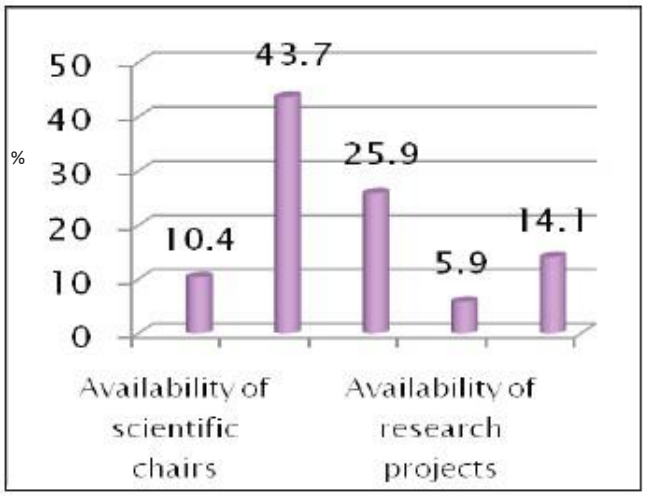
Figure 2 illustrates that 43.7 %, 25.9 %, 10.4 % and 5.9 % of the students and interns said that availability of research groups, workshops, scientific chairs and research projects are the available opportunities for facilitating conduction of researches, respectively.

Figure 1: Participation, presentation and publishing scientific researc



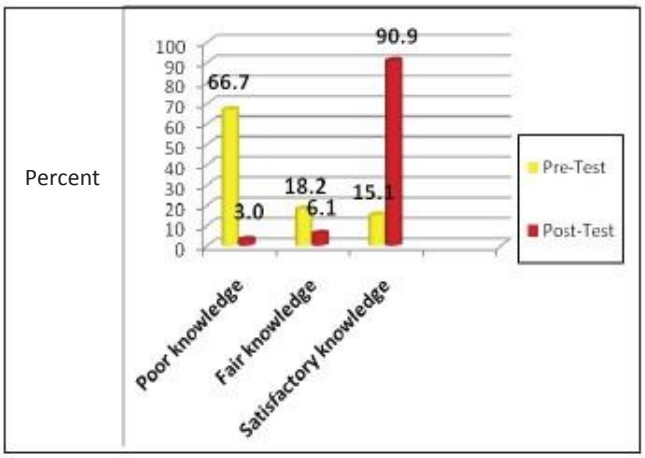
After finishing the workshop on research methodology, the vast majority (93.9 %) of them said that it was a valuable and enjoyable experience which provided them with many research knowledge and skills.

Figure 2: Opinion regarding opportunities available for conducting research.



In the Pre-test, two thirds of participants (66.7%)got poor knowledge score.This percentage markedly declined to reach only 3% after the program (Fig 3). On the other hand, the percentage of satisfactory scores was noticeably enhanced from 15.1% to 90.9 % in the Pre and Post-tests, respectively with a statistically significant difference (McNemar test= 39.03, P < 0.001).

Figure 3: Level of students' knowledge about research before and after the research methodology educational program. McNemar test = 39.03, P < 0.001



The mean participants' knowledge score in the Pre- Test was 3.91 ±2.42 (on 10 questions). Obvious enhancement was observed after the intervention program. Their mean score reached8.82±1.59 in the Post-test (paired t-test: 11.37, $p<0.001$). During the workshop, the participants prepared 7 research proposals and presented a brief summary of these proposals at the end of the workshop.

DISCUSSION

Research experience is invaluable to the physician's evidence-based practice. [9] Results of the cross-sectional part of the present study revealed that the majority of medical students and interns obtained low research knowledge score with a mean score of 2.44±1.96 on the pre-test.This score is lower than the score obtained from Zagreb University, Croatia, where students' average knowledge score was 3.2±1.7 on 8 questions.[2] A study from the Aga Khan University, Pakistan, found that medical students had a moderate level of knowledge about research. [9] Our study showed that there is a statistical relationship between knowledge about research and previous research training. This coincides with results of Sabzwari, et al [5] from a study among junior faculty members of Pakistani medical universities. Owing to the benefits of researches, it is not Surprising that the majority of medical students and interns in the current study had positive attitudes towards research and they agreed that research isbeneficial for their future career. This result is in accordance with results reported from other studies.[16-18] Research not only improves medical information, but also keeps physicians in touch with revolutions in their field and encourages better communication. [19] Our study revealed that the majority of the sample agreed that research improves their communication skills and critical thinking, as shown by others.[5] Undoubtedly, research in general practice is crucial for the improvement of patient care outcomes [18,20]
Student research is not without problems. Good mentorship is an essential component of the successful undergraduate research, while insufficient mentoring can lead to discontentment.
Other problems include lack of time, neglect of routine studies, and inadequate project management.[20] Our study showed that lack of mentorships, limited time and inadequate funding were the major obstacles to conduction of research, as reported by other studies.[9,16-18]
In the current study,the medical students and interns for improving students' research activities suggested several solutions.It included conduction of research methodology training workshops, integration of research methodology mandatory courses into the undergraduate curriculum, engaging students in mentored research projects, boosting more funds for students' research and conduction of more students' conferences. These concur with the suggestions of students from Alexandria's study. [17]

Regarding the practice, our study showed that 38.1% of medical students and interns participated in researches which coincides with results of Sabzwari et al. [5] On the other hand, the current results are better than those reported from Aga Khan University,[9]
where only 26.9 % of post graduates had previously participated in research. The current results are also better than those reported from India[21]where only 9 % of interns reported their previous research experience during medical school.
It is crucial that medical students appreciate the role of research and submit articles for publication.[16]Our results showed that 12.8% of the study population presented papers in scientific conferences and 5.8% of them published a paper in a scientific journal. These rates are lower than the rates reported from a UK study. [16] This difference may be attributed to involving of British students in research or audit project since early phase of their medical education.
Results of the intervention part of our study Revealed that there was marked improvement in the participants' knowledge score after conduction of the program. Few other studies have addressed the knowledge gains after intervention. [21] The Aga Khan study reported that workshops about research skills potentially improved research knowledge. [9] The vast

majority of participants in the current study said that the workshop was valuable and enjoyable experience and provided them with knowledge and skills. Thisagrees with studies from India [21,22] Croatia [2,3] and Alexandria. [17]

CONCLUSION

The knowledge about research was generally low among medical students and interns. On the other hand, positive attitudes towards research were present. Overall, the vast majority of participants considered research helpful for their profession. About two-fifths of medical students and interns participated in researches, while 5.8% published a scientific paper. The training workshop was very successful in improving participants' knowledge about research.The knowledge of the target population was markedly improved after the educational intervention program. Early provision of mandatory and elective courses on research methodology, summer courses on research, good mentorship, graduating research projects, more funds for students' researches, more students'conferences, workshopsand research training are recommended.

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Conception and design: Nahla, Dina, Jamil
Collection and assembly of data: Nahla, Dina,
Analysis and interpretation of the data: Nahla, Dina,
Drafting of the article: Nahla, Dina, Jameel
Critical revision of the article for important intellectual content: Nahla
Statistical expertise: Nahla
Final approval and guarantor of the article: Nahla
Corresponding author email: nahlakhamis@yahoo.com
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