

Perceptions, attitudes and practice on scientific research of final-year medical students: a cross-sectional study

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ABSTRACT

Scientific research is the foundation of progress in technology and medicine, but the number and quality of researchers in the medical field are decreasing. Medical students' perceptions, attitudes, and practices toward scientific research must be considered. This study was conducted to assess the perception, attitude, and practice of scientific research of medical students; as well as to determine the correlation between these factors. A cross-sectional study was implemented on 508 final-year students belonging to four medical major groups at Da Nang University of Medical Technology and Pharmacy, Vietnam. The questionnaire included two parts: general characteristics, and students' perceptions, attitudes, and practice towards medical research. Data were analyzed using SPSS 20.0, with the descriptive analysis used for variables, and Pearson correlation was calculated to assess the relationship between perception, attitude, and practice contents. The study found that students have a positive perception (4.11 ± 0.64) and attitude (3.88 ± 0.54) towards scientific research, while the average score of scientific research practice was not high (3.71 ± 0.70). In addition, students with positive perceptions had good attitudes and practices of scientific research ($P < 0.05$), and the better the attitude, the better the practice of scientific research ($P < 0.01$). Motivating medical students to do research plays a key role, therefore, medical universities should consider providing training programs that focus on developing the perception, attitude, and efficient capacity of all students. In addition, the idea of a medical research volunteer program to support students in scientific research should be considered for implementation.

Keywords:

attitudes, perception, practice, medical students, science research

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INTRODUCTION

Scientific research is the foundation of progress in technology and medicine. With the consistent and diverse development of the medical field, one of the important issues for healthcare professionals is to update technological advances, as well as understand and create additional research in the field of practice, which improves the effectiveness of patient care.¹ In addition, Atta Elmannan et al. indicated that the important issue for healthcare practitioners was to have the necessary skills and competencies to review the literature and critically evaluate research evidence before applying it to treatment and patient care activities². Scientific research will play a role in addressing the above requirement. However, the reality shows that the number and quality of researchers in the medical field are decreasing.² Medical students are considered to have the potential to become future researchers and therefore scientific research training should be emphasized during their school years.²

However, implementing a scientific research topic for students is an arduous process. Another reality is that universities can train thousands of students, but the number of students participating in scientific research is minimal. This problem has created many concerns about developing training programs to support and encourage students to have early exposure to research in medical and pharmaceutical schools to promote student research activities and fill the gap in the number of scientific researchers in the medical field in the future.³

Exposure to health-related research topics has been recognized as an important activity in modern medical education at universities. There have been numerous studies in different countries that have assessed students' perceptions, attitudes,

and practices toward medical research at the undergraduate level.^{4,5} It has been reported that medical students' involvement in research activities will enable them to acquire research skills, thereby improving patient care.⁵ Another study by Funston et al. found that, of the 1625 responses collected from 38 countries, less than half of medical students believed that their medical schools provided opportunities for them to participate in mentored research topics.⁶ In addition, in a study by Vodopivec et al. assessing the knowledge and attitudes of medical students towards scientific research in Croatia, the results of the study showed that students expressed a positive attitude towards research.⁷ While other studies found that students have inadequate knowledge about research and were not aware of its importance, leading to significantly limited motivation to participate in research.^{2,3,8} In addition, a lack of time for scientific research activities is a barrier frequently mentioned by many students in various studies.^{1,5,6,9} Specifically, 59.8% of medical students across different specialties in Osman's study reported a lack of time for research, while a similar result was found in Alaa's study, with 53.3% of students unable to find sufficient time to engage in research.⁵ Moreover, some barriers related to the educational infrastructure, such as the lack of time among faculty members to support and mentor students¹⁰, the inadequacy of the curriculum design and research methodology courses^{1,2}, and the lack of funding⁵, were also identified as factors influencing students' motivation to engage in scientific research.

In Vietnam, under the influence of the evidence-based practical training trend in the world, most medical schools have made efforts to encourage students to participate in research through competitions, scientific research conferences, or selecting students with outstanding academic

achievements to conduct graduation theses. However, the assessment of perception, attitudes, and scientific research practices of undergraduate medical students towards scientific research activities has not been found in any recent studies.

Therefore, we conducted a study to assess the perception, attitude, and practice of scientific research of medical students; as well as to determine the correlation between these factors. These findings will contribute to the identification of gaps in the scientific research activities of students and propose methods to improve the quantity and quality of research conducted by students.

METHODS

Study design

A cross-sectional study was conducted in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement (<https://www.strobe-statement.org/>).

Setting

The study was conducted among all final-year students across all majors at the Da Nang University of Medical Technology and Pharmacy from August 2023 to June 2024. Here, the duration of the training program for students ranges from 4 to 6 years, depending on their major. Allocating time to teach research knowledge and skills is an important aspect of all training programs, aimed at enabling students to participate in research and rigorously evaluate scientific evidence for clinical decision-making and care. Starting from the second year, students are taught research principles and design through the Epidemiology course. The entire third year is dedicated to data collection and analysis, with each student group required to submit a research report of one study that they conducted during the course for the final evaluation of the Scientific Research course. For final-year students, those with

excellent academic results can register to write a graduation thesis. This activity is considered an opportunity for students to apply and demonstrate their research knowledge and skills, and it also serves as a foundation for their future research activities as official healthcare professionals. The final thesis score contributes up to 20.0% of the total final grade of the course. In addition to courses supporting scientific research, the university currently organizes an annual Student Scientific Research Conference. Here, students are required to present their individual or group research results, and awards are given for outstanding research projects.

Participants

A total of 508 final-year students at Da Nang University of Medical Technology and Pharmacy, Vietnam, were included in this study using the census sampling method. Participants were informed about the research purpose and provided with comprehensive details before giving their consent to participate. They were also assured that they could withdraw from the study at any time without needing to provide any explanations.

Study measurement

A three-part questionnaire was used in this study. The first part collected general information on participants' gender, age, major, GPA from previous years and students' research experience. Students' research experience refers to the hands-on involvement in scientific or academic research where students contribute to research related tasks.

The second part was the scale for assessing perception, attitude, and practice towards medical research which was developed by El Achi and colleagues (2020).¹⁰ This scale consists of 12 closed-ended questions and is divided into 3 subscales: Perception (3 items), Attitude (5 items), and Practice (4 items). Each item is rated on a 5-point Likert scale from 1 to 5

(1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). The score for each subscale of Perception, Attitude, and Practice is calculated from the average score of the questions in that subscale. A higher average score indicates better attitudes, knowledge, and practices among students, and vice versa. Additionally, we categorize students' responses to questions related to attitude, knowledge, and practice into positive and negative answers. For statements supporting scientific research (e.g., "Scientific research is very interesting"), positive answers correspond to strongly agree, agree, or neutral, while negative answers correspond to strongly disagree or disagree. The opposite applies to statements not supporting scientific research (e.g., "Scientific research is time-consuming").¹⁰

After obtaining permission for use, the second part of the questionnaire was translated into Vietnamese using the back-translation technique by Cha et al., 2007.¹¹ Before using it in the study, the Vietnamese version was tested for reliability in a pilot study involving 30 final-year students. Specifically, the perception, attitude, and practice in the scientific research questionnaire had a Cronbach's alpha score of 0.85 entirely, and for the subscales: Perception at 0.92, Attitude at 0.89, and Practice at 0.89.

Bias

Data were collected from the entire population to minimize selection bias. To reduce measurement bias, the instruments' validity and reliability were assessed through a preliminary study before being used with the full sample.

Study sample size

A software named G*Power ver. 3.1.9.4 (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany; <http://www.gpower.hhu.de/>) was used for the measurement of sample size in this study. In the case of the correlation test, the input was a one-sided analysis, the effect size was 0.2, the α error probability was 0.05, and the power was 0.8. After putting these parameters into the software, a total of 153 students was suggested as a minimum sample size. However, the researcher has chosen an entire population of 508 students as an actual sample size to enhance the generalizability of the study findings.

Statistical method

Data were analysed using SPSS version 20.00 with an alpha level of 0.05.

Descriptive analysis was performed to report the distribution of demographic variables, the research perception, research attitude, research practice by frequency, mean (M), and standard deviation (SD). Pearson's product-moment correlation was calculated to assess the relationships among research perception, research attitude and research practice.

RESULTS

Participant's characteristics

The study participants had an average age of 21.73 years (SD=1.10), with 79.1% being female. Most participants were nursing and medical students, accounting for 25.6% and 17.3%, respectively. About 64.2% of the students had a GPA in the previous years classified as 'Good.' Among the 508 students who participated in the study, 9.4% had research experience, only 1.0% had published research, and 8.3% had presented research findings (see Table 1).

Table 1. Participant's characteristics

Contents	N	%
Age	Mean (SD): 21.73 ± 1.10	
Sex	Male	106
	Female	402
Major	Medical students	88
	Pharmacy	85
	Nursing	220
	Medical technology	115
GPA	Out standing	8
	Excellent	111
	Good	326
	Average	63
Research experience	Yes	48
	No	460
Having a published research article	Yes	5
	No	503
Participated in research presentation	Yes	42
	No	466

GPA= Grade Point Average

Research perception, attitude, and practice of medical students

The results showed that students had a positive perception of scientific research, with a relatively high average score (4.11±0.64). Additionally, most

students agreed that scientific research helped enhance knowledge, stimulated critical thinking, and allowed them to discover personal prospects, with average scores of 4.20±0.71, 4.18±0.73, and 3.95±0.76, respectively (see Table 2).

Table 2. Research perception, attitude, and practice of medical students

Contents	Positive answer (%; N)	Mean (SD)	Range
I. Research perception		4.11 ± 0.64	1 – 5
Enhances critical thinking	97.6 (496)	4.18±0.73	1 – 5
Enhances career prospect	96.5 (490)	3.95±0.76	1 – 5
Enhancing knowledge	98.2 (499)	4.20±0.71	1 – 5
II. Research attitude		3.88 ± 0.54	1 – 5
Time consuming	100 (508)	4.03±0.67	1 - 5
Exciting	95.5 (485)	3.77±0.76	1 – 5
Complicated	100 (508)	4.21±0.66	1 – 5
Enjoyable	89.6 (455)	3.45±0.83	1 – 5
Valuable	97.8 (497)	4.23±0.74	1 – 5

Contents	Positive answer (%; N)	Mean (SD)	Range
III. Research practice		3.71 ± 0.70	1 – 5
Willing to spend > 2 months for joining research	91.7 (466)	3.63±0.86	1 – 5
Willing to take part in any research related task	94.9 (482)	3.81±0.79	1 – 5
Willing to devote the same thing to medical research as their university studies	94.3 (479)	3.71±0.79	1 – 5
Willing to take part in a medical research project even if it does not lead to a publication	94.1 (478)	3.68±0.80	1 – 5

Students exhibited a positive attitude towards research, with an average score at a moderate level (M=3.88; SD=0.54). Specifically, 100% of the students agreed that scientific research was complex and time-consuming (4.21±0.66; 4.03 ± 0.67). However, 97.8% of the students also believed that scientific research was valuable (M=4.23; SD=0.74).

However, the average score for research practice was not yet high (M=3.71; SD=0.70). Among these, students had participated in research activities (94.9%, M=3.81; SD=0.79), and the time they dedicated to research was similar to the time spent on academic activities (94.3%, M=3.71; SD=0.79), which has the highest participation rate and average score.

Impact of perception, attitude on the practice regarding scientific research among medical students

Table 3. Relationships between perception, attitude and practice toward science research of medical students

Contents	Research perception	Research attitude	Research practice
Research perception	1		
Research attitude	0.648**	1	
Research practice	0.466**	0.499**	1

** $P < 0.001$

Table 3 shows the association between research perception, research attitude and research practice. Significantly, there were positive and moderate relationships between research practice and research perception and research attitude ($r=0.466$ and $r=0.499$; $P < 0.001$). The relationship between research perception and research attitude

was positive and high with $r=0.648$ ($P < 0.001$).

DISCUSSION

The importance of integrating scientific research training into medical curricula has been widely discussed in studies around the world. Various methods

have been used to engage medical students in scientific research topics, however, their perceptions, attitudes, and practices regarding scientific research still need to be assessed.

Our study found that students had a positive perception of scientific research, with a relatively high average score (4.11 ± 0.64). Additionally, the majority of students agreed that scientific research helped enhance knowledge, stimulated critical thinking, and allowed them to discover personal prospects, with average scores of 4.20 ± 0.71 , 4.18 ± 0.73 , and 3.95 ± 0.76 , respectively. This result was similar to the study of El Achi et al. (2020), however, for each item, the score in El Achi et al.'s study was higher.¹⁰ The difference in the rate of positive responses is because most of the subjects in El Achi et al.'s study have been supported or were participating in research projects under the Medical Research Program for students from the first year, so students understand the importance and role of scientific research in their future career fields.¹⁰ This also shows the importance of building and implementing programs to support or accompany students' scientific research activities at universities. This effort will have a great impact on promoting students' awareness of scientific research.

Besides, the study's participants exhibited a positive attitude toward research, with an average score at a moderate level (3.88 ± 0.54). This result is similar to the study of El Achi et al. in Lebanon, and the study of Vodopivec et al. in Croatia.^{7,10} Vice versa, a study by Memarpour et al. indicated that most students had negative attitudes toward participating in scientific research.¹² These differences may be related to differences between countries and students and were also influenced by other factors such as access to courses and scientific research programs implemented for students at universities. In addition, for specific contents, 100% of the students agreed that

scientific research was very complex and time-consuming (4.21 ± 0.66 ; 4.03 ± 0.67). This rate was significantly higher than the results of El Achi et al.'s study, with only 91.3% of students finding scientific research very complicated, and 76.1% finding scientific research time-consuming.¹⁰ Students' exposure to research-related activities can have a positive impact on their views of research.¹³ This observation is consistent with our results, 90.6% of our study subjects said that they had no experience in scientific research, which leads to most students feeling that scientific research is complicated and time-consuming. With the content of assessing students' positive attitudes towards scientific research, the results also recorded that 97.8% of students thought that scientific research is very valuable (4.23 ± 0.74). This result is similar to some previous studies.^{3,9-10,14} The above authors all found that students were interested in research and aware of the usefulness and important role of scientific research for their work as well as their future career development. However, the difficulties, lack of confidence, and anxiety when participating in research have made students' attitudes towards scientific research worse. Therefore, training programs need to increase the number of credits students need to do research, combined with direct support from lecturers to help students reduce these psychological barriers.

Regarding the research practice of medical students, our results showed that the average score was not high (3.71 ± 0.70). Among these, most students had participated in research activities (94.9%, 3.81 ± 0.79), and the time they dedicate to research was similar to the time spent on academic activities (94.3% , 3.71 ± 0.79). This result was higher than the study of El Achi et al.¹⁰ In addition, the study of Alghamdi KM et al. in Saudi Arabia showed that only about half of the students participated in research during their time at

school, although most felt that research was very important in the medical field.¹⁵ This finding is also completely similar to our research results on the positive perception and attitude of students, but the level of practice is not high. This can be explained by the fact that although several different methods have been proposed to attract medical students to participate in scientific research topics, such as encouraging students to participate through sponsored research training programs, scientific research competitions, students participating in research with lecturers, or graduation thesis, however, the high study intensity can affect the positive attitude of students towards participating in research activities. Through this result, medical training universities also need to consider and implement more scientific research activities to promote student participation. In addition, supporting students in developing a study plan combined with scientific research also needs to be paid attention to and implemented early.

In addition, students with a good perception of research have good attitudes and practices toward scientific research ($P<0.01$). This result is similar to the results in the study of Htoo et al. (2018) ($P=0.0003$).¹⁶ Students' perceptions and attitudes towards scientific research were considered a foundation that can help improve the research practices of these health workers in the future.¹⁶ Therefore, in addition to focusing on supporting students in practicing scientific research, training programs need to raise students' perception of the importance of scientific research for their capacity development and their future career requirements. Thereby, helping to promote positive attitudes and students' initiative in participating in programs and activities related to scientific research not only during their study time but also after becoming a real health worker.

Besides, this study found a positive correlation between the attitude and practice of scientific research of medical students ($r=0.499$; $P<0.01$), and this result is similar to some previous studies.¹⁶⁻¹⁷ Specifically, the study of Bin-Ghouth et al. (2023) found that students with good attitudes toward scientific research tend to participate more in research activities, and teaching research methods will improve students' attitudes toward research.¹⁷ In addition, to develop students' attitudes and practice of scientific research, the training program can also integrate the scientific research module with other modules so that students can see the application of research results in professional practice. And it is necessary to simplify the teaching methods used in the scientific research module, not focusing too much on theory, but instead enhancing students' practical research skills.

Limitation

This study found some limitations. First, the study was conducted on medical students at one medical school. Therefore, the findings may not be generalizable to all medical students in Vietnam or those in other countries. Future research will need to include a multi-institutional design to assess the generalizability of the results. Second, only final-year students participated in the study, so some students who participated in scientific research in previous years (although not many) may have been missed. Last, the use of questionnaires allows for a large number of participants to be reached but limits the depth of the study. Therefore, future studies should consider conducting a qualitative component to further clarify the salient personal opinions of the participants.

CONCLUSION

Students have positive perceptions and attitudes toward scientific research, while the average score of scientific research practice was not high. In addition, students' perceptions were positively correlated with scientific research attitudes and practices ($P<0.05$), and the better the attitude, the better the practice of scientific research ($P<0.01$). Motivating medical students to do research plays a key role, therefore the training program at medical schools needs to focus on developing perception, attitude, and efficient capacity for all students. In addition, support and encouragement programs for students to do research need to be implemented as soon as possible and continuously during the time they study. In addition, an idea of a medical research volunteer program to support students in scientific research through research funds from lecturers or medical staff at hospitals should also be considered for implementation. Future studies should consider conducting research at multiple sites and adding a qualitative component to clarify participant opinions and generalize study results.

AUTHOR CONTRIBUTIONS

N.T.Y.H., T.T.H.O.: Conceptualization, N.T.Y.H., T.T.H.O., P.T.T., L.T.T., D.T.N.U.: Data curation, Formal Analysis, Validation, and Writing – original draft, N.T.Y.H., T.T.H.O., P.T.T., L.T.T.: Writing – review & editing: N.T.Y.H., T.T.H.O., P.T.T., L.T.T.

ETHICAL CONSIDERATION

The study was conducted after it was approved by the Medical Ethics Committee of Da Nang University of Medicine and Pharmacy and received approval to allow access to students (approval No. DUMTP-2023-139 dated 01/12/2023). All participants were clearly

informed about the purpose and significance of the study and then, the students who agreed to participate in this study would voluntarily sign the consent form. In addition, students have the right to refuse or stop participating in the study at any time they wish.

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CONFLICT OF INTEREST

There are no conflicts of interest in this study.

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