Interest in research among medical students: Challenges for the undergraduate education

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Summary

Introduction: In recent decades, there has been a reduction in the number of graduates from medical schools who choose to pursue a career in scientific research. That has an impact on the profile of graduates, since medical education depends on understanding the formation of scientific evidence. The construction of new knowledge is also hampered by the reduction of medical scientists, whose clinical experience with patients provides an essential step towards medical science evolution.
Objective: The present cross-sectional study sought to identify the interest in research among medical students from a federal university in southern Brazil.
Method: Medical students from a federal university were asked to respond to a self-administered questionnaire that sought to identify the level of knowledge about the importance of scientific research in medical training, and the interest of this population in this element of their training.
Results: 278 medical students from the first to the sixth year responded to the questionnaire, and 81.7% stated their interest in medical research. However, only 4.7% of respondents considered research as first in degree of importance to their medical training. The variable "interest in research" showed no statistically significant association with age, gender, presence of physicians in the family, or other prior college courses.
Conclusion: Although interest in research is clearly present among the students, this is still an underexplored element among the population studied. The incorporation of research in the learning process depends on stimulus and guidance until it becomes culturally consolidated as an essential element of the medical training.

Keywords: medical schools, biomedical research, medical education, motivation, learning, career choice.

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Introduction

Continued progress in medicine is fundamentally dependent on the training and performance of scientists dedicated to research in the health sciences. Although not limited to such, the participation of medical scientists in research in the medical field represents a valuable contribution, given the clinical orientation of the training given to such professionals. The problem is that even in countries with a renowned calling for science, such as the USA, it is increasingly less common for doctors to decide to focus their careers on scientific activity.[1] A formula that appears to contribute to solving this problem is the early inclusion of these future professionals in the world of scientific research during their academic training. Fur-

thermore, the intersection between studying for medical practice and academic scientific activity allows the future professional to be placed on a path of cooperative participation in the process of constructing their own medical training, contributing to the development of both their clinical and their scientific skills.

The importance of scientific research for the physician goes beyond their direct involvement with this activity. Modern medicine is based on the search for evidence leading to a specific diagnosis and, for this reason, all physicians should know about research in order to understand the process for the formation of evidence.[2] This close relationship is the basis for certain ideas stating that research fundamentals should be presented during the medical student's undergraduate period, and not just as another career option for those who have obtained their MD.

As most students entering medical school are unaware of how scientific research functions and its importance, interest in scientific activity tends to emerge during the course. The factors leading to the emergence of this interest are unknown. However, the influence of a scientific methodology course[3] and the opportunity to participate in scientific research during the entire degree tend to produce more researchers than limited participation during part of the higher education course.[4]

Based on these considerations, this study has the purpose of describing the interest in research among medical students at a federal university in Brazil, aimed at enhancing the educational planning of scientific methodology as subject and discussing its importance to medical training.

Method

This is a cross-sectional study in which a questionnaire was applied to medical students at the Federal University of Health Sciences of Porto Alegre. All students from the first to the sixth year of the course were considered eligible to participate. Participation was voluntary, after an explanation about the research and signing the informed consent form. The project was approved by the institution's Ethics Committee (project number 10-646).

To calculate the sample size, interest in research among freshmen was estimated at approximately 20%, while among graduates this figure might possibly be higher, at 60%. For this difference, considering an alpha of 0.05 and a beta of 0.20, it would be necessary to study 28 students from each course year. A safety margin of 20% was added to compensate for possible losses.

The questionnaire contained questions about: the respondent's stage of the course; what would be the most important item for medical training in the respondent's opinion: practice, theory or research; if they had been in a different undergraduate program previously; if they had had contact with scientific research while in the other course; if there were physicians in their family; if any relative had postgraduate academic titles; if the respondent worked or intended to work with scientific research during the undergraduate program; if they intended to work with scientific research after graduation; if they intended to pursue an academic career; if they had any published scientific studies. Collection of data was held during the academic months of May to September 2011, by supervisors in the scientific methodology course trained specifically for this purpose.

The data was analyzed using a specific statistics program (SPSS for Windows). Tables were made of the absolute frequencies and percentages for characterization of the sample. The continuous variables were described using means and standard deviations, or medians and interquartile ranges. The comparisons between groups were undertaken using chi-squared test, Fisher's exact test, linear correlation, or t-test according to the variables compared. The values considered significant were those with $p<0.05$.

Results

The research population consisted of 278 medical students from the Federal University of Health Sciences of Porto Alegre. The average age of the population was 22.26 years, with a standard deviation of 2.898. One hundred and fifteen (115) participants were male and 163 were female. Students from all six years of the medical course participated, distributed according to the figures shown in Table 1. Most of the participants originate from the state of Rio Grande do Sul. The distribution of origins can be seen in Table 1.

As observed in the data presented in Table 2, 81.7% of the respondents declared they had an interest in research during their training. A percentage of 60.8% stated they had an interest in continuing research activities after graduation, 58.6% stated they had a desire to pursue an academic career and 10.4% declared that they already had a scientific publication.

When asked to rank the importance of the items "research", "theory", and "practice" for the medical training, 4.7% of respondents put research in first place. 77.7% of the sample chose practice as the pillar of greatest importance to their training.

TABLE 1 Demographic characteristics of the population.

Characteristic	Value
Age (years)	22.26±2.898
Gender	
Male	115 (41.4%)
Female	163 (58.6%)
Year	
1st	43 (15.5%)
2nd	45 (16.2%)
3rd	72 (25.9%)
4th	57 (20.5%)
5th	32 (11.5%)
6th	29 (10.4%)
Have you already taken a different undergraduate course?	
Yes	68 (24.5%)
No	210 (75.5%)
Do you have relatives who are physicians?	
Yes	58 (20.9%)
No	196 (70.5%)
Did not respond	24 (8.6%)
Student's state of origin	
Rio Grande do Sul (RS)	191 (68.71%)
São Paulo (SP)	31 (11.15%)
Santa Catarina (SC)	18 (6.47%)
Paraná (PR)	10 (3.6%)
Minas Gerais (MG)	8 (2.88%)
Goiás (GO)	7 (2.52%)
Distrito Federal (DF)	3 (1.08%)
Alagoas (AL)	1 (0.36%)
Espírito Santo (ES)	1 (0.36%)
Mato Grosso do Sul (MS)	1 (0.36%)
Mato Grosso (MT)	1 (0.36%)
Piauí (PI)	1 (0.36%)
Rondônia (RO)	1 (0.36%)
Did not respond	4 (1.44%)
Total	278 (100%)

TABLE 2 Interest in research.

Question	N
Do you work or plan to work with research during your undergraduate program?	
Yes	227 (81.7%)
No	50 (18%)
Did not respond	1 (0.4%)
Do you plan to continue working with research after graduation?	
Yes	169 (60.8%)
No	71 (25.5%)
Did not respond	38 (13.7%)
Do you intend to pursue an academic career?	
Yes	163 (58.6%)
No	110 (39.6%)
Did not respond	5 (1.8%)
In your opinion, which is the most important for medical training: "research", "theory" or "practice"?	
Research	13 (4.7%)
Theory	49 (17.6%)
Practice	216 (77.7%)
Do you have any studies published in a scientific journal?	
Yes	29 (10.4%)
No	247 (88.8%)
Did not respond	2 (0.7%)

The data presented in Figure 1 indicate the variation between the 6 years of the medical course in terms of interest in research during and after the course, respectively.

Considering the variables "research during the undergraduate program" and "interest in research after the course", it was noted that people with an interest during the course also reported that they intend to maintain this interest after they graduate ($p<0.001$). The interest during the undergraduate program variable did not present a statistically significant association with age ($p=0.755$), gender ($p=0.118$), presence of physicians in the family ($p=0.387$) or other prior higher education course ($p=0.314$). Similarly, the variable interest in research after graduation also showed no significant associations with the variables age ($p=0.972$), gender ($p=0.744$), presence of physicians in the family ($p=1.00$) or other prior higher education course ($p=0.115$).

Discussion

In this cross-sectional study with students from all years of the medicine course at the Federal University of Health Sciences of Porto Alegre, it was noted that a large proportion of students is interested in conducting research activities during their training and continuing these activities after the conclusion of the course. More than half of the students want to pursue an academic career. Some of the respondents are already effectively involved in the scientific process, and a significant proportion of undergraduates (around 10%) declared that they already had a scientific publication.

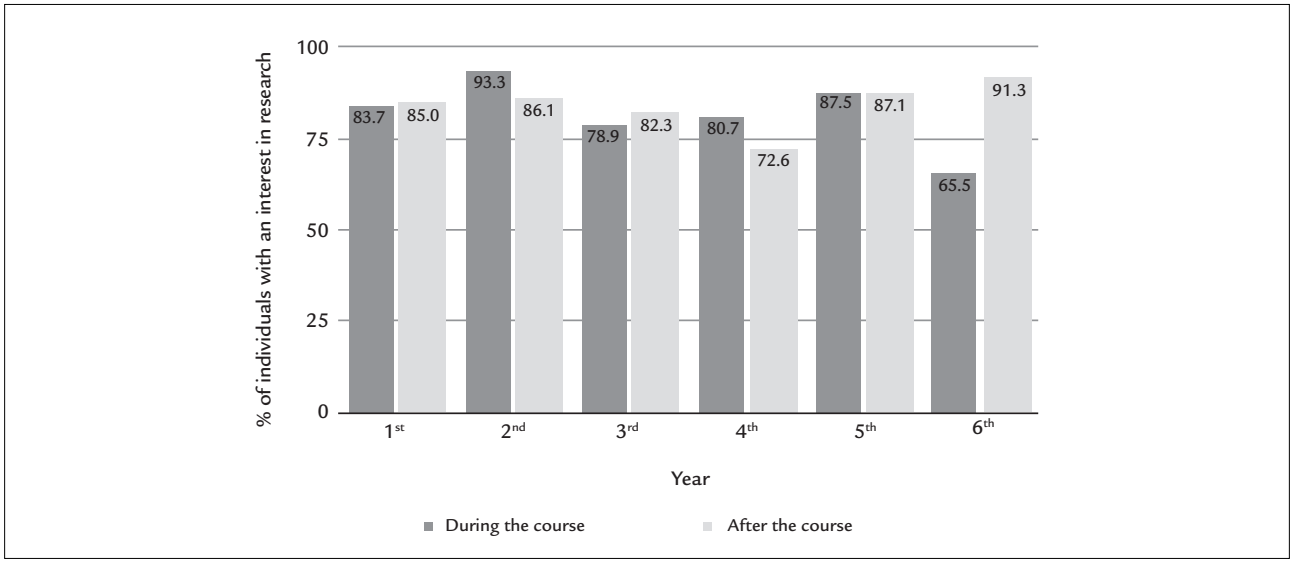

FIGURE 1 Proportion of respondents with an interest in research.

The advancement of scientific studies in the biomedical areas has increased the need to recruit more and more health professionals to the area of research.[5] Preliminary studies demonstrate high levels of interest in research among medical students, with the intention of integrating scientific activity with their curricular activity. However, many of them do not understand the benefits of research during their training period.[6] Despite growing interest over time during the medical course,[3] a decreasing number of new medical researchers have effectively been verified in recent years.[7]

This verification contrasts with the research's findings, which indicate a high level of interest in an academic career among students. This apparent discrepancy may be explained by specific characteristics of the university where the research was conducted. Since the beginning of the process that culminated in the transformation of the Federal University Foundation of Medical Sciences of Port Alegre into the Federal University of Health Sciences of Porto Alegre, in 2008, several other courses in the health area were added to the institution. With the addition of these new biomedical science courses, such as pharmacy, physiotherapy, and nursing, there was a boom in the field of research within the university, with the opening of new, modern research laboratories, in addition to the possibility of dialog and partnerships between various academic courses. This event has probably changed the profile of our medical school graduates, traditionally a professional more inclined to medical practice than research activity, as shown in the studies referenced above.

In the present study, we noted that most of the medical students of the Federal University of Health Sciences of Porto Alegre who responded to the survey stated they had an interest in research activities. The initial hypothesis that estimated interest to the order of 20% among freshmen and interest in 60% of graduating students was not confirmed. Instead, a more equitable and homogeneous distribution was found throughout the course, without significant fluctuations.

We also noted that a portion of the respondents to the survey already had published scientific studies. Depending on the characteristics of certain studies in the health area, some of which were undertaken over a long period of time and therefore sometimes involving a rotating team of researchers, we should also consider that other students who were possibly participating in research projects at the time the questionnaire was applied could have their work published by the end of their undergraduate program, or even afterwards.

Most of the students who participate in scientific studies choose research in clinical areas.[5] Previous studies have already shown that medical students in the first years, who are studying basic sciences, are more eager to participate in clinical trials than students carrying out medical rotations.[8] Payment is also an important motivational factor for research.[5,8]

For Ley and Rosenberg, there are three obstacles for medical students pursuing an academic career: accumulated debts (with student loans); the long training period; and uncertainty of success.[9] From the first factor, we can

derive the urgency of financial independence, in contrast to the second factor, namely the long path required for building a solid academic career. Considering this, clinical practice seems to be justified as a first-choice option, to the detriment of an academic career, which thereby lacks new aspirants. Thus, there is a need for governments and institutions to develop or improve incentive and benefit programs in order to elicit more physicians as candidates for an academic career.

Some medical students consider scientific research crucial for their future medical activity,[6] with 80% of them stating their interest in putting into practice what they learned in their respective study has increased. Better guidance for medical students to conduct scientific studies is also considered crucial, so that they can publish their work and maintain their interest in science.[10] Even those who do not wish to pursue an academic career can benefit from the experience of scientific research in their professional practice given that nowadays professionals who know how to search scientific information and to critically evaluate it are essential.

Analyzing the interest in research seen in the different stages of the medical course, there is a relatively homogeneous and high distribution across all years. This information seems relevant to us, considering that academic research is traditionally an optional and voluntary element in medical training in Brazil, and that the compulsory curricular demands include a high amount of theoretical subjects in the early years, corresponding to the basic and clinical cycles and to mandatory internships, during the internship cycle, during the last years of medical training.

However, the positive data showing the interest in research contrast with the widely known fact that there is a shortage of medical professionals that effectively end up pursuing an academic career. Compared to curricular academic activity, research activity requires proactive effort from the student, as well as greater independence. However, although this independence is a desirable attribute for a researcher, it should be included in a scenario that takes into consideration that the student is still an apprentice and, as such, requires constant direction, especially during their freshman year and while being introduced to research. Therefore, stimulating the emergence of new researchers requires the implementation of affirmative and comprehensive action in order to direct the student at early stages.

Targeted actions have been tested worldwide in order to deal with the declining interest in scientific careers within the medical world. At a faculty of Queen's University in Canada, a study has shown that the inclusion of a compulsory elective subject called Critical Investigation in the students' medical curriculum led to positive results in the motivation of such students in relation to research activities.[7] The results of a similar study at Zagreb University of Medicine in Croatia are in accord, showing that the experience of a compulsory subject, The Principles of Scientific Research in Medicine, led to a positive impact on students' perception in relation to science and scientific research.[11]

In Brazil, similar initiatives have been implemented with the aim of encouraging national scientific production. Examples of this are the Science without Borders and Young Talents for Science programs, both implemented by the Brazilian federal government through its research funding agencies, with the purpose of investing in the creation of future researchers, also in the medical field.

Analyzing the results of our research involving this specific population, the importance given to research for medical training draws our attention, as it has been put in last place on a scale of priorities that also include theory and practice as instruments for training. Only 4.7% of respondents put research in the first place in level of importance to their training. It seems to us that this is in accordance with a technicist trend within medical education,[12-14] in which the incorporation of technology and the ability of the future doctor to understand it have replaced more intuitive medicine focused on medical history, whose investigative process depends more on method than technology. This impression is corroborated by the fact that the vast majority chose practice as the pillar of greatest importance to their training.

An interest in research does not necessarily imply a choice for a future academic career. When considered well, an interest in research means understanding its importance to medical training, which, in addition to technique, is also questioning and investigative. Furthermore, it means considering a commitment to active participation in educational training itself.

Technicist medicine seems to want to dispense with training based on individual discoveries through research in favor of training that enables understanding of ultramodern tests and technicized diagnostics. Here, concern is not for the advent of technology, which is always welcome in order to assist health professionals, but for gradual abandonment in the training of future doctors dedicated to scientific research, which is important not only to universities but also to medical outpatient clinics and individual practices.

During the analysis of the data collected for the research, the data were cross-referenced in order to find

variables that could elucidate the reasons that lead to an interest in research. Among these potential variables, the data relating to an interest in research were cross-referenced with: the gender of the respondent; any previous university degree; the existence of physicians among relatives; and the existence of researchers among relatives. No statistically valid relationship was found in the cross-referencing of the data collected from participating medical students.

The absence of a specific determinant of interest in research reinforces the importance of the issue, given that it implies that occasional factors must be multiple and scattered. It can also be implied that such factors are probably of an essentially individual nature. Thus, a project for encouraging research would also possibly have to operate in a manner that is more personalized to the individual characteristics and demands of the students.

Furthermore, it seems to us that in the diversion away from the career of researcher there is an underlying sociocultural element that identifies the physician mostly as the operator of medicine and less as its developer or instigator. This divergence between clinical practice and investigative practice becomes more and more relevant to the extent in which the benefits of modern medicine, such as genetic and molecular approaches to diseases, require an investigative capacity from the physician within the clinical assessment of such,[15] meaning that advances made by research may cut across the distance between the laboratory and the doctor's office.

Although playing a fundamental role for the initial guidance of those students already inclined toward scientific research, introductory courses specifically aimed at encouraging and focusing on research, such as scientific methodology, do not appear to adequately fulfill the role of stimulating the vocation for research by itself. It seems to us that a change to the content of the subjects in the medical degree, that is, including greater focus on the development of investigative skills, could contribute much to the awakening new scientific vocations among the students.

Limitations of the study

The data were collected using a non-validated, self-applied questionnaire. The sample was comprised of respondents who volunteered to the survey, which in itself may have selected individuals already predisposed to the field of research. However, as the objective of this work was to provide an overview about interest in research, and given that we achieved a number of respondents according to that specified initially in the methodology, these possible limitations do not negate the value of the study's findings.

Conclusion

The study conducted showed that medical students at the Federal University of Health Sciences of Porto Alegre are inclined toward research activity. However, it was not possible to identify which factors hold an influence on this inclination. This circumstance poses a challenge for planning actions focused at stimulating research, and suggests that whenever working on specific aspects is impossible, the approach should perhaps begin with an educational plan directed to research, in which the student is monitored in a serial manner throughout their training, with permanent incentives and the establishment of goals, ranging from an understanding of the importance of the subject up to effective publication of a scientific work.

Resumo

Interesse em pesquisa entre estudantes de medicina: desafios para a graduação

Introdução: nas últimas décadas, diminuiu o número de egressos de escolas médicas que optam por se dedicar à pesquisa científica. Isso tem impacto sobre o perfil dos profissionais formados, já que o aprendizado médico é indissociável da compreensão da formação da evidência científica. A formação de novo conhecimento é prejudicada com a redução de pesquisadores médicos, cujo contato clínico com os pacientes fornece etapa essencial na evolução da ciência médica.
Objetivo: o presente estudo transversal buscou identificar o interesse em pesquisa entre estudantes de medicina de uma universidade federal do Sul do Brasil.
Método: estudantes de medicina de uma universidade federal foram convidados a responder um questionário autoaplicável que buscou identificar o nível de conhecimento sobre a importância da pesquisa científica na formação do médico, bem como o interesse dessa população por esse elemento da formação.
Resultados: 278 estudantes de todas as séries do curso de medicina responderam ao questionário, e 81,7% declararam interesse pela pesquisa científica. Contudo, apenas 4,7% dos entrevistados consideraram a pesquisa em primeiro lugar em grau de importância para a sua formação. A variável "interesse em pesquisa" não apresentou associação estatisticamente significativa com idade, gênero, presença de médicos na família ou outro curso superior prévio.

Conclusão: embora o interesse em pesquisa esteja claramente presente entre os estudantes, este é um elemento da formação ainda pouco explorado pela população estudada. A incorporação da pesquisa na rotina do aprendizado depende de estímulo e orientação até que esteja culturalmente consolidada como matriz essencial da formação.

Palavras-chave: escolas médicas, pesquisa biomédica, educação médica, motivação, aprendizagem, escolha da profissão.

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