Original article

Scientific production of medical school students at a private institution: a cross-sectional study

Produção científica dos discentes do curso de medicina de uma instituição privada: um estudo transversal

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ABSTRACT | INTRODUCTION: Although it is guaranteed by the National Curricular Guidelines for the medical course, the incentive for scientific production is not seen in practice in most private universities in Brazil. **OBJECTIVE:** Quantify the scientific production of students based on the mandatory curricular component in the practice of research in the Medicine course at a private institution in Lauro de Freitas, Bahia. **METHODOLOGY:** This is a cross-sectional study. Data collection was carried out using an online questionnaire, via the Google Forms® platform. Medicine students who had completed the full workload of the mandatory curricular component were included, and the students' scientific production and research experience were evaluated. **RESULTS:** 100 students answered the questionnaire, the majority of whom (96%) have Curriculum Lattes, but only 28 periodically updated it. All participated in events and/or congresses, 27 presented scientific work in the last year, and 26 participated in research groups linked to CNPq. Within the period studied, 32 (46.4%) articles were published, and 14 articles were published in indexed scientific journals of national impact, showing an increase in the quality of publications over the years. There was a 280% increase in the number of students covered by the scientific initiation scholarship, mainly as volunteers. **CONCLUSION:** In five years, 69 projects were produced, and 32 (46.4%) scientific publications were generated. A 280% increase in the number of students awarded scientific initiation scholarships.

KEYWORDS: Medical Education. Research. Curriculum. Scientific Publication Indicators.

RESUMO | INTRODUÇÃO: Embora seja garantido pelas Diretrizes Curriculares Nacionais para o curso de Medicina, o estímulo à produção científica não é visto na prática em grande parte das universidades particulares no Brasil. **OBJETIVO:** Quantificar a produção científica dos discentes a partir do componente curricular obrigatório em prática de pesquisa no curso de Medicina em uma instituição privada de Lauro de Freitas, Bahia. **METODOLOGIA:** Trata-se de um estudo transversal. A coleta de dados foi realizada por um questionário on-line, via plataforma *Google Forms*®. Foram incluídos discentes do curso de Medicina que cumpriram a carga horária total do componente curricular obrigatório, e foram avaliadas a produção científica e a experiência com pesquisa dos estudantes. **RESULTADOS:** 100 alunos responderam ao questionário, dos quais a maioria (96%) possui Currículo Lattes, porém apenas 28 o alimentam periodicamente. Todos participaram de eventos e/ou congressos, 27 apresentaram trabalhos científicos no último ano e 26 relataram participar de grupos de pesquisa vinculados ao CNPq. Dentro do período estudado, foram 32 (46,4%) artigos publicados e 14 artigos publicados em periódicos científicos indexados de impacto nacional, observando um aumento na qualidade das publicações ao longo dos anos. Houve um aumento de 280% no número de discentes contemplados pela Bolsa de Iniciação Científica, principalmente como voluntários. **CONCLUSÃO:** Em cinco anos foram produzidos 69 projetos e gerados 32 (46,4%) publicações científicas. Um aumento de 280% no número de alunos contemplados por bolsas de iniciação científica.

PALAVRAS-CHAVE: Educação Médica. Pesquisa. Currículo. Indicadores de Produção Científica.

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1. Introduction

Scientific production can be defined as the result of a process of searching, creating, and consolidating knowledge about a given subject through the active search for theoretical references as well as experiments and interviews. It is also a way for academics to expand their experiences beyond the limits of their curriculum.[1]

The National Curricular Guidelines for the medical course, approved in 2014 by the Ministry of Education, state that the medical course must use methodologies that favor the active participation of the student in the construction of knowledge and the integration between contents, in addition to stimulating interaction between teaching, research and extension/assistance.[2] Therefore, scientific production should not only be seen as an important component of the Lattes Curriculum but also as a form of contribution to the scientific environment and to perpetuate it in clinical practice.[3]

The Scientific Methodology component is included in the curriculum of several medical universities, contributing to the interaction of the syllabus of the medical course, promoting reflection, analysis, preparation, and interpretation of scientific articles. Despite its importance, it is common for the component to be offered for a short duration in the last semesters and limited to theoretical classes, without the basis for applying the principles of Evidence-Based Medicine (EBM) and, in many cases, the content offered aims to build the course completion work.[4]

Despite the knowledge about the importance of scientific production for the curriculum and clinical practice of medical students, to date, only one study has sought to quantify the scientific production generated by a mandatory curricular unit in the medical course in a federal university.[1] Therefore, it is necessary to evaluate other academic scenarios in order to ultimately provide information for coordinators and professors of Brazilian medical universities so that they can develop, within their reality, strategies for institutional scientific production. Therefore, to understand the impact of the component on the academic production, performance, and clinical practice of students, the present study aims to quantify the scientific production of students based on the mandatory curricular component in research practice in the Medicine course at a private institution from Lauro de Freitas, Bahia.

2. Methodology

This is a cross-sectional study with medical students from the 9th to the 12th semester, duly enrolled, as well as those who graduated in periods 2021.1 and 2 from the União Metropolitana para o Desenvolvimento da Educação e Cultura (UNIME) in Lauro de Freitas, Bahia. Students who studied the "General Skills" curricular component, from the first to the eighth semester, were included, and those with irregular enrollment, semi-annual students, and those wishing to transfer to another institution were excluded. Data collection took place between July and November 2022. This research was approved by the research ethics committee of the UNIME through the CAAE: 57448422.1.0000.0190.

Participants were invited and informed about the objectives and possible risks of the study through electronic means of communication (WhatsApp, e-mail, Telegram, and other social networks) and information cards on the walls of the educational institution. After acceptance, an online questionnaire prepared by the researchers was made available through the Google Forms® platform. To start the research questionnaire, the participant had to agree after reading the Informed Consent Form.

This questionnaire is made up of three stages: 1st – Identification: collection of name, age, gender, contact, enrollment number, current semester, or when it ends, and curricular information; 2nd – Scientific Production: analyzing whether the

participant has a Lattes Curriculum, adequate completion and participation data in scientific Events, with their frequency, Academic Leagues, Academic Directory, and Research Groups; 3rd – Experience with Research: measuring the degree of affinity with scientific research and teachers responsible for the component on a scale from 0 (none) to 10 (highest affinity), interest in a career as a researcher or teacher, research improvement courses, in addition to projects developed outside the "General Skills" component.

The "General Skills" curricular component aims to provide a scientific methodological basis and critical analysis of scientific evidence, in addition to preparing students to develop academic work in a critical and ethical manner to be used in society as a whole. It consists of theoretical-practical modules, developed from the 1st to the 8th semester of the medical course at a private institution, which enable progressive mastery of the application of the scientific method: theoretical foundation, problematization, survey of hypotheses, preparation of an academic research project, development, execution and conclusion of the research project, presentation to the examining board, submission of an article for publication and use of EBM as a tool for critical analysis of scientific works.

To prepare the course completion work, the students, separated into groups (max. eight components), develop the scientific research project on the health/disease process and health education, after which this project is exposed to evaluation boards and after submission and approval by the Research Ethics Committee, they begin collecting data that will be tabulated and compiled throughout the fourth year. They must then complete the academic work and generate a scientific article for publication at the end of the fourth year, with its presentation and submission to a scientific journal being the necessary condition for entry into the 9th semester or Internship.

The groups are guided by a faculty advisor, designated among the faculty members of the curricular component, and may invite as co-advisors other professors from the course and/or those external to the course. In total, there were six supervising professors, masters, and doctors in the health field who had at least five years of experience supervising scientific work. The component was implemented in the medical course in 2017 in a private institution that does not have a research group at its headquarters and has, until the present research, three classes that attended the complete curriculum, resulting in a total of 324 eligible students.

A documentary analysis was also carried out to quantify scientific publications, which consisted of a retrospective examination of the university's records and an analysis of the Lattes Curriculum of the curricular component's professor and eligible students. For this analysis, all 324 students from the three semesters (2019.2, 2020.2, and 2021.2) who completed the full course load of the mandatory curricular component were included. For Qualis evaluation, the 2017-2020 four-year periodical classifications for Medicine II were used through the Sucupira Platform (https://sucupira.capes.gov.br/sucupira/).

To create the database, descriptive and analytical analysis, the SPSS software version 14 for Windows was used. The normality of numerical variables was verified using the Kolmogorov-Smirnov test, descriptive statistics, and graphical analysis. The results were presented through tables. Continuous variables with normal distribution are expressed as mean and standard deviation (±SD), and those with asymmetric distribution as median and interquartile (IQ).

3. Results

Of the 324 eligible students, 100 responded to the online questionnaire, with a mean age of 26.1 ± 3.2, and 66% were female. The majority of students (96%) have Lattes Curriculum, but only 28 (28%) periodically updated it. Nine medical students had previous training, and most of them had courses in the health area (77.8%), such as Nursing, Pharmacy, Psychology, and Dentistry. Five students completed a specialization, master's, or doctorate (Table 1).

Table 1. Characterization of medical students at a private institution in Lauro de Freitas – Bahia, 2022

Variables	n=100
Age, mean ± standard deviation	26.1±3.2
Sex, n (%)	
Male	34 (34.0)
Female	66 (66.0)
Education, n (%)	
9th semester	05 (5.0)
10th semester	44 (44.0)
11th semester	02 (2.0)
12th semester	27 (27.0)
Graduates 2021.2	22 (22.0)
Previous education, n (%)	09 (9.0)
Specialization, master's degree or doctorate, n (%)	05 (5.0)
Lattes Curriculum, n (%)	96 (96.0)
Periodically update your CV, n (%)	28 (28.0)

Source: the authors (2022).

Table 2 represents the participation in events such as conferences, symposia, and congresses. Everyone participated in events and/or conferences, and 27 students presented scientific work in the last year. The frequency of participation in events and the frequency of presentation of works at events presented a median of 2.0 (00 - 3.0) and 0.0 (00 - 1.0), respectively. The institution studied does not have research groups linked to the Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq (National Council for Scientific and Technological Development); despite this, 26 students reported participating in research groups in other higher education institutions with professors from the institution described.

Table 2. Participation in events by medical students at a private institution in Lauro de Freitas – Bahia, 2022

Variables	n=100
Academic leagues, n (%)	94 (94.0)
Study groups, n (%)	70 (70.0)
Research groups (CNPq), n (%)	26 (26.0)
Academic Directory, n (%)	08 (8.0)
Events promoted by academic leagues, n (%)	100 (100.0)
Number of league events last year, n (%)	
Didn't participate	77 (77.0)
One event	15 (15.0)
Two events	03 (3.0)
Three events	05 (5.0)
Conferences, symposiums, and/or conferences, n (%)	99 (99.0)
Number of events last year, median (IQ)	2.0 (00 - 3.0)
Number of paper presentations, median (IQ)	0.0 (00 - 1.0)

Source: the authors (2022).

Among the students, 28% underwent additional training on scientific methods, and 72% reported that they had already developed other projects in addition to the mandatory curricular component (Table 3). Two students completed Research Fellowships in England and the United States. When assessing affinity with the component's teachers and with scientific research, the median was 8.0 (7.0 – 10.0) and 6.0 (5.0 – 7.75), respectively.

Table 3. Affinities and improvement in scientific methodology of medical students at a private institution in Lauro de Freitas – Bahia, 2022

Variables	n=100
Developed other projects	72 (72.0)
Improved scientific methods	28 (28.0)
Idealize a career as a researcher or teacher	31 (31.0)
Affinity with teachers, median (IQ)	8.0 (7.0 – 10.0)
Affinity with scientific research, median (IQ)	6.0 (5.0 – 7.75)

Source: the authors (2022).

To quantify scientific publications, all 324 students from the three semesters, 2019.2, 2020.2, and 2021.2, who completed the full course load of the mandatory curricular component, were analyzed. Table 4 shows the number of article publications in the semesters. There were 69 groups, of which 32 (46.4%) articles were published within the period studied; among these, 14 articles were published in indexed scientific journals. There was an increase in the number of students awarded Scientific Initiation Scholarships, from 10 students in 2019 to 38 in 2021.

Table 4. Scientific productions of medical students who completed the full workload of the mandatory curricular component of a private institution in Lauro de Freitas – Bahia, 2022

Variables	2019.2	2020.2	2021.2
Total of students	**122**	**82**	**120**
Scientific Initiation Students	**10**	**11**	**38**
Working groups	**25**	**20**	**24**
Publications	**17**	**06**	**09**
Type of publications			
Articles published with book chapter	**14**	**04**	**-**
Articles published in periodicals	**03**	**02**	**09**
Qualis Periodicals*			
B2	**-**	**01**	**-**
B4	**-**	**-**	**04**
B5	**01**	**-**	**01**
C	**02**	**01**	**04**

* Classifications of 2017-2020 quadrennium journals for Medicine II.
Source: the authors (2022).

There was a reduction in publications in the 2020.2 semester; however, it is possible to observe that there was an improvement in the quality of publications in this period, evidenced by the improvement in Qualis, which is a way of classifying journals in terms of their level of scientific evidence and reliability. All publications from this period are related to journals of great national impact, such as the Revista Brasileira de Hipertensão, Arquivos Brasileiros de Cardiologia, Revista de Medicina (Universidade of São Paulo - USP), and the Brazilian Journal of Plastic Surgery.

4. Discussion

The present study showed that among the 69 projects produced in the five years of existence of the mandatory curricular component, 32 (46.4%) achieved scientific publication within the period studied, and of these, 14 (20.2%) articles were published in indexed journals. In contrast, a similar study, which aimed to evaluate the scientific production of medical students at a New Zealand university, during the period from 1985 to 2013, observed a production of 227 research projects, of which 19 studies were published, corresponding to 8.4%.[5] Despite the difference between the percentage of articles published, it is important to take into account the difference in sample size, the period evaluated, and the difference in the development of the countries involved in this comparison.

A study conducted in Brazil, including 278 students from the first to the sixth year of medicine, using an electronic questionnaire, showed that only 29 (10.4%) students published a scientific article.[6] Another study evaluated 133 students from different Universities in Colombia through an online questionnaire and observed a publication rate of 14.3%, a total of 19 published works.

One of the hypotheses for this study to present a higher publication rate than the studies mentioned above may be the constant and mandatory presence of a professor supervising the curricular component who encourages and engages the student to carry out scientific production. This finding can also be justified by the fact that scientific production takes place in groups and not individually, as is usual in other universities.[7] This hypothesis corroborates the study that sought to evaluate the scientific knowledge and scientific attitudes of students in the health area at the Universidade Federal de Sergipe, which showed that only 18 (11.11%) of the 162 students interviewed were involved in research projects.[8]

A reduction in scientific publications can be observed in the period studied; however, an improvement in the quality of publications is also evident, considering that they are all related to journals with great national impact. This reduction, mainly in the 2020.2 semester, can be justified by the period of social distancing due to the COVID-19 pandemic, which required adaptations in the formats of guidelines, classes, and changes to projects with in-person data collection, in which it was not possible.

This research demonstrates that 72 students developed other projects in addition to the mandatory curricular component, and when asked about their affinity with scientific research, they presented a median of 6.0 (5.0 – 7.75). A similar rate was evidenced when scientific attitudes were assessed using a validated questionnaire.[8,9] It can be concluded that students are motivated to carry out and participate in scientific research. Previous research indicates that the main motivations for student participation in research are interest in publishing (47%), influence from professors (34%), and classes on research methodology (22%).[7] Such factors, together or not, may be associated with students' desire to improve scientific methods outside the university, as observed in the present study.

The higher education institution of the present study does not have research groups linked to the CNPq in the medical course; despite this, 26 (26%) students reported participating in research groups in other universities with the teachers linked to the institution. A similar finding was demonstrated in the Colombian study, in which 26% of respondents were part of a recognized research group and pointed out personal affinities with the research topic (66%) and the desire to acquire methodological skills as the main motivators for joining research groups (26%).[7]

A study also conducted at a Brazilian university, which did not have a scientific initiation program, showed that among the 415 students, 47.2% were involved in research activities and also revealed that the main motivation for participation was related to curricular enrichment (32.1%), the need for a subsidy (19.9%) or the chance to increase experience in a specific area (17.3%).[10] These findings show that regardless of whether or not the institution provides scientific initiation programs or groups, medical students understand the role of research for future clinical practice, even if student participation is still proportionally minimal.

Still, in this sense, even with the lack of research groups registered with CNPq, there is an incentive on the part of the university for students to

participate in scientific initiation programs, which highlights an increase, in the last year, of 280% in number of students participating in scientific initiation research, totaling 59 students (59%) in the period studied. One of the hypotheses for this increase is the affinity of students with scientific research, the university's clear promotion of voluntary participation programs for students in scientific initiation, which is mainly responsible for the increase, in addition to students receiving scholarships, a financial incentive that encourages longer dedication to research, both fellows and volunteers driven by the possibility of improving their curriculum with a view to a medical career.

In a study carried out at a Brazilian federal university, which aimed to quantify the scientific production generated by the mandatory curricular unit in research practice in the Medicine course, 48 scientific research groups were analyzed, and there were nine groups included in a scientific initiation program (18.75%).[1] However, this difference in the number of links to scientific initiation programs can be justified by quantification in research groups in the aforementioned study, and not individually as in the present study.

It is believed that the mandatory curricular component, as well as the present and active guiding teachers, encourages students in the search for scientific knowledge and engagement in research groups. The “General Skills” component introduces students to EBM, and they are encouraged to produce science during the eight semesters of the medical course. In this scenario, the student is encouraged to leave a world of assumptions and guesswork to a more critical scenario, where scientific evidence is evaluated for decision-making, thus contributing to their professional future. According to a study, students who publish during their undergraduate studies are 1.9 times more likely to publish after graduation than graduates who did not, with a 95% CI of 1.90 [1.76 - 2.05].[11]

The participation of students in scientific research has benefits such as increased learning capacity, the development of critical thinking, better performance in problem-solving, and better understanding and communication of data originating from scientific research.[12] For the medical graduate, scientific initiation and publication of articles can score points during the curricular analysis in the medical residency exams.[13] Despite the growing interest in participating in non-compulsory scientific activities, the involvement of Brazilian students in these activities was 28%[10], while in developed countries, such as Norway and the United States, these numbers reach 87% and 90%, respectively.[14,15]

It is expected that this mandatory curricular component structure can serve as a model for implementation in other Brazilian universities, with the aim of improving the quality of institutional scientific production and knowledge about EBM on the part of students. With the implementation, students will be accompanied from the 1st to the 8th semester by more active and effective advisors, in addition to having cyclical knowledge and the constructivist spiral, characteristics of the active teaching methodology, in which there is an increase in knowledge throughout the semesters.

The present study presents as a possible limitation the risk of selection bias, due to the lack of coverage of all eligible students and the possibility that only those students most engaged with the component and scientific research responded to the online questionnaire. However, the same limitation does not arise for the analysis of scientific production, which was carried out through a documentary survey that included all students from the three classes analyzed. It also presents a probable conflict of interest, as the supervisors of the present study are teachers of the mandatory curricular component studied.

5. Conclusion

Given the 69 projects produced in the five years of existence of the mandatory curricular component, there were 32 (46.4%) scientific publications, and of these, 14 (20.2%) articles were published in indexed scientific journals. There was a 280% increase in the number of students awarded scientific initiation scholarships, and it was possible to identify student engagement in participating in events, leagues, and research groups.

Authors' contributions

Máximo SA, Bastos AS, Nunes ALS, Miranda RPO, Brasil CA, and Lemos AQ participated in the data curation, investigation, methodology, and project administration. All authors approved the final version to be published.

Conflicts of interest

No financial, legal, or political conflicts involving third parties (government, private corporations and foundations) have been declared for any aspect of the submitted work (including, but not limited to, grants and financing, advisory board participation, study design, preparation manuscript, statistical analysis).

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References

1. Soares JMA, Rios JVLG, Maia JM, Rigo TM, Araújo DRF, Camuñas GC. Medical undergraduate research: scientific production from a compulsory subject. Rev. Med. 2020;99(6):531-7. https://doi.org/10.11606/issn.1679-9836.v99i6p531-537

2. Resolução CNE/CES nº 3, de 20 de junho de 2014 (Brasil). Institui Diretrizes Curriculares Nacionais do Curso de Graduação em Medicina e de outras providências. [Internet]. Diário Oficial da União. 2014 jun. 23. Available from: https://www.gov.br/saude/pt-br/acesso-a-informacao/acoes-e-programas/pnsp/legislacao/resolucoes/rces003_14.pdf/view

3. Rocha LB, Oliveira IP, Silva MOM, Rezende MC, Santos RAS, Coelho CM, et al. Scientific initiation in medicine course: contributions and challenges. Braz J Hea Rev. 2019;2(6):5445-56. https://doi.org/10.34119/bjhrv2n6-046

4. Guedes HTV, Guedes JC. Student Evaluation of the Activity — "Research Project for Course Completion" as Final Stage of the Scientific Research Axis in a Medical School. Rev Bras Educ Med. 2012;36(2):162-71. https://doi.org/10.1590/S0100-55022012000400003

5. Al-Busaidi IS, Tarr GP. Dissemination of results from medical student public health research training and factors associated with publication. Postgrad Med J. 2018;94(1112):330-4. https://doi.org/10.1136/postgradmedj-2017-135361

6. Moraes DW, Jotz M, Menegazzo WR, Menegazzo MS, Veloso S, Machry MC, et al. Interest in research among medical students: Challenges for the undergraduate education. Rev Assoc Med Bras. 2016;62(7):652-8. https://doi.org/10.1590/1806-9282.62.07.652

7. Bonilla-Escobar FJ, Bonilla-Velez J, Tobón-García D, Ángel-Isaza AM. Medical student researchers in Colombia and associated factors with publication: a cross-sectional study. BMC Med Educ. 2017;17(1):254. https://doi.org/10.1186/s12909-017-1087-9

8. Figueiredo WPS, Moura NPR, Tanajura DM. Research and non-degree projects actions, and scientific attitudes of undergraduate students from healthcare areas. Arqu Ciênc Saúde. 2016;23(1):47-51. http://dx.doi.org/10.17696/2318-3691.23.1.2016.197

9. Khan H, Khawaja MR, Waheed A, Rauf MA, Fatmi Z. Knowledge and attitudes about health research amongst a group of Pakistani medical students. BMC Med Educ. 2006;6:54. https://doi.org/10.1186/1472-6920-6-54

10. Oliveira CC, Souza RC, Abe EHS Móz LES, Carvalho LR, Domingues MA. Undergraduate research in medical education: a descriptive study of students' views. BMC Med Educ. 2014;14:51. https://doi.org/10.1186/1472-6920-14-51

11. Waaijer CJF, Ommering BWC, Wurff LJ, Leeuwen TN, Dekker FW, NVMO Special Interest Group on Scientific Education. Scientific activity by medical students: the relationship between academic publishing during medical school and publication careers after graduation. Perspect Med Educ. 2019;8(4):223-9. https://doi.org/10.1007/s40037-019-0524-3

12. Huang Q, Yue Z, Lin J, Zhang Y, Yuan S, Zhuang Q, et al. The effect and influence of undergraduate research on medical undergraduates in China. Biochem Mol Biol Educ. 2019;47(1):47-50. https://doi.org/10.1002/bmb.21194

13. Siemens DR, Punnen S, Wong J, Kanji N. A survey on the attitudes towards research in medical school. BMC Med Educ. 2010;10:4. https://doi.org/10.1186/1472-6920-10-4

14. Hunskaar S, Breivik J, Siebke M, Tømmerås K, Figenschau K, Hansen JB. Evaluation of the medical student research programme in Norwegian Medical Schools. A survey of students and supervisors. BMC Med Educ. 2009;9(1):43. https://doi.org/10.1186/1472-6920-9-43

15. Jacobs CD, Cross PC. The value of medical student research: the experience at Stanford University School of Medicine. Med Educ. 1995;29(5):342-6. https://doi.org/10.1111/j.1365-2923.1995.tb00023.x