



Review Article

# Academic productivity of Iraqi medical students in the field of neurosurgery: A literature review

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## ABSTRACT

**Background:** The interest in clinical research is growing worldwide, and the involvement of medical students in academic and clinical research is increasing. Medical students in Iraq have started to focus on academic activities. However, this trend is in its infancy due to limited resources and the war burden. Their interest in the field of Neurosurgery has been evolving recently. This is the first paper that aims to assess the status of the academic productivity of Iraqi medical students within the neurosurgical field.

**Methods:** We searched the PubMed Medline database and Google scholar between January 2020 and December 2022 with a different combination of keywords. Additional results were obtained by individually searching for all the medical universities in Iraq that participated in the neurosurgical literature.

**Results:** Between January 2020 and December 2022, 60 neurosurgical publications included Iraqi medical students. 47 Iraqi medical students from 9 universities (the University of Baghdad 28 students, followed by 6 students from the University of Al-Nahrain, and others) were involved in these 60 neurosurgery publications. The topics of these publications are “vascular neurosurgery” ( $n = 36$ ) followed by “neurotrauma” ( $n = 11$ ).

**Conclusion:** Academic productivity of Iraqi medical students in the field of Neurosurgery has surged in the last 3 years. In the past 3 years, 47 Iraqi medical students from nine different Iraqi universities contributed to sixty international neurosurgical publications. However, there are challenges that are required to be tackled to establish a research-friendly environment despite wars and restrained resources.

**Keywords:** Academic productivity, Iraq, Medical education, Medical students, Neurosurgery

## INTRODUCTION

Clinical research represents one of the measures of development for the institutes and communities. This impacted the tendency to increase academic productivity over the last decades. Alongside other databases of medical publications, PubMed, for example, has reached more than eight hundred thousand research papers added annually.<sup>[71]</sup>

Research within the medical school is not only a requirement for educational institutes but dramatically benefits medical students regarding their medical knowledge, career development, and specialty choice.

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Medical students' research production has increased steadily over time, particularly in the field of neurosurgery.<sup>[62,70]</sup> In the past few decades, the neurosurgical field has faced a significant rising in the number of publications. In 2017, around 7000 peer-reviewed neurosurgical articles were published in different national laboratories.<sup>[30]</sup> In Iraq, contemporary neurosurgery was started in 1970; since then, there has been a massive increase in demands for neurosurgical care, together with war and armed conflict in the region.<sup>[14]</sup> Hence, the neurosurgical field offers some of the most excellent opportunities for scientific discovery, as the applicability of research in neurosurgical problems is highly needed in all subspecialties.<sup>[29]</sup> At the level of medical students in Iraq, quantitative assessment of their academic work in neurosurgery highlights the recent changes in the field. However, currently, the literature lacks pinpointing the academic achievements of Iraqi medical students to the specialty. Over the past six decades, neurosurgery in Iraq has had a pronounced paucity of international publications, with a recent surge happening after 2017.<sup>[44]</sup> Since 2019, several neurosurgical centers in Iraq, and in Baghdad in particular, have served as leaders in the research-mentoring pathway by considering medical students as part of their plan to improve individual and institutional research productivity.

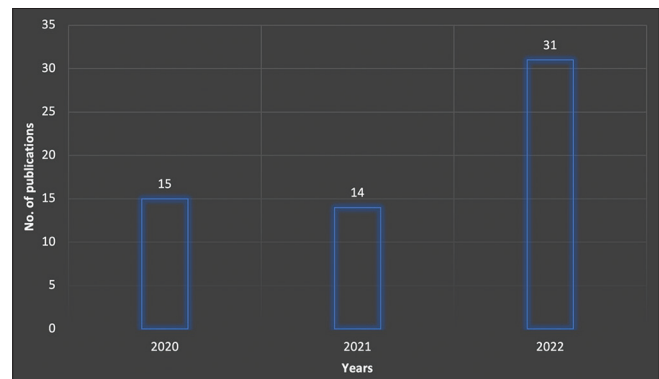
This is the first paper that aims to explore the quality and quantity of the academic productivity of medical students in Iraq in the field of neurosurgery over the past 2 years.

## MATERIALS AND METHODS

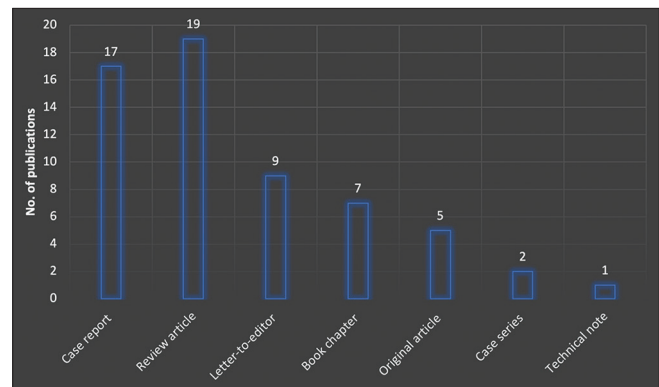
We conducted a search in the PubMed Medline database and Google scholar by the following combined keywords: "Neurosurgery" "Neurological surgery" "Iraq" "Iraqi" "Medical students." The results were filtered to include papers published between January 2020 and December 2022. We included articles that involved medical students from Iraqi universities who published in the field of neurosurgery, and we excluded articles related to non-Iraqi medical students. Afterward, a search by author name was done for all known medical students who participated in research activity from Iraq. In addition, direct reach out to universities and medical students is performed to verify their affiliation. Information on these papers was extracted and analyzed according to the following parameters: author name, medical college/university, city/governate, stage at the time of publication (all medical colleges in Iraq have 6 years bachelor program), the topic of the publication (general neurosurgery, neurosurgery education, history of neurosurgery, neurotrauma, vascular neurosurgery, and others), the type of the publication (original article, literature review, case series, case reports, technical note, letter-to-editor, and book chapter), journal name/specialty/impact factor, and number of medical students in the paper out of the total number of authors.

## RESULTS

Between January 2020 and October 2022, 47 medical students from Iraq participated in 60 neurosurgical publications. These publications included 53 published articles and 7 book chapters. Most of the students' publications were in 2022, including 31 publications, followed by 15 publications in 2020 and 14 in 2021 [Figure 1]. The most common type of publication that Iraqi medical students contributed to was literature review articles ( $n = 19$ ), case reports ( $n = 17$ ), letter-to-editor ( $n = 9$ ), book chapters ( $n = 7$ ), and original articles ( $n = 4$ ) with one article reported as case series and one as a technical note [Figure 2]. The topics of these publications were mainly "vascular neurosurgery" ( $n = 36$ ) followed by "neurotrauma" ( $n = 11$ ). The rest were "education" ( $n = 6$ ), "general" ( $n = 5$ ), and "history" ( $n = 2$ ) [Figure 3]. In 23 publications, medical students participated as first authors, and the remaining 37 as co-author and chapter authors. The number of medical students per publication ranged between 1 and 6, with a mean of 1 medical student per publication. The journals that published those research



**Figure 1:** An illustration of the distribution of Iraqi medical students' publications within the neurosurgical field in the past 3 years.

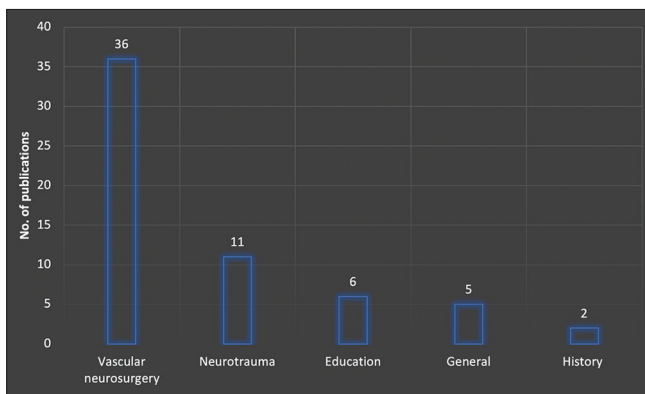


**Figure 2:** This graph depicts the frequency of each type of publication that was published in the neurosurgical field within the past 3 years in Iraq involving Iraqi medical students.

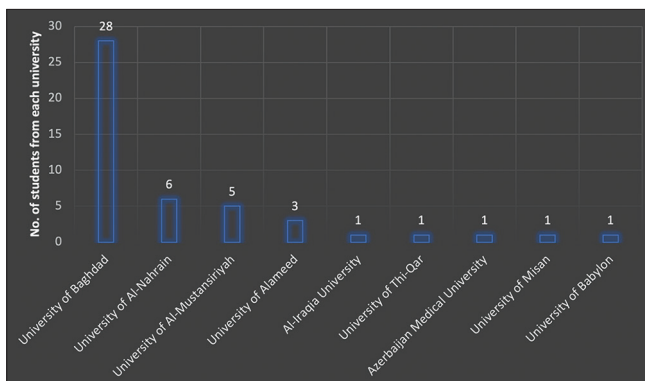
projects were primarily neurosurgical journals with an impact factor ranging between 0.118 and 4.008 with a mean of 0.91. Out of 47 medical students, 28 were students in the College of Medicine - University of Baghdad, and 12 were from other colleges in the same governorate; only seven were from outside of Baghdad [Figure 4]. The medical students' stages ranged from the 3<sup>rd</sup> to the 6<sup>th</sup> grade with a mode of 4<sup>th</sup> grade 12 medical students. The number of publications for each medical student ranged between 1 and 22, with a mode of 1 for each medical student. Table 1 shows the productivity of Iraqi medical students with their publications' number and type of authorship.<sup>[2-12,15-25,28,31-37,39-43,45-61,63,65,67-69,72,73]</sup>

## DISCUSSION

The development in the neurosurgical field can be measured with a variety of parameters, with the research activity reflecting a critical aspect of the program, institutional, and national quality of education and health care.<sup>[26,64]</sup> One of the critical components of assessing and evaluating any country's



**Figure 3:** An illustration that demonstrates the numerical distribution of publications over five sections in the neurosurgical literature within the past 3 years in Iraq which involved medical students.



**Figure 4:** A graph shows the numerical distribution of universities that involved Iraqi medical students who participated in neurosurgical publications in the past 3 years.

research activity is to emphasize its history. Currently, medical education in Iraq faces multiple challenges that are influenced by multiple factors. Such factors include the unavailability of the proper facilities, proper resources, financial support, and the recent decades of wars and conflict.<sup>[27,66]</sup> In addition, medical schools are concentrating their efforts more on lecture attendance and traditional exams and less attention on updating their curriculum to include more research-based activities. Moreover, learning is still following the traditional methods and is characterized by a teacher-centered approach. The modern style of medical education has not yet been introduced; the one which depends on a student-centered approach in which the students are encouraged to take greater responsibility for learning decisions and to question what and how they learn; while a mentor supervises them. Nevertheless, students' academic productivity was present, even if it was scarcely.

Moreover, both under and post-graduation of the medical system in Iraq, centrally reflecting on research as a byproduct of the system and individually as a leisure activity; the neurosurgical field is not an apparent exception. There is an urge to get a higher number of publications to get academic promotion and empower curriculum vitae for abroad job applications; nonetheless, recently, amid this reality of research in Iraq, new approaches have emerged, and they focus on developing medical students, and resident primarily through mentorship to bring the research main in neurosurgery into a new level and advance the field.

The number of neurosurgical publications involving Iraqi medical students throughout recent years shows a relatively promising productivity trend. By searching different data databases and selecting the timeframe in 3 years, the results showed 15 projects published in 2020, followed by 14 projects published only in two-thirds of 2022, and the majority of the publications are in vascular neurosurgery. The explanation of most publications within the vascular subspecialty is ignited by the fact that the neurosurgery teaching hospital in Baghdad is the center of cerebrovascular practice in Iraq, and this center constantly welcomes medical students from all over Iraq. Moreover, from 2019 till the present, the status of mentoring medical students in neurosurgery (including research mentoring) is active, and a significant number of those mentors are vascular neurosurgeons with vigorous accomplishments in the field. However, these numbers may be considered small compared to international research productivity related to neurosurgery. Such conditions may be attributed to insufficient research resources, insufficient funding, and the absence of a documentation system in the academic field in Iraq.<sup>[44]</sup>

Out of all published studies, neurotrauma was the second most common topic to be highlighted by publications that included

**Table 1:** The number and type of authorship of neurosurgical publications that involved Iraqi medical students in the past 3 years.

Author name	Number of publications	Type of authorship
Mustafa Ismail <sup>[2-4,6,7,9,12,16,24,32,48-56,58,59,72]</sup>	22	9 first author\13 co-author
Aktham O. Al-Khafaji <sup>[2,5,9,10,15,19,23,31,34,37,41,45,52,53,56]</sup>	15	3 first author\12 co-author
Saja A. Albanaa <sup>[10,20,21,22,35,37,39,40,42,43,46]</sup>	11	1 first author\10 co-author
Teeba A. Adnan <sup>[2,4,6,7,48,49,52-54,58]</sup>	10	2 first author\8 co-author
Alkawthar M. Abdulsada <sup>[3,4,9,32,49,51,56,65]</sup>	8	1 first author\7 co-author
Zahraa A. Alsubaihawi <sup>[8,15,19,21,31,63,72]</sup>	7	Co-author
Ali M. Neamah <sup>[9,10,35-37,45]</sup>	7	1 first author\6 co-author
Zahraa M. Kareem <sup>[2,3,17,19,53,61,63]</sup>	7	1 first author\6 co-author
Hagar A. Algburi <sup>[3,12,36,52,58,68,73]</sup>	7	1 first author\6 co-author
Fatima O. Ahmed <sup>[16,33,50,51,60]</sup>	5	Co-author
Mohammed Maan AbdulAzeez <sup>[5,11,18,34]</sup>	4	2 first author\2 co-author
Mustafa E. Almurayati <sup>[8,17,19,23]</sup>	4	Co-author
Sama Albairmani <sup>[2,31,41,47]</sup>	4	Co-author
Aanab O. Abdulameer <sup>[24,56,57]</sup>	3	Co-author
Ruqayah Ali al-Baidar <sup>[2,9,28,61]</sup>	3	Co-author
Fatimah Ayad <sup>[2,52]</sup>	2	Co-author
Haneen A. Salih <sup>[3,53]</sup>	2	Co-author
Muntadher H. Almufadhal <sup>[7,48]</sup>	2	Co-author
Mohammad S. Al-Mosawy <sup>[4,67]</sup>	2	Co-author
Younus M. Al-Khazaali <sup>[16,53]</sup>	2	1 first author\1 co-author
Teeba M. Ghanim <sup>[45]</sup>	1	Chapter author
Farah W. Abdulmohsin <sup>[35]</sup>	1	Co-author
Noor F. Hassan <sup>[23]</sup>	1	Co-author
Rania H. Al-Taie <sup>[57]</sup>	1	Co-author
Saleh Al-Lami <sup>[57]</sup>	1	Co-author
Ahmed Muthana <sup>[55]</sup>	1	Co-author
Noor A. Hummadi <sup>[16]</sup>	1	Co-author
Noor K. Al-Waely <sup>[16]</sup>	1	Co-author
Zainab I. Abdualmurtafie <sup>[52]</sup>	1	Co-author
Sadik K. Daily <sup>[52]</sup>	1	Co-author
Mohamed Almustafa A. Alzerkani <sup>[53]</sup>	1	Co-author
Sara A. Mohammed <sup>[7]</sup>	1	Co-author
Ali H. Al-Delfi <sup>[7]</sup>	1	Co-author
Muhammed S. Alshedidi <sup>[7]</sup>	1	Co-author
Mohammed B. Al-Jaberi <sup>[7]</sup>	1	Co-author
Sura H. Talib <sup>[54]</sup>	1	Co-author
Rania Thamir Hadi <sup>[54]</sup>	1	Co-author
Jaafer AbdulWahid <sup>[4]</sup>	1	First author
Hussein M. Hasan <sup>[12]</sup>	1	Co-author
Noor M. Akar <sup>[6]</sup>	1	Co-author
Jaber H. Obaid <sup>[6]</sup>	1	Co-author
Rokaya H. Abdalridha <sup>[6]</sup>	1	Co-author
Mohammed A. ALAli <sup>[6]</sup>	1	Co-author
Mustafa R. Al-Gertani <sup>[12]</sup>	1	Co-author
Sajjad N. Majeed <sup>[12]</sup>	1	Co-author
Huda Jaafer <sup>[67]</sup>	1	Co-author
Hawraa Sadiq Naser <sup>[67]</sup>	1	Co-author

medical students, perhaps this is not surprising due to the vast numbers of neurotrauma cases faced by Iraqi neurosurgeons, and the reporting of these cases is still remarkable due to ongoing armed conflicts especially when viewed in the context of a war-afflicted country. Numerous atypical injuries are witnessed on regular bases, including blast bombings and severe

penetrating craniofacial injuries caused by unusual grenades such as tear gas canisters.<sup>[1,13,38]</sup> In addition to neurotrauma publications, there was a noticeably high number of vascular neurosurgery publications, which is attributed to the effect of mentorships done by Iraqi neurosurgeons for medical students interested in neurosurgery as a future career choice.<sup>[48]</sup>

Mentorship has been established globally as one critical of the gateways to acquiring and maintaining knowledge, skills, and attitudes; neurosurgery is entangled with a such approach in medical education. In recent years in Iraq, neurosurgery spotted mentorships of medical students, residents, and practicing neurosurgeons. For medical students, it is more vivid and produced a significant change in their learning of neurosurgery academically and technically. Despite all highlighted challenges facing Iraqi research productivity, great efforts are being made to improve the neurosurgical academic productivity in Iraq by medical students through their ambitions and interest in the field. Neurosurgeons provide research opportunities through mentoring students and involving them in research activities. The best example of these opportunities occurred during the COVID-19 pandemic when the country encountered the expansion of “Baghdad Neurosurgery Mentorship” by Dr. Samer S. Hoz; the opportunities came to vast numbers of Iraqi medical students to discover and explore their interest in neurosurgery.<sup>[27]</sup> Through the mentorship program, 558 medical students participated in online sessions. Approximately 223 students were welcomed to join surgeries in all branches of neurosurgery, as most of the students were engaged in real-time neurosurgical operations. Their feedback about the surgeries is summed up in three categories; the first is witnessing the surgery’s overall atmosphere, as most have never been to surgeries before. Second, their express how learning surgical etiquette was challenging at first and how they overcame the obstacles to adapt to them. Third, communication skills were crucial for most students because of COVID-19-related restrictions in their activities with patients; however, learning these skills in neurosurgical orientation was important for them. Furthermore, all of these facilities open the door to students interested in neurosurgery as a future career to participate in neurosurgical research; as we found, there were more than 107 participations in research projects from neurosurgical interested medical students between January 2020 and October 2022. Most of these publications were in 2022, although this year is still ongoing.

Furthermore, a possible explanation for increasing medical students’ publications in neurosurgery in 2022 is Surgical Neurology International® (SNI®)-Baghdad neurosurgical online meetings.<sup>[41,52]</sup> These are monthly meetings held online between the SNI editorial board and medical students, residents, and neurosurgeons from Iraq. The meetings started in the middle of 2021 and are still continuous indefinitely. In the survey of these meetings, more than 60% of participants reported increases in their overall capacity to conduct research.<sup>[52]</sup> Moreover, the content of the meetings, which include presentations and discussions of various neurosurgical topics, is triggering for formulating ideas for research. A significant number of projects started in 2021

and got published in 2022. Consequently, SNI®-Baghdad meetings encompass the environment for ongoing research development and provide opportunities for medical students to participate in them.

Further, selecting journals for submitting research papers was one of the critical steps in maintaining the students’ neurosurgical research activity. Through the mentorship, direct communication between the mentees and mentors to discuss the journal selection. One of the journal metrics pointed out in the discussion was the journal’s impact factor; however, other equally important metrics were mentioned, which included time from acceptance to publication, article processing charge, the scope of the journal, and the option of open access. The results are that medical students published in neurosurgical journal with variable impact factors; nevertheless, highlighting the impact the paper was taken into consideration as the impact factor metric focus on the citations of the journal articles over a period of time (usually 2 years) and this may not represent the precisely the impact of the paper in the field of medicine. The impact factor does not consider the impact of the clinician who read a paper and used its information in his/her practice.<sup>[25]</sup> Therefore, examination of the journal and pre-submission discussion between the team usually add the value of directing the paper to the proper journal.

The limitation of the current study includes the culture of participation in sub-specialty-related research is a novel approach to learning in Iraq, so we focused on the recent 3 years to address academic productivity. Despite shown development in medical students’ productivity, much effort and the right plans are required to improve the research activity at an internationally comparable level. Furthermore, basic sciences research in neurosurgery was not found in our review because this type of study requires funding and support, which has not existed in Iraq until recently. We emphasize that this issue can be the next step in supporting academia. The funding is required to flourish both academic and clinical types of research, and this can be the prototype for a future national-level strategic plan. That would spark a new era under the motto that research is a need rather than a luxury, even in a war-torn country like Iraq, as this is the only way to build a fair foundation for better education in the future.

## CONCLUSION

Academic productivity of Iraqi medical students in the field of neurosurgery has surged in the last 3 years. In the past 3 years, 47 Iraqi medical students from nine different Iraqi universities contributed to sixty international neurosurgical publications. However, it is still improving and with several challenges that are required to be addressed, tackled, and resolved to establish a research-friendly environment despite the consequences of wars and restrained resources.

### Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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