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Forty-year Tunisian bibliometrics of general surgery theses in the four national faculties of medicine (1980–2019)

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ABSTRACT

The objective of this work was to establish the bibliometric profile of Tunisian theses in 'general surgery' and to describe their themes, their study designs, and their writing quality. This is a retrospective descriptive bibliometric study, covering all the theses in medicine in the specialty of 'general surgery', defended in the four medical faculties of Tunisia, during the forty last years from 1980 to 2019. During the study period, 739 theses in 'general surgery' were discussed in Tunisia, with an average of 19 theses per year. The most studied research topic was emergencies (41%), followed by common surgical pathologies (26%) and digestive oncology (21.5%). Descriptive studies and case studies represented the majority of study designs with respective proportions of 56.9% and 40.6%. Only 20.7% of these theses had a scientific writing quality deemed satisfactory. The least respected elements in writing their summaries were statistical (confidence intervals and standard deviations) and documentary (keywords). Despite the plethora of themes of Tunisian theses in 'general surgery', their basic methodology and their editorial non conformity require the educational reform of the dissertations, both doctoral students and supervisors, by strengthening their skills in research methodology and scientific communication written.

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Bibliometrics; academic dissertations as topic; general surgery; surgical procedures, operative; schools, medical; Tunisia

1. Introduction

Bibliometrics is considered as one of the amongst the national biomedical research fields. It takes in consideration an interest not only on the various geographic dimensions: regions, universities, and specialties, but also on the various 'outputs' of research such as scientific publications and medicine's theses [1–3]. Most of these bibliometric studies recorded a low efficiency of Tunisian research activities and thus played a role in the emergence of educational thoughts especially relating to the dilemma of the low relevance of the theses in medical sciences [4].

In addition to the pedagogical problems found in the national faculties of medicine, such as the learners' dissatisfaction, the publications' scarcity [4], the outbreak of plagiarism and scientific non-integrity [5], other problems have been observed. In fact, the basic choice problems of research subjects and study designs and the poor editorial quality of thesis manuscripts [6] have been contributed to limit their editorial chances.

This is how longitudinal bibliometric research on the theses of tracing specialties, such as "General Surgery", have become a necessity. The leaders of these fields have been working on the scientific pedagogy in recent years [7]. However, these exhaustive studies covering

the four faculties of medicine in Tunisia, over four decades of medical education, have been absent from the national medical and educational literature. The development of a 'case mix' of the 'General Surgery' thesis will contribute enormously to debate the reform actions of the conduct of theses in medical sciences, in the areas of the choice of relevant themes, study plans, high level of evidence and promotion of medical writing, in accordance with the 'gold standard' of the scientific article [8].

The objectives of this pioneering bibliometric study, carried out in the four Tunisian faculties of medicine over the last 40 years, are principally to draw up the bibliometric profile of Tunisian theses in 'General Surgery' and to describe its different aspects as the research themes, study's schemas, and the editorial quality.

2. Materials and methods

This is a retrospective bibliometric study, covering all the medical theses in the specialty of 'General Surgery', defended in all the Tunisian medical schools over the last forty years from 1980 to 2019. During this study, the relationship of the doctorate in medicine, to the specialty of 'General Surgery' was attributed to the specialty of the first university hospital director, specialized in visceral surgery.

The bibliometric data of the theses were collected by consulting the paper catalogs, available in the archives of the medical schools' libraries and from the theses' online catalogs. Thus, the cover pages and the summaries and/or conclusions of each selected dissertation were printed and systematically analyzed by two specialists: a 'General Surgery' expert for the thematic items and an expert on Preventive and Community Medicine for the methodological sections. We used data collection grid developed by the LR19SP01 Research Laboratory, to standardize and enter the variables from these pages.

The bibliometric research methodology in 'General Surgery' is based on the following three pillars: research themes, study designs and editorial quality. The research themes analysis was based on the indexing lines indicated in the cover pages of the theses. The research team choose a key descriptor among the index lines of each thesis. This choice is based on the abstracts and/or conclusions of the theses. It is mainly linked to the surgical morbidity explored or to the studied surgical technique. All the descriptors that are synonymous, or which can be grouped together in the same nosological framework, were subsequently replaced by major descriptors. In a subsequent stage, these major descriptors were divided into homogeneous indexing groups, merging them according to the essential themes. The study design of the 'General Surgery' thesis was identified according to the classical taxonomy of epidemiological studies and the pyramid of clinical studies of 'Evidence Based Medicine' [9].

As for the assessment of scientific writing, applied only to recent theses accompanied by abstracts, it was analyzed according to an iso-weighted scale, composed of 20 items, covering all the components of the thesis abstract. The items of good scientific medical writing were deduced from the latest version of the Referential [10] of the International Committee of Editors of Medical Journals (ICMJE). This scale which has been developed by the LR19SP01 Research Laboratory was transformed into a score of 100 points. The scientific medical writing was deemed satisfactory in the presence of a thesis summary and an evaluation score of at least 75%.

The descriptive bibliometric analysis is based on two major factors. The first one consists of time frame divided into two 20 years period (1980–1999 and 2000–2019). The second factor is related to medical school where the thesis is defended.

Statistical analyses were performed using the latest version of IBM SPSS software for Windows. The central tendencies of the variables studied were summarized by means \pm Standard Deviations (SD) and medians \pm Inter Quartile Intervals (IIQ).

3. Results

3.1. Bibliometric characteristics of 'General Surgery' theses

Table 1 describes the general bibliometric characteristics of Tunisian theses defended in 'General Surgery'. It is worthful to mention that during the last four decades, there were an average of 19 'General Surgery' theses per year defended in the national level. Since 2000, 70% of the theses were defended in the second phase. The medical school of Tunis has assured, it alone 46% ($n = 339$) of the medical theses. There were 193 (26%) theses analyzed in co-supervision (a thesis supervised by two supervisors) of which 73 (38%) co-supervisors belonged to other specialties, mainly surgical resuscitation (anesthesia-resuscitation), anatomopathology and gastroenterology. Figure 1 illustrates the evolution of the number of theses in 'General Surgery' in Tunisian medical schools.

3.2. Research topics

Table 2 lists the homogeneous groups for research topics. The surgical emergencies are always at the top of the list in the national level and regardless of the period. Indeed, during the four decades of the study, 41% of 'General Surgery' theses focused on surgical emergencies, in all Tunisian medical schools. The most studied surgical emergencies were complications of ulcerative disease (13.3%), acute appendicitis (10.7%) and acute pancreatitis (8.3%), respectively, as shown in Table 3. There is a remarkable interest of students in oncology over the years: the percentage of theses treating cancer has doubled in Tunisia, in the second period (2000–2019) compared to the first period, it raised from 13.6% to 24.9% (Table 2), placing oncology in third position in the ranking of homogeneous groups for indexing research topics of academic dissertations in 'General Surgery'. By quantifying the different types of cancer studied, the 'General Surgery' theses have been focusing more on rare tumors (16.4%), paradoxically to the epidemiology of other digestive cancers (Table 3). However, the subjects of transplantation, medical education and bariatric surgery have exceptionally been studied. In fact, there is only 10 theses in 40 years.

We have counted 163 descriptors while indexing 'General Surgery' theses. We have identified the following six frequent topics: ulcer disease, hydatid cyst/complications, acute appendix, pancreatitis /complications, rare tumors, and lithiasis of the main bile duct. These topics cover almost the quarter of the research theses.

We have noticed that the theses' supervisors in Tunis and Sfax medical schools are more interested in ulcer disease. Their colleagues in Sousse medical

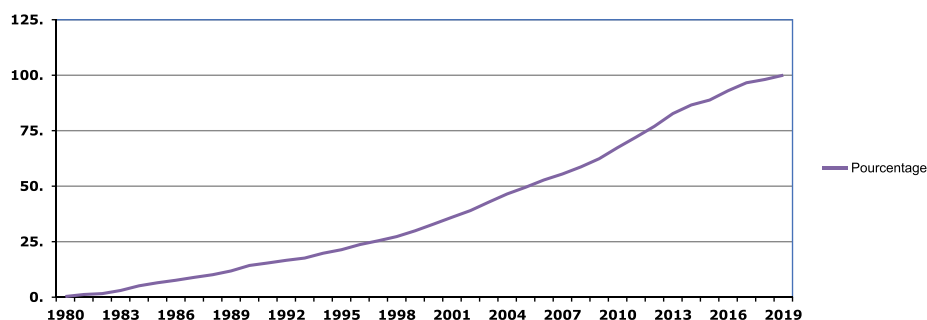


Figure 1. Cumulative percentage of medical dissertations in «General Surgery», defended at the four Tunisian faculties of medicine from 1980 to 2019.

school are more focused about hydatid cyst of the liver, in the conduct of the theses of 'General Surgery'. As for the Monastir medical school, the most discussed topics are acute appendicitis, ulcer disease and abdominal wounds, with similar percentages.

3.3. Methodological typology of 'General Surgery' theses

Most of the thesis (97.5%) have opted either for descriptive study or case study. In fact, the descriptive studies represent 56.9% and case studies' share is 40.6%. These results were broadly similar between the two periods and in the four medical schools.

3.4. Editorial quality of the 'General Surgery' theses

For all the theses in 'General Surgery' (with or without abstracts), the quality of the scientific writing was satisfactory in 20.7% of cases. Variability according to period and medical school was observed as illustrated in Table 4, Figure 2. The best quality of scientific writing of 'General Surgery' theses at the national level, was noted during the second period (2000–2019), with a percentage of 28.4%, especially in Tunis medical school (43.8%) (Table 4). While working on their theses, candidates have paid a lot of attention on the following elements: the title, the objective, and the absence of typographical errors (Figure 2). As for the least respected elements in these summaries, they were related to the statistical aspect of the research such as presentation of confidence intervals in the case of sampling and standard deviation, research methodology (i.e. type of study) and documentary (i.e. choice of words MeSH).

4. Discussion

This bibliometric study on Tunisian 'General Surgery' theses, was characterized by its temporo-spatial and operational exhaustiveness. It covered a long period of forty years, in the four medical schools in Tunisia. Our research team is composed of four specialists in

'General Surgery' and Preventive and Community Medicine. Despite the standardization of the research protocol, this work is not spared from certain methodological shortcomings, which slightly limit its validity. Indeed, the documentary query used in this work could be slightly lacking in sensitivity, passing by exceedingly rare theses whose authors had not deposited copies in university libraries, unsaved memorandum or even those forgotten in the theses' catalogs. The variability in the coding of theses' grids has been considerably reduced thanks to double reading the research topics, study outlines and theses' summaries. This has been achieved by relying on pairs specialized in 'General Surgery' and public health. Thus, it would be very unlikely that our bibliometric study on the theses in 'General Surgery' is affected by systematic errors limiting the validity of the national trend of its research topics, its study designs, or the editorial quality of its summaries. In this study, traditional bibliometric methodologies are used, however, in terms of the data analysis, more advanced techniques and tools for constructing and visualizing bibliometric networks are now widely adopted and would impacted more. Extrapolation of the findings of this work, to other specialties of Tunisian medical schools or to countries of the Great Maghreb, Sub-Saharan Africa, or the French-speaking countries, over the last four decades, would be possible. The results of this bibliometric study of the academic history of 'General Surgery' theses, across all Tunisian medical schools, demonstrate three key pieces of information: thematic polymorphism, a low level of methodological proof and a lack of editorial conformity.

4.1. Thematic polymorphism

The homogeneous group for indexing surgical emergencies has always been at the top of the list, regardless of when and where the thesis has been conducted. This is because digestive emergencies, well known by severity of their prognosis, remain at the top of the surgical pathology. Moreover, the educational committee of the European Society of Trauma and Emergency Surgery [11] even recommended the recognition of

Table 2. Homogeneous indexing groups for research topics in general surgery, defended at the four Tunisian faculties of medicine from 1980 to 2019; n,(%).

	Medical School of Tunis (N = 339)				Medical School of Sousse (N = 148)				Medical School of Monastir (N = 75)				Medical School of Sfax (N = 177)				Total Tunisia (N = 739)			
	2000-		1980-		2000-		1980-		2000-		1980-		2000-		1980-		2000-		1980-	
	2019 (n = 217)	2019 (N = 339)	1999 (n = 62)	1999 (N = 148)	2019 (n = 86)	2019 (N = 148)	1999 (n = 16)	1999 (N = 75)	2019 (n = 59)	2019 (N = 59)	1999 (n = 75)	1999 (N = 177)	2019 (n = 156)	2019 (N = 177)	1999 (n = 221)	1999 (N = 518)	2019 (n = 518)	2019 (N = 739)		
Emergency	54 (44.3)	127 (37.5)	32 (51.6)	62 (41.9)	30 (34.9)	62 (41.9)	7 (43.8)	36 (48)	29 (49.2)	9 (42.9)	75 (42.4)	66 (42.3)	102 (46.2)	198 (38.2)	300 (40.6)					
Surgical pathology	37 (30.3)	89 (26.3)	15 (24.2)	40 (27.0)	25 (29.1)	40 (27.0)	4 (25.0)	15 (20.0)	11 (18.6)	6 (28.6)	46 (26.0)	40 (25.6)	62 (28.1)	128 (24.7)	190 (25.7)					
Oncology	16 (13.1)	77 (22.7)	7 (11.3)	24 (16.2)	17 (19.8)	24 (16.2)	3 (18.8)	15 (20.0)	12 (20.3)	4 (19.0)	43 (24.3)	39 (25.0)	30 (13.6)	129 (24.9)	159 (21.5)					
Trauma	10 (8.2)	24 (7.1)	7 (11.3)	14 (9.5)	7 (8.1)	14 (9.5)	2 (12.5)	8 (10.7)	6 (10.2)	2 (9.5)	11 (6.2)	9 (5.8)	21 (9.1)	36 (6.9)	57 (7.7)					
Anatomy	2 (1.6)	10 (2.9)	-	2 (1.4)	2 (2.3)	2 (1.4)	-	-	-	-	-	-	2 (0.9)	10 (1.9)	12 (1.6)					
Public health	3 (2.5)	7 (2.1)	1 (1.6)	2 (1.4)	1 (1.2)	2 (1.4)	-	1 (1.3)	1 (1.7)	-	1 (0.6)	1 (0.6)	4 (1.8)	7 (1.4)	11 (1.5)					
Bariatric surgery	-	2 (0.6)	-	3 (2.0)	3 (3.5)	3 (2.0)	-	-	-	-	-	-	-	5 (1.0)	5 (0.7)					
Pedagogy	-	2 (0.9)	-	1 (0.7)	1 (1.2)	1 (0.7)	-	-	-	-	1 (0.6)	1 (0.6)	-	4 (0.8)	4 (0.5)					
Transplantation	-	1 (0.5)	-	-	-	-	-	-	-	-	-	-	-	1 (0.2)	1 (0.1)					

Table 3. Ranking of the main major descriptors by homogeneous indexing groups of 739 medical theses in general surgery, defended at the four Tunisian faculties of medicine from 1980 to 2019.

Major descriptors	Frequency	Percentage
Emergency		
Ulcer disease	40	13.3
Appendicitis	32	10.7
Pancreatitis and complications	25	8.3
Crohn disease	21	7.0
Complications of hydatid cyst	18	6.0
Surgical pathology		
Lithiasis of bile duct	22	11.6
Hydatid cyst	19	10.0
Hernia	10	5.3
Eventration	9	4.7
Congenital cystic malformation of bile duct	8	4.2
Oncology		
Rare tumors	26	16.4
Gastric cancer	19	11.9
Rectal cancer	16	10.1
Colon cancer	14	8.8
Gastro-intestinal stroma tumors	12	7.5
Trauma		
Abdominal wounds	14	24.6
Abdominal contusions	9	15.8
Spleen trauma	9	15.8
Hepatic trauma	5	8.8
Duodeno-pancreatic trauma	4	16

Emergency Surgery as a separate subspecialty in Europe, which would improve outcomes for patients and facilitate the allocation of resources to Emergency Surgery. The emergence of digestive cancers, increasingly considerable, over the last decades, secondary to a multitude of risk factors. The interest of supervisors and their students on oncology could be motivated by the considerable increase of the digestive cancers over the last decades. This increase is a result of numerous factors. In fact, the candidates, who have been working on this topic, have doubled over the years [12]. This choice proves the relevance of the subjects addressed by the conducted theses in General Surgery". It is mainly due the fact that cancers represent a public health problem in Tunisia, such as colon and rectal cancers that are the most frequent digestive cancers [13]. However, the paradoxical choice of rare tumors by doctoral students and their supervisors, in the specialty of 'General Surgery', as subjects of study in digestive oncology, could be explained by the methodological ease of the research protocols of these studies, often drafted according to the model of 'report cases' [14].

A similar study, carried out in Turkey [15], found that the topic most approached in theses of Surgery, published subsequently, was colorectal cancer followed by occlusions on flanges and mesenteric ischemia: a list judged to be in perfect adequacy with the national epidemiological priorities in Turkey. Moreover, several authors have recommended [16] that the priority themes to be chosen for carrying out research work must contribute to significant advances in scientific knowledge, to be of real relevance making it possible to overcome major health issues not yet resolved, and to create innovative

techniques [16]. At the Faculty of Medicine of Sousse, the hydatid cyst of the liver was the subject most approached in the theses of 'General Surgery', which was correlated with the burden of morbidity of this specific pathology of our country [1718]. In fact, in Tunisia as well as in the countries of the Maghreb, the hydatid cyst evolves in endemic mode, unlike in developed countries, explaining the scarcity of the literature on 'Echinococcosis' in developed countries and its occurrence in North Africa (18). Finally, it should be noted that the Tunisian surgical themes of the theses have failed to evolve towards recent global trends in cutting-edge surgical procedures, such as duodeno-pancreatectomies and hepatectomies by laparoscopic route and liver transplantation [19]. For greater social relevance and innovation, the Tunisian specialty of 'General Surgery' should better meet the requirements of modern science, in applications for the registration of medical theses [14]. Moreover, a better strategy for an optimal scientific exploitation of the clinical files and their digitization should necessarily be based on the selection of research objectives according to the academic level of the doctoral students. This by granting to future family physicians, thesis subjects consistent with their educational objectives. Residents of 'General Surgery' can exploit advanced and innovative themes exploring recent concepts, methods, and advanced surgical procedures.

4.2. Low level of methodological proof

In our bibliometric survey of Tunisian theses in 'General Surgery', original research predominated (99.3%). However, the theses of synthesis and of pedagogy (systematic review, bibliometrics, review of the global evaluation literature and teaching aid) are almost absent. The most common clinical studies were descriptive studies (56.9%) and case studies (40.6%). These types of studies ('case studies' and descriptive studies) are located at the lowest level of the pyramid [14,20] of scientific medical writing (correlated with the lowest level of proof of level IV). Thus, they are not considered as solid references neither to scientifically argue a decision nor to qualify a result as relevant. The results of these theses are like those of the 'case report' studies of Tunisian 'General Surgery' publications, indexed in the Medline database over the last thirty years [14,20]. This bibliometric study of the national publications of 'General Surgery', underlined an inflationary tendency of 'cases report', relative to other types of scientific articles such as systematic reviews and analytical studies. In comparison to developed countries, the level of evidence in publications has been higher, influenced by the paradigm of 'Evidence Based Medicine' [21]. Similar results are found in Tunisian theses in occupational medicine,

Table 4. Classification of editorial quality of medical theses in general surgery, defended at the four Tunisian faculties of medicine from 1980 to 2019.

	Medical School of Tunis (N = 339)				Medical School of Sousse (N = 148)				Medical School of Monastir (N = 75)				Medical School of Sfax (N = 177)				Total (N = 739)	
	1980 -1999 (n = 122)	2000 -2019 (n = 217)	1980 -1999 (N = 339)	1980 -2019 (n = 86)	1980 -1999 (n = 62)	2000 -2019 (n = 86)	1980 -2019 (N = 148)	1980 -1999 (n = 16)	2000 -2019 (n = 59)	1980 -2019 (N = 75)	1980 -1999 (n = 21)	2000 -2019 (n = 156)	1980 -2019 (N = 177)	1980 -1999 (n = 221)	2000 -2019 (n = 518)	1980 -2019 (N = 739)		
SATISFACTORY																		
QUALITY																		
Editorial Score >75%	3 (2.5)	95 (43.8)	98 (28.9)	3 (4.8)	37 (43)	40 (27.0)	-	4 (6.7)	4 (5.3)	-	11 (7.1)	11 (6.2)	6 (2.7)	147 (28.4)	153 (20.7)			
UNSATISFACTORY																		
QUALITY																		
Without summary	47 (38.5)	2 (0.9)	49 (14.4)	40 (64.6)	-	40 (27.0)	15 (93.7)	14 (23.7)	29 (38.7)	21 (100.0)	25 (16.0)	46 (26.0)	123 (55.6)	41 (7.9)	164 (22.2)			
Editorial Score <75%	72 (59.0)	120 (55.3)	192 (56.6)	19 (30.6)	49 (57.0)	68 (46)	1 (6.3)	41 (69.5)	42 (56.0)	-	120 (76.9)	120 (67.8)	92 (41.6)	330 (63.7)	422 (57.1)			
Total (without summary or Score <75%)	119 (97.5)	122 (56.2)	241 (71.1)	59 (95.2)	49 (57.0)	108 (73)	16 (100.0)	55 (93.2)	71 (94.7)	21 (100.0)	145 (92.9)	166 (93.8)	215 (97.3)	371 (71.6)	586 (79.3)			

Global SCORE

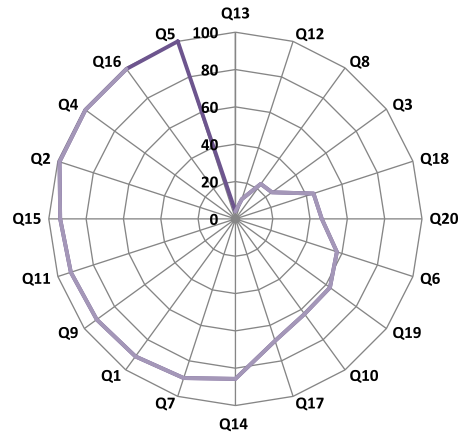


Figure 2. Radar diagram of the editorial components of the summaries of doctoral theses in general surgery at the Tunisian faculties of medicine from 1980 to 2019.

where research essays are mostly descriptive (92.9%) and rarely analytical (6.7%) [22]. Our results contrast with those reported in a bibliometric study conducted in Turkey, studying 'General Surgery' theses for the period between 1998 and 2018 [23]. In fact, in this country, 49.3% of study designs were experimental, against 50.6% of clinical studies therefore having a significantly higher publication potential. According to S. Onkuga [24], a new approach to teaching research methodology in postgraduate medical studies would be necessary to improve research interest in publication among residents and encourage the spread of local solutions to health problems.

4.3. Editorial conformity

We have relied to the thesis summary to assess its editorial quality of the thesis. The summary is a condensed version of thesis content and style and thus it fully reflects the work carried out and give us a clear vision to its methodology, its results, and its editorial conformity. In our bibliometric study, the writing quality of the 'General Surgery' theses was satisfactory in only one out of five theses. The limiting elements were related especially to the availability of the structured summary for each thesis manuscript and to the in-depth progress of the statistical (confidence intervals and standard deviations) and documentary (keywords) analysis. It is currently accepted that the quality of a scientific manuscript depends on its conformity with the principles of scientific medical writing regarding the triad: Structure, Substance and Style. thematic relevance of the subject and the validity of the methods are also important [25]. In the summaries of Tunisian theses in 'General Surgery', the IMRaC structure was respected only in 57.2% of the summaries. This percentage is similar to bibliometric studies carried out on Tunisian theses [22,26], anatomic-pathology (57%) and psychiatry (56%). In our study, the percentage of thesis abstracts having

adopted the IMRaC structure, compared to all annual theses, was in clear increase, throughout the study period: 5.1% before the year 2000, versus 67.9% after 2000. The presence of the IMRaC plan would have made it easier to read the summaries of theses respecting this structure [6]. Indeed, this format is not arbitrary but reflects a process of scientific discovery. It is universally accepted in scientific journals because it is the simplest and most logical form of communicating scientific results. According to Cascher [27], it is imperative that the student follow the format of this structure, because this model is like a research manuscript prepared for publication in a scientific journal. It is also useful to consult the latest recommendations for writing research work from the International Committee of Medical Journal Editors (ICMJE). The latter is a set of guidelines for standardizing the ethics, preparation and formatting of manuscripts submitted, for defense and for publication [28]. As for standard deviations and confidence intervals (in the case of sampling), they are rarely present in the 'results' part of the summaries of 'General Surgery' theses, altering the statistical rigor of the results of the surveys. According to Sidebe [29], all quantitative variables must be described by their means and standard deviations if the distribution is Gaussian. Otherwise, they should be measured by their medians. For qualitative data, we will indicate the frequencies with their 95% confidence intervals. The structure of the thesis is the first criterion for evaluating the dissertation according to the Dutch Association for Medical Education [30].

In addition to the choice of the relevant research project, clear and concise writing represents a major stake in professional success. It requires considerable investments associated with strict compliance with the rules of scientific research and including documentation. Regarding the Tunisian theses of 'General Surgery', only 46.3% of the descriptors cited are MeSh words. General Surgery thesis candidates should

become more familiar with MeSH nomenclature, which can resolve several common difficulties encountered when searching bibliographic databases. Unlike other descriptors, the keywords in the PubMed database constitute a standardized vocabulary. However, the tree structure of MeSH words is little known by doctoral students and health supervisors, hence the need for their valuation in educational strategies in a research environment.

This Tunisian bibliometric study has covered 739 medical theses in 'General Surgery' defended in the four national medical schools for 40 years. Three main characteristics emerge: A thematic polymorphism with a focus on surgical emergencies; a basic methodology dominated by descriptive studies and case studies; editorial non-compliance. Thus, the quality of Tunisian theses in 'General Surgery' is beneath the expected level. An urgent educational reform plan is of paramount importance. The latter can be based on similar comparative studies in all the Maghreb and African medical schools as well as the monitoring of their scientific future.¹

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Authors' contributions

The Authors contributed to the following research activities:

MA: Drafting of the first version of the manuscript, statistical analysis of the database and collection of bibliometric data.

DC: Revision of multiple versions of the manuscript, contribution to the interpretation of tables and figures in the study, and audit of the quality of the data collected.

DC: Help in the discussion of results and the review of the research report.

SN: Contribution to data collection and discussion of results.

SM: Contribution to documentary research and the design of the research protocol.

NH: Contribution to data collection and discussion of results.

AB: Design of the research protocol, development of the results analysis plan and revision of the different versions of the manuscript.

All authors read and approved the final manuscript.

Note

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