

# Bibliometric profile of Tunisian medical publications written in English and indexed in Medline

## Profil bibliométrique des publications médicales tunisiennes rédigées en anglais et indexées dans Medline.

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### R É S U M É

**Background:** English is becoming nowadays the universal language of science. Rresearch published in English can be considered as a bibliometric indicator of the scientific productivity.

**Aim:** We sought to describe the evolution of the Tunisian medical publications written in English over the period from 2004 to 2014.

**Methods:** Medline's database was consulted using a research query associating the names of the country and the main university cities both in French and in English. The articles with a Tunisian health affiliation were retained but the articles of dentistry, pharmacy and non-medical fields were not included.

**Results:** We counted 979 English language Tunisian medical articles published during the three tracer years of the study: 2004, 2009 and 2014. The increase rate was about 38% between 2004 and 2014. The contribution of medical fields in English language publications was important but showed a clear decrease over time. The retrieved articles did not have the same distribution according to the specialties and the institutions. The distribution according to the journals showed that these articles were mainly published by foreign journals with an increasing impact factors between 2004 and 2014.

**Conclusion:** The English language Tunisian medical productivity had shown an important increase over time but many specialties and institutions still not enough implicated in this production. Therefore, increasing research funding, improving the physicians' research methodology and English writing capacities are likely needed to improve the Tunisian medical output.

### M o t s - c l é s

Publications; PubMed; MEDLINE; Biomedical research; Tunisia

### S U M M A R Y

**Contexte:** L'anglais devient de nos jours la langue universelle de la science. La recherche publiée en anglais peut être considérée comme un indicateur bibliométrique de la productivité scientifique.

**Objectif:** L'objectif de cette étude était de décrire le profil bibliométrique des publications médicales tunisiennes rédigées en anglais entre 2004 et 2014.

**Méthodes:** La base de données «Medline» a été consultée à l'aide d'une requête de recherche associant les noms du pays et les principales villes universitaires en français et en anglais. Les articles avec une affiliation sanitaire tunisienne ont été retenus, mais les articles de la dentisterie, de la pharmacie et des spécialités non médicales n'ont pas été inclus.

**Résultats:** Un total de 979 articles médicaux tunisiens rédigés en anglais, ont été publiés au cours des trois années traceuses de l'étude: 2004, 2009 et 2014. Le taux d'augmentation était d'environ 38% entre 2004 et 2014. La contribution des spécialités médicales dans les publications en anglais était importante mais a montré une nette diminution au fil du temps. Les articles collectés n'avaient pas la même distribution selon les spécialités et les institutions. La distribution selon les revues a montré que ces articles étaient principalement publiés par des revues étrangères avec des facteurs d'impact croissants entre 2004 et 2014.

**Conclusion:** La production médicale tunisienne rédigée en anglais a été marquée par une augmentation importante au fil du temps, mais de nombreuses spécialités et institutions n'étaient pas suffisamment impliquées dans cette production. Par conséquent, la promotion de la recherche, l'enseignement de la méthodologie de recherche et l'amélioration des capacités d'écriture en anglais chez les médecins sont probablement nécessaires pour améliorer la qualité des publications médicales en Tunisie.

### Key - words

Bibliométrie; Publications; PubMed; MEDLINE; Rédaction médicale; Recherche biomédicale; Tunisie

Throughout the 20th century, international communication has shifted from a plural use of several languages to a clear pre-eminence of English, especially in the field of science. In fact, 75 percent of the articles in the social sciences and humanities and well over 90 percent in the natural sciences are written in English (1).

Biomedical research is also mostly communicated in English (2,3). And the majority of biomedical databases classify publications according English keywords.

Furthermore, the articles published in English have a higher number of citations than those published in other languages. This may result because English articles are accessible to a larger audience (4,5).

For all these reasons, many observers conclude that it has become inevitable to publish in English, even in English only (1,4).

In Tunisia, French is still the most used language in communication, teaching and even in publication; in fact a bibliometric study that describes the medical Tunisian productivity between 2000 and 2003 showed that only 20% of the medical publications were written in English (6). This type of study is a statistical analysis of books, articles, or other publications in order to construct "productivity" indicators for academic research (7).

It is a way to situate a country in the world, an institution in a country and even to determine the place of a scientist in his community in terms of scientific production (8).

Scientific research published in English could be considered a bibliometric indicator of the scientific productivity; it helps to measure the international radiance because more we publish in English more we are visible in the literature (6). In these last years we are showing a considerable tendency to English use in the Tunisian scientific production and especially in the medical papers but there is no recent study that describes this transition of language use. In fact, there is no system of documentary monitoring as is done in several countries worldwide (9) and Tunisian bibliometric studies are rare and the last ones are more than 10 years old (6,8,10). The aim of this study was to quantify the Tunisian medical publications written in English and indexed in Medline between 2004 and 2014 and to describe their bibliometric profiles.

## METHODS

It turns about a bibliometric study that describes the progress of the medical Tunisian publications written in English and indexed in Medline between 2004 and 2014 and focus, among these publications, on the papers produced during three tracer years: 2004, 2009 and 2014. Data were collected through Medline database using a search query associating, by the Boolean Operator «OR», the names of the country in French "Tunisie" and in English "Tunisia" and the main University towns: "Tunis", "Sousse", "Monastir" and "Sfax".

We retained only the articles which satisfied the two following conditions: The address is a Tunisian health institution either of care (Hospitals, Institutes, Centers...) or of education (Medicine faculties...) and the first author is Tunisian.

Other scientific articles of non-medical specialties (biotechnology, agriculture...) and juxtamedical specialties (dentistry, pharmacy and veterinary) were not included in the study. (Figure 1)

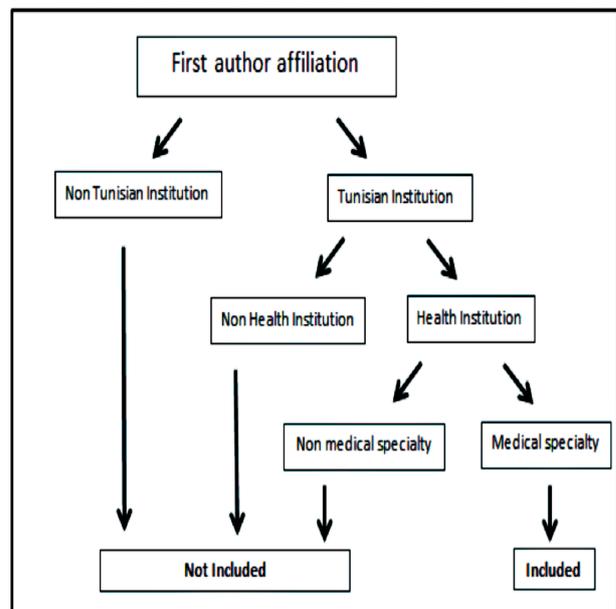


Figure 1: Inclusion criteria algorithm of the Tunisian medical articles written in English and indexed in Medline.

In order to study the bibliometric profile of these publications, a grid was designed to describe their different characteristics (the field of research, the address, the specialty, the journal...)

In the first part of the study, the Tunisian medical publication written in English and indexed in Medline was compared to the whole Tunisian indexed biomedical research and then compared to the whole Tunisian indexed medical research during the study period.

The rate of English language medical publication in Tunisia was calculated by year and its progress was described during this period. Then, the contribution of the medical research in the English language scientific productivity in Tunisia was illustrated.

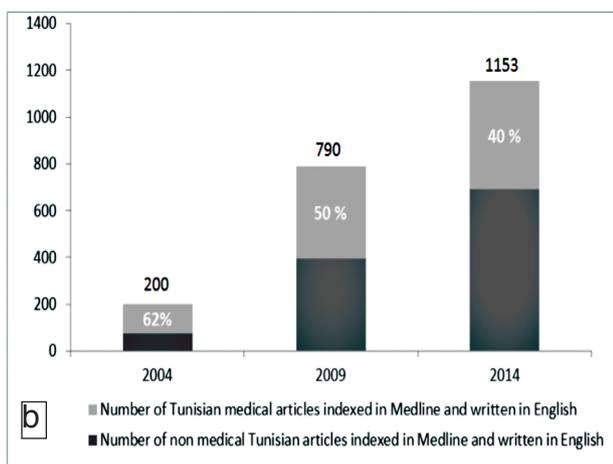
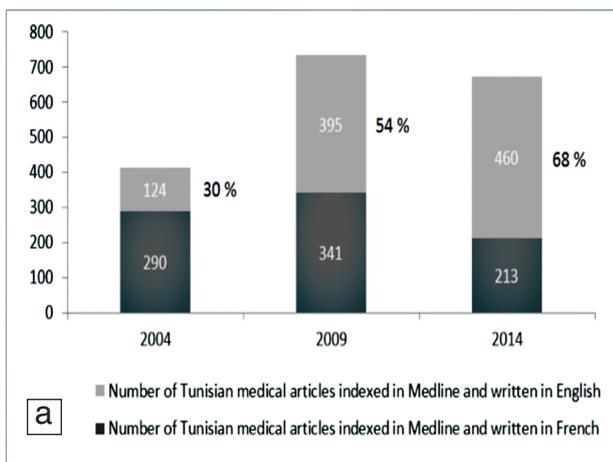
In the second part of the study, the bibliometric profile of the Tunisian medical publications written in English was described: Their distribution on Tunisian Universities and health institutions was illustrated. Then, they were categorized by areas of specialization and classified according to the main publishing journals.

**RESULTS**

**Evolution of the Tunisian medical publications written in English and indexed in Medline:**

The rate of English language indexed medical publication in Tunisia had known an important increase during the period of the study: Between 2004 and 2009; it had risen from 30% to 54%. Then, between 2009 and 2014; it had crossed to 68%. The global increase rate during the 10 years of the study was about 38%. (Figure 2-a)

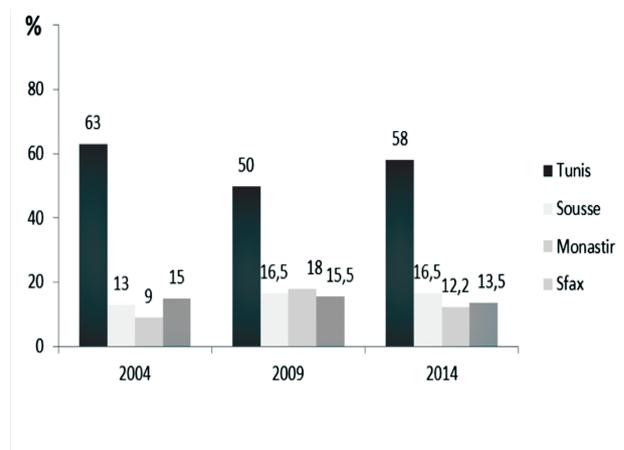
The contribution of these medical publications in the Tunisian scientific production was about 62% in 2004, then it declined to 50% in 2009 and then to 40% in 2014. The decrease rate each five years was about 10%. (Figure 2-b)



**Figure 2:** Evolution of the Tunisian medical publications written in English and indexed in Medline between 2004 and 2014. a: Progress of Tunisian medical publications written in English comparatively to those written in French  
b- Proportion of medical publications written in English among the total number of Tunisian publications indexed in Medline.

**Bibliometric profile of the Tunisian medical publications written in English and indexed in Medline:**

English language medical production was not equally distributed on the university zones in the three tracer years of the study: The first rank of this production was attributed to the University of Tunis El Manar. Its production rate crossed the half of the whole production: It reached 63% in 2004, 50% in 2009 and then 58% in 2014. The other universities had comparable production rates with a variation between 9% and 18%. (Figure 3)



**Figure 3:** Distribution of the English language Tunisian medical publications indexed in Medline on Tunisian universities

The proportions of Tunisian medical publications produced in English were, also, not evenly distributed according to the health structures. All the health institutions had an important increase in English language medical production during the period of the study but their contribution in this production had changed from one year to another. The highest rate of production was in Pasteur Institute in 2004 (13%), then it moved to Farhat Hached University Hospital in 2009 (11.4%) and then it went back to Pasteur Institute in 2014 (12%).

In 2004, the proportion of English language medical publication by fundamental specialties was slightly superior to the production by clinical specialties. Then, in 2009 and 2014, the situation was reversed with a big difference in production rates. Social medicine contribution in this production did not cross the 2.5% of the whole production during the three tracer years of the study.

All the medical specialties had an important increase in English language medical production but there were a significant difference in production rates between them. The main specialties that took part in this production during the tracer years of the study were: immunology, microbiology and genetic with rates varying between 6% and 13%. (Table 1)

**Table 1:** Distribution of the Tunisian medical publications written in English according to the specialties during the following three years: 2004, 2009 and 2014

Rank	2004 (N=124)			2009 (N=395)			2014 (N=460)		
	Speciality	n	%	Speciality	n	%	Speciality	n	%
1	Immunology and Microbiology	16	13.0	Anatomopathology	36	9.0	Immunology and Microbiology	39	8.5
2	Genetic/ Biomolecular biology	15	12.0	Immunology and Microbiology	32	8.0	Genetic/ Biomolecular biology	31	6.7
3	Internal medicine/ Nephrology	9	7.2	Biochemistry	26	6.5	Sports medicine	29	6.3
4	Dermatology	5	4.0	Genetic/ Biomolecular biology	24	6.0	Biochemistry	25	5.4
5	Biochemistry	5	4.0	Dermatology	19	4.8	Pharmacology	21	4.6
6	Anatomopathology	4	3.2	Pediatrics	18	4.5	Cardiology	19	4.1
7	Emergency	4	3.2	Internal medicine/ Nephrology	13	3.3	Parasitology	15	3.2
8	Hematology	4	3.2	Ophthalmology	12	3.0	Anatomopathology	14	3.0
9	Neurology	4	3.2	Pharmacology	10	2.5	Rheumatology	14	3.0
10	Radiotherapy	4	3.2	Cardiology	9	2.2	Dermatology	14	3.0
	Nuclear Medicine	4	3.2	General Surgery	9	2.2			
	Others	52	43.8	Others	281	71.1	Others	338	73.5

These 979 Tunisian medical articles were published in 537 different journals which were mainly from foreign countries. The two national journals that took part in this publication were "Tunis Med" and "Arch Institut Pasteur Tunis".

The contribution of "Tunis Med" was about 2.4% in 2004, 7.7% in 2009 and 0% in 2014. Table 2 shows the list of the 10 First journals that had published the most Tunisian medical literature written in English and indexed in Medline.

When comparing Impact Factors values year-by-year (2004, 2009 and 2014), we find that Tunisian medical articles written in English had a clear trend to be published in higher Impact Factors journals. (Table 2)

## DISCUSSION

Publishing in English is one of the most successful ways to spread the information widely because English, nowadays, is considered as the first spoken and written language in the field of science all over the world (11,12).

The study of the bibliometric profile and the evolution of Tunisian medical publications written in English were considered necessary to evaluate the quality of the Tunisian medical literature.

The results of our study show that the main characteristics of the Tunisian medical research written in English were: an important increase rate, between 2004 and 2014, that had reached 30% and an important contribution in the whole scientific Tunisian publications written in English and indexed in Medline during this

**Table 2:** List of the main journals that published the most Tunisian medical literature written in English and indexed in the Medline database during the following three years: 2004, 2009 and 2014

Rank	2004 (N= 124)				2009 (N= 395)				2014 (N= 460)			
	Journal	IF*	n	%	Journal	IF*	n	%	Journal	IF*	n	%
1	Ann Genet	0.76	5	4.0	Tunis Med	0.15	30	7.7	Pan Afr Med J	0.59	20	4.4
2	Joint Bone Spine	1.30	4	3.2	Pathologica	0.39	14	3.6	BMJ Case Rep	0.36	12	2.6
3	Acta Orthop Belg	0.62	3	2.4	Pathol Biol (Paris)	0.79	13	3.3	Saudi J Kidney Dis T	0.81	12	2.6
4	Cancer Radiother	0.34	3	2.4	Orthop Traumatol Surg Res	1.20	9	2.3	PLoS One	4.17	10	2.2
5	Dermatol Online J	0.84	3	2.4	N Am J Med Sci	1.75	8	2.0	J Strength Cond Res	2.77	7	1.5
6	Hemoglobin	0.21	3	2.4	Clin Biochem	2.37	7	1.8	Gene	1.51	6	1.3
7	Neurosciences (Riyadh)	0.07	3	2.4	Transplant Proc	1.52	7	1.8	Asian Pac J Cancer P	3.38	5	1.1
8	Pathologica	0.20	3	2.4	Ann Phys Rehabil Med	0.89	6	1.5	Biomed Res Int	3.77	5	1.1
9	Saudi J kidney dis Transp	10.11	3	2.4	Clin Microbiol Infec	2.67	6	1.5	Libyan J Med	1.21	5	1.1
10	Transplant Proc	0.67	3	2.4	Ann Endocrinol (Paris)	0.57	5	1.3	Mol Biol Rep	1.75	4	0.9
	Tunis Med	0.07	3	2.4	Joint Bone Spine	0.39	5	1.3	J Med Case Rep	0.94	4	0.9
									Afr J Paediatr Surg	0.65	4	0.9
									J Saudi Heart Assoc	0.09	4	0.9
									Muscles Ligaments Te	-	4	0.9
	Other journals	-	88	71.2	Other journals	-	285	72.1	Other journals	-	358	71.9

\*IF = Impact factor

period. This increasing kinetics of productivity in English shows the awareness degree of the Tunisian researcher about the importance of the publication in English. In fact, the rate of this productivity which reached 68% in 2014 did not exceed 20% between 2000 and 2003 (6).

In Algeria, this proportion was about 43% between 2000 and 2009 (13).

This proportion of English publications is still modest in Maghreb countries compared to many other Arab countries that publish only in English (14).

The medical contribution in the Tunisian scientific literature written in English and indexed in Medline was very important during the study period, but its evolution showed a clear linear decrease from one year to the next. This trend is attributed to the fact that English publication in the other fields of biomedical sciences is overcoming that in the medical field.

In Saudi Arabia, the situation is not the same as it is in Tunisia, In fact a recent bibliometric Saudian study that explored the scientific productivity between 2010 and 2011 had shown that most publications were in the medical fields (15).

Another finding of this study was the concentration of the most publications in the capital city which can be explained by the presence of many institutions of care and health education and then of researchers in this city comparatively to the other University towns. This result is similar to that found in a Lebanese study where the analysis of the articles 'distribution by governorate showed an enormous domination of Beirut with 98% of the total publishing output (16).

The examination of the relative contributions of the different health institutions in this productivity showed that most publications resulted from work conducted by university hospitals, medicine faculties and research institutes.

Regional and local hospitals production was very limited if not absent in the majority of the Tunisian cities. It could be argued that these structures were created principally to focus on clinical health care and provide clinical service to their local populations. However, in developed countries, even the non-university doctors practicing in primary care are also implicated in the field of research (17).

Another thing that was evident from our results was the significant increase of clinical specialties contribution in the medical research written in English compared to fundamental specialties. These results are concordant with the findings of a Saudian and a Syrian studies that had shown that the main implicated specialties in medical research were clinical ones (18,19). The same findings were also demonstrated in the medical Lebanese literature between 1985 and 2004 where more than three quarters of medical publication were attributed to clinical medicine (16).

The distribution of the retrieved medical articles by journals shows that they were mainly published in foreign

reviews. When comparing these results with the findings of a Tunisian bibliometric study conducted between 2000 and 2003 we find that most of them were written in French and published by a national review "Tunis Med"(6). So, it can be concluded that publication in English may be a promoting factor of article acceptance in international journals.

Furthermore, this study highlights an important increase in Impact factors values with the increase of English publication rate between 2004 and 2014 which means that more we publish in English more we can publish in high impacted journals. This relationship between English language papers and publication in high impacted reviews was demonstrated by many studies (3).

Our study has few limitations that need to be stated: Medline is a large and comprehensive database but not all journals are indexed in Medline and therefore, some Tunisian articles written in English published in un-indexed journals might be missed. Furthermore, the keywords used might not be enough sensitive to find the whole Tunisian publications produced in English. In addition, this study took into account only the specialty of the first author in each article which can lead to an underestimation of the other specialties contribution. This selection according to the first author is due to the non-availability of information about the other authors in the majority of the articles in Medline. Furthermore, PubMed uses the first author's affiliation as the country of the publication's origin, which means that collaborative publications in which the first author is not affiliated to Tunisia were missed. These limitations and others are found in most bibliometric studies (20-22) but "Medline» remains the most representative database of international biomedical science (23).

This study revealed that the main features of the Tunisian medical publications written in English over the period from 2004 to 2014 were: a clear climbing productivity and an important contribution in the whole scientific Tunisian production but they didn't have the same distribution according to the cities, the specialties and the institutions. They still also classified among the least impacted publications comparatively to those of many other countries. Besides, a remarkable association between the English language use and the publication in high impacted journals was observed. Thus, integrating scientific English learning in the medical program for the pre and post-graduates and courses about research methodologies and scientific writing in university curriculum are actions that would enhance the Tunisian medical publications in all medical fields and even in non-University hospitals and primary care institutions. That would enhance, also, the production quality and would help researches to have better chances to publish in high impacted reviews.

Another action that should be implemented is to increase investment in Research and Development especially by

helping researchers to publish in open access journals. This bibliometric study had explored the whole Tunisian medical literature produced in English and indexed in Medline but did not examine neither the other databases

nor the non-indexed papers. Further bibliometric researchs on these publications should therefore be undertaken.

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