ORIGINAL ARTICLE

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Biomedical Bibliometrics of a Country with Multiple Identities: The Case of Palestine.

Abstract

Objective: The presence of erroneous author and address information in scientific articles is a great concern to bibliometricians studying research outputs. While it is usual to find inconsistencies regarding the department, faculty, institution, or city names, in articles from Palestine, an additional difficulty emerges due to the absence of consensus on the country name. In the present study, we aimed at developing accurate search strategies on PubMed to explore biomedical research productivity in Palestine.

Materials and Methods: We analyzed an existing query syntax for search for Palestinian papers on PubMed, applied a series of additional search strategies, and formulated a new search formula for Palestine.

Results: In 162 Palestinian biomedical citations published between 1987 and 2005, the name of the country appeared in a number of polymorphs. Quantitatively, Palestine produces far less than 0.5% of the total biomedical citations output in the Arab World. Qualitatively, almost all Palestinian biomedical articles appeared in low impact factor journals with very little exceptions.

Conclusion: War medicine is a well developed science in biomedicine in Palestine. Most authors study aspects of sanitation and microbiology. Similarly, post-traumatic disorders, including diabetes, are primary targets for research in the country.

Key words: Bibliometric Analysis, Biomedical Research Outputs, Research Evaluation, Palestine.

Introduction

In the biomedical fields, scientists utilize many high quality citation databases to search for scientific literature, including PubMed, the online version of MEDLINE. PubMed is the most significant barrier-free biomedical resource available on the World Wide Web and provides a strong health discipline indexing coverage. PubMed currently catalogues over 15 million biomedical articles in 4,800 journals published in more than 70 countries [(1)]. Using PubMed several groups investigated global trends for biomedical research productivity and provided objective and useful tools to evaluate the results of scientific activity in different locations worldwide [(2-4)]. Unfortunately, contemporary Arab scientists produce less than 1% of the peer-reviewed biomedical citations published worldwide, despite the available wealth and human resources [(4)]. Major contributors to this situation include: the Arab-Israeli conflict, the

catastrophic health and economic situation in Palestine and Somalia, devastating embargoes on several Arab countries, and the major wars that erupted in the past few decades in the region. Surely, internal factors do also contribute to this situation including the serious imbalance GDP allocations to research and development (US$0.9 billion per year) in favor to military spending ($60 billion per year) of the $600 billion GDP per year [4] In addition, Arab authors do publish hundreds of papers annually in local or regional peer-reviewed journals that do not have on-line access or are not indexed in international bibliographies. Unfortunately, this cause many publications to go unrecognized by the wider scientific community despite the wealth of information that they may contain.

Among the most important fields that investigators query in bibliometric analyses are those containing information regarding authors and their addresses indicated in corresponding scientific papers. As expected, the occurrence of errors or inconsistencies in such key fields may lead to loss of relevant valuable information [5-7].

Our experience on biomedical research throughputs from the Arab World and neighboring countries exposed us to a wide variety of such errors and inconsistencies, including absence of uniformity in reporting addresses at the level of city, institution, faculty, and department names [8, 9]. Major reasons for these errors are the transliteration of addresses from native languages into English or French [10]. Other inconsistencies include misspelled names or the use of abbreviations to express names of universities or research centers [8].

In most of the cases, bibliometric analyses are usually conducted to make pronouncements about outputs in defined geographical locations that can be continents, major world regions, or, most commonly, countries according to their political divisions. In the Arab World, researchers focusing on Jordan, Lebanon, and Palestine face deviations from true results due to the fact that many cities in the world may carry the names of these countries; hence adding false positive results if non-specific queries are utilized [10]. A typical example in this case is the name Palestine, which refers to small towns in the United States (e.g., Arkansas, Illinois, Indianapolis, Ohio, Texas, and West Virginia). Additionally, bibliometricians studying Palestine face the additional inconvenience of the absence of consensus on the country name [11]. A number of international bodies do not recognize the proper name Palestine, whilst several refer to it with different alternatives (e.g., Palestinian Authority) or prefers to isolate the country into two islets: West Bank and Gaza Strip.

Such a division is reflected in the addresses reported by Palestinian authors when publishing scientific articles.

Bibliometric Analysis

In 2004, we developed a sensitive search strategy to accurately obtain specific data on biomedical research productivity in Palestine and other Arab countries as of MEDLINE [10]. In the present study, we utilized the same search strategy to evaluate its level of validity and to explore whether further adjustment is necessary to eliminate any false-positive results for Palestine. Additionally, we also implemented different combinations of search syntaxes following the trends of address reporting by Palestinian authors to explore the possibility of covering

biomedical research outputs from Palestine excluded by our previously suggested model.

Results

A list of search syntaxes and their outcomes are summarized in table 1. Results obtained from these searches were exported from PubMed in MEDLINE format and imported to a local analysis system [4]. False positive results were noted after the application of each search strategy

Table 1. Preliminary search strategies for biomedical publications from Palestine (performed on 19.12.2005).

Search Syntax		Citations
Suggested by Tadmouri and Bissar-Tadmouri [10]	Palestine[affiliation] NOT Jordan[affiliation] NOT TX[affiliation] NOT Lebanon[affiliation] NOT Egypt[affiliation]	102
Preliminary syntaxes (this study)	Palesti*[affiliation] NOT Palestine[affiliation] NOT Jordan[affiliation] NOT TX[affiliation] NOT Lebanon[affiliation] NOT Egypt[affiliation]	32
	Gaza[affiliation] NOT Palesti*[affiliation]	14
	"West Bank"[affiliation] NOT Palesti*[affiliation]	64
Suggested syntax (this study)	(Palesti*[affiliation] OR Gaza[affiliation] OR "West Bank"[affiliation]) NOT Jordan[affiliation] NOT TX[affiliation] NOT Lebanon[affiliation] NOT Egypt[affiliation] NOT Italy[affiliation] NOT Korea[affiliation] NOT Catterick[affiliation] NOT Turkey[affiliation] NOT Katif[affiliation] NOT District[affiliation] NOT Trent[affiliation] NOT Sheffield[affiliation] NOT Minnesota[affiliation] NOT Orleans[affiliation] NOT Saudi[affiliation]	162

By using these initial search strategies, there were 45 false-positive citations. Accordingly, new syntaxes were formulated and tested for validity. We realized that in approximately 35 citations, the address ended with the name of the locations Gaza or West Bank without indicating the country name (data not shown). Taking into account this additional observation, a final syntax was formulated to search for "Palestinian" biomedical citations indexed by PubMed. In total, there were 162 biomedical citations authored by principal authors from Palestine for the period between 1987 and 2005 (Figure 1). Very interestingly, authors utilized a variety of styles to report their addresses. The most common inconsistency was related to reporting the country name. In address fields, the country name Palestine occurred in addresses in a number of polymorphms such as: Palestine, Palestinian National Authority, Palestine National Authority, PNA, Palestinian Authority, Occupied Palestinian Territory, OPT, Palestine Territory, Gaza-Palestinian Authority, Israel, via Israel, and others. Overwhelmingly, these examples clearly indicate that authors in Palestine do not follow a consensus of how to indicate the name of their country.

Following the implementation of the new revised search strategy for biomedical publications from Palestine as indexed by PubMed, we conducted a series of analyses to quantitatively and to qualitatively evaluate the citations obtained. Over the period between 1987 and 2005, Palestine produced an average of approximately 8-9 citations per annum. This is by far less than the average annual publication rates for authors from Lebanon (123 papers per annum), which is a country of relatively similar population size and witnessed successive turmoil over the last four decades, of other Arab authors (approximately 1,933 papers per annum for the Arab World) or International authors (approximately 1.3 million

papers per annum worldwide). On average, there were 3-4 collaborating authors in every paper from Palestine; this is very close to rates recorded in other Arab countries such as Lebanon (3-5 authors) and the United Arab Emirates (3-4 authors; unpublished data). On the other hand, of 30 institutes that contributed to all biomedical publications from Palestine, Birzeit, An-Najah, and Al-Quds universities produced more than half of the total publications from the country (Table 2).

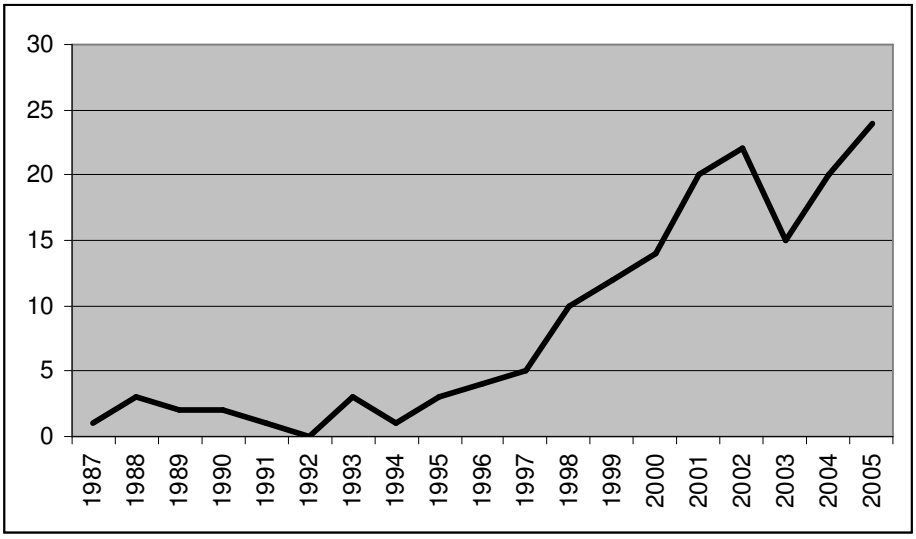

Figure 1. Annual biomedical citation outputs from Palestine (1987-2005).

Table 2 Proliferate biomedical institutes in Palestine (1987-2005).

Institute	Citations	Per Cent
Birzeit University	55	33.95
An-Najah University	28	17.28
Al-Quds University	19	11.73
Islamic University	8	4.94
Al-Azhar University	7	4.32
Gaza Community Mental Health Programme	7	4.32
Ministry of Health	5	3.09
Bethlehem University	4	2.47
Hebron University	4	2.47
Khan Younis Hospital Laboratory	4	2.47
Environmental Protection and Research Institute	2	1.23

During the last 19 years, Palestinian authors destined their biomedical research papers to 94 journals, five of which attracted approximately 21% of these papers (Table 3). As in other Arab countries, Palestinian papers appear in low impact factor journals. Notably, two papers appeared in the high impact factor journal "Lancet" (data not shown). Almost all papers consisted of Journal Articles and with the exception of one (Arabic), they were published in English. Strikingly, only one review article occurred among all Palestinian citations. This is in contrast to data from other countries such as Saudi Arabia [8], Lebanon, and the United Arab Emirates (unpublished data) that produce review articles at rates of 6-17% of their total citation productivities.

Table 5. Top biomedical journal destinations for Palestinian authors (1987-2005).

Journal	Citations	Impact Factor
Eastern Mediterranean Health Journal	11	-
International Journal of Environmental Health Research	6	0.588
Mycopathologia	6	0.878
Saudi Medical Journal	6	0.306
Journal of Ethnopharmacology	5	-

The analysis of 2001 keywords occurring in the 162 Palestinian articles indicates that 62% of research is directed on human subjects while animal studies were dealt with in 16% of the cases (data not shown). As in other Arab countries, male and female human subjects were equally investigated in Palestine. The most investigated age groups included: adults (25%), children (22%), adolescents (20%), and middle-aged (16%) subjects (data not shown). The studies covered several aspects of biomedical research including: prevalence studies (14%), risk factors (9%), and comparative studies (9%). More specifically, 11% of articles discussed different aspects of water sanitation, 9% of the papers revolved around war outcomes, 8% of research involved microbial sensitivity tests, 8% analyzed anti-bacterial agents, 7% covered different aspects of diabetes, 7% on drug resistance, and 7% discussed post-traumatic stress disorders (data not shown).

Discussion

It is important to note that address-based search on PubMed automatically excludes letters to the editors and commentary articles. On the other hand, search results only include papers in which the principal investigators are affiliated to institutes in Palestine; thus, reflecting major involvement in the studies reported.

Keyword analysis of biomedical journal articles from Palestine reflects the bleeding history of the country dating back to the beginning of the last century. The field of war medicine is clearly expressed in Palestine, where we see a great deal of investigations on the features of sanitation, including water pollution, microbial tests, and anti-microbial agents. In addition, post-traumatic disorders and diabetes are natural outcomes of the stressful conditions witnessed in the country; hence, becoming interesting targets for research.

We believe that the approach utilized to develop a search syntax for Palestine in a bibliographic database may be adapted as a model for other countries as well. Validity of this model may not be verified until it is subjected to critical inspection and analysis.

On the other hand, the present study emphasizes the primary responsibility of authors to grant precision of their affiliation addresses and avoid the continuous accumulation of errors and inconsistencies in bibliographic databases. We suggest that Palestinian institutions must apply a standardized uniform style for address reporting in scientific articles, for example: "*Department, Faculty, Institution, City, Palestine*" Such a system when applied, will surely allow bibliometricians investigating biomedical research outputs to classify

Palestine according to its proper international placement.

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