

## Research Article

# Medical Research Productivity in Oman: A Bibliometric Analysis

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## Abstract

**Objectives:** Bibliometric analysis of publications has been used as a tool to describe trends, patterns and areas of research in different medical subjects and countries. This has not been analyzed recently for Oman so we aimed to perform this analysis over a period from 2006 to 2018.

**Methods:** The PubMed database was searched for all publications from Oman during the identified period. The bibliometric data were extracted and analyzed using RISmed package of R program.

**Results:** We found a total of 6363 publications using the word “Oman” as a free-text search in all fields and a total of 1667 indexed with Oman as a country of publication over the study period. In 2006, the total publication count was at its lowest with 188 publication per year, which increased to 767 publication per year in 2018 (an overall increase of 208%). When the analysis was restricted to Oman as the country of publication and normalized to every 100,000 publications per year in the searched database, the rate increased from 26.4 in 2006 to 65.8 in 2018. The peak was in 2017 with a value of 65.9 per 100,000 publications, which represent 0.000658% of the total publications that year in the database.

**Conclusion:** We found a promising positive trend in the rate of biomedical publications from Oman. We recommend that future bibliometric analysis should be conducted over a wide range of databases with a more in-depth analysis.

**Keywords:** Oman; Bibliometric analysis; Biomedical research; Productivity

## Introduction

Bibliometric analysis of publications has been used as a tool to describe publications trends, patterns and areas of research in different medical subjects and countries. When analyzed for a country, it informs decision makers where the country stands compared to other countries and benchmarks the country's contribution to the research output worldwide. To the best of our knowledge, there is no study that looked at this question from Oman, though a number of bibliometric analysis studies included Oman when analyzing trends and patterns from the Middle East or when searching for a specific subject area [1]. Therefore, we aimed to assess the trend of medical publications produced from Oman over a period from 2006 to 2018.

## Methods

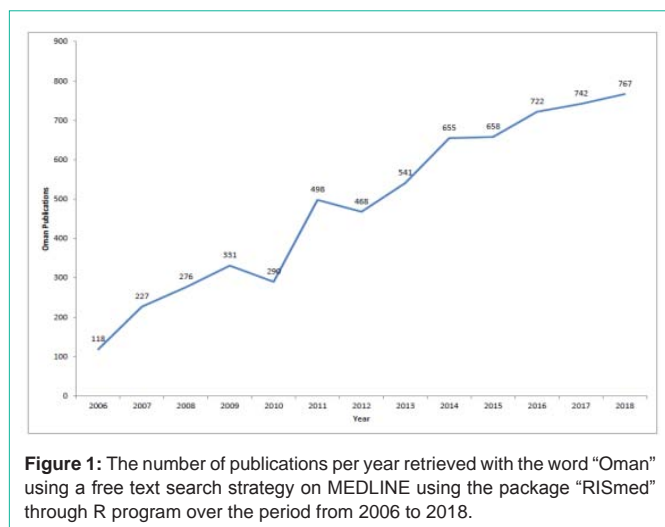
This retrospective study included all publications indexed in the United States National Library of Medicine, MEDLINE, [2] with Oman as a country over a period of 12 years. We searched MEDLINE using the package “RISmed” [3] through R program [4]. We retrieved all publications with the word “Oman” in all search fields using a free text search strategy. The periods specified was 2006 to 2018 inclusive. The same package and software were used to retrieve all publications from MEDLINE during the same search period and normalized the publication rate to every 100,000 publications per year in MEDLINE. All descriptive statistics were derived using R program [4] and all figures were constructed using the same program and Microsoft

Excel (2013). The results are presented using line and bar charts. No analytical statistics were used in this study. As this is a secondary data analysis, which does not involve participants directly, there was no consent form and no ethical committee review.

## Results

Our search found a total of 6363 publications during the period from 2006 to 2018 using the word “Oman” as a free-text search in all fields and a total of 1667 indexed with Oman as a country of publication. At the start of the study period, in 2006, the total publication count was at its lowest with 188 publication per year. Five years later, in 2011, there was an increase to 498 publication per year (65% increase) and in 2018; the total publication count reached a peak of 767 publication per year (an overall increase of 208% from baseline). There were two years in which the publication count was less than the previous year. In 2010, the publication rate decreased by 41 publication per year (12% decrease) while in 2012 it decreased by 30 publication per year (6% decrease) compared with the previous years. The greatest increase was between these two declines from 290 publication per year in 2010 to 498 publication per year in 2011, which equals an increase of 72%.

When the analysis was restricted to publications with Oman as the country of publication and normalized to every 100,000 publications per year in MEDLINE, the rate was at its nadir in 2006 with 26.4 per 100,000 publications. Five and 12 years later it increased to 55.4 and



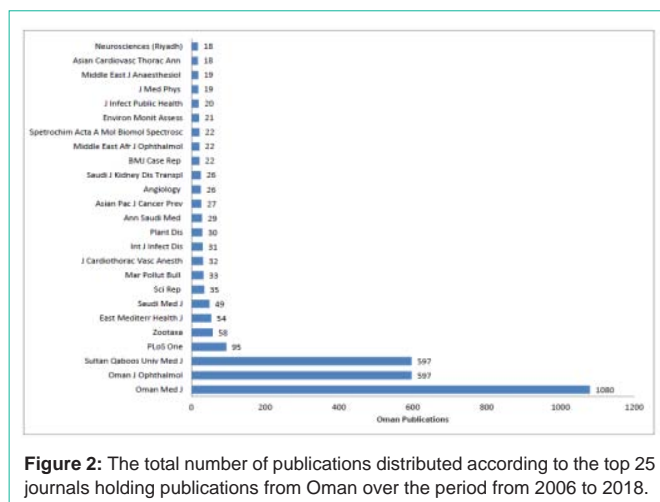
65.8 per 100,000 publications in 2011 and 2018 respectively. The peak normalized publication count was recorded in 2017 with a value of 65.9 per 100,000 publications, which represented 0.000658% of the total publications that year in the MEDLINE database (Figure 1).

Upon reviewing the distribution of publications among the top three journals (Figure 2), we found that most of the papers were published in Oman Medical Journal, followed by Oman Journal of Ophthalmology and Sultan Qaboos University Medical Journal. These three journals are local Omani journals and between them hold 2274 publications. Other regional journals, which are among the top 25 most popular journals for Omani publications, include: Saudi Medical J (49 publications), Ann Saudi Med (29 publications), Asian Pac J Cancer Prev (27 publications), Saudi J Kidney Dis Transplant (26 publications), Middle East Afr J Ophthalmol (22 publications), and Middle East J Anaesthesiol (19 publications). In total, these regional journals hold 172 publications (6% of publications to the top 25 journals). The most popular international journal is PLoS One. Ninety-five publications from Oman were published in this journal, which makes it the fourth most popular journal (3% of total publications to the top 25 journals). Angiology is the other international journal and it ranked the 15th most popular one and contained 26 publications.

## Discussion

In this study, we found that there is an increasing trend in the number of publications from Oman over a period of 12 years starting in 2006 to 2018. We also found that the relative contribution to the overall global biomedical publications measured as normalized count increased over the same period. Most of the publications from Oman were published in local journals. Among the non-local journals, PLOS One had the highest number of publications from Oman.

Evidently, from the results, the number of Oman publications has increased and shows a promising positive trend. This trend is unsurprising and can be accounted to many possible factors including the growth in the number of healthcare facilities and workers including clinicians and the overall increase in health related expenditures in Oman over the same period. The number of publications progressively increased and was not affected by the



global financial crisis with the drop in Oil prices in 2016 and the global restriction of research funding. A similar study was carried out for the overlapping period 2008-2012 for the Kingdom of Saudi Arabia and the results showed a linear increase in the biomedical research publications per year [5]. This study also found that the peak publication rate for the Kingdom of Saudi Arabia was 428 publications in 2012. In comparison, in 2012 Oman had 40 publications more (468 publications). However, the peak publication rate for Oman was 767 publications in 2018. Another study conducted for a longer yet an overlapping period (2002-2011) found that the trend in biomedical publications from Palestine is also positively increasing and the peak value in the study period was 126 publications in 2011 [6].

Another standout observation is the increase in relative contribution to the overall global biomedical publications in the MEDLINE database. This trend is very encouraging and indicates an increasing trend in the academic capacity of Oman as well as an expansion in the existing scientific community. On a regional scale a study found that up to 2013, Sultan Qaboos University (the largest academic center for biomedical research in Oman) was the eleventh most productive institution from Arab world affiliations in integrative and complementary medicine-based publications [7].

When comparing Oman’s global contribution to Western countries, we found that France, as an example, contributed 3.4% of total worldwide biomedical publications in 2015 according to its government statistics [8]. France’s impact index justifies this significant contribution by being over the global average. Normalizing France’s contribution yields a figure of 3400 French articles in every 100,000 global articles. This value is profoundly larger than what we found Oman’s normalized contribution in 2015 to be (60.3). This difference is accounted for by the fact that France is a leading scientific publisher with established roots and a prominent presence in the international biomedical community.

An overwhelming majority of the publications from Oman were published in local journals. This is expected, especially during the early phase of biomedical research when the focus is on establishing baseline data and gathering basic information, which is not of a high interest to international journals. However, such information will be a major interest to local Omani journals. The other possible explanation for this observation is a misclassification in the country

of publication. When publications are indexed in PubMed, the country of publication reflects the country of the journal and hence the number of publications is overestimated for the country of interest. This would also falsely increase the proportion of local publication like in our case. Unless performed manually, it is very difficult to properly classify publications from local journals. That being said, the trend should stay the same and not affected by this misclassification. Additionally, the proportion and the rank for the journal outside the country of interest is not affected by this possible misclassification. This is true for PLOS One, which received the most Oman publications of all international journals.

We conducted this research with the intention of carrying out an accurate bibliometric analysis detailed to Oman. Although we did manage to conclude a depiction of the trend in research productivity, our method's limitations are as follows. It is likely that the total numbers presented in the figures were underestimated as only MEDLINE was searched so not all publications from Oman were taken into consideration. Additionally, no in-depth analysis was performed. Only the publication counts were analyzed and the subject, impact factor, authors, collaborations and citations were not included in this analysis. On the other hand, our study has a number of strengths. It is currently the first bibliometric analysis tailored to Oman and as such provides baseline data for future research in this field. In addition, it uncovers areas of improvement to include increasing collaboration and targeting higher impact journals once the background information for different diseases like epidemiology and patterns of presentation has been established in the local journals.

## Conclusion

In conclusion, we found a promising positive trend in the rate of Oman publication over the period 2006-2018, throughout this period Oman's global contribution to medical publications was found to be low but increasing. This recent period highlights the gradual but progressive increase in research productivity in Oman in the area of biomedical science. As such, the next period must be treated with care and delicacy and research projects, grants and campaigns should be encouraged by providers and institutions to facilitate progression

in the scientific community of Oman as well as working towards an international presence. More effort is required to maintain the current rate of progression in the field of medical science in Oman. We recommend that future bibliometric analysis should be conducted over a wide range of databases in order for the analysis to be more in-depth and the results to be more accurate and closer to the actual value of Oman publications. Finally, the citation counts should be looked into closely and analyzed in detail in order to establish links or trends between publications and as a means of evaluating the quality of the research.

## Article Highlights

There is an increasing trend of medical scientific publications from Oman over time. The relative contribution to the scientific literature has also increased with time but overall remains low.

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