



Original Article

A bibliometric and social network analysis of pelvic organ prolapse during 2007–2016

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Abstract

Background: Pelvic organ prolapse (POP) seriously affects the life quality of old females. In the present work, we described the knowledge structure of POP in a macroscopic view, and summarized the recent research focus.

Methods: Candidates were identified through reading and screening publications from PubMed database with a MeSH term of “pelvic organ prolapse” during 2007–2016. Relevant journals and journal-affiliated countries were extracted, and essential information, such as the number of publication of each year, first authors and MeSH/subheading words, was analyzed with BICOMB. In addition, highly-frequent MeSH/subheading words were determined and classified, and co-occurrence matrices were produced accordingly. Finally, social network was utilized to analyze the knowledge structure.

Results: A total of 3294 publications of POP were retrieved from 364 journals. The publication of POP had a significant downward trend since the beginning of 2015. POP articles published in American and British journals were significantly more compared with other countries. The co-occurrence matrices of 37×37 and 55×55 were produced by the highly-frequent MeSH/subheading words, and then the social network analysis was performed based on them.

Conclusion: These publications on POP were mainly from the developed countries. Surgical treatment of POP was a hot topic of POP research in recent 10 years.

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Keywords: Bibliometrics; Co-word analysis; Pelvic organ prolapse; Social network analysis

1. Introduction

As a common disease among women after parturition,¹ pelvic organ prolapse (POP) usually has symptoms, such as discomfort in vagina, leakage of urine, dysuria, dyschezia, vaginal bleeding, inflammation and so on, and some of patients have even no any symptoms. These symptoms cause social, psychological and sexual problems to female POP

patients,² negatively influencing their daily activity and quality of life.³ Therefore, more and more doctors and medical researchers have been involved in the POP study, and they have achieved fruitful results about this topic, including etiology and pathogenesis,^{4–8} prevention and control,^{9–12} diagnosis,¹³ conservative treatment,¹⁴ surgical treatment,^{15–17} and post-operative complications.^{18–20} These studies have greatly contributed to POP research and provided meaningful guidelines for the clinical decision-making of POP. The ultimate goal is to find the best individual treatment for every POP patient and improve their quality of life. In this study, we aimed to statistically analyze published articles of POP in the PubMed database in recent 10 years using bibliometric techniques and explain the hot topics of current research.

Conflicts of interest: The authors declare that they have no conflicts of interest related to the subject matter or materials discussed in this article.

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Bibliometric is a set of special research methods, which can be used to quantify the documents, authors, words, citation and co-citation by employing mathematics and statistics.^{21,22} Co-word analysis is a one of methods that count and analyze the high frequency of keywords.^{23,24} It can reveal the theme of the article, estimate the co-occurrence frequency of two words in the same paper and then form a co-word network by these relevant words, while the distance between the network nodes can reflect the theme of kinship. By this way, the essential information of these articles about the country, author, journal and the MeSH words can be traced, and a specific visual representation can be formed to summarize the contents, characteristics, internal relationship and scientific structure of the published literature in the POP field. Our data could provide the basis and guidelines of POP study for researchers, clinical doctors and educators.

2. Methods

Our study consisted of several steps as follows: 1) data collection; 2) extraction of major journals and journal-affiliated countries, including the number of publication of each year, first authors and the MeSH words, as well as the discovery of highly-frequent MeSH/subheading words; 3) establishment of a co-word matrix; and 4) social network analysis with co-word matrix.

2.1. Publication search

Our research materials were obtained from PubMed, which is an authoritative database well recognized by medical investigators and doctors worldwide. The MeSH word 'pelvic organ prolapse' was introduced into PubMed MeSH vocabulary in 2010, so such a keyword was employed to retrieve online data from January 1st, 2007 to December 31st, 2016 without any language restriction. News, letters, comments, editorials, repeated studies and other irrelevant literature were excluded through reading titles, abstracts, clinical cases and full texts of the articles by two independent reviewers.

2.2. Information extraction and data analysis

Invented by Professor Cui Lei (China Medical University), Bibliographic Item Co-occurrence Matrix Builder (BICOMB) is a basic tool that can read and extract a large number of information as quickly as possible, generating a bibliographic data matrix. In this work, BICOMB was used to determine the distribution of the journals and journal-affiliated countries, the publication year, first authors and the MeSH/subheading words. Moreover, the highly-frequent MeSH/subheading words were determined by threshold value (T), which was calculated based on high-frequency and low-frequency keywords by Donohue formula²⁵: $T = (1 + \sqrt{1 + 8i})/2$, where 'i' refers to the number of MeSH/subheading words appearing only once. According to their relationship and characteristics, the highly-frequent MeSH/subheading words were classified, and then a co-occurrence matrix²⁶ was produced with them.

Finally, social network analysis, as the last step, was performed with UCINET 6 software.

3. Results

3.1. Eligible articles, the number of major journals, the number of publication of each year, high-yield journal-affiliated countries and first authors

A total of 10,374 records were selected from the initial screening, and then some limited conditions were applied, leading to 3294 records for future analysis. Fig. 1 describes the detailed steps and results. We found that 364 journals published relevant articles about the field of POP, and journals publishing more than 50 articles were enrolled as the major journals, yielding 13 types of journals. The journal with the greatest contribution was International Urogynecology Journal (n = 571), and the remaining journals included International urogynecology journal and pelvic floor dysfunction, American Journal of Obstetrics and Gynecology, European Journal of Obstetrics & Gynecology and Reproductive Biology, Female Pelvic Medicine & Reconstructive Surgery, Obstetrics and Gynecology and so on (Fig. 2). Fig. 3 indicates that the publication of each year exhibited a gradual upward trend from 2007 (n = 268) to 2012 (n = 406), and then there was gradual downward trend in 2015 with only 233 articles. A total of 54 journal-affiliated countries were summarized, and 18 countries published more than 10 articles (Fig. 4). Articles published in American (n = 1102) and British (n = 1141) journals were significantly more compared with other countries. In addition, a total of 2101 first authors were recorded in this investigation. Fig. 5 lists the top 12 authors who published more than 10 articles in this field, as well as the countries from which they are were enrolled.

3.2. Highly-frequent MeSH/subheading words

In this study, the number of MeSH/subheading words appearing once was 1467 (i = 1467), and the threshold value was 54.66 (T = 54.66) based on the Donohue formula, suggesting that 33 highly-frequent MeSH/subheading words appeared more than 54.66 in these papers. However, such a value was too small to show the centrality of knowledge structure network or the research hotspots.^{27,28} Therefore, the threshold value was decreased to 35, resulting in 55 identified words (Table 1). According to their relationships and characteristics, 55 highly-frequent MeSH/subheading words were divided into six categories (Table 2) as follows: "therapy, surgical treatment was the main location" (4797, 74.33%), "pathology and physiopathology" (443, 6.86%), "diagnosis and auxiliary examination" (337, 5.22%), "epidemiology" (241, 3.73%), "etiology" (171, 2.65%) and others (465, 7.20%).

3.3. Co-occurrence matrix and social network analysis of highly-frequent MeSH/subheading words

In order to test the necessity of reduction of the T value, better and more clearly reflect the research hotspots of this

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