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Bibliometric analysis of tuberculosis pleurisy based on web of science

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Abstract

Background: To reveal the worldwide research status of Tuberculosis pleurisy through a bibliometric analysis.
Methods: Articles were searched from Web of Science (WoS) SCI-Expanded database. Retrieved documents were analyzed using the database with its own statistical functions and Histcite software (version 8.12.16). The impact factor and Eigen factor scores were extracted from the Thomson Reuters Journal Citation Reports.
Results: Overall 1071 papers from 422 types of journals were found. From the year 2005 to 2016, the research on Tuberculosis pleurisy increased steadily and significantly in the world. China, USA, India have played important roles in the Tuberculosis pleurisy research in the world, although the number of published literature in South Africa, is not much, but the quality of its literature is very high. Shi HZ from China published the most and the highest quality of literature. Publications in this area were most frequent from four leading journals including International Journal of Tuberculosis and Lung Disease (n=46), PLoS ONE (n=46), Respirology (n=42), Chest (n=37), Tuberculosis (n=24).
Conclusion: Clinical researchers have paid more attention to Tuberculosis pleurisy than before, but there are still many important issues unresolved.

Keywords: Tuberculosis pleurisy, Tuberculosis effusion, Bibliometric analysis.

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Introduction

On a global scale, Tuberculosis (TB) is one of the leading killers of adult infectious diseases. It is one of the important diseases that threaten human health. In 2013, an estimated 9 million people developed active TB, with 1.5 million deaths attributed to the disease [1]. According to the World Health Organisation (WHO) the incidence of pulmonary TB in some regions is as high as 1,000 cases per 100,000 persons [1]. Although TB affects the lungs in the majority of patients, extra-pulmonary TB serves as the initial presentation in about 25% of adults and primarily involves the lymph nodes and pleura [2].

In recent years, with the rise of the Tuberculosis epidemic, the epidemic of HIV/ARDS, Tuberculosis pleurisy incidence has also increased [3]. Although Tuberculosis is a disease can be cured, but Tuberculosis pleurisy especially exudative pleurisy will form chronic encapsulated effusion, Tuberculosis empyema, bronchial fistula complications if treatment is not timely or non-standard, leading to lung compression and thoracic deformity, seriously affecting the patient's respiratory function and quality of life. Therefore, the research on Tuberculosis pleurisy should be paid more and more attention, especially in developing countries.

Of course, at present, the global have paid a lot on the tuberculosis infection, and also made great achievements on it. As we all know, unity is strength. Multi-national, multi-agency, multi-center cooperation will be able to control Tuberculosis infection at the lowest level, even to destroy it. Bibliometrics is a useful method to evaluate trends in research activity over time and to inform future policy.

There are no bibliometrics studies relating to Tuberculosis pleurisy exist. So there is a need to conduct a bibliometrics study of the published literature relating to Tuberculosis pleurisy to help the researchers to look for partners, and to provide the reference for the researchers to publish journals. Hope to have a certain reference for the researchers who interested in the study of Tuberculosis pleurisy.

Materials and Methods

Sources of data

Data were retrieved in March 2016 from the Web of Science (WoS) SCI-Expanded database produced by the Thomson Reuters. Web of Science (Science Citation Index, SCI network version) is the nation's most authoritative Natural Science Citation Database. Moreover, it is a valuable tool to evaluate the achievements of scientific research. The quantity and quality of the paper that included by SCI is a quantitative standard of research evaluation.

Retrieval method

We retrievaled the articles from 2005 to 2016. Landing WoS database(SCI-Expanded), was used for the Core collection and advanced search, We used the Boolean operators "OR", "AND" and "NOT", the following search query which was developed to estimate the total number of published items related to Tuberculosis pleurisy. The search type is TS=((pleural effusion) OR (pleural effusions) OR (pleural lesion) OR (pleural disease) OR (pleural fluid) OR (pleurisy OR pleuritis) OR hydrothorax)) AND TS=((Tuberculosis OR consumption OR phthisis OR TB OR (Mycobacterium Tuberculosis) OR (Tuberculosis bacillus) OR MTB OR Tuberculosis OR tuberculotic OR tuberculo)). The results of the search were reviewed once the query was performed. To export all necessary information from all articles, plain text files and full records were selected in the search results page. The impact factor and Eigen factor scores were extracted from the Thomson Reuters Journal Citation Reports.

Statistical method

This analysis contains full bibliographic information about the articles, including author, title, source publication, summary, addresses and the numbers of citations received by each article. We analysed the retrieval results not only applying the statistical tools from SCI but also applying the Histcite 8.12.16 researched by Dr. Eugene Garfield and his team.

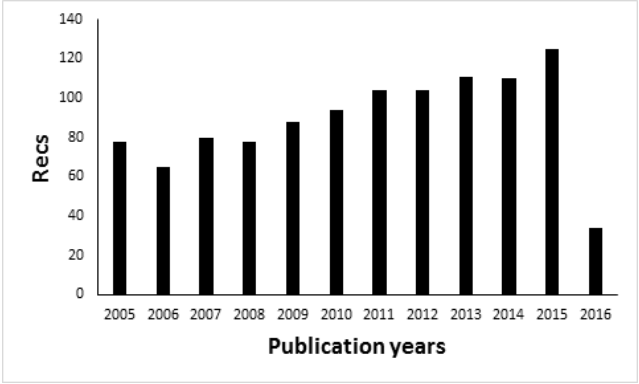

Figure 1. *The annual output of literature on Tuberculosis pleurisy, from 2005 to 2016. Annotation: Recs (Number of published articles).*

Results

In view of the SCI database, error exists in the literature retrieval. The traditional retrieval method may cause false or false positives. In this paper, we design the logical way to retrieve the Tuberculosis pleurisy to exclude the false part. To ensure that the literature we retrieved was a reflect of the actual situation in the field as far as possible, we found logical to retrace data from the search engines to avoid analytical errors.

Table 1. *Leading 20 countries by number of Tuberculosis pleurisy publications and citations, from 2005 to 2016.*

Country	Recs	Per%	TLCS	TLCS/Recs	TGCS	TGCS/Recs
Peoples R China	178	16.62	395	2.22	1340	7.53
USA	123	11.48	363	2.95	1539	12.51
India	95	8.87	346	3.64	1022	10.76
Spain	64	5.98	230	3.59	776	12.13
Turkey	62	5.79	87	1.4	316	5.1
UK	61	5.7	208	3.41	994	16.3
South Korea	59	5.51	125	2.12	482	8.17
Japan	56	5.23	122	2.18	465	8.3
Taiwan	56	5.23	156	2.79	705	12.59
Brazil	52	4.86	139	2.67	373	7.17
South Africa	47	4.39	212	4.51	1104	23.49
Germany	34	3.17	90	2.65	702	20.65
Italy	31	2.89	106	3.42	796	25.68
Canada	24	2.24	76	3.12	412	17.17
Iran	24	2.24	0	0	39	1.63
Unknown	23	2.15	22	0.96	231	10.04
France	22	2.05	4	0.18	163	7.41
Australia	18	1.68	23	1.28	97	5.39
Greece	18	1.68	64	3.56	271	15.06
Argentina	16	1.49	60	3.75	348	21.75

Annotation: Recs (Number of articles), TLCS (Total Local Citation Score, it says in the WOS database the total number of this article being cited. It is proportional to the quality of literature). TGCS (Total Global Citation Score, it says in the current database the total number of this article being cited). Above national statistics is based on the authors work address in literature to classify statistics, through the analysis we found 23 articles (make up 2.15% of the total amount of literature), the author address is unknown, inevitably caused the error.

This method was found after a number of searches which was done to find the appropriate way to retrieve data for such particular studies. At the same time, according to the development of the times and the keywords of the update also be taken into account.

The number of annual variation of Tuberculosis pleurisy

In the last 10 yearsthat is from 2005 to 2016, the annual output of literature on Tuberculosis pleurisy increased steadily. The greatest number of outputs were published in 2015 (n=123). Because only to retrieved in March 2016, so the amount of outputs in 2016 was low (Figure 1).

Table 2. *Leading 20 Institutions by number of Tuberculosis pleurisy publications and citations.*

Institution	Recs	%	TLCS	TGCS	Country
Sun Yat Sen Univ	28	2.6	41	252	Peoples R China
Univ Stellenbosch	22	2.1	109	448	South Africa
Huazhong Univ Sci & Technol	21	2	64	161	Peoples R China
Univ Sao Paulo	19	1.8	37	117	Canada
Capital Med Univ	17	1.6	16	46	Peoples R China
Chest Hosp Guangzhou	17	1.6	24	124	Peoples R China
Guangxi Med Univ	17	1.6	200	346	Peoples R China
Univ Cape Town	17	1.6	100	561	South Africa
All India Inst Med Sci	16	1.5	193	499	India
Natl Taiwan Univ Hosp	14	1.3	79	232	Peoples R China
Makerere Univ	13	1.2	9	96	Uganda
McGill Univ	13	1.2	72	365	Canada
Natl Taiwan Univ	13	1.2	50	266	Peoples R China
Unknown	13	1.2	16	209	unknown
Chinese Acad Med Sci	11	1	20	172	Peoples R China
Tongji Univ	11	1	14	59	Peoples R China
Univ Fed Rio de Janeiro	11	1	23	75	Brazil
Arnau de Vilanova Univ Hosp	10	0.9	59	78	Spain
Fudan Univ	10	0.9	11	25	Peoples R China
Postgrad Inst Med Educ & Res	10	0.9	15	53	Canada

Tuberculosis pleurisy literature national/regional distribution

A total of 81 countries or regions contributed to the published output during the study period. Peoples R China published the highest number of publications (n=178) (Table 1). Other countries, such as Afghanistan, Ukraine only one article. The leading 20 countries and resions (Table 1), Peoples R China contributed to 16.62% of the overall output, followed by USA (11.48%), India (8.87%), and Spain (5.98%). From the internal reference point of view, South African and Agentina literature get more recognition and attention, reflecting the quality of the literature is higher. The data above show that the research work of Tuberculosis pleurisy in China (mainland) is developing at the fastest speed to a higher level, and the contribution to the world will gradually increase. We see that the number of published literature in South Africa, although not a lot, but the quality of its literature is very high. Due to the cooperation between the international authors, the data added by the national statistics may be greater than the number of SCI mentioned above. According to the work address that the author registers in the literature to carry on the country classification statistics. Through the Histcite analysis, it is found that 23 papers (2.15% of the total amount of literature), the author's address is unknown, that cannot be summed up the literature of the country, inevitably caused the error. We found that most articles with no address published after 2005 are in the form of meeting abstract.

Analysis of Tuberculosis pleurisy literature language

Through the analysis of the language used in the literature, it is found that the research work is based on the use of English (93.5% of the full text), followed by Spanish (2.1%) and French (1.9%), and less than 1% in other languages. At present, the vast majority of research work based on SCI platform will have the same conclusions that may be related to the internationalization of English and the language requirements of foreign journals. And the wide use of English is helpful to the exchange between researchers.

Tuberculosis pleurisy research institution distribution

From the last ten years analysisa total of 1405 institutions contributed to the overall published output. We can see the top 20 domestic and international institutions researched on Tuberculosis pleurisy (Table 2). In the top 20 institutions, there are more institutions from China, including Sun Yat Sen Univ, Huazhong Univ Sci & Technol, Chinese Univ Hong Kong, Capital Med Univ, Guangxi Med Univ, Chest Hosp Guangzhou, Nat Taiwan Univ. China as a developing country, vast territory, large population, the level of economic development around the inconsistent, high incidence of TB, the Chinese government on TB related diseases research inputs are also relatively more, including human, financial, and fully confirmed the relevant research institute in China emphasis on Tuberculosis pleurisy. We analyzed the quantity of articles published in the past 10 years, and found that the number of papers published by Sun Yat Sen University ranked first in the world, but the literature published by Guangxi Medical University has the highest quality. In the world, there are 1405 famous research institutions or universities to carry out the research work of Tuberculosis pleurisy, so it can be seen that the research on the Tuberculosis pleurisy has been widely valued. Because the database may have a very small amount of error classification in the semantic word judgment, there will be some deviation in the relative ranking of the organizations.

Journal distribution of literature

1071 papers from 422 kinds of Periodicals, Publications in this area were most frequent from four leading journals including International Journal of Tuberculosis and Lung Disease (n=46),

PLoS ONE (n=46), Respirology (n=42), CHEST (n=37), Tuberculosis (n=24) as seen in Figure 2. These five journals represented 4.3%, 4.3%, 3.9%, 3.5% and 2.2% of the overall output respectively. The leading 15 journals contributed 31.6% of the overall publication output. In this analysis, the Impact Factor (IF) of American Journal of Respiratory and Critical Care Medicine is the highest. It is found that International Journal of Tuberculosis and Lung Disease and PLoS ONE published the largest amount of literature.

Literature authors distribution

A total of 4901 authors published 1071 papers, the top 20 authors of publishing literature on Tuberculosis pleurisy is as follows (Table 3). Among the top 20 authors, there are 9 authors from China mainland. In the study of Tuberculosis pleurisy, Dr. Shi Huanzhong from China published the most and the highest quality. And the top four authors, all of them come from China, especially Shi Huanzhong Team. According to our search because of the author has changed the work address, resulting in the author rankings and research institutions are not in conformity.

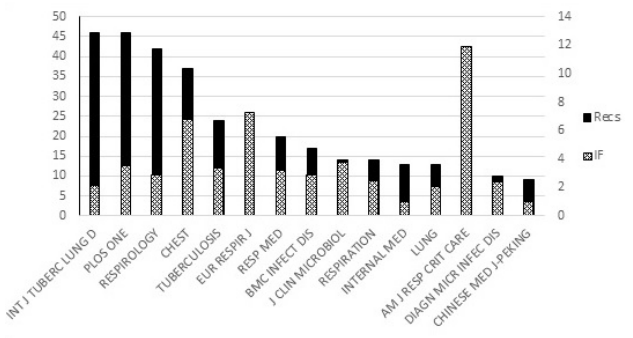

Figure 2. *Leading 15 Journals by number of Tuberculosis pleurisy publications and the IF of the Journals. Recs: The number of published by the Journals: IF: 5-Year Impact Factor.*

Document type distribution

According to the statistics of the type of literature, the literature on the Tuberculosis pleurisy was found mainly in the research literature, which was published in the form of 79.9%.

Discussion

Tuberculosis is a serious public health problem in the world, which is harmful to the health of the society. Tuberculosis pleurisy is the one of the most common type of extra-pulmonary Tuberculosis (EPTB). Because the clinical manifestation of the Tuberculosis pleurisy is not obvious and the disease is relatively hidden, which leads to the clinical misdiagnosis and missed diagnosis. Tuberculosis pleurisy poses a serious threat to the life and health of the patient [1,2]. Tuberculosis pleurisy is gradually being valued by people, even in the developed countries. Figure 1 shows that the international research on the Tuberculosis pleurisy is increasing year by year. Nearly half of the world's countries publish a paper on the disease. Among them, China published the most literature on Tuberculosis pleurisy, occupy 16.62%. The total number published by ChinaUSA, India, Spain and Turkey nearly 50% (Table 1). From the last ten years analysis, we can see the steadily increased of the outputs.

Table 3. *Leading 20 authors by number of Tuberculosis pleurisy publications and citations.*

Author	Recs	TLCS	Institution	Country
Shi HZ	26	224	Capital Med Univ	Peoples R China
Wu CY	19	35	Sun Yat Sen Univ	Peoples R China
Lao SH	17	24	Chest Hosp Guangzhou	Peoples R China
Li L	15	23	Sichuan Univ, West China Hosp	Peoples R China
Porcel JM	14	132	Arnau de Vilanova Univ Hosp	Spain
Valdes L	14	56	Complejo Hosp Clin Univ Santiago	Spain
Zhou Q	13	37	Huazhong Univ Sci & Technol	Peoples R China
Chen XC	11	31	Nagoya Univ	Japan
Lee LN	11	72	Natl Taiwan Univ	Taiwan
Wang JY	11	70	Natl Taiwan Univ	Taiwan
Antonangelo L	10	33	Univ Sao Paulo	Brazil
Dheda K	10	99	Univ Cape Town	South Africa
Tong ZH	10	10	Capital Med Univ	Peoples R China
Vargas FS	10	34	Univ Sao Paulo	Brazil
Yang BY	10	10	Sun Yat Sen Univ	Peoples R China
Fu XY	9	10	Sun Yat Sen Univ	Peoples R China
Gonzalez-Barcala FJ	9	29	Complejo Hosp Clin Univ Santiago	Spain
Kim CH	9	12	Kyungpook Natl Univ	South Korea
Liu HY	9	20	Peking Union Med Coll	Peoples R China
Mayanja-Kizza H	9	8	Makerere Univ	Uganda

The publication of the Journal of Tuberculosis pleurisy can be published in a comprehensive journal such as PLoS ONE, and can also be published in a professional magazine such as International Journal of Tuberculosis and Lung DiseaseTuberculosis. The greater number of articles published in International Journal of Tuberculosis and Lung Disease, followed by PLoS ONE.

Although TB affects the lungs in the majority of patients, extra-pulmonary TB serves as the initial presentation in about 25% of adults and primarily involves the lymph nodes and

pleura [2]. Tuberculosis pleurisy accounted for 4.7%~17.6% of pulmonary Tuberculosis [3]. In recent years, with the rise of a Tuberculosis epidemic, the epidemic of HIV/ARDS, Tuberculosis pleurisy, pleural effusion incidence also increased [3]. Data from the United States and South Africa show that HIV-positive patients with Tuberculosis prone to pleural effusion, the incidence of 29%~38%, significantly higher than the HIV-negative TB [4]. The incidence of Tuberculosis pleural effusion in HIV/AIDS has ranged from 15 to 90% [5,6]. Tuberculosis pleurisy in young adults, aged 15-44 accounted for more than 60% [7]. However, the manifestation of Tuberculosis pleurisy was highly heterogeneous.

Delayed diagnosis contributes significantly to morbidity and mortality. Since the Tuberculosis pleurisy prone to young adults, the task is more arduous, how to timely and accurate to give a clear diagnosis and active treatment, to avoid the occurrence of complications and decrease the burden on the family and society. Also, the world's scholars have been trying to find a new, high specificity and sensitivity of the diagnostic indicators. Mycobacterial culture of the body fluid or biopsy specimens is considered the gold standard for the diagnosis of EPTB. However, the obtained fluid sample may be paucibacillary, the mycobacterial culture requires an extended period, and the diagnostic yield of effusion is only 63% [8]. Sputum, pleural effusion, pleural acid-fast staining Mycobacterium Tuberculosis in search, but the positive rate is low [6,9]. Serum antibody in diagnosis of Tuberculosis tuberculin sensitivity and specificity are limited, clinical application value is not high. Pleural biopsy has a diagnostic yield of up to 90% for pleural TB [10].

Medical thoracoscopy have previously been found to have a diagnostic sensitivity of 100% [11], but this inspect is a traumatic examination, and in the basic level hospitals or patients with poor state are limited. Moreover, such approaches place patients at an increased risk of complications and result in higher costs [12]. In recent years, with the rapid development of molecular biological technology, such as PCR nucleic acid probe provides a rapid diagnostic technology has been used for the detection of Mycobacterium Tuberculosis [13]. At the same time, due to the progress of immunology, the research on various cytokines in pleural effusion has become a hot spot in recent years. The application of biological index has a large number of reports in the literature of Adenosine Deaminase (ADA), interferon gamma, soluble interleukin-receptor and lysozyme (LZM) etc. [14-17]. It opens up a new way for the diagnosis of Tuberculosis pleurisy. However these tests are lack sensitivity and specificity [18]. The medical treatment for TB pleural effusion is the same as for pulmonary TB, and is consistent with the theory that the majority of pleural TB cases develop from pulmonary disease. The expected resolution of TB pleural effusion is variable and assuming appropriate therapy.

The current evidence on the role of surgical intervention is limited and difficult to interpret, and intercostal drainage is traditionally not offered to patients unless severe dyspnoea is present [19,20]. A recent study by Bhuniya et al. investigated the use of early pleural drainage (using pleural manometry) in addition to standard anti-TB therapy, compared to standard therapy alone, and demonstrated significant differences after six months in lung function [21]. Also, In selected patients, administration of corticosteroids can shorten the duration of fever and time to fluid resorption, although the risks and benefits of corticosteroids in this setting have not been well defined [22,23]. At present, there is still some controversy in the treatment of Tuberculosis pleural effusion.

There are several limitations of the present study. First, we have not provided a detailed analysis of the factors that have led to the observed trends and can only hypothesize potential reasons at this stage. Second, we have selected publications available in the WoS for analysis, and it is therefore likely that some research output in national language journals has not been included in this evaluation, which will affect our results for country-level outputs. Third, the outputs of research may be affected by publication bias.

In conclusion, the prognosis of Tuberculosis pleurisy is mostly good if can get early diagnosis and timely treatment. But delayed diagnosis and nonstandard treatment can change for pleural adhesions, hypertrophy, chronic sacculated pleurisy, and even the development of Tuberculosis empyema, pleural tuberculoma. At present, significant progress has been made in the pathophysiology of Tuberculosis pleurisy, and more and more diagnostic methods have been applied to clinical. However, the low sensitivity and specificity of diagnostic methods for the diagnosis of Tuberculosis pleurisy and the controversy over the treatment. Moreover, with the aging of the population, the emergence of drug-resistant bacteria and the incidence of HIV increased, the incidence of Tuberculosis pleurisy once decreased after the rise of the trend, the situation is grim, we have found only the tip of the iceberg, Therefore, we need many subjects (such as breathing, infection, immunity, molecular biology, etc.), mutiple centers cooperation to joint to find out the faster, more sensitive, and specific test for the diagnosis of Tuberculosis pleurisy, and make out the appropriate treatment options. That's what we do with this analysis.

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