SCIENTOMETRICS

Low back pain in China: Disease burden and bibliometric analysis

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Abstract

BACKGROUND
Low back pain has become a global problem. Since many traditional Chinese therapies are helpful for low back pain, the current status of low back pain in China may provide some insights to this issue.

AIM
To demonstrate the disease burden of low back pain in China and the response of Chinese scholars to this issue.

METHODS
The burden of low back pain in China was estimated using the Global Burden of Disease Study 2021 released by the American Institute for Health Metrics and Evaluation. The incidence, prevalence and disability-adjusted life years were analyzed. We also performed a bibliometric analysis to analyzed the publication trend, changes of cooperation models and research topics on low back pain.

RESULTS
Prevalence of low back pain increased from 69.61 million in 1990 to 102.96 million in 2021. New cases increased by a stunning 44.50 million in 2021. Low back pain led to an increase of 4.16 per 1000000 population in terms of disability-adjusted life years from 1990 to 2021. But the increase in China was slower than that of world average. As a response, publications of low back pain published by Chinese scholars were stably raised. From 1990 to 2023, domestic cooperation significantly increased, while international cooperation and no cooperation decreased. However, domestic cooperation decreased between 2021 and 2023. The number of studies on prevention and treatment of low back pain reduced from 1990 to 2023, while the mechanism, etiology and other aspects of low back pain augmented.

CONCLUSION

The burden of low back pain in China is heavy. Together with the government, Chinese institutions of medical science should do more in declining the impacts of low back pain.

Key Words: Low back pain; Trend; Disease burden; Bibliometric analysis; Public health

Core Tip: Low back pain has become one of the most common health issues globally. As a country with the most population, the situation of low back pain in China is of great importance. This study analyzed the disease burden of low back pain in China from 1990 to 2021 on the basis of Global Burden of Disease Study 2021. Additionally, a bibliometric analysis was performed to show what did Chinese scholars do on low back pain.

INTRODUCTION

Low back pain refers to pain symptoms ranging from the lower margin of the ribs to the gluteal fold, covering a range of different types of pain, such as nociceptive pain, neuropathic pain and non-specific pain[1]. The broad concept of low back pain makes most people suffer from it during their lifetime. Systematic reviews have identified risk factors of low back pain, including age, previous low back pain, poor general health (smoking, chronic diseases, sleep problems, frequently feeling tired, pain at any other regional site), physical stress (whole-body vibration, long-time driving, pulling, prolonged standing/walking, *etc.*) and psychological stress (monotonous work, mental distress, *etc.*)[2,3]. Though there are many preventions and treatments to acute or chronic pain, such as exercise, education, ergonomic modifications, against bed rest, massage, acupuncture, and pharmacological and surgical treatments[1,4], the disease burden of low back pain is still heavy.

With more than 628 million people estimated to have low back pain and more than 266 million new cases worldwide in 2021, low back pain has become a leading cause of productivity loss globally[5,6]. Low back pain is estimated to cause 2.42% of total disability-adjusted life years (DALYs) and 7.75% of years lived with disability (YLDs)[7]. What's worse, the number of populations with low back pain is estimated to exceed more than 840 million in 2050[8]. There is no doubt that low back pain has become a major global problem, and it will get worse as society ages for the physiological changes (osteoporosis, lumbar degeneration, muscle strength decreases and increased comorbidities) in the older adults[9]. This is not only a test of the adaptability of the healthcare system, but also an important opportunity to promote medical innovation and promote health equity. By strengthening international cooperation, filling data gaps, and developing individualized treatment options for all ages and cultures, we have the potential to reduce the heavy burden of low back pain and bring benefits to hundreds of millions of patients worldwide.

As many traditional Chinese therapies, such as acupuncture, massage, Taichi and Chinese medicinal formulae[4,10], are helpful for patients with low back pain, the current status of low back pain in China may provide some insights to this issue. This study will analyze the trend of the burden of low back pain in China based on the results of Global Disease Burden. Since bibliometric analysis is popular in understanding the past, present and future of a certain research area[11,12], we intend to analyze the literature on low back pain published by Chinese scholars based on Web of Science (WoS) database.

MATERIALS AND METHODS

Data acquisition and analysis of disease burden of low back pain

Relevant data for disease burden of low back pain in China was obtained from the latest version of the global burden of disease results released by the American Institute for Health Metrics and Evaluation[2]. The prevalence and incidence of low back pain, DALYs and YLDs were extracted, and Excel was used to draw line charts to reflect the change trend. Since the DALYs and YLDs of low back pain are equal in amount, we only displayed the results of DALYs in this study. The data were from 1990 to 2021. We also compared Chinese disease burden of low back pain with global data.

Bibliometric analysis of studies on low back pain

The research papers published by Chinese scholars on low back pain were retrieved from the WoS Core Collection (WoSCC) and the Chinese Science Citation Database (CSCD). On May 10, 2024, "low back pain" was used to retrieve in

the two datasets respectively. The publication year was limited to 1990 and thereafter, and the paper types were specified as "Article" and "Review Article". Language was not limited. Then, researchers reviewed the retrieved records, excluded retracted papers and those did not focus on low back pain.

Using the filters of WoS database, the annual number of publications and the number for each institution were counted. Then, distribution map of the publications was drawn on the MapChart website (mapchart.net) according to location of the institutions. Finally, the researchers reviewed the selected articles one by one, and divided them into four categories according to the research topics: Research on the mechanism and etiology of low back pain, research on the treatment of low back pain, research on the prevention of low back pain, and research on other aspects of low back pain. According to the information of the authors' signatory institutions, the studies were classified into three categories: No inter-agency cooperation, domestic inter-agency cooperation and international inter-agency cooperation.

RESULTS

Changes of disease burden of low back pain in China
First of all, the prevalence of low back pain in China decreased from 69.61 million in 1990 to 65.49 million in 1994, and then gradually increased to 102.96 million in 2021, with a stepped-up growth since 2017 (Figure 1A). The global prevalence stably increased since 1990, with a population of 386.73 million in 1990 and 628.84 million in 2021 (Figure 1D). The incidence of low back pain followed the same trend as the prevalence, with a nadir of 28.94 million in 1994 and a peak of 44.50 million in 2021 (Figure 1B). Globally, the incidence of low back pain continuously raised from 165.06 million to 266.87 million, with a growth rate of 161.68% (Figure 1E). Moreover, DALYs reached a nadir of 7.46 per 1000000 population in 1994 and increased to 11.62 per 1000000 population in 2021, whereas the increase of global DALYs is linear (Figure 1C and F). In addition, the Chinese contribution of low back pain prevalence, incidence and DALYs to global burden reduced from 1990 to 2021 (Figure 2).

Bibliometric analysis for publications on low back pain in China
From January 1, 1990 to May 10, 2024, the number of papers on low back pain published by Chinese scholars included in the WoSCC and CSCD databases was 1,388, of which 432 (31.12%) were in Chinese and 956 (68.88%) were in English. Overall, the number of publications showed an upward trend, and from 2019, the number of publications increased significantly, reaching 184 (13.26%) in 2023 (Figure 3). In terms of the national distribution of the publications, Taiwan, Shanghai, Beijing, Guangdong, Hong Kong, Jiangsu and Zhejiang had the most active researchers and the most research achievements, while Tibet, Macao, Xinjiang, Qinghai and Inner Mongolia had the least number of publications in the field of low back pain research, and Sichuan is in the leading position in the central and western regions (Figure 4).

The cooperation between domestic institutions was the main way, accounting for 42.94%, followed by no cooperation between institutions (39.41%) and international cooperation (17.65%) (Figure 5A). Further analysis of the cooperation models in the past 3 years (2021, 2022 and 2023) showed that the overall cooperation increased, whereas either domestic cooperation or international cooperation decreased by year (Figure 5B and C).

Based on the study topics, the articles were classified into 4 types, namely mechanism and etiology, treatment, prevention, and other aspects. As shown in Figure 5D, over 59% of the articles focused on treatment of low back pain, 12.10% on mechanism and etiology, 6.41% on prevention, and 22.41% on other aspects. But, studies on mechanism and etiology or other aspects of low back pain increased significantly during the past 3 years, whereas those on treatment and prevention had an obvious decrease (Figure 5E). Specific changes from 2021 to 2023 are displayed in Figure 5F.

DISCUSSION

This study focuses on the most updated disease burden of low back pain from 1990 to 2021 in China and furnishes the responses of Chinese medical field from a bibliometric perspective.

Firstly, we assessed the annual incidence, prevalence and DALYs of low back pain in China. The trends of disease burden of low back pain went down from 1990 to 1994 and went up between 1995 and 2021. With the development of economy in China, social production pattern has gradually transitioned to industrialization and many heavy manual jobs have been replaced by machines, which decreases physical stress on spine and further reduces risk of low back pain[2]. On the contrast, other risk factors for low back pain, such as obesity, excessive sitting and older age, consequently increased[8,13,14]. According to the population reports from the United Nations, the number of aged populations has been increasing and China is one of the countries with most severe problem in aging[15]. It was estimated that the prevalence of adult obesity increased from 4.2% in 1993 to 15.7% in 2015 and reached 16.4% in 2019[16,17]. In addition, a cross-sectional study involved 38515 adult participants indicated that excessive sitting was a high-frequency behavior even in rural regions in China[18]. All of these factors contributed to the heavy burden of low back pain. Though rapid deteriorations in aging, obesity and unhealthy behaviors occur in China, the growth rate of disease burden of low back pain was slower than global trend. This partly represents that the prevention and treatment for low back pain in China are ahead of the world average.

Owing to kinds of risk factors for low back pain, and complex combinations of the risk factors, prevention and treatment to low back pain need multidiscipline strategies. Prevention is regarded as a big problem in high-risk populations. Despite the effectiveness of exercise and education (*i.e.* controlling body weight, reducing prolonged sitting
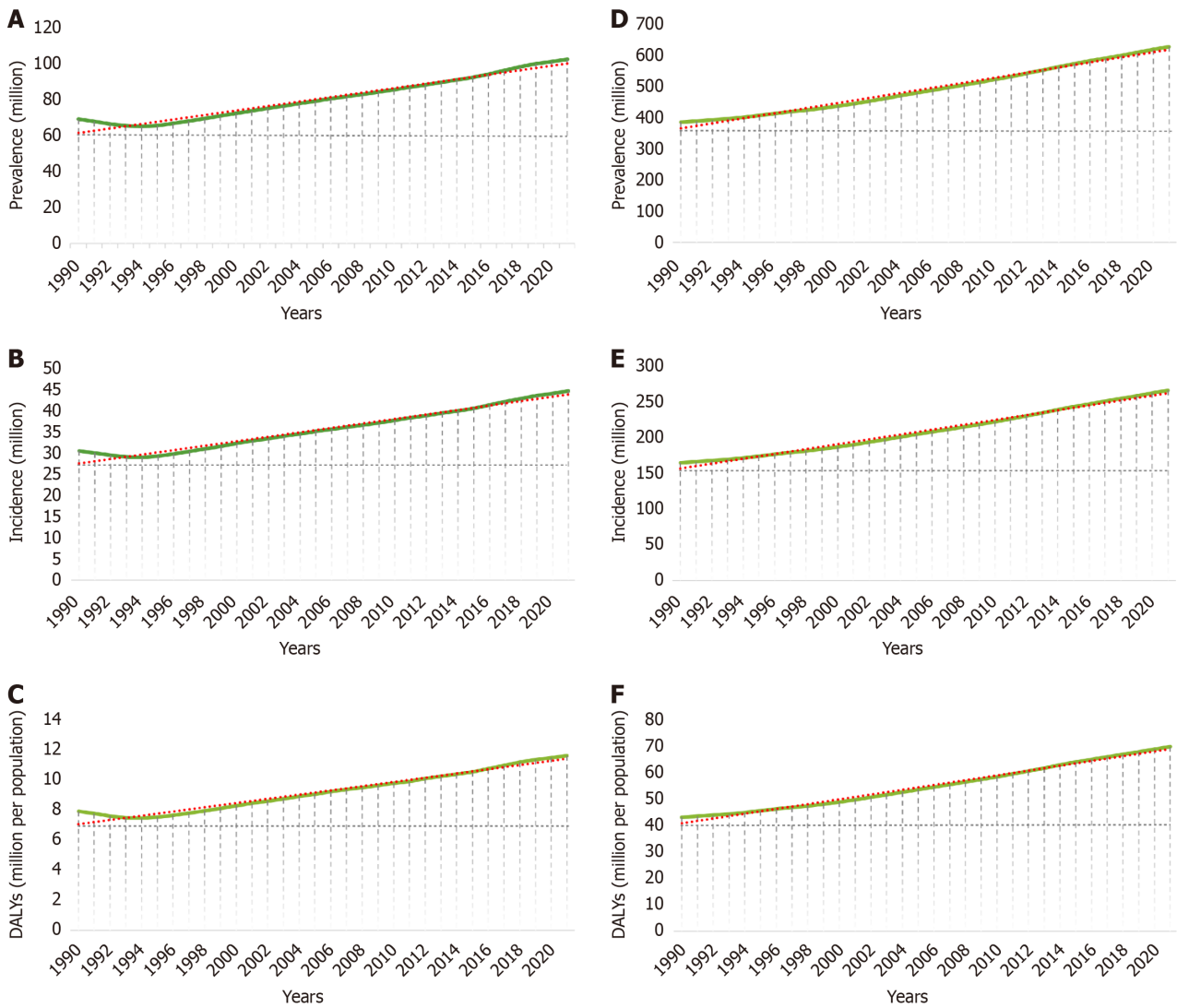
Figure 1 Disease burden of low back pain from 1990 to 2021. A: Prevalence of low back pain in China; B: Incidence of low back pain in China; C: Disability-adjusted life years (DALYs) of low back pain in China; D: Global prevalence of low back pain; E: Global incidence of low back pain; F: Global DALYs of low back pain. DALYs: Disability-adjusted life years.
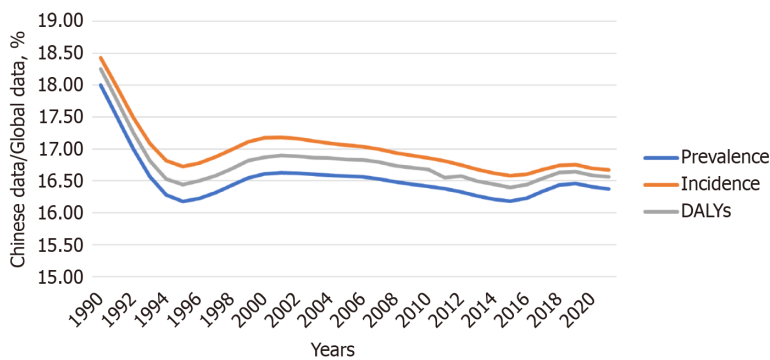

Figure 2 Trends of China's contribution rate to global burden of low back pain. DALYs: Disability-adjusted life years.

or standing and keeping a positive mental status)[19,20], it is not easy to maintain a lifetime. Therapeutic strategies can be alterable for different kinds of pain. Generally, they start with non-pharmacological methods, such as massage, physical therapy and acupuncture, and combination with pharmacotherapy[1]. Unrelieved patients may choose invasive therapy, for example, local nerve block, spinal cord stimulation, radiofrequency ablation and surgery[1]. There are also many science popularization activities and education intervention to help with low back pain patients[21]. However, low back pain is a lifetime issue and needs multidiscipline cooperation, such as traditional Chinese medicine, rehabilitation
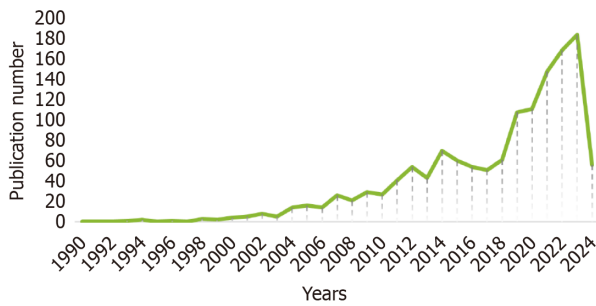
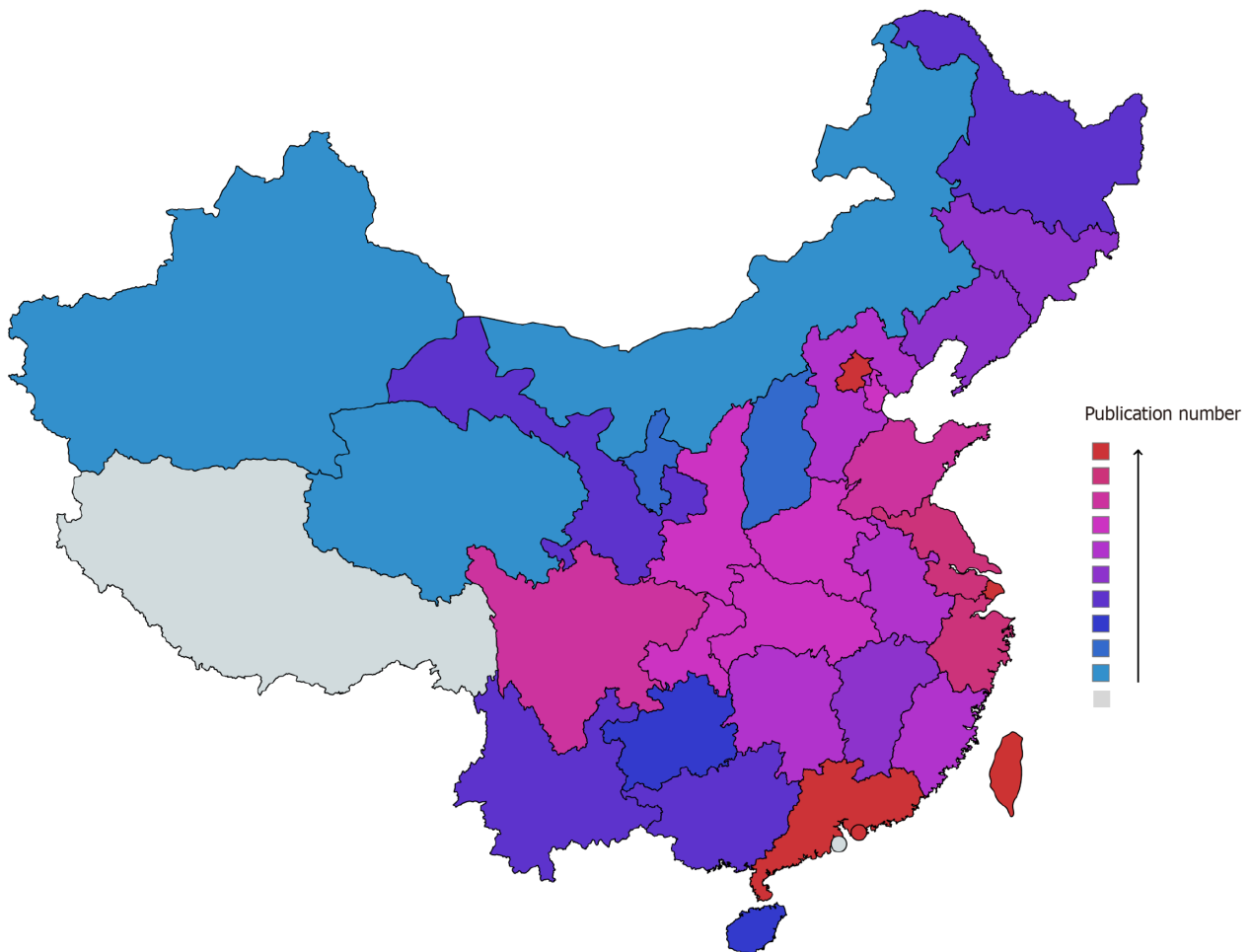**Figure 3 Publication trend of studies on low back pain.**

Figure 4 National distribution of the publications on low back pain.

medicine, internal medicine and surgery. The combination of exercises and electrotherapy has been successfully used to improve low back pain[22,23].

Secondly, we performed a bibliometric analysis for publications on low back pain published by Chinese scholars. The results indicated that low back pain did not get much attention until the 21 century and the publication number rapidly raised at the end of the 2010s. This trend reflects the understanding of low back pain. On the one hand, since low back pian is not a fatal disease, many people did not attach importance to it in the era of underdeveloped economy. So, doctors might not realize the importance to perform scientific research. On the other hand, scientific output depends on fundings and national policies[24]. On May 6, 1995, China proposed the strategy of rejuvenating the country through science and education[25]. On December 30, 2005, the concept of developing China through science and technology was first put forward in the Outline of the National Plan for Medium and Long-term Science and Technology Development (2006-2020)[26]. Moreover, the report of the 20th National Congress of the Communist Party of China has advanced the goal of "building a scientific and technological power" to 2035, which is the high requirements of the Party Central Committee for the goal of scientific and technological power, and also emphasizes the urgency of the time. Therefore, the fundings and
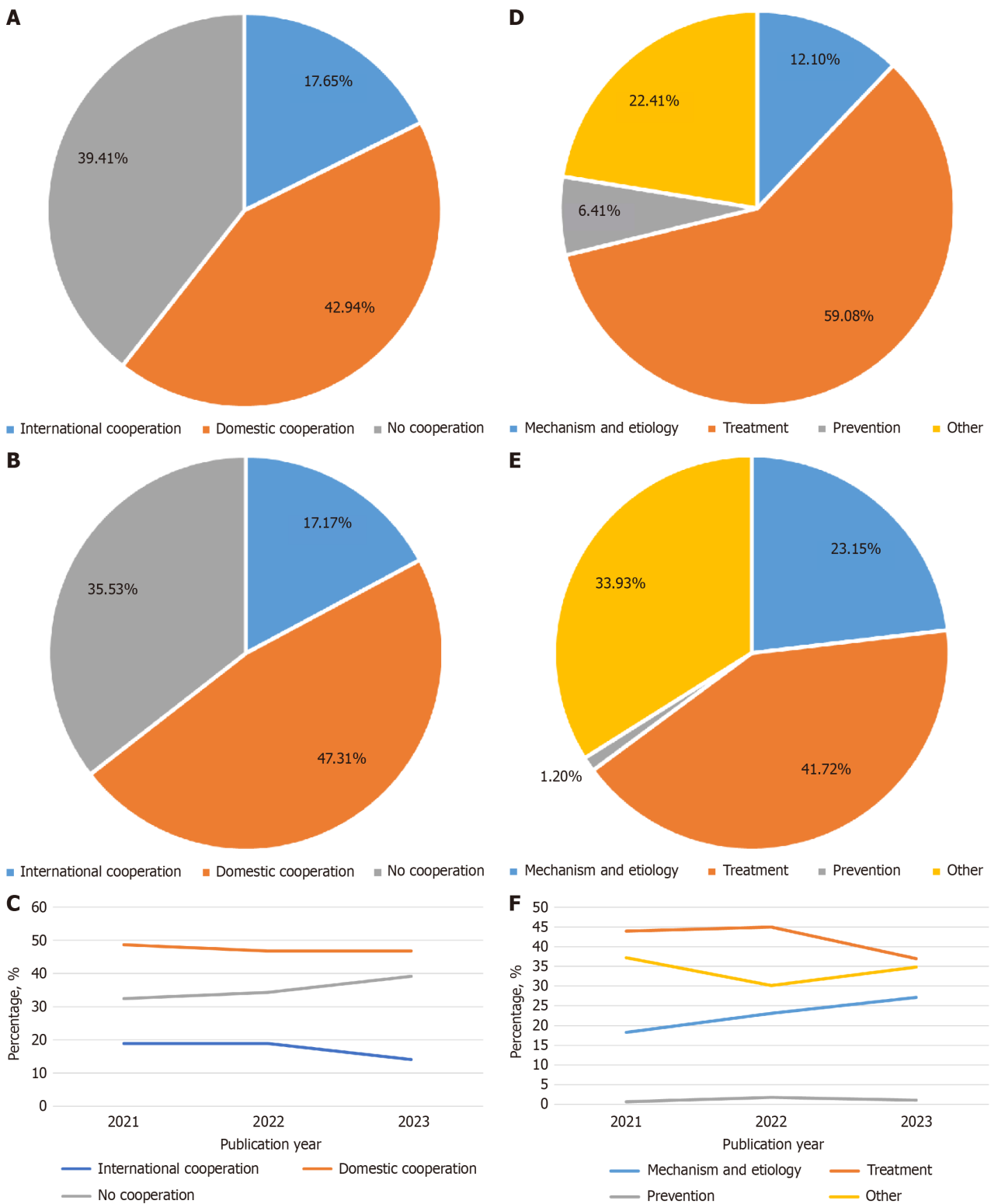
Figure 5 Cooperation models and study topics of the publications on low back pain. A: Cooperation models of articles published from 1990 to 2023; B: Cooperation models of articles published from 2021 to 2023; C: Specific changes of cooperation models of articles published from 2021 to 2023; D: Study topics of articles published from 1990 to 2023; E: Study topics of articles published from 2021 to 2023. F: Specific changes of study topics of articles published from 2021 to 2023.

requirement to medical academia have been increasing annually. The publication trend of low back pain is accordance with government policies. Besides, our results also showed that the publication distribution in different regions was closely related to the economic development level.

The cooperation model changed. In general, the cooperation degree increased during the past 3 years, mainly owing to domestic cooperation. However, the proportion of no cooperation increased from 2021 to 2023. These results suggested the development of scientific power in this field as well as potential barriers to collaboration.

There were obvious changes of the study topics on low back pain. Chinese scholars paid more attention to the mechanism and etiology of low back pain and other aspects associated with low back pain, except for the treatment. Globally, experts recommend not early intervention with drugs and surgeries, but non-pharmacological strategies, including self-care, physiotherapy, cognitive and behavior therapy, and complementary and alternative medicine[4]. Novel strategies such as basivertebral nerve ablation, biological therapy and multifidus stimulation have been concluded to improve low back pain and disability enduringly[27]. However, there are still many things should be done.

Evidence from undeveloped and developing countries or regions is urgently needed[4]. Future studies could focus on the execution of better clinical practice, occupational care and education, and prevention strategies that are suitable for wider populations. One important link is uncovering the underlying mechanism of how low back pain happens and develops, and how to target on the potential therapies. China is moving towards this direction.

Lastly, the present study has several limitations. First, although we analyzed the disease burden of low back pain in China annually from 1990 to 2021 and compared it with global trend, we did not obtain the data for different regions of China. Second, bibliometric analysis for literature on low back pain published by Chinese scholars was based on the WoS database. Although the WoSCC and the CSCD include English and Chinese publications respectively, some articles in other databases were omitted. However, the WoS database is the most frequently used source for bibliometric analysis and publications in this database are well recognized[28,29]. Third, the CSCD is applied to bibliometric analysis for Chinese literature[30,31]. Lastly, due to the limited bibliometric indicators in CSCD, we did not analyze the networks of authors, institutions, countries/regions, journals and keywords. However, we analyzed the publication trend and distribution, and changes of cooperation models and study topics to reflect the response of Chinese scholars to the disease burden.

CONCLUSION

The incidence, prevalence and DALYs of low back pain have increased in China during the past 2 decades, though the disease burden is smaller than that of the world average. Studies on low back pain in China have emerged in large numbers. Chinese scholars have paid much attention to the mechanism, etiology and many other aspects of low back pain, except for therapeutic strategies. To improve the burden of low back pain, studies and strategies for prevention and treatment should be suitable for wider populations, especially undeveloped and developing regions.

FOOTNOTES

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