



Evidence Base of Clinical Studies on Qi Gong: A Bibliometric Analysis

Ya-Peng Zhang^{a,i}, Rui-Xue Hu^{a,b,i}, Mei Han^{a,i}, Bao-Yong Lai^{c,i}, Shi-Bing Liang^{a,d,i}, Bing-Jie Chen^{e,i}, Nicola Robinson^{a,f,i}, Kevin Chen^{g,h,i}, Jian-Ping Liu^{a,i,*}

^a Centre for Evidence Based Chinese Medicine, Beijing University of Chinese Medicine, Beijing, 100029, China

^b Center of Evidence Based Traditional Chinese Medicine, Institute of Basic Research in Clinical Medicine, China Academy of Chinese Medical Sciences, China

^c The Third Affiliated Hospital of Beijing University of Chinese Medicine, Beijing 100029, China

^d College of Basic Medical Sciences, Shanxi University of Traditional Chinese Medicine, Taiyuan, 030000, China

^e College of Traditional Chinese Medicine, Beijing University of Chinese Medicine, Beijing, 100029, China

^f School of Health and Social Care, London South Bank University, London, SE1 0AA, UK

^g University of Maryland School of Medicine, Center for Integrative Medicine, United States

^h Shenzhen University, Faculty of Physical Education, China

ⁱ Institute of Integrated Traditional Chinese Medicine and Western Medicine, Guangzhou Medical University, Guangzhou, China



ARTICLE INFO

Keywords:

Qigong
Ba Duan Jin
Bibliometric Analysis
Clinical Study
Non-drug therapy

ABSTRACT

Objective: This bibliometric study aimed to systematically and comprehensively summarize the volume, breadth and evidence for clinical research on Qigong. And this bibliometric analysis also can provide the evidence of this field.

Design: Bibliometric analysis.

Methods: All types of primary and secondary studies on humans were included: systematic reviews, randomized clinical trials, non-randomized controlled clinical studies, case series and case reports. Chinese Biomedical Literature Database, China National Knowledge Infrastructure, Chinese Scientific Journal Database, Chinese Academic Conference Papers Database and Chinese Dissertation Database, PubMed and the Cochrane Library were searched from the date of inception to December 10, 2018. Bibliometric information, such as publication information, disease/condition, Qigong intervention and research results were extracted and analyzed.

Results: A total of 886 clinical studies were identified: including 47 systematic reviews, 705 randomized clinical trials, 116 non-randomized controlled clinical studies, 12 case series and 6 case reports. The studies were conducted in 14 countries. The top 15 diseases/conditions studied were: diabetes, chronic obstructive pulmonary disease, hypertension, stroke, cervical spondylosis, lumbar disc herniation, insomnia, knee osteoarthritis, low back pain, and osteoporosis, Coronary heart disease, breast cancer, periarthritis of shoulder, depression, metabolic syndrome. Of the various Qigong exercises reported in these 886 clinical studies, Ba Duan Jin was the most frequently researched in 492 (55.5%) studies, followed by Health Qigong 107 (12.1%), Dao Yin Shu 85 (9.6%), Wu Qin Xi 67 (7.6%) and Yi Jin Jing 66 (7.4%). The most frequently used comparisons in randomized trials were maintaining normal way of life unchanged 149 (18.1%), the remaining controls included conventional treatment, mainly western medicine, Chinese herbal medicine, acupuncture, health education, psychological therapy, Yoga, Tai Chi and other non-drug therapy. The most frequently reported outcomes were physical function, quality of life, symptoms, pain and mental health indicators. Beneficial results from practicing Qigong were reported in 97% of studies.

Conclusions: Qigong research publications have been increasing gradually. Reports on study types, participants, Qigong Intervention, and outcomes are diverse and inconsistent. There is an urgent need to develop a set of reporting standards for various interventions of Qigong. Further trials of high methodological quality with sufficient sample size and real world studies are needed to verify the effects of Qigong in health and disease management.

Abbreviations: SR, systematic review; RCT, randomized clinical trial; CCS, non-randomized controlled clinical studies (quasi-randomized clinical trial or observational studies such as cohort or case-control studies); CS, case series; CR, case report; USA, United States of America; UK, United Kingdom; COPD, chronic obstructive pulmonary disease; QOL, quality of life

* Corresponding author.

E-mail addresses: zhangyapeng@bucm.edu.cn (Y.-P. Zhang), ruixue_hu@bucm.edu.cn (R.-X. Hu), hanmeizoujin@163.com (M. Han), by_lai@126.com (B.-Y. Lai), zyi20126185@163.com (S.-B. Liang), tian8388@163.com (B.-J. Chen), nicky.robinson@lsbu.ac.uk (N. Robinson), KChen@som.umaryland.edu (K. Chen), LiuJP@bucm.edu.cn (J.-P. Liu).

<https://doi.org/10.1016/j.ctim.2020.102392>

Received 26 September 2019; Received in revised form 13 February 2020; Accepted 26 March 2020

Available online 06 April 2020

0965-2299/© 2020 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Qigong, a mind-body practice first developed over 5000 years ago, is an important part of traditional Chinese medicine (TCM) used to promote health, well-being and improve medical conditions.¹ Qigong uses physical activity and meditation to harmonize the body, mind and spirit,² it combines gentle body movements with breathing and mindfulness.³ Qigong is a general term or concept for a variety of traditional Chinese energy exercises and therapies facilitating the flow of qi (vital energy)⁴ also called Dao yin in ancient time. Qigong including movement form of Qigong and static form of Qigong or standing form. Qigong is currently described as using the skill of body-mind exercise to integrate the three adjustments of body, breath, and mind into “one”.⁵ With the constant evolution and development of history, the types of Qigong have become more diverse. Qigong includes a broad range of traditional Chinese health care exercises such as : Dao Yin, Wu Qin Xi Qigong, Ba Duan Jin Qigong, Yi Jin Jing Qigong, Liu Zi Jue Qigong and so on. These are all part of movement form of qigong.

Wu Qin Xi Qigong, is one of the most widely practiced forms of traditional Chinese Qigong deriving from the I-Ching philosophy and TCM Theory.^{6,7} Hua Tuo carefully observed the activity characteristics of 5 animals, tiger, deer, bear, ape and bird, and composed the set of actions integrated with the human body functions and the biological clock.^{8,9} Ba Duan Jin Qigong is another popular traditional Chinese mind-body exercise that focuses on breathing, increasing flexibility and strengthening muscles and tendons, eight fixed movements that can be learned easily, and is less demanding physically and cognitively.¹⁰ Yi Jin Jing Qigong is a branch of the Dao Yin developed into the Qing dynasty which defined the concept of fitness and disease treatment of the Dao Yin as qi and tendons, highlighting the fitness and disease treatment through stretching and regulating “tendons”.¹¹ Liu Zi Jue Qigong exercise characterized by diaphragmatic breathing and pursed lip breathing, is performed by expiration to produce six different sounds, namely, “xu”, “he”, “hu”, “si”, “chui”, and “xi” and corresponding limb movements.¹²

As a health-friendly sport, Qigong is loved by people all over the world, and received good benefits. In recent years, more and more clinical studies of Qigong have shown the safe and health promoting effects of Qigong intervention. Many randomized clinical trials (RCTs) have yielded positive results on the clinical efficacy of Qigong, involving a variety of diseases and health related symptoms, including Chronic Low Back Pain,¹³ Fibromyalgia Syndrome,¹⁴ Cardiovascular Disease,¹⁵ Parkinson's Disease, Motor Function, Depression and quality of life (QOL),¹⁶ Chronic Pain,¹⁷ Essential Hypertension,¹⁸ chronic obstructive pulmonary disease (COPD),¹⁹ Cancer.²⁰ However, current status of systematic research evidence on Qigong is still unclear.

Therefore, a study was conducted to systematically and comprehensively summarize and analyze the clinical research evidence on Qigong exercises, and to understand the trends, characteristics and limitations of Qigong clinical research, and to provide a basis for the direction of future clinical research and the use of Qigong in healthcare.

2. Material and methods

A search was conducted for movement form of Qigong in the Chinese Biomedical Literature Database (Sino-Med), China National Knowledge Infrastructure (CNKI), Chinese Scientific Journal Database (VIP), Chinese Academic Conference Papers Database and Chinese Dissertation Database (Wan fang), PubMed, Cochrane Library, from the date of inception to 10th December 2018. The bibliometric analysis included all clinical studies using Qigong and its various types of interventions, without language restrictions and type of publication. If multiple publications were found to report the same data, only the most recently published studies were chosen and analyzed.

2.1. Search strategy

The key words used were : Dao Yin, Tao Yin, Dao Yin Shu, Wu qinxi, Wu qinxi qigong, Ba duanjin, Ba duanjin qigong, Eight Fragments, Yi jinjing, Yi jinjing qi gong, Liu zijue, Liu zijue qigong, Qigong, Qi-gong, Chi gong, Ch'i Kung, Chi gung, Shi erduanjin, Ma wangdui daoyin, Health Qigong Da wu, Modern Health Qigong Health Stick, review, randomized clinical trial, non-randomized controlled clinical studies, cohort studies, case-control studies, case series, case reports.

The Search strategy for the CNKI database was for example:

#1 Dao Yin OR Daoyinshu OR wuqinxi OR Health qigong wuqinxi OR Baduanjin OR Health qigong baduanjin OR Yijin jing OR Health Qigong Yijinjing OR Liuzijue OR Liuzijue qigong OR Health Qigong Liuzijue OR Qigong OR Health Qi-gong OR Shierduanjin OR Mawangdui daoyin OR Health Qigong shier Duan Jin OR Health Qigong Ma Wangdui Daoyinshu OR Health Qigong Da wu OR Modern Health Qigong Health Stick [Title/Abstract]

#2 Review OR Randomized clinical trial OR Non-randomized controlled clinical studies OR Cohort study OR Case-control study OR Case series OR Case report [Title/Abstract]

#3 #1 AND #2

2.2. Study Selection/ Research screening

Two authors (ZYP and LSB) first screened the titles and abstracts of the hits, and full papers were retrieved and reviewed according to the inclusion and exclusion criteria. The two authors (ZYP and LSB) also classified all eligible clinical articles according to their study designs. If there was any uncertainty or discrepancy, a third author (JPL) was consulted.

2.3. Inclusion/Exclusion Criteria

All types of clinical study types including systematic reviews (SRs), randomized clinical trials (RCTs), non-randomized controlled clinical studies (CCSs) (quasi-randomized clinical trial or observational studies such as cohort or case-control study), case series (CSs), case reports (CRs). Duplicates and anecdotes were excluded.

Any disease/condition or healthy participants of study subjects were included (regardless of age, gender, disease type), animal experimentation and cytology experiments excluded.

Only include movement form of Qigong, static form of Qigong (meditation) or standing form (zhuang gong) was exclude, regardless of the style or training regimen was included. Qigong is the skill of body-mind exercise that integrates the three adjustments of body, breath, and mind into “one”.⁵ It included Tao yin, Wu Qin Xi Qigong, Ba Duan Jin Qigong, Yi Jin Jing Qigong, Liu Zi Jue Qigong, Shi Er Duan Jin, Ma Wang Dui Dao Yin. Tai Chi, Tai Chi pushing hands, Tai Chi sword, Tai Chi knife, Yoga were excluded. Reports published in abstracts, and studies lacking basic information on Qigong interventions were excluded.

There was no restriction on control group, which included no exercise, routine exercise, western medicine therapy, traditional Chinese medicine, acupuncture and moxibustion, massage, Qigong combined with other therapies. Comments irrelevant to Qigong intervention, or studies of complex intervention including Qigong as one of the intervention components which have no detailed description on Qigong intervention were also excluded.

There were no restrictions on outcome indicators. Studies with no clear explanation of Qigong efficacy and its evaluation were excluded.

2.4. Data Extraction

The two authors designed a structured data extraction form using Excel 2010. The form consisted of the following sections.

- (1) Publication information, including year of publication, study type, study participants (patient, health, and both), language, country of study implementation and funding information.

- (2) Disease/condition. Western medical diagnosis name primarily. The names of diseases/conditions were extracted directly and then classified into different categories according to International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD 10).²¹ As the study was to explore the role of Qigong in fitness and preventing disease, specific information was extracted.
- (3) Qigong intervention. Data was extracted on Qigong styles, the method of learning and practicing Qigong, (frequency, location, treatment time, follow-up time, scheme of practicing Qigong and the way of learning Qigong, qualifications of Qigong instructors and teaching age. If Qigong was applied in combination with other therapies, other therapies were extracted.
- (4) Outcome indicators: The name of outcome indicators was extracted directly, and then classified.
- (5) Outcomes and overall conclusions. All outcomes were extracted directly (including adverse events, drop outs and their causes) and then classified into different categories. The overall authors' conclusions (positive, negative or unclear) were examined. "Positive": such as research achieved the goal, or the conclusion supported Qigong; or "negative": if the research failed to achieve the purpose, the conclusion did not support Qigong; or "unclear": the research conclusion was not clear.

Four authors (ZYP, HRX, LSB, LBY) participated in data extraction. The method was to evenly distribute the retrieved public data, which was finally checked and summarized by the main researcher (ZYP). All

extractions were verified by one author (ZYP). 2.5 Data Analysis

SPSS 20.0 and Microsoft Excel 2010 were used to perform data analysis. Data were presented by counts, percentage and frequency. A structured data extraction form was designed using Excel, extracting publication information, disease/condition, Qigong intervention, outcome indicators, outcomes and overall conclusions. These data were imported into SPSS 20.0 and analyzed using descriptive statistics. Categorical variables were reported as frequencies and percentages. The disease system was classified according to ICD-10.

3. Results

3.1. Study selection

We initially identified 13148 studies, of which 5087 were removed after screening because of duplicate records. We then screened the full-texts of the remaining 1266 studies to assess the eligibility. A total of 886 studies met the inclusion criteria. (Fig. 1) illustrates a PRISMAflow diagram to show the study selection process.

3.2. Study types

Of the 886 studies included in the analysis, 776 (87.6%) were published in Chinese and 110 (12.4%) were in English. Clinical studies on Qigong include almost all levels of intervention study, Since 2005, the number of publications for all research types has increased year on

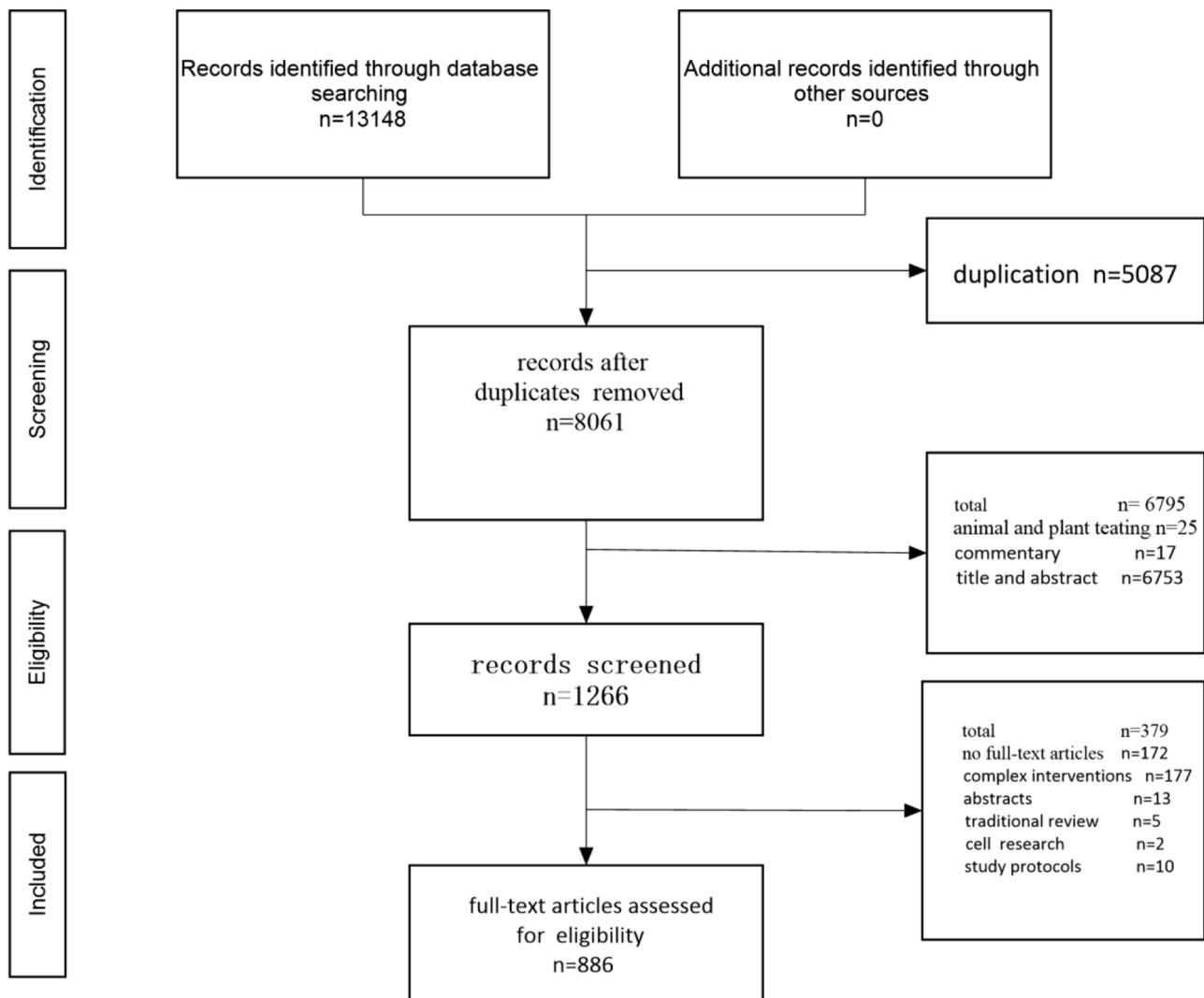


Fig. 1. Study Selection Flow Chart.

year, especially the number of randomized controlled clinical trials, but also the number of SR of clinical studies 47(5.3%), RCT 705(79.6%), CCS 116(13.1%), CS 12(1.4%) and CR 6 (0.7%).(Fig. 2)

3.3. General Characteristics of Included Studies

The 886 studies were conducted in 14 different countries, and the majority of studies 844(95.3%) were conducted in China (including 5 in Taiwan and 8 in Hong Kong), followed by the United States 14(1.6%). Table 1 shows the details of countries where the research was conducted? A total of 348 studies reported funding information, most were funded by the government 348(39.3%).

Among the top 10 journals published in 886, the most frequently published articles were in dissertations 132(14.9%). Followed by *Nursing Research of China* 16(1.8%), *Chinese Journal of Gerontology* 15(1.7%), *Alternative and Complementary Medicine* 13(1.5%), *Hunan Journal of Traditional Chinese Medicine* 11(1.2%), *Liaoning Journal of Traditional Chinese Medicine* 11(1.2%), *Shanghai Journal of Traditional Chinese Medicine* 11(1.2%), *Chinese Journal of Sports Medicine* 9(1.0%), *Complementary and Alternative Medicine* 9(1.0%), *He bei Journal of Traditional Chinese Medicine* 9(1.0%).

3.4. Qigong Intervention

Among the 886 studies, Ba Duan Jin was the most frequently studied 490(55.3%). Other articles included Health Qigong 107(12.1%), Dao Yin Shu 85(9.6%), Wu Qin Xi 67(7.6%), Yi Jin Jing 66(7.4%), Liu Zi Jue 30(3.4%), Health Qigong Da wu 12(1.4%). One reported the 'Modern Health Qigong Health Stick'. There were 17(1.9%) using more than one method (See Fig. 3 for details).

Table 1
Number of clinical studies on Qigong conducted in different countries (n = 886).

Country	Study design and No. of studies by country					Total (%)
	SR	RCT	CCS	CS	CR	
China	39	685	110	6	4	844(95.3)
USA	3	7	2	2	0	14(1.6)
South Korea	3	1	1	0	0	5(0.6)
UK	2	1	1	0	0	4(0.5)
Sweden	0	2	0	0	1	3(0.3)
Germany	0	2	0	1	0	3(0.3)
Australia	0	2	0	0	1	3(0.3)
Korea	0	1	0	1	0	2(0.2)
Spain	0	2	0	0	0	2(0.2)
Canada	0	1	0	1	0	2(0.2)
Austria	0	0	1	0	0	1(0.1)
Brazil	0	0	0	1	0	1(0.1)
Japan	0	0	1	0	0	1(0.1)
Italy	0	1	0	0	0	1(0.1)

Abbreviation: SR, systematic review; RCT, randomized clinical trial; CCS, non-randomized controlled clinical studies (quasi-randomized clinical trial or observational studies such as cohort or case-control studies); CS, case series; CR, case report; USA, United States of America; UK, United Kingdom.

A total of 503 studies reported various Qigong learning methods. In most clinical studies participants learned Qigong under the guidance of Qigong teachers 311(61.8%), of these, 94 participants learned Qigong under the guidance of teacher guidance and video self-study 94(18.7%). Participants also practiced under the guidance of medical staff 83(16.5%). 13(2.6%) of the participants learn Qigong by watching

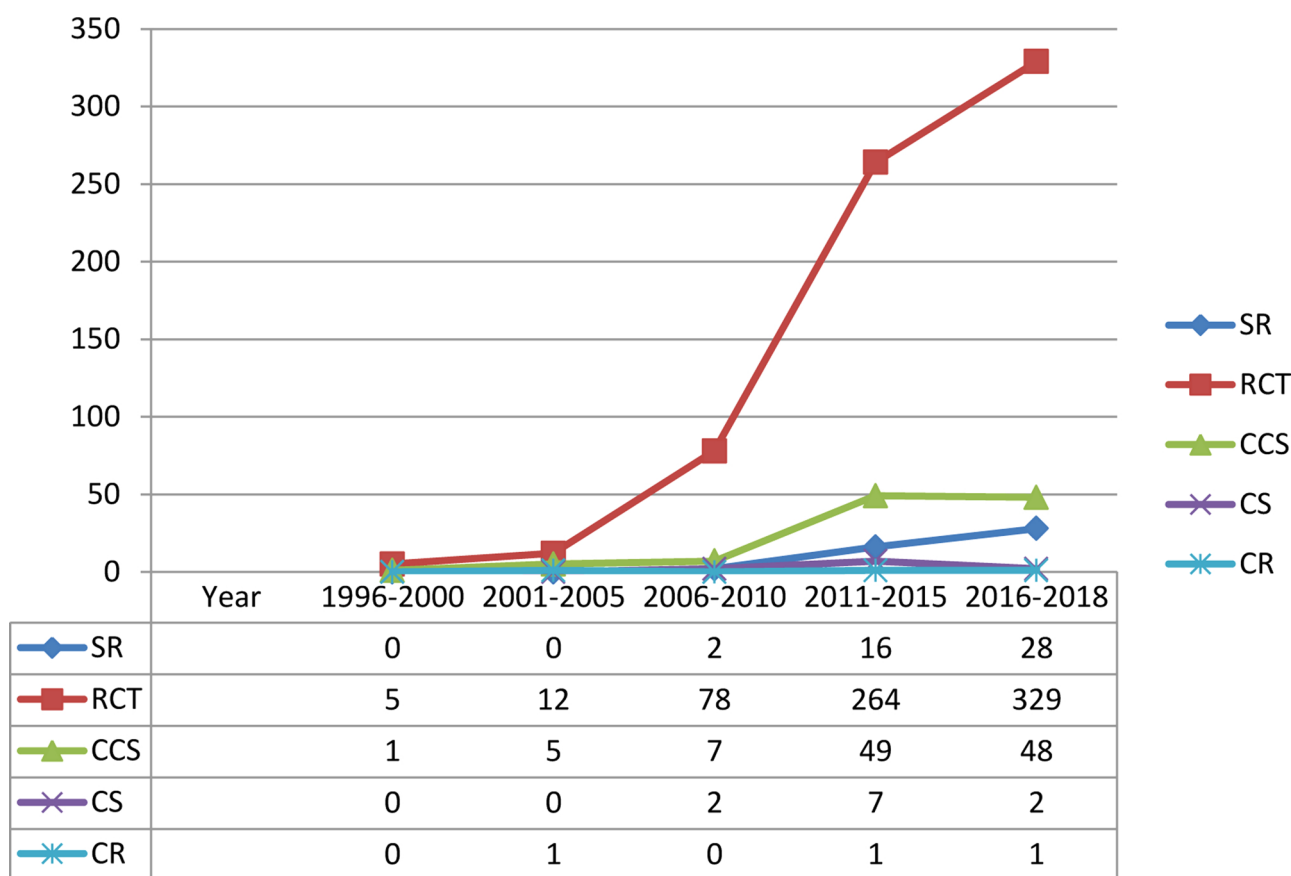


Fig. 2. Study designs over time, numbers of published clinical studies on Qigong.

Abbreviations: SR, systematic review; RCT, randomized clinical trial; CCS, non-randomized controlled clinical studies (quasi-randomized clinical trial or observational studies such as cohort or case-control studies); CS, case series; CR, case report.

videos, paper textbooks assisted learning 5(1.0%). In 485 studies under the guidance of Qigong trainers, 250(51.5%) studies reported the qualifications of Qigong trainers. Of these 110(22.7%) were professional Qigong masters, 52(10.7%) were trained trainers, 38(7.8%) were qualified, 25(5.2%) were described as experienced, 20(4.1%) were full-time qigong trainers, 11(2.3%) were qualified, 10(10/485, 2.1%) is a master Qigong master, and one, a national Qigong trainer was used to guide participants practice. Of the studies, 21 reported the specific teaching age of Qigong teachers, all had over more than 3 years of Qigong teaching experience,²² and this ranged up to 30 years of Qigong teaching experience.²³

179 studies reported where the participants practiced Qigong: 79(44.1%) were conducted in hospitals, and the remaining 100 included families, schools, companies, parks and community service centers. A total of 157(17.7%) reported in detail the specific content of their practice of Qigong, including the specific operation of each movement, the specific content of the exercises, and 22(2.5%) were focused according to the specific conditions of the participants. The Qigong practice grading, for example, the intensity of training was gradually increased from small to big. The volume of training was limited by mild fatigue or divided into three stages (primary, intermediate, advanced), or grading according to the duration of each exercise.

779 studies reported the frequency of Qigong practice, ranging from 1 minute to 1.5 hours per session, from 1 to 10 times a week; the most frequent was 5 times a week, 1 hour each time 192(24.6%) 3 times a week, 1 hour of Qigong practice, 87(11.2%). 763(86.1%) studies reported the course of treatment, the time span of the treatment was large, the shortest course of treatment was 5 days,²⁴ the longest course of treatment was 3 years.²⁵ Of these 763 studies the frequency of treatment over specified time periods was the highest for 3 months 250(32.8%), followed by 6 months 183(24.0%), 1 month 96(12.6%). A total of 171(19.3%) studies reported on the follow-up, including door-to-door follow-up, telephone, We Chat and other forms of follow-up exercise reminders, supervision and guidance. The longest follow-up was 30 years²⁶ and the shortest 10 days.²⁷

In the intervention group (including CSs, CRs), Qigong interventions were used alone to account for more than half of the 886 Qigong clinical studies 495(55.9%), and other studies combined with other interventions, including Western medicine, Chinese medicine, acupuncture, dietary and lifestyle guidance, health education, psychotherapy, Yoga,

Tai Chi and other non-drug therapies. In 821 studies there was a control group, 64 studies had more than two controls 64(7.8%), and for 149(18.1%) of the control groups the intervention was to maintain the original lifestyle, and the remaining control group interventions included conventional treatment, Western medicine, Chinese medicine, acupuncture, dietary and lifestyle guidance, health education, psychotherapy, Yoga, Tai Chi and other non-drug therapies.

3.5. Disease/Condition Categories

Of the 886 included studies, the types of participants most frequently reported were patients 797(90.0%), followed by healthy people 52(5.9%). Part of the patient and some healthy people 36(4.1%). Participants were trained and assessed to meet standards in 174(19.6%) of studies. Of the 886 included studies, the majority were diseases/conditions of the musculoskeletal system or connective tissue and endocrine, nutritional or metabolic diseases and the circulatory system, based on ICD 10 categorization (Table 2).

The top 15 diseases/conditions included diabetes, COPD, hypertension, stroke or cervical spondylosis, lumbar disc herniation, insomnia disorders, osteoarthritis, low back pain, and osteoporosis or osteopenia, Coronary heart disease, breast cancer, peri-arthritis of shoulder, depression, metabolic syndrome (Table 3).

Among the 886 included studies, the first clinical study of Qigong was published in 1984, which was a randomized controlled study conducted in China²⁸ to investigate the effects of Qigong on hypertension and changes in plasma cyclic nucleotides. The publication of clinical studies on Qigong has been increasing year by year, especially since 2000, the number of publications has shown a steady trend in growth, particularly RCTs which showed a significant increase after 2006.

3.6. Outcomes and Main Findings

Among the 886 studies included, the most frequently reported outcome indicators were physical function, quality of life, symptoms, pain, and mental health indicators. Of these studies, 561(63.3%) reported body function related outcomes, including blood biochemical indicators, exercise capacity, proprioception, joint mobility, balance, lung function, cardiovascular function, lower extremity muscle strength, and physical weakness degree, daily living ability, overall

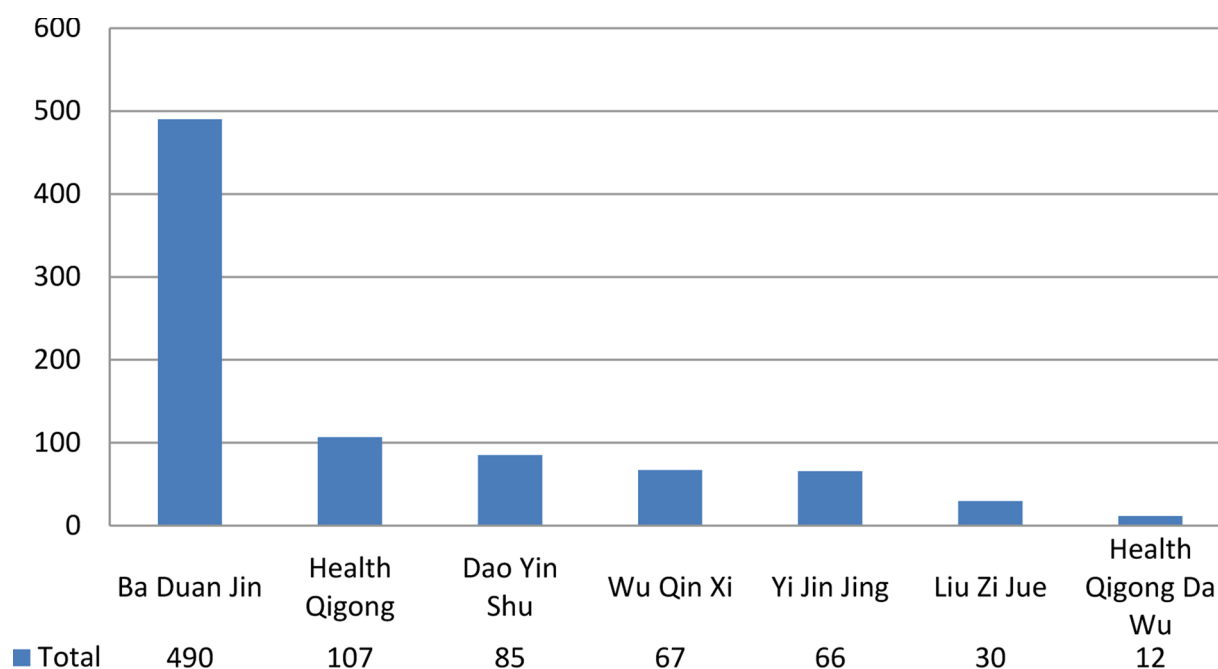


Fig. 3. The number of various Qigong in 886 clinical studies.

Table 2
Clinical trials of Qigong categorized by prevalence of disease categories based on ICD-10 classifications.

Disease/conditions (ICD-10 codes)	No. of study (%)
Diseases of the musculoskeletal system or connective tissue	190(21.4)
Endocrine, nutritional or metabolic diseases	123(13.9)
Diseases of the circulatory system	99(11.2)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	87(9.8)
Diseases of the respiratory system	86(9.7)
Diseases of the nervous system	81(9.1)
Mental and behavioural disorders	79(8.9)
Factors influencing health status and contact with health services	59(6.7)
Neoplasms	38(4.3)
Diseases of the digestive system	10(1.1)
Certain infectious and parasitic diseases	7(0.8)
Diseases of the skin and subcutaneous tissue	5(0.6)
Diseases of the genitourinary system	3(0.3)
Diseases of the eye and adnexa	3(0.3)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	2(0.2)

Abbreviations: ICD-10, International Classification of Diseases, Tenth Revision.

cognitive function. Quality of life was reported in 87(9.8%) studies. The measurement scales used included universal scales such as Short Form Health Survey (SF-12), Short Form Health Survey (SF-36), Symptom check list 90 (SCL-90) scale, and quality of life measurement scale (WHOQOL-BREF) Chinese version and disease-specific scales such as the Minnesota Heart Failure Quality of Life Questionnaire and the St. George Respiratory Questionnaire, assessment of quality of life (CAT score) for chronic obstructive pulmonary disease, and diabetes-specific quality of life scale (A-DQOL); Symptoms were reported in 80(9.0%) studies; 77(8.7%) studies reported pain indicators with Visual Analogue Scale (VAS), WOMAC pain and function, McGill pain Questionnaire (MPQ), and Japanese Orthopaedic Association scoring system for the assessment of lumbar spinal diseases (JOA score) and fibromyalgia impact questionnaire (FIQ), knee pain score, pain self-efficacy questionnaire (PSEQ), Oswestry low back disability index. 61(6.9%) studies reported mental health indicators including depression, stress, mood, self-efficacy, anxiety, self-esteem, quality of sleep, and other measures of the Hamilton Depression Scale (HAMD) and Self-rating Depression Scale (SDS), Self-rating Anxiety Scale (SAS), BECK Depression Self-Assessment Questionnaire (BDI), Pittsburgh Sleep Quality Index (PSQI), and Mini Mental State Examination Scale (MMSE) Scoring, Profile of Mood States (POMS); 42(4.7%) studies reported patient outcomes; 22(2.5%) studies did not report outcome indicators; 12(1.4%) the study reported satisfaction with Qigong intervention; 10(1.1%) studies reported patient physical fitness; 9(1.0%) studies reported sub-health, 6(0.7%) studies reported health-related events. 1 study reported adverse events (one patient experienced an increase in right-sided shoulder pain, and another participant experienced an episode of plantar fasciitis. In both cases, patients were able to continue with the study and the pain settled over time.²⁹

A total of 166(18.7%) studies reported loss to follow up of the participants, and 10 were completed without loss to follow up. The reasons for loss to follow up include: loss of contact, loss of interest in practicing Qigong, insufficient Qigong practice, time conflicts, moving away, and illnesses or symptoms unrelated to Qigong (leg pain, wrist fracture, acute illness requiring surgery) and so on.

Positive results for Qigong interventions were reported by 855(96.5%) studies reported, of which 131(14.8%) reported significant results and 125(14.1%) reported the interventions were effective in combination, and the rest of the studies were described as “Can improve efficacy”, “Have a certain effect”, “Active”, “Good Effect” and so on; 22(2.5%) studies reported that the efficacy of Qigong was uncertain. This included 11 systematic reviews, 6 RCTs, 3 CCSs, 1 CR, 1 CS; 5(5/886, 0.6%) studies which

reported Qigong negative results, 4 RCTs and 1 CCS, including Qigong versus fatigue rehabilitation (1), Chronic Low Back Pain (1), Mild essential hypertension (1), Prehypertension and Mild Essential Hypertension (1) and The role of nasopharyngeal cancer (1). Conclusions in the 11 systematic reviews of Qigong efficacy uncertainty, the types of diseases involved: Stroke Rehabilitation (1), Essential hypertension (1), Depression (1), Cancer (2), Fibromyalgia (1), Healthcare (1), Cardiovascular disease (1), Depressive and Anxiety symptoms (2), COPD (1). 6 RCTs explored Essential Hypertension (1), Osteoarthritis of the knee (1), Promote health (1), Fatigue and distress in senior prostate cancer (1), Fatigue in breast cancer survivors (1), psychosocial health (1). The 3 CCS diseases include COPD (1), Breast Cancer (2), 1 CR study of the brain function, and 1 CS study of the blood pressure and quality of life.

4. Discussion

4.1. Primary Outcome

The current situation on the clinical evidence for Qigong is summarized as follows:

At present, there have been a large number of clinical studies on various Qigong exercises, including SRs, RCTs, CCSs, CSs and CRs. Among them, RCTs have the most research and show a growing trend. The clinical research of various Qigong exercises covers a wide range of diseases, and has been used in 17 disease systems, involving 134 disease types.

There are many types of Qigong, but Ba Duan Jin had the highest frequency of use. Qigong intervention measures are complex and diverse. Each study varies greatly in each week, the frequency of each practice and the course of treatment. Qigong exercises are performed 5 times a week for one hour, 3 times a week, 1 hour each time, the frequency of 3 months of treatment is the highest. There are many methods of learning Qigong. Most of the participants studied Qigong under the guidance of Qigong teachers. However, only a few studies reported whether the training of the participants was qualified, the qualifications of the teachers, and a few reported on-site follow-ups of the participants including exercise reminder, supervision and guidance in the form of telephone, WeChat and so on. A very small number of studies report the teaching age of Qigong teachers. A very small number of studies detail the specific schemes for practicing Qigong and the grading of Qigong. The Qigong exercises are used alone for more than half of the clinical research on Qigong, and the rest are used in combination with other interventions. Outcome indicators with the highest

Table 3
Top 15 diseases/conditions included in clinical studies on Qigong. (n = 886)

Disease/condition	Study design (number of studies)					Total (%)
	SR	RCT	CCS	CS	CR	
Diabetes	6	84	4	0	0	94(10.6)
COPD	6	70	8	0	0	84(9.5)
Hypertension	9	40	8	0	1	58(6.5)
Stroke	2	44	2	0	1	49(5.5)
Cervical spondylosis	0	34	3	0	0	37(4.2)
Lumbar disc herniation	0	34	2	1	0	37(4.2)
Insomnia disorders	0	19	7	0	0	26(2.9)
Osteoarthritis	0	20	3	1	0	24(2.7)
Low back pain	0	22	0	0	0	22(2.5)
Osteoporosis or osteopenia	1	17	0	0	0	18(2.0)
Coronary heart disease	2	14	2	0	0	18(2.0)
Breast cancer	1	9	2	1	0	13(1.5)
Periarthritis of shoulder	0	10	3	0	0	13(1.5)
Depression	2	5	3	1	0	11(1.2)
Metabolic syndrome	0	10	0	0	0	10(1.1)

Abbreviation: SR, systematic review; RCT, randomized clinical trial; CCS, non-randomized controlled clinical studies (quasi-randomized clinical trial or observational studies such as cohort or case-control studies); CS, case series; CR, case report; COPD, chronic obstructive pulmonary disease.

frequency of outcomes were physical function, quality of life, symptoms, pain, and mental health indicators. A few studies reported drop outs of the subjects, and most studies reported positive results for Qigong interventions.

In summary, the existing clinical studies of various diseases/conditions show that the comprehensive and evidence base of Qigong clinical research is abundant but mainly restricted to China.

4.2. The relevance of this study to previous studies

Previous research by Li Ying³⁰ and Yuan Yiping³¹ respectively explored publications in the literature, author distribution, journal distribution, subject distribution and the topics featuring the distribution of Qigong research in core journals from 2003 to 2010 and 2008 to 2015. They only analyzed in these areas. Yang Yingli³² et al. and Yu Jing³³ only studied and analyzed the clinical research evidence of Ba Duan Jin and they only study Ba Duan Jin in their reviews. This bibliometric study does not limit the number of years and types of research, and conducted more systematic and comprehensive research and analysis on various exercises of Qigong. The intervention measures include not only Ba Duan Jin but also Dao Yin, Wu Qin Xi Qigong, Yi Jin Jing Qigong, Liu Zi Jue Qigong and so on.

4.3. Advantages and limitations of the study

The study has the clinical research status and evidence base of Qigong exercises and analyzes relevant research using rigorous methods in detail.

The study has some following limitations: Firstly, there are a large number of RCTs among the 886 included studies, the quality of their methodology was not evaluated in the current analysis but the studies were analyzed and summarized for general trends and explored the characteristics of Qigong clinical research evidence, without an in-depth analysis of the quality of Qigong clinical research. The specific effects of Qigong interventions on different diseases/symptoms, may be the direction of the next stage of our study.

Secondly, the retrieval may not be comprehensive enough. Although the language of the search strategy was not limited, the 886 studies included are only Chinese and English. Qigong has been widely used in the world, and this study found that 14 countries have published Qigong clinical research. Due to language limitations, this study only retrieved Chinese and English databases, which may have missed some studies.

In addition, the bibliometric analysis did not extract the severity and duration of the disease or the condition. The influencing factors of journals and the number of citations per paper were not analyzed. The methodology and quality of the studies included in the study were not assessed. The specific routines of each Qigong method were not further classified, for example, if they were homemade, adapted, or nationally issued.

4.4. Implications for future research

This study found that the content of Qigong interventions measures reported in most Qigong clinical studies is different and not detailed. There is an urgent need to develop a set of reporting standards for various clinical interventions of Qigong. It is recommended that future research reports the following items in detail when reporting Qigong interventions measures: Qigong types and specific exercises; Reasons for choosing the Qigong type; Qigong learning method; Qigong practice method; each Qigong time, grading, content and steps of the intervention; practice frequency; course of treatment; qualifications or teaching experience of Qigong teachers, whether the participants were qualified or not, and whether follow-up was conducted to supervise and guide the participants. There is still no basic standard for the intensity and duration of Qigong practice. Although the intensity and course of Qigong can be adjusted according to the physical quality of the participants, by changing the type of Qigong, the routine, the speed of the exercise, the length

of time. But patients with different diseases or healthy people choose the appropriate intensity and course of Qigong remains to be studied. It is suggested that future clinical research on Qigong should be based on practicing Qigong for 1 hour 2 to 3 times a week for 12 consecutive weeks to further explore the optimal Qigong exercise program suitable for different populations. The intensity of Qigong exercises should be graded, as far as possible to avoid the occurrence of adverse reactions.

In addition, the role of Qigong teachers in the learning process of Qigong training is crucial. This study found that all participants in most studies only followed the same Qigong teacher to learn Qigong. It is suggested that the future Qigong study can be designed to compare the effects of Qigong teachers with different qualifications and teaching ages on Qigong intervention measures, and report the specific qualifications of Qigong teachers, so as to provide references for future clinical studies. Future clinical trial scheme design, should also include the training qualification standards of the teachers and follow-up by the Qigong coach should be added to supervise and guide the subjects.

At present, studies have reported positive results, significant results and uncertain results. It can be seen that the efficacy of Qigong is still controversial. It is recommended to design high-quality clinical research on Qigong in the future to further confirm the efficacy of Qigong intervention. This will require a systematic review and meta-analysis to reliably identify any potential benefits. This study found that RCTs showed an increasing trend, but the quality of their research was uneven. Quality control is recommended. It has also been found that many test reports are not standardized. For clinical trials evaluating the efficacy of interventions, especially RCTs, the report should follow International CONSORT (Consolidated Standards of Reporting Trials), Standard, high-quality reports can objectively reflect the external validity and applicability of the test results.³⁴

5. Conclusions

Qigong research publications have been increasing gradually. Although Qigong is popular with people all over the world, especially in other countries except China, how to implement Qigong as an intervention? Reports on study types, participants, Qigong Intervention, and outcomes are diverse and inconsistent. There is an urgent need to develop a set of reporting standards for various clinical interventions of Qigong. Further trials of high methodological quality with sufficient sample size and real world studies are still needed to further verify the effects of Qigong health management.

6. Authors' contribution

Ya-peng Zhang, Jian-Ping Liu designed the bibliometric analysis. Ya-peng Zhang and Rui-xue Hu participated in searching and selecting studies and data extraction. Ya-Peng Zhang, Shi Bing Liang, Rui-xue Hu and Bao Yong Lai participated in identified studies for inclusion and data extraction. Ya-peng Zhang, Bao Yong Lai and Shi Bing Liang participated in data analyses and assessing study quality. Ya-peng Zhang, Rui-xue Hu and Bao Yong Lai contributed to performing data analyses and first draft of manuscript. Mei Han, Bing Jie Chen, Nicola Robinson, Kevin Chen, Jian-Ping Liu were all involved in advising and critically revising the manuscript. All authors have read and approved the final manuscript.

Funding

This work was supported by the key program of the National Natural Science Foundation of China (No. 81830115), and by Beijing University of Chinese Medicine funding project for the research and development of evidence base medicine of TCM clinical scientific research ability and international development (No.2016-ZXFZJJ-011); Prof. Nicola Robinson (visiting professor of Beijing University of Chinese Medicine) is funded by Overseas Expertise Project, Ministry of Education of China(MS20080009).

Declaration of Competing Interest

All authors declare that they have no conflict of interests.

Acknowledgements

We greatly thank Guo-Yan Yang, from NICM Health Research Institute, Western Sydney University, for his suggestion on Qigong and disease classification.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.ctim.2020.102392>.

References

- Peiwen L. *Management of Cancer with Chinese Medicine*. St Alban, UK: Donica Publishing; 2003.
- Chen K, Yeung R. Exploratory studies of Qigong therapy for cancer in China. *Integr Cancer Ther*. 2002;1(4):345–370.
- Kemp CA. Qigong as a therapeutic intervention with older adults. *J Holist Nurs*. 2004;22(4):351–373.
- Liu TJ, Hua WG. *Qigong Study in Chinese Medicine. (The only official textbook used in all Schools of Traditional Chi-nese Medicine in China)*. Beijing: China Publisher of Chinese Medicine; 2005.
- Liu TJ, Zhang WC. *Traditional Chinese Medicine Qigong*. 4nd edn Beijing, China: China Press of Traditional Chinese Medicine; 2016:2–17.
- Zhang F, Bai YH, Zhang J. The Influence of "wuqinxi" exercises on the Lumbosacral Multifidus. *J Phys Ther Sci*. 2014;26(6):881–884.
- Wei X, Xu A, Yin Y, Zhang R. The potential effect of Wuqinxi exercise for primary osteoporosis: A systematic review and meta-analysis. *Maturitas*. 2015;82(4):346–354.
- Li XF. *Research on the Development of Our Health Qigong Associations in Present Stage*. Beijing: Master dissertation Beijing Sport University; 2008.
- Wang L. *Research on Popularization Strategy of Health Qigong*. Shanghai: Master dissertation Shanghai University of Sport; 2009.
- Tao J, Chen X, Egorova N, et al. Tai Chi Chuan and Baduanjin practice modulates functional connectivity of the cognitive control network in older adults. *Sci Rep*. 2017;7:41581.
- Yang XM, Li DX. A Study on the Origin of the Method of Breathing Qigong. *Journal of Jiangxi University of Traditional Chinese Medicine*. 2009;21(03):32–35.
- Xiao CM, Zhuang YC. Efficacy of Liuzijue Qigong in individuals with chronic obstructive pulmonary disease in remission. *J Am Geriatr Soc*. 2015;63(7):1420–1425.
- Teut M, Knilli J, Daus D, Roll S, Witt CM. Qigong or Yoga Versus No Intervention in Older Adults With Chronic Low Back Pain-A Randomized Controlled Trial. *J Pain*. 2016;17(7):796–805.
- Maddali Bongi S, Del Rosso A, Di Felice C, Calà M, Giambalvo Dal Ben G. Ressayguier method and Qi Gong sequentially integrated in patients with fibromyalgia syndrome. *Clin Exp Rheumatol*. 2012;30(6 Suppl 74):51–58.
- Hartley L, Lee MS, Kwong JS, et al. Qigong for the primary prevention of cardiovascular disease. *Cochrane Database Syst Rev*. 2015(6).
- Song R, Grabowska W, Park M, et al. The impact of Tai Chi and Qigong mind-body exercises on motor and non-motor function and quality of life in Parkinson's disease: A systematic review and meta-analysis. *Parkinsonism Relat Disord*. 2017;41:3–13.
- Bai Z, Guan Z, Fan Y, et al. The Effects of Qigong for Adults with Chronic Pain: Systematic Review and Meta-Analysis. *Am J Chin Med*. 2015;43(8):1525–1539.
- Chen D. Effect of Health Qigong Mawangdui Daoyinshu on Blood Pressure of Individuals with Essential Hypertension. *J Am Geriatr Soc*. 2016;64(7):1513–1515.
- Xiao CM, Zhuang YC. Efficacy of Liuzijue Qigong in Individuals with Chronic Obstructive Pulmonary Disease in Remission. *J Am Geriatr Soc*. 2015;63(7):1420–1425.
- Oh B, Butow P, Mullan B, et al. Impact of medical Qigong on quality of life, fatigue, mood and inflammation in cancer patients: a randomized controlled trial. *Ann Oncol*. 2010;21(3):608–614.
- World Health Organization. *International Statistical Classification of Diseases and Related Health Problems*. Available: 10th Revision(ICD-10Version2010) 2010; 2010http://apps.who.int/classifications/icd10/browse/2010/en.
- Kuan SC, Chen KM, Wang C. Effectiveness of Qigong in promoting the health of wheelchair-bound older adults in long-term care facilities. *Biol Res Nurs*. 2012;14(2):139–146.
- Chen Z, Meng Z, Milbury K, et al. Qigong improves quality of life in women undergoing radiotherapy for breast cancer: results of a randomized controlled trial. *Cancer*. 2013;119(9):1690–1698.
- Li M, Lai LH, Lai YJ, et al. Observation on the Clinical Nursing of Concept "Xu" Tactics in the Acute Phase Cervical Spondylopathy of Radiculopathy Analgesia. *Chinese Medicine Modern Distance Education of China*. 2016;14(15):49–50.
- Zhu GM, Hua X, Zhou J, Li L, Wang JW. Cohort study on prevention of cervical spondylosis by combination of health education with Daoyin technique. *Shanghai Journal of Traditional Chinese Medicine*. 2012;46(04):10–12.
- Wang CX. Study on prevention of hypertensive stroke by qigong and its mechanism (a follow-up data of 242 patients with hypertension for 30 years). *Chinese Journal of Gerontology*. 1994(02):90–92.
- Tang N, Jin J, Ban Y, et al. Observation on the Therapeutic Effect of Eight-section Brocade Exercise combined with Moxibustion Therapy in the Treatment of Yang Deficiency Constipation of Diabetic Patients. *Chinese Medicine Modern Distance Education of China*. 2016;14(20):111–112.
- Wang CX, Zhang DQ, Xu DH, et al. A Clinical Observation of Clinical Efficacy and Plasma Cyclic Nucleotide Changes in Qigong Treating Hypertension. *Journal of Traditional Chinese Medicine*. 1984(12):27–29.
- Lynch M, Sawynok J, Hiew C, Marcon D. A randomized controlled trial of qigong for fibromyalgia. *Arthritis Res Ther*. 2012;14(4):R178.
- Li Y. *Bibliometric Analysis of Health Qigong Research in China from 2003 to 2010*. China Sport Science Society. Summary of the abstracts of the 9th National Sports Science Conference 2011(1). China Sport Science Society: China Sport Science Society, 2011:2.
- Yuan YP. *Bibliometric Analysis of Scientific Research Papers on Health Qigong in China*. Master dissertation Shandong Normal University; 2017.
- Yang YL, Wang YH, Gao SB, Xiao M, Shi PS, Wang C. Evidence of Clinical Studies on Baduanjin Based on Bibliometric Analysis. *Journal of Traditional Chinese Medicine*. 2019;60(08):664–670.
- Yu J. A Bibliometric Research of Status and Trends of the Eight-section Brocade. *Chinese Medicine Modern Distance Education of China*. 2018;16(15):56–59.
- Liu JP. [Methodological quality assessment of clinical trials in traditional Chinese medicine: the principles of evidence-based medicine]. *Zhong Xi Yi Jie He Xue Bao*. 2006;4(1):1–6 Chinese.