

LAMPIRAN

SURAT PERNYATAAN

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Dengan ini menyatakan bahwa saya bersedia atau mengizinkan hasil penelitian saya yang berjudul: “Studi Literatur: Pengaruh Pijat Akupresur dan Moksibusi terhadap Lamanya Batuk Pilek pada Anak Balita” untuk dipublikasikan pada Jurnal Metro Sai Wawai Prodi Kebidanan Metro.

Demikian surat pernyataan ini saya buat untuk dipergunakan sebagaimana mestinya.

Metro, Juni 2020

Mengetahui,

Ketua Program Studi Sarjana Terapan

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Yang membuat pernyataan



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**Ringkasan dari Literatur tentang Pengaruh Pijat Akupresur dan Moksibusi
terhadap Lamanya Batuk Pilek pada Anak Balita**

No	Peneliti	Judul	Metode Penelitian	Signifikan	Resume
1.	Fajarianti (2019)	Pengaruh Akupresur terhadap Lamanya Batuk Pilek pada Balita di Puskesmas Margorejo Metro Selatan Kota Metro	Jenis penelitian kuantitatif dengan desain <i>quasi eksperimen</i> dengan pendekatan <i>only one shoot case study</i>	<i>P-value:</i> 0,000	Hasil kesimpulan penelitian ada pengaruh akupresur dalam menurunkan lamanya batuk pilek.
2.	Marisa (2019)	Pengaruh Terapi Akupresur terhadap Lama Hari Batuk Pilek pada ISPA Non Pneumonia pada Bayi di Puskesmas Margorejo	Jenis penelitian <i>pre eksperimen</i> , dengan pendekatan <i>one shoot case study design</i>	<i>P-value:</i> 0,000	Kesimpulan dari penelitian ini ada pengaruh terapi akupresur terhadap lama hari batuk pilek.
3.	Suzuki, M.,etc (2015)	<i>Research into acupuncture for respiratory disease in Japan: a systematic review</i>	Jenis Penelitian dengan metode Studi yang meninjau referensi yang dikutip dalam dokumen yang diambil dan artikel asli yang dipilih dan laporan kasus tentang terapi akupunktur dan terapi moksibusi untuk penyakit pernapasan.	Untuk pencegahan flu biasa, lima studi menemukan akupunktur atau moxibustion unggul control	Sejumlah kecil laporan tentang pengobatan akupunktur dan moksibusi untuk penyakit pernapasan ditemukan di database Jepang. Penelitian di masa depan harus menggunakan metode evaluasi yang lebih ketat, seperti uji coba terkontrol secara acak, untuk mengukur efektivitas akupunktur dan terapi moksibusi untuk mengobati penyakit pernapasan.

Ringkasan dari Literatur tentang Moksibusi

No.	Penulis	Judul	Tahun	Resume
1.	Deng, H. dan Shen, X.	<i>Review Article The Mechanism of Moxibustion: Ancient Theory and Modern Research</i>	2013	Moksibusi tidak dapat dipisahkan dari teori TCM. Lebih dari sekadar stimulus sederhana, sistem meridian dan acupoint tubuh manusia adalah kunci kemanjuran moksibusi. Pada mekanisme efek moksibusi, ada banyak sudut pandang, seperti efek stimulasi termal, terapi protein autologous non spesifik, respons stres non-spesifik, dan aromaterapi. Pandangan yang diterima secara umum adalah bahwa sistem meridian bergabung dengan efek fisik dan kimia moksibusi untuk menghasilkan efek yang komprehensif.
2.	Huang, C., etc.	<i>Review Article Moxibustion in Early Chinese Medicine and Its Relation to the Origin of Meridians: A Study on the Unearthed Literatures</i>	2016	Moksibusi digunakan untuk mengobati berbagai penyakit dan indikasinya mengandung hampir semua penyakit umum ketika muncul dalam teks-teks awal ini. Sepanjang catatan moksibusi dalam teks yang digali kita melihat bahwa moksibusi berkembang dari modalitas kesatuan menjadi beberapa modalitas. Bahan pembakaran yang berbeda dan langkah-langkah operasi dipilih untuk penyakit yang berbeda, dan beberapa modalitas masih berlaku untuk perawatan dalam kehidupan modern.

POLITEKNIK KESEHATAN TANJUNGPUR
JURUSAN KEBIDANAN PRODI KEBIDANAN METRO
Skripsi, Juni 2019

Ade Okta Fajarianti

Pengaruh Akupresur Terhadap Lamanya Batuk Pilek Pada Balita di Puskesmas Margorejo Metro Selatan Kota Metro Tahun 2019

xv + 53 halaman + 6 Tabel, 12 Gambar, 11 Lampiran.

Angka kejadian ISPA pada balita di Indonesia masih tinggi yaitu 25,0% dan hanya 13,8% kasus yang telah terdiagnosis pasti oleh dokter. laporan P2 dinas kesehatan Kota Metro tahun 2017 angka kejadian ISPA di Kota Metro 7.04% dan menduduki peringkat kedua pada kunjungan di Puskesmas. Hasil studi pendahuluan di Puskesmas Margorejo balita yang mengalami batuk pilek pada bulan Oktober 39%, November 43%, Desember 55% . Dampak jangka panjang yang terjadi akibat batuk pilek ini adalah gangguan tumbuh kembang. Salah satu upaya yang dapat dilakukan untuk mengatasi batuk pilek pada balita dengan menggunakan terapi non farmakologi berupa Akupresur. Tujuan penelitian ini adalah untuk mengetahui pengaruh Akupresur terhadap lamanya batuk pilek pada balita di Puskesmas Margorejo Metro Selatan tahun 2019.

Jenis penelitian ini adalah penelitian kuantitatif dengan desain quasi eksperiment dengan pendekatan Only One Shoot Case Study. Populasi berjumlah 32 balita dengan besar sampel diambil menggunakan rumus Taro Yamane didapatkan 30 responden balita. Teknik pengambilan sampelnya Acidental Sampling. Cara pengumpulan data menggunakan kuisisioner melalui proses wawancara dan observasi. Analisis univariat yaitu menggunakan mean dan analisis bivariat menggunakan One Sample T Test.

Hasil analisis univariat dari 30 responden balita diperoleh rata-rata batuk pilek pada Balita setelah dilakukan Akupresur sebesar 3,47 hari. Hasil P Value sebesar 0,000. Hasil kesimpulan dari penelitian ini ada pengaruh Akupresur dalam menurunkan lamanya batuk pilek pada balita di Puskesmas Margorejo Metro Selatan Tahun 2019. Akupresur batuk pilek diharapkan dapat dijadikan sebagai salah satu pilihan terapi non farmakologi yang aman dan efektif dalam upaya mengatasi batuk pilek pada balita di Puskesmas Margorejo Metro Selatan.

Kata Kunci : Akupresur, Batuk Pilek

Daftar Bacaan : 25 (1997-2018)

JURUSAN KEBIDANAN PRODI KEBIDANAN METRO
Skripsi, Juni 2019

Yunia Marisa

Pengaruh Terapi Akupresur Terhadap Lama Hari Batuk Pilek pada ISPA Non
Pneumonia pada Bayi di Puskesmas Margorejo Tahun 2019
xv+ 50halaman + 4 tabel +7 gambar + 13 lampiran

ABSTRAK

Akibat batuk pilek pada ISPA non pneumonia yang tidak tertangani dapat menyebabkan pneumonia. Angka kejadian Pneumonia di Indonesia sebesar 46,34%. Angka kejadian pneumonia di provinsi lampung 35,09%. Angka Kejadian batuk pilek pada ISPA non pneumonia pada bayi sebesar 32,5% di Kota Metro. Salah satu cara menangani ISPA non pneumonia adalah terapi akupresur. Hasil studi pendahuluan di Puskesmas Margorejo kejadian ISPA non pneumonia pada bayi 20,6%, maka dibutuhkan cara untuk mengatasi batuk pilek pada ISPA non pneumonia dengan menggunakan terapi non farmakologi seperti terapi akupresur.

Tujuan penelitian ini untuk mengetahui pengaruh terapi akupresur terhadap lama hari batuk pilek pada ISPA non pneumonia pada bayi di Puskesmas Margorejo Tahun 2019.

Jenis penelitian yang digunakan Pre Eksperimen, dengan pendekatan one shoot case study design, dengan besar sampel diambil menggunakan rumus drop out didapatkan 16 sampel. Penelitian ini berjumlah 16 bayi batuk pilek pada ISPA non pneumonia. Teknik pengambilan sampel menggunakan teknik accidental sampling. Intervensi yang diberikan terapi akupresur titik LU 7 dan ST 40, dilakukan 1 kali sehari selama 3 hari dan dilakukan observasi pada hari ke 4 setelah intervensi diberikan. Dilakukan observasi menggunakan metode wawancara, menggunakan alat ukur kuesioner. Analisis univariat yaitu menggunakan mean dan analisis bivariat menggunakan uji One Sample T-Test.

Hasil analisis univariat dari 16 responden ternyata rata-rata batuk pilek pada ISPA non pneumonia setelah dilakukan terapi akupresur sebesar 3,5 hari. Hasil analisis bivariat pvalue sebesar 0,000. Kesimpulan dari penelitian ini ada pengaruh terapi akupresur terhadap lama hari batuk pilek pada ISPA non pneumonia pada bayi di Puskesmas Margorejo tahun 2019. Dengan demikian terapi akupresur diharapkan dapat menjadi salah satu pilihan terapi non farmakologi yang aman dan mudah dilakukan dalam penanganan ISPA non pneumonia di Puskesmas Margorejo.

Kata Kunci : Batuk Pilek, Lama Hari, Akupresur
Daftar Bacaan : 43 (2001-2018)

Research into acupuncture for respiratory disease in Japan: a systematic review

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ABSTRACT

Background: In Japan, studies on acupuncture therapy for respiratory disease have rarely been reported.

Additionally, most of the reports are difficult for overseas researchers to access because they are written in Japanese and cannot be located using Medline.

Purpose: To review studies on acupuncture and moxibustion therapy for respiratory disease conducted in Japan.

Data sources: The results of a literature search using "Igak Chu Zasshi Web" and the Medical Online Library, both of which are Japanese databases, covering the period between 1979 and 2006.

Study selection: This study reviewed references cited in retrieved documents and selected original articles and case reports on acupuncture and moxibustion therapy for respiratory disease.

Data extraction: The search terms used were "acupuncture" and "respiratory disease", along with "respiratory", "asthma", "COPD", "bronchitis" and "common cold".

Results: The study retrieved 34 papers on acupuncture treatment for respiratory disease written in Japanese (9 full papers, 19 case reports and 6 case series). The papers dealt with such conditions as asthma (14 trials), cough variant asthma (one trial), chronic obstructive pulmonary disease (seven trials), chronic bronchitis (one trial), usual/idiopathic interstitial pneumonia (one trial) and the common cold (two trials). The study also found eight trials dealing with cold prevention.

Conclusions: A small number of reports on acupuncture and moxibustion treatment for respiratory diseases were found in the Japanese databases. Future studies must use more rigorous evaluation methods, such as randomised controlled trials, to measure the effectiveness of acupuncture and moxibustion therapy for treating respiratory diseases.

Acupuncture, a non-invasive therapy based on traditional Chinese medicine (TCM), may be a valuable modality in managing symptoms of chronic obstructive pulmonary disease (COPD).¹ Moreover, the World Health Organization has recognized that acupuncture may be effective in treating chronic pulmonary disorders,² and it is widely used in Japan for the treatment of chronic disease. The traditional theory behind the use of acupuncture is to restore the balance of "vital flows" by inserting needles at particular points on the body surface where the "meridians" of these flows lie. The specific points can also be stimulated with pressure or laser application.³

In many patients, particularly those with advanced pulmonary disease, symptomatic measures are required in addition to other therapies,

and may even be the mainstay of treatment.⁴ Jobst *et al* showed an improvement in subjective scores and the 6-minute walking distance (6MWD) after acupuncture treatment in a randomised controlled trial (RCT) that compared real and placebo treatment of the knee in breathless patients with COPD.⁵ The open evaluation of a standardised acupuncture technique for cancer-related breathlessness by Filshie *et al* also showed significant short-term symptomatic relief in relation to breathlessness, relaxation, anxiety and respiratory rate in 14 of the 20 patients studied.⁶ In addition, several reviews have examined the efficacy of acupuncture for the relief of respiratory disease.⁷⁻⁹

Acupuncture is a popular alternative therapy.² Needle acupuncture has been used to treat various complaints for hundreds of years in Japan and has been reported to be of therapeutic benefit in controlling pain. However, in Japan, reports on patients with respiratory disease who have received acupuncture and moxibustion therapy are rare and clinical trials intended to assess the effectiveness of the therapy for respiratory disease are even rarer. Moreover, most of the papers on acupuncture published in Japan are written in Japanese and cannot be retrieved using major English-language medical databases. Thus, the purpose of this review was to evaluate and introduce the current status of clinical trials conducted in Japan on acupuncture in treating respiratory disease.

METHODS

Accessing the literature

A computer-assisted search was used to examine the Igaku Chu Zasshi (Japan Centra Revuo Medicina) and Medical Online Library (Metointergate, Inc.) databases. We also investigated the references that were cited in each retrieved document and selected relevant papers. The period covered was from January 1979 to May 2006. The keywords used in the database searches were "respiratory disease", "acupuncture", "asthma", "chronic obstructive pulmonary disease", "bronchitis", "common cold", "pulmonary disease" and "clinical trial". The search was limited to original papers and case reports.

Study selection criteria

Clinical trials (case reports, random parallel- or crossover-designed trials and non-random parallel- or crossover-designed trials) that assessed the efficacy of needle acupuncture were included.

All studies that used a control were labelled CCT (controlled clinical trial) including N-of-1 studies and RCTs.

Experimental studies, animal studies and duplications of published papers were excluded.

Data extraction

For each study, the following items were reviewed: trial design, randomisation, blinding, handling of dropouts, publication year, health condition examined, treatment and control procedures, number of participants, main result, number of treatments, type of control used, main outcome measure, descriptions of informed consent, affiliations of authors and publication types.

The quality of reporting was evaluated using the scale developed and validated by Jadad *et al* (table 1).¹⁰ This scoring system took into account the most relevant characteristics of a clinical trial, randomisation and blinding. Two points were given for correct, random allocation and correct blinding, and one point was given if a description of dropouts and withdrawals was provided. Thus, the maximum score was 5, and a score of at least 3 indicated an adequate methodology.

Additional information

Control groups were classified into one of six categories as follows: (i) waiting lists; (ii) physiologically inert controls, for example, sham transcutaneous electrical nerve stimulation (TENS), placebo acupuncture; (iii) sham acupuncture; (iv) standard medical care, for example, drug therapy or physiotherapy; (v) other acupuncture methods; and (vi) other control methods. Placebo acupuncture was defined as a mock acupuncture procedure in which needles were not actually inserted. On the other hand, sham acupuncture was defined as a mock acupuncture procedure in which needles were inserted in the skin. Therefore, placebo acupuncture was considered a physiologically inert control whereas sham acupuncture was considered as a separate control group, because the growing body of evidence indicates that sham acupuncture may actually produce some effects that are not specific to the points used.¹¹ When the proportions responding were cited in the article, this information was also extracted, in order to compare proportions responding to physiologically inert controls to those responding to sham acupuncture. The country of the study was also recorded due to recent research indicating that certain countries may be associated with positive outcomes.¹²

RESULTS

We found a total of 34 Japanese papers on acupuncture that was applied to respiratory disease (19 case reports, 6 case series and 9 full papers). Nineteen (55.9%) of the 34 Japanese trials were published before 2001, and the rest after 2001 (fig 1).

Table 1 Scoring system of trial according to Jadad *et al*

Question	Score	
1 Study described as randomised (including the words "random", "randomisation", "randomly")?	Yes = 1	
2 Study described as double-blind?	Yes = 1	No = 0
3 Withdrawals and dropouts described?	Yes = 1	No = 0
4 Method of randomisation described and appropriate?	Yes = 1	No = 0
Appropriate tables of random numbers, computer-generated sequences		
Not appropriate alternate allocation, birth data		
5 Method of double-blinding described and appropriate?	Yes = 1	No = 0

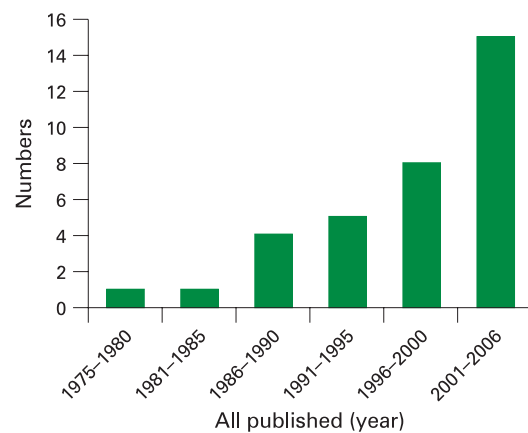


Figure 1 Published articles by years regarding acupuncture treatment of respiratory disease in the Japanese literature.

Case reports and case series

A list of 25 case reports and case series is shown in table 2 and fig 2.

Diagnosis

The conditions examined in these types of papers were asthma (14 trials),¹³⁻²⁶ COPD (five trials),²⁷⁻³¹ chronic bronchitis (one trial),³² usual interstitial pneumonia (UIP) (one trial)³³ and the common cold (two trials).^{34 35} We also found studies dealing with cold prevention (two trials)^{36 37} (fig 3).

Intervention

Eighteen of 25 case reports used TCM as the standard method of acupuncture treatment. Of the rest, some applied special acupuncture treatments, such as electric acupuncture treatment,^{16 23} roller acupuncture,³⁴ skin implant needles,²⁴ *Doushi*²⁶ and *Ryoudouraku*.¹⁷

Duration of treatment

The duration of treatment observation for respective research was over 1 month for 17 reports, but only 1 day in three reports.^{22 24 26} The rest did not report the period of treatment observation.^{14 17 18 25 35 37}

Outcome measures

The main outcome was not measured by commonly validated methods in 14 papers. These papers measured their outcomes by

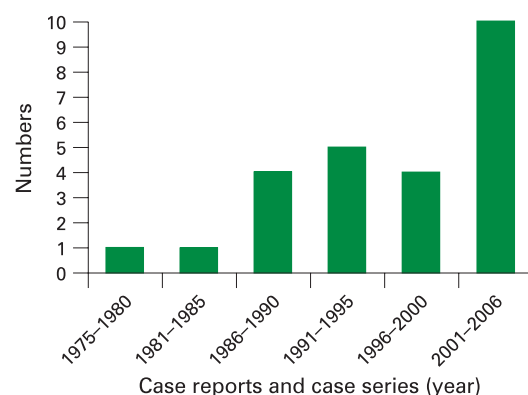


Figure 2 The number of case reports and case series regarding acupuncture treatment of respiratory disease in the Japanese literature.

Table 2 Summary of case reports and case series on acupuncture and moxibustion in the Japanese literature

Year	Author/reference no	Diagnosis	n	Study design	Intervention	No of treatments/duration	Outcome measures	Result
2006	Yamashita Y/32	Common cold	1	Case report	Roller acupuncture	160 times/104 weeks	Symptom	+
2005	Suzuki M/25	COPD	1	Case report	Acupuncture (TCM)	10 times/10 weeks	Exercise tolerance test, respiratory function, attack	+
2005	Suzuki M/26	COPD	1	Case report	Acupuncture (TCM)	10 times/10 weeks	Exercise tolerance test, respiratory function	+
2005	Tsuru K/27	COPD	1	Case report	Acupuncture (TCM)	33 times/20 weeks	Exercise tolerance test, respiratory function	–
2004	Katayama Y/28	COPD	1	Case report	Acupuncture (TCM)	33 times/7 weeks	Nutrition, symptom	+
2004	Oyagi T/12	Asthma	1	Case report	Acupuncture (TCM)	No description/no description	Symptom	+
2004	Uematsu Y/13	CVA	1	Case report	Acupuncture (TCM)	10 times/9 weeks	Asthma diary, PEFR	+
2003	Egawa M/13	Asthma	1	Case report	Acupuncture (TCM)	60 times/72 weeks	Attack diary, PEFR	+
2003	Uematsu Y/33	UIP	1	Case report	Acupuncture (TCM)	50 times/50 weeks	Exercise tolerance, respiratory function, symptom	+
2002	Nakano T/14	Asthma	10	Case series	Electroacupuncture, acupuncture	10 times/10 weeks	Attack diary, Medicine	+
2000	Gotou K/15	Asthma	17	Case series	Acupuncture (Ryoudouraku)	13 times/no description	Ryoudouraku, symptom	+
2000	Suzuki M/29	COPD	1	Case report	Acupuncture (TCM)	60 times/61 weeks	Attack diary, PEFR, symptom	+
2000	Tokuchi J/36	Cold prevention	1	Case report	Acupuncture (TCM)	8 times/4 weeks	Symptom	+
1998	Tanioka K/35	Cold prevention	2	Case report	Child acupuncture	No description/no description	Symptom	+
1995	Matsuzawa M/16	Asthma	30	Case series	Acupuncture, Kampo (TCM)	No description/no description	Effective: 90%	+
1995	Yu S/17	Asthma	2	Case report	Acupuncture (TCM)	26 times/12 weeks	Symptom	+
1994	Hashimoto K/18	Asthma	1	Case report	Acupuncture (TCM)	47 times/28 weeks	Symptom	+
1993	Rin S/30	Chronic bronchitis	1	Case report	Acupuncture, Kampo (TCM)	8 times/8 weeks	Symptom	+
1992	Seki Y/33	Common cold	3	Case report	Acupuncture (TCM)	No description/no description	Symptom	+
1990	Shinohara M/19	Asthma	1	Case report	Acupuncture (TCM)	30 times/84 weeks	Category scale, emergency outpatient medication, ABG	Category scale (+), emergency outpatient (+), medication (+), ABG (–)
1989	Hayasaki Y/20	Asthma	3	Case report	Acupuncture (TCM)	Once/1 day	Symptom	+
1987	Tsukada Y/21	Asthma	12	Case series	Electroacupuncture, acupuncture	28 times/56 weeks	Symptom, PEFR, blood test	Symptom (+), PEFR (10% improvement), blood test (–)
1987	Fu Y/22	Asthma	21	Case series	Acupuncture (implant a needle)	Once/1 day	Symptom	+
1982	Sugiura R/23	Asthma	1	Case report	Acupuncture (TCM)	No description/no description	Symptom	+
1979	Takishima T/24	Asthma	10	Case series	Acupuncture (Japanese: Doushi)	Once/1 day	Symptom	+

ABG, artery blood gas; COPD, chronic obstructive pulmonary disease; CVA, cough variant asthma; PEFR, peak expiratory flow rate; TCM, traditional Chinese medicine; UIP, usual interstitial pneumonia; +, positive; –, negative.

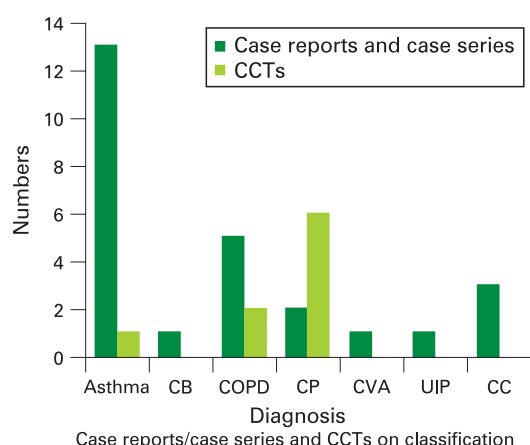


Figure 3 The conditions examined in these case reports and case series were asthma (13 trials), CVA (one trial), COPD (five trials), chronic bronchitis (one trial), UIP (one trial), cold prevention (two trials) and common cold (two trials). The conditions examined in these CCTs were asthma (one trial), COPD (two trials) and cold prevention (six trials). CB, chronic bronchitis; CC, common cold; CCT, controlled clinical trial; COPD, chronic obstructive pulmonary disease; CP, cold prevention; CVA, cough variant asthma; UIP, usual interstitial pneumonia.

conducting unstructured individual interviews of the patients. The rest carried out reliable examinations, such as testing improvement in respiratory function, keeping asthma diaries or measuring exercise tolerance.^{13 15 16 21 23 27–31 33}

Results

All trials but one indicated positive results,²⁹ although unusual techniques of acupuncture were used in some case reports. In one study, the common cold was treated with roller acupuncture³⁴ (fig 4). In another study, the acupuncture point ST10 in the front of the neck was treated for bronchial asthma (Japanese: Doushi).²⁶

Full papers: controlled clinical trials

We found a total of nine papers regarding CCTs on acupuncture in treating respiratory disease and in cold prevention. One of the first CCT papers on acupuncture was published in 1996.³⁸ A list of these CCTs is shown in table 3.

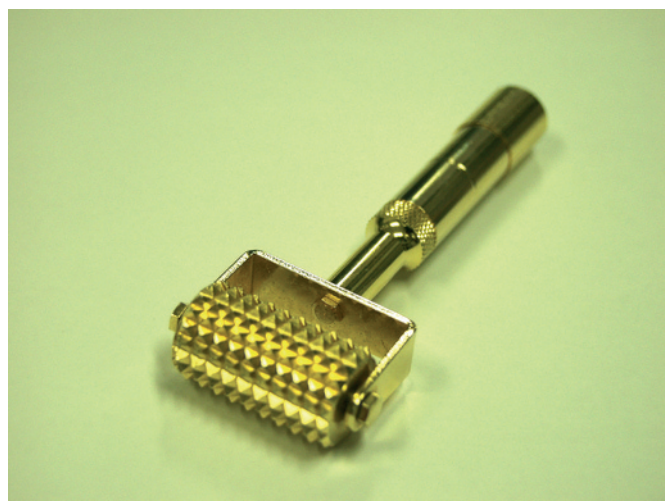


Figure 4 Photograph of the roller acupuncture.

Diagnosis

The conditions examined in these CCTs were asthma (one trial)³⁹ and COPD (two trials).^{40 41} We also found six trials on cold prevention^{38 42–46} (fig 3).

Study design

The mean (SD) Jadad score for all nine papers was 0.9 (1.2). In fact, using the Jadad score, only four trials received any points.^{39 42–44} Of them, three were regarded as genuine RCTs.^{42–44} No subjects were blinded. Dropouts or withdrawals from the studies were indicated in three trials.^{39 42 43}

Intervention

The method of acupuncture used was TCM (three trials),^{39–41} specific acupoint needles (four trials)^{38 43 44 46} and moxibustion (two trials).^{42 45}

Control

Regarding controls, no trial used sham or placebo procedures, six trials employed drugs or vaccine injections^{38–41 45 46} and three trials employed no treatment^{42–44} (table 3).

Duration and frequency of treatments

The duration of all trials was over 1 month. The mean frequency of treatments was 16.8 times (range 8–32).

Outcome measures

Of six papers that intended to measure the effects of acupuncture and moxibustion therapy on cold prevention, two required research participants to maintain diaries to record changes in cold symptoms, and three conducted blood tests that revealed relationships between particular biomarkers (CD4, CD8 and CD53) and patients' cold symptoms. However, one paper measured the effects based solely on self-reports by participating patients.

Two papers measured the effects of acupuncture and moxibustion therapy for COPD using validated tests, such as respiratory function inspection and exercise tolerance. Similarly, one measuring the effects on bronchial asthma used validated measurements, such as requiring patients to keep asthma diaries and conducting respiratory function inspections.

Results

The results were positive in five trials (55.6%).^{39–41 43 44} For COPD, one study⁴¹ with Jadad score of zero, found acupuncture superior to drugs, but was not supported by an N-of-1 study.⁴⁰ For asthma, one n-of-1 study³⁹ suggested acupuncture may have an effect compared with drugs. For prevention of the common cold, five studies found acupuncture or moxibustion superior to control, but only one of these studies⁴⁴ had an adequate quality score.

DISCUSSION

We examined the methodological quality, acupuncture treatment characteristics and respiratory outcome of nine CCTs on acupuncture for respiratory disease in Japan. Only one of these trials received an adequate quality score (>3).⁴⁴ For most, the research methods used were inadequate or inappropriate (ie, not randomised, controlled and/or blinded, and without any quantitative measurement). Furthermore, even the CCTs that scored 2 or 3 on the Jadad scale did not indicate whether a third person had assessed them, and thus the validity of their results cannot be guaranteed to be high.

Table 3 Summary of controlled clinical trials on acupuncture and moxibustion in the Japanese literature

No	Author/reference no	Year	Diagnosis	Study design	Allocation method	n	Intervention	Control	Duration	No of treatment	Outcome measures	Result	Jadad score
1	Suzuki M/39	2006	Asthma	N-of-1	No description	6	A: acupuncture	B: iv (drugs)	40 weeks	20 times	Asthma diary, respiratory function	A > B, p = 0.0001	1
2	Egawa M/40	2005	COPD	N-of-1	No description	1	A: acupuncture	B: iv (drugs)	64 weeks	32 times	Exercise tolerance, respiratory function	A = B, p value (no description)	0
3	Takahashi N/42	2006	Cold prevention	RCT, N-of-1	No description	2	A: moxibustion	B: vi (temperature-controlled room)	16 weeks	24 times	Symptom	A > B p value (no description)	2
4	Suzuki M/41	2004	COPD	Parallel	Each establishment	37	A: acupuncture	B: iv (drugs)	10 weeks	10 times	Exercise tolerance test, respiratory function	A > B, p = 0.0001	0
5	Shichidou T/43	2001	Cold prevention	RCT	Computer software	24	A: acupuncture	B: I (waiting lists)	4 weeks	9 times	Symptom diary	A > B Acupuncture group had the protective efficacy compared with the control group	2
6	Isobe Y/44	2000	Cold prevention	RCT	Computer software	24	A: acupuncture	B: I (waiting lists)	4 weeks	8 times	Symptom diary	A > B Acupuncture group had the protective efficacy compared with the control group	3
7	Tanaka J/45	2000	Cold prevention	Parallel	No description	60	A: moxibustion	B: iv (vaccine + moxibustion), C: iv (vaccine)	4 weeks	16 times	Symptom, CD4+, CD8+, CD53	A = B > C p < 0.05	0
8	Kaneko I/46	1998	Cold prevention	Parallel	No description	60	A: acupuncture	B: iv (vaccine + acupuncture), C: iv (vaccine)	4 weeks	16 times	Symptom, CD4+, CD8+, CD53	A = B > C p < 0.05	0
9	Kobayashi Y/38	1996	Cold prevention	Parallel	No description	40	A: acupuncture	B: iv (vaccine + acupuncture), C: iv (vaccine)	48 weeks	16 times	Virus serum antibody titre	A = B > C p < 0.05	0

COPD, chronic obstructive pulmonary disease; RCT, randomised controlled trial; vaccine, influenza vaccine.

Most case reports and case series dealt with chronic disease, such as bronchial asthma, COPD and UIP. Chronic diseases require relatively long periods of acupuncture treatment and monitoring. However, several of these case reports and case series conducted treatment and monitoring for only short periods of time. Thus, we cannot know the long-term effects, beyond the periods covered by the respective studies. The validity of acupuncture treatment in these studies must be gauged in this light. Nevertheless, a few studies have carried out relatively long periods of acupuncture treatment and monitoring. These studies are of great importance in assessing the realistic effects of acupuncture treatment on these chronic diseases.

Because only three complete RCTs were found out of 34 papers, we cannot strongly argue that acupuncture was effective in treating respiratory disease. As Martin *et al* argued, the effect of a treatment can be systematically assessed only by improving study quality.⁴⁷ In this review, the result was positive in 24 papers (case reports and case series) (54.1%). However, in 13 of these 24 papers, the assessment was based solely on patients' complaints, indicating that these results are weak in terms of validity and reliability. This result suggests the publication bias was present, in the sense that only positive outcomes tended to be published.

Our review clarified that weaker study designs may bias study results and overestimate positive effects of the treatment — consistent with the findings of Martin *et al*.⁴⁷ Despite the weaknesses observed, some studies demonstrated the potential of acupuncture in the sense that it may be effective in treating certain diseases, such as COPD⁴¹ and UIP,³³ which are currently incurable by modern medicine. Likewise, some papers suggested a possibility of using acupuncture in health promotion, such as cold prevention. These cold prevention studies, along with the RCT study of 326 subjects reported by Kawakita *et al*⁴⁸ showing significant improvements in preventing colds in the treatment group, are seminal in that they examined the possibility of applying acupuncture and moxibustion therapy as preventive medicine.

The Japanese CCTs that measured the effects of acupuncture in treating respiratory diseases lag far behind in quality compared with those conducted in the West.⁴⁸ Whilst studies in the West began to apply RCTs in the 1980s,⁵ the Japanese counterparts did not do so until 2000.⁴⁴

The overall scarcity of reports on acupuncture and moxibustion therapies for respiratory disease in Japan is probably due to the medical insurance system. The system enables practically every Japanese citizen to seek mainstream modern (Western) medicine treatments offered by medical institutions at relatively low cost. Because most complementary and alternative medicine treatments are not covered by insurance; it is unlikely that Japanese patients with respiratory disease would choose acupuncture or moxibustion therapy as their first choice of treatment. In some Western countries, however, acupuncture treatment for some kinds of diseases have been reported to be more effective⁴⁹ and less costly^{50–52} than treatments with modern medicine.

It is, of course, true that acupuncture has been practised much more widely in Japan than in the West. Of 2000 respondents, 6.5% had received acupuncture treatment in Japan,⁵³ whilst the number was only 2% in Australia⁵⁴ and 1% in the USA.⁵⁵ However, acupuncture treatment has been used primarily for relieving pains, such as back pains and stiff shoulders in Japan, whilst in the USA⁵⁶ and the former Czechoslovakia,⁵⁷ the treatment has been used more for

Summary points

- Research published in Japanese is not easily accessible to western researchers.
- This review of acupuncture and moxibustion for respiratory disease found 34 published research reports.
- Nine trials used some form of control arm, but none used sham.
- The current evidence justifies further studies, which should be published in English.

bronchial asthma, allergy or mental disorders, than for pain relief. Particularly interesting is that whilst 3.1% of respondents had received acupuncture treatment for respiratory diseases in the USA, none had done so in Japan.

Another difference is that in Euro-American countries, doctors practise acupuncture treatment at hospitals, whilst in Japan doing so is illegal. That is, when patients seek acupuncture treatment for respiratory diseases in some countries in the West such as Germany and the USA,^{58–59} they may have easier access than their Japanese counterparts.

Japanese acupuncture has developed some culturally unique methods whilst being practised for hundreds of years. Some papers reviewed here dealt with such unique methods as roller acupuncture (*Roller-shin* in Japanese), Ryoudouraku and Doushi. For roller acupuncture treatment, practitioners apply a roller with a warty surface across a patient's skin, which stimulates cutaneous vessels and results in their dilation. Because no needle penetrates the skin, roller acupuncture is considered to be easier to practise than the orthodox method. Yamashita reported that roller acupuncture was a safe and effective method for cold prevention.³⁴ Ryoudouraku and Doushi are traditional Japanese concepts. Ryoudouraku therapy is the method of search for needling point using a special probe. Doushi is treatment in which an intercarotid body is stimulated by insertion of the acupuncture from ST9 (Renying), and the excitation of a vagus nerve takes place, and bronchodilatation.

CONCLUSION

In conclusion, future trials should have larger sample sizes, more rigorous methods and reflect principles and practices of acupuncture as applied in practice today. Furthermore, to complete systematic reviews on acupuncture, we encourage researchers in Japan and elsewhere to publish relevant results of RCTs in English, so that they will be listed in major English-language databases. We believe that conducting reviews of non-English papers on RCTs, which have especially been published in East Asia, would promote a more thorough scientific evaluation of acupuncture treatments of respiratory diseases.

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Original paper

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Research into acupuncture for respiratory disease in Japan: a systematic review

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Review Article

The Mechanism of Moxibustion: Ancient Theory and Modern Research

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The moxibustion has a dual effect of tonification and purgation in TCM theories, which are based on two aspects: the actions of the meridian system and the roles of moxa and fire. Modern research works of the moxibustion mechanism mainly relate to the thermal effects, radiation effects, and pharmacological actions of moxa and its combustion products. Experimental results showed that moxibustion thermal stimulation affects both shallow and deep tissues of the skin, and the warm-heat effects of moxibustion have a close relation to the warm receptors or/and the polymodal receptor. The burning moxa radiation spectrum ranges from 0.8 to 5.6 μm ; peak is nearby 1.5 μm , lying within the near infrared portion. There is an amazing consistency in the infrared spectrums of three types of indirect moxibustion and the unified spectrum of acupoints; all have their peaks of radiation near 10 μm . Lots of ingredients had been identified from mugwort leaves and moxa smoke, which have a variety of biological activities; they were considered to participate in the comprehensive effects of moxibustion. Although lots of research works have been carried out and made some progress, there is still a great distance from fully understanding the mechanism of moxibustion.

1. Introduction

Moxibustion is a kind of external treatment; it is based on the theory of traditional Chinese medicine (TCM), and it usually bakes acupoints with burning moxa wool. Moxibustion can dredge meridians and regulate qi-blood and has been used to prevent and cure diseases for more than 2500 years. *Zuo zhuan* of the pre-Qin dynasty in China, which recorded a disease discussion occurred in 581 B.C., is considered to be the earliest literature of moxibustion. The silk books discovered in Mawangdui tomb of the Han dynasty (about 168 B.C.), *Moxibustion Classic of Eleven Foot-hand Meridians* and *Prescriptions for Fifty-two Diseases*, had documented the use of moxibustion to treat complex diseases. There are a lot of moxibustion contents in *Inner Canon of Huangdi*; it inferred that the origin of moxibustion is related to the living habits and disease characteristics of northern Alpine nation in the part of *Su wen*, *Yi fa fang yi lun*. Later doctors after Han dynasty had made considerable progress in theory and practice on moxibustion and promoted moxibustion to be a mature and widely used therapy.

Moxibustion has been applied in treating a great range of diseases. A bibliometric analysis on the papers published from 1954 to 2007 in China showed that up to 364 kinds of diseases can be treated with moxibustion. The most proper indications of moxibustion therapy are malposition, diarrhea, and colitis; the common proper indications are urinary incontinence and dysmenorrhea; the next common proper indications are knee osteoarthritis, temporomandibular joint disturbance syndrome, soft tissue injury, heel pain, asthma, urinary retention, and herpes zoster [1]. Moxibustion can also be used to treat weakness, fatigue, and aging related problems. Moxibustion can be classified as traditional moxibustion, drug moxibustion, and modern moxibustion. Traditional moxibustion therapy is the most commonly used in the ancient and contemporary moxibustion clinics; it is characterized by the use of moxa as burning material and can be divided into direct moxibustion and indirect moxibustion depending on whether moxa is directly in contact with the skin while operating. A moxa cone placed directly on the skin and ignited is called direct moxibustion, while the moxa kept at certain distance from the skin is called

indirect moxibustion. The insulating materials of indirect moxibustion can be air, garlic, ginger, aconite, salt, and so forth. Drug moxibustion, also named nature moxibustion, uses irritant drugs (such as cantharis, garlic, and semen sinapis) to coat the surface of acupoints and make local skin flushed and blistered to cure diseases. Modern moxibustions, such as microwave moxibustion, laser moxibustion, and electrothermal moxibustion, are used to simulate traditional moxibustion stimulation factors by physical or chemical methods to achieve therapeutic effects of moxibustion. Usually, narrow sense of moxibustion refers to the traditional moxibustion with moxa. This review will concentrate on the ancient theory and modern mechanism research of traditional moxibustion.

2. Traditional Moxibustion Theory

Ling Shu, *Guan Neng* says that where needle does not work, moxibustion does. TCM theory holds that moxibustion has a dual effect of tonification and purgation. Different from needles and drugs, characteristics of moxibustion in materials and using fire determine that its efficacy is inclined to warming and nourishing. So, moxibustion is often applied in deficiency-cold syndrome, though some excess-heat syndrome can also use it. The roles of moxibustion can be broadly grouped into warm nourishing, warm dredging, and warm melting. Warm nourishing refers to the benefits of warming Yang, tonifying qi, nurturing blood, and relieving depletion; warm dredging refers to the functions of activating blood, dissolving stasis, promoting qi, dredging channels, and relieving pain; warm melting refers to the roles of reducing phlegm, eliminating stagnation, removing wind, dispelling dampness, drawing out poison, and purging heat. Some people believe that warm dredging is the nature of moxibustion and is the key role of moxibustion effects. The functions of moxibustion, expelling cold, promoting the circulation in meridians and collaterals, clearing away heat, detoxification, and so forth, are dependant on the efficacy of moxibustion for circulating qi and blood flow [2].

In TCM basic theory, moxibustion effects are based on two aspects: the action of the meridian system and the role of moxa and fire.

2.1. Meridian System. TCM usually takes “needling” and “moxibustion” collectively, for both of them are similar therapeutics based on the same theory of meridian and acupoint. In other words, the moxibustion therapeutic effect is partly dependant on the body’s nonspecific system of meridians.

Moxibustion is closely related to meridians, cutaneous regions, and acupoints. Meridian system consists of channels and collaterals; they are pathways of communicating internal and external, contacting organs, running qi-blood, and regulating the whole body. *Ling Shu*, *Hai Lun* says that there are twelve regular channels, the inner ones belong to viscera and the outer ones connect with limbs. TCM believes that a person is as a whole. The organs and limbs communicate and interact through the meridian system, which plays a very important role in physiological functions and pathological

processes. The cutaneous regions are the surface part of the twelve regular channels, which are nourished by channel-qi. The cutaneous regions can show the status of qi-blood from meridians and organs, also it can receive treatment stimulation and then make effects. Acupoints are the sites on the body surface, in which the qi of organs and meridians assembled, that act as target points and response points of treatment.

In the moxibustion treatment process, the cutaneous regions and acupoints are the terminals of the meridian system, as the receivers, by which moxibustion stimulations can be transmitted into the body. Through the meridian system, moxibustion can reinforce insufficiency and reduce excessiveness and directly correct the disease state of the human body or activate the meridian system self-healing function and play a therapeutic role. For example, the different acupoints can cure different diseases in moxibustion, and the same acupoints can get similar results regardless of acupuncture or moxibustion; all of these proved that the body meridian and acupoint system play an important role in the treatment of moxibustion.

2.2. Moxa and Fire. *Elementary Medicine* believes that the diseases that cannot be cured by drugs and acupuncture should be treated with moxibustion. The unique therapeutic effects of moxibustion are closely related to the specificity of moxa and fire.

On moxibustion fire in TCM, there is a discussion in *Shen jiu jing lun* stating that moxibustion using fire, for being hot and rapid, with soft body can bear with that to eliminate the shadow; it can move instead of stay and always go into organs. Fire is hot, so it can warm back the Yang and eliminate cold of the Yin, even it can melt the poisoning things caused by damp, wind, phlegm, and so on; fire is speedy, so it can dredge the channels, remove the pain or numbness, and active blood and qi. So, the feature of moxa fire shows the main role of moxibustion.

Materials are very important to moxibustion. The choosing of materials of moxibustion in TCM is really harsh. *Pu ji fang*, *Acupuncture* cited the *Xiao pin fang* on eight kinds of fire: moxibustion with pine wood fire, hard to cure; cedar wood fire, ulcer and pus; orange wood fire, skin hurt; mulberry wood, muscle withered; jujube wood fire, body emaciated; bamboo fire, tendons injured, excessive lead tendons flabby; trifoliate orange wood fire, veins “collapse”; elm wood fire, bone hurt, excessive lead bone withered; none of them can be used. But moxa fire is warm without dry, and it can ascend and descend with strong penetration ability into the viscera. *Compendium of Materia Medica* had said that moxa leaf are slightly bitter and over-spicy when raw, and slightly spicy and over-bitter when processed. Moxa with the nature of pure Yang, raw moxa is warm and become hot after processing. It can take the Tai-Yang fire and get back dying Yang. It can go through three Yin, get rid of all the cold and dampness, and turn the cold into warm after taking orally. Moxibustion with moxa leaf can get into the channels and cure hundreds of diseases. Its function is great. The drug properties of moxa leaves (raw) are that they turn warmer after being processed, become moxa wool (processed), which

are suitable for moxibustion, and the older the better. The ancients chose moxa as moxibustion material for it is easy to collect and more for its drug properties, and long-term clinical practices have proved that.

3. Mechanism Research of Moxibustion

Modern research of moxibustion started in the early last century, Japanese scholars began to observe physical characteristics of moxibustion materials and the effects of moxibustion on blood pressure and intestinal peristalsis in 1912 [3, 4]. Up to this day, there have been more and more studies of effects of moxibustion on the human body or experimental animals, almost involving all major physiological systems, especially in the fields of analgesic, enhancing immunity and antiaging. At the same time, researching works on the mechanism of moxibustion also gradually developed, mainly related to the thermal effects, radiation effects, and pharmacological actions of moxa and its combustion products.

3.1. Thermal Effects. Burning moxa without flame can produce high temperature of about 548–890°C [5, 6]; it will give a warm feeling when it is close to the body, so some people think that this treatment is essentially a thermal physical effect [7]. Experiment confirmed that single Zhuang (a dose unit of moxibustion) of moxa cone (2 mg) moxibustion on mice abdomen can raise the temperature to 130°C outside the skin of the point and 56°C inside the skin; the same changes of temperature were not observed in the forelimb far away from the stimulation site [8]. By using 50 mg moxa cone direct moxibustion on the skin of mice with thermocouple implanted, the temperatures of epidermal, subcutaneous, and basal layers were different; the results suggested that moxibustion thermal stimulation affects both shallow and deep tissues of the skin [9]. The maximum temperature change by indirect moxibustion was about 65°C on the skin and 45°C in the subcutaneous layer [10]. The temperature-time curve of moxa cone can be characterized by slow rising, rapid rising, rapid decline, and slow decline phases, and ginger-separated moxibustion can “buffer” the temperature changes [11]. The actual temperature of indirect moxibustion is greatly affected by the texture, size, and the moisture content of the insulating material [12].

The thermal effects of different moxibustions are not the same. Some people used thermal resistor thermometer and computer online real-time processing to measure the skin temperature at the acupoints of different moxibustions: direct moxibustion, ginger-separated moxibustion, suspension moxibustion, light moxibustion, and He-Ne laser moxibustion. All of them except He-Ne laser moxibustion had significantly changed the temperature of the acupoints through the skin to the muscularis, and each had their own rules and characteristics. The results suggested that the effects on acupoint and even the efficacy of moxibustion depend on the temperature changing of acupoint caused by moxibustion [13]. Others observed the relationship between the moxibustion effect and the intensity of thermal stimulation through the change of pain threshold. In the 40–60 minutes of moxibustion, the pain threshold rose with the

operative time and increasing the burning moxa amount per unit time can significantly improve the immediate analgesic effect and lingering effects [14]. Experiment of activation of subnucleus reticularis dorsalis (SRD) neuron by variety intensities of moxibustion thermal stimulation shown that noxious thermal (44–52°C) stimulation can activate SRD neurons, which reaches a plateau when the stimulated area is increased to a certain range [15].

The warm-heat effect of moxibustion has a close relation to the warm receptors (WRs) or/and the polymodal receptor (PRs). The antipyretic and thermolytic effects of moxibustion are achieved by stimulating polymodal receptors of acupoints [16–18]. Effects of moxibustion on the skin can appear as hotness, flushing, pain, blisters, and other skin irritations and burns phenomena. Moxibustion can lead to vasoconstriction at the burning point while vasodilatation around the point and increase peripheral arterial blood flow and microvascular permeability [8, 19]. Another thermal effect of moxibustion is to induce heat shock proteins (HSPs) in local tissues. HSPs are a class of functionally related proteins involved in the folding and unfolding of other proteins. As an endogenous protective mechanism, HSPs can be synthesized in cells in response to hyperthermia and other environmental stresses. The HSPs induced by moxibustion may be an important factor of its mechanism of action [20].

3.2. Radiation Effects. By irradiating acupoints of pain model rats with radiogenic heat of 40–43°C, there are no significant changes in the tail-flick latency or vocalization threshold, suggesting that not any thermal stimulation can achieve moxibustion efficacy [21]. The burning moxa emits visible light and infrared (IR) radiation; therefore, besides the heat effects, nonthermal radiation effect may be an important role in the efficacy of moxibustion. Physics tells us that the radiation is a process of energy outward diffusion in the form of electromagnetic waves or particles; any object above absolute zero in temperature emits electromagnetic radiation. At present, the common view is that the ignited moxa radiation spectrum ranges from 0.8 to 5.6 μm ; peak is nearby 1.5 μm , lying within the near infrared (NIR) portion [22]. But results are reported differently due to the measurement methods and the experimental conditions. Thermal radiation of burning moxa stick measured by indirect methods is mainly far infrared (FIR) near NIR, with spectrum peak at 2.8 μm [23]. Measured with visible-infrared monochromator, radiation spectrum of drug moxa sticks is distributed from red light through NIR to middle infrared (MIR), in which multiple peaks especially at 2.4 μm are detected and without the parts of wavelength shorter than 0.6 μm [24].

By analyzing and comparing the infrared radiation spectrums of the moxibustion, the substitute moxibustion, and acupoints of human body, it was found that there was a surprising consistency in the spectrums of three types of indirect moxibustion, namely, separated with prepared monkshood, ginger, and garlic, and the unified spectrum of acupoints. Both had their peaks of radiation near 7.5 μm (after modification, this wavelength should be around 10 μm). However, the spectrum of the substitute moxibustion (separated with cucumber and carrot) was completely different

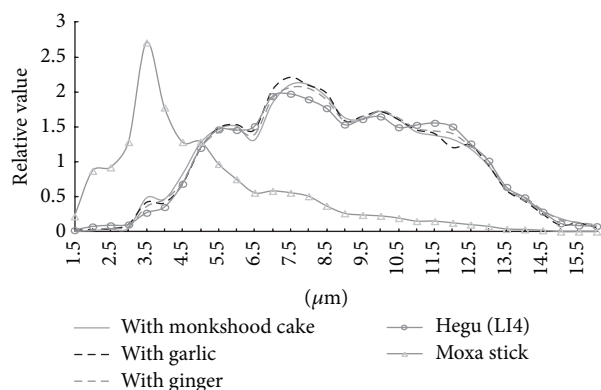


FIGURE 1: Unified infrared radiation spectrums of an acupuncture point, Hegu (LI 4), direct moxibustion with a traditional moxibustion stick, and indirect moxibustion with three traditional media.

from them. Its warming function was far less than the traditional moxibustion, and there was also a big difference between the infrared radiation spectrums of the moxa-stick (with a peak at $3.5\ \mu\text{m}$) and acupoints (see also Figure 1 and Table 1). The results indicated that, in the therapeutic effect of traditional indirect moxibustion, the resonance vibrations of infrared radiation of indirect moxibustion and acupoints play an important role and the substitute moxibustion could not replace the traditional moxibustion in terms of the infrared characteristics of moxibustion [25–29].

Infrared acting on the body will produce thermal and nonthermal effects. Thermal effects are produced under the action of electromagnetic waves; the human body molecules absorb energy from IR and convert it into heat and therefore promote blood circulation and improve the cell and enzyme activities. The nonthermal effect is related to the interaction of electromagnetic waves and organism; it is more complex and with nonlinear characteristics. The actions of NIR and FIR on organism are different. NIR is generally believed to play a major role in the biological radiation effect of moxibustion. When NIR irradiates body, the light reflected by the skin is relatively low, the energy can be transmitted about 10 mm deep into the skin, reach the tissues, and be absorbed by them [30]. The NIR can induce some active substances produced within the tissues, after being absorbed by connective tissue, blood vessels, lymphatic vessels, and nerves under the irradiated skin, distribute to other parts of the body with the blood circulation, and enhance the metabolism and thermogenesis of organs they reached. NIR can also energize the metabolism of cells. The energy generated by the photoelectric effect and photochemical process and passed through the nerve-humoral system can provide the activation for the pathological cells lacking energy and then further adjust the body's immune and neurological functions [31, 32].

3.3. Pharmacological Actions. Moxa, *Artemisia argyi* Levl. et Vant., also known as mugwort, is a Compositae *Artemisia* perennial herb. Mugwort leaf can produce moxa wool after drying and grinding, which is a common moxibustion material. The ingredients of moxa are complicated; more

than 60 kinds of components had been identified [33]. The volatile oils of moxa include 1,8-Cineole, alkenes (alpha-thujene, pinene, sabinene, etc.), camphor, borneol, and little aldehydes, ketones, phenols, alkanes, and benzene series compounds. Heptatriacontane ($\text{C}_{37}\text{H}_{76}$) plays an important role in combustion [34]. The moxa also has tannins, flavonoids, sterols, polysaccharides, trace elements, and other ingredients.

The ingredients of moxa always change according to the place and season of production. The oil rate of QiAi in Hubei is obviously higher than in Hebei, Shangdong, and other places. Some people had measured the heat of combustion from different kinds of moxa: QiAi (from Hubei) was 18139 J/g, BeiAi was 17463.4 J/g, QiAi (from Hebei) was 17419.3 J/g, and ChuanAi was 16136.4 J/g [35]. The combustion heat of QiAi (from Hubei) was the biggest, and it has been considered to be the best moxibustion material since ancient times.

The volatile oil rate of moxa is 0.45%–1.00%. It has a variety of biological activities such as the expansion of airway smooth muscle, relieving cough, expectorant effect, and a strong antioxidant activity [36–38]. The moxa is rich in flavonoids and polysaccharides, which have strong antioxidant activity too [39, 40].

The moxa combustion test showed that the relative equilibrium moisture content of moxa was 13.51%, the relative ash content was 11.77%, and the relative smoke production rate was 126.42% [41]. Parts of the moxa combustion products are brown tar-like substances; they play a role by penetrating into the human body through the skin damaged by the burning. The moxa and the combustion products of moxa having been extracted with methanol, both extracts showed the actions of clearing the free radicals and lipid peroxidation, and the latter was stronger. The result indicated that the active ingredients of moxa were increased rather than being destroyed after burning. The methanol extracts of moxa combustion products, tars, can be divided with silica gel column chromatography, and the antioxidant components were found in band IV. Further divided by thin-layer chromatography, the antioxidant effect in band Rf 0.14 is better than the synthetic antioxidant BHT. Ginger and garlic, the important auxiliary materials for moxibustion, are commonly used in indirect moxibustion. The ginger and garlic had been put on the evaporating dish for experiment and had confirmed that gingerol and allicin, the active ingredients of them, could act on the body by heat to give the therapeutic effects [42–44]. The extracts of moxa combustion ashes also have the strong ability of antifree radical [45].

Another combustion product of moxa is smoke. The smoke of moxa contains a variety of complex components, and its volatile ingredients are ammonia, alcohols (ethylene glycol, pentyl butanol), aliphatic hydrocarbons, aromatic hydrocarbons, terpene compounds and their oxides, and so forth. They may come from the incomplete combustion products of moxa volatile oil of moxa and its oxidation products. Qualitative analysis of the smoke of burning moxa by solid phase microextraction-gas chromatography-mass spectrometry (SPME-GC-MS) had isolated 61 peaks and identified 26 ingredients. The founded substances can be

TABLE 1: Intensities and peaks wavelengths of the infrared radiation of traditional moxibustion, moxibustion with controls, and Hegu (LI4).

	<i>n</i>	Intensity of radiation (mV)	Wavelength of the peak of radiation (μm)
Traditional moxa stick	4	43300.41 \pm 425.15	3.5
Smokeless moxa stick	4	31.15 \pm 3.49 [#]	7
555 cigarette	4	37.03 \pm 3.82 [#]	3.5
Indirect moxibustion with monkshood cake	4	681.87 \pm 47.52 ^{**$\Delta\Delta$}	8
Indirect moxibustion with ginger	4	520.27 \pm 68.22 ^{*Δ}	7.5
Indirect moxibustion with garlic	4	594.79 \pm 44.71 ^{**$\Delta\Delta$}	7.5
Indirect moxibustion with cucumber	4	274.47 \pm 19.61	5
Indirect moxibustion with carrot	4	50.53 \pm 4.68	5
LI4 (Hegu)	28	20.40 \pm 5.69	7.5

[#]Compared to the traditional moxa-stick, $P = 0.000$.

^{*}Compared to indirect moxibustion with cucumber, $P = 0.004$.

^{**}Compared to indirect moxibustion with cucumber, $P = 0.000$.

^{Δ} Compared to indirect moxibustion with carrot, $P = 0.001$.

^{$\Delta\Delta$} Compared to indirect moxibustion with carrot, $P = 0.000$.

divided into 3 parts by time: the furan structure substances in 0–10 min, mainly aromatic compound in 10–40 min, and esters, alkanes, or hydroxyl-containing compounds in 40–70 min [46]. The smoke of moxa can be used in air disinfection and as antiviral and antifungal. It was also reported that it has applications in wound infections, vaginal itching, uterine prolapse, anal fistula, common warts, and so forth [47], and some studies showed that the smoke of moxa would make effects on the body through breathing [48].

There is still a debate on the safety of moxa smoke. Some reports showed that moxa smoke may be harmful to the human body, such as causing allergic reactions [49, 50]. The mugwort leaf contains terpenes; it may produce polycyclic aromatic carcinogens in the process of combustion, and during moxibustion, the concentration of air pollutants, such as nitrogen oxides, carbon monoxide, and particulates, is tenfold higher than the level of standard class II which was issued in the State Environmental Protection Act. They would do damage to the patients and staffs [51]. But a research giving consideration to short-term and long-term exposure showed that the volatile matter and carbon monoxide generated by the smoke of moxa under normal operating conditions did not exceed the safety level [52].

4. Conclusion

On the mechanism of moxibustion effects, there have been many viewpoints, such as thermal stimulation effect, non-specific autologous protein therapeutics, non-specific stress responses, and aromatherapy. The generally accepted view is that the meridian system combines with moxibustion physical and chemical effects to produce comprehensive effects. When physical and chemical factors act on the acupoint receptors, the signal enters the central nervous system through the peripheral pathways and outgos after being integrated, adjusting the nerve-endocrine-immune network and circulatory system, so as to regulate the internal environment of the body, in order to achieve the effects of preventing and curing diseases [53]. Although lots of research works have

been carried out and made some progress, there is still a great distance from fully understanding the mechanism of moxibustion. Therefore, we will propose the following views on the study of mechanism of moxibustion in the future.

First, value the importance of whole, moxibustion cannot be separated from the theory of TCM. More than a simple stimulus, meridian and acupoint system of the human body is the key of efficacy of moxibustion. The studying of mechanism of moxibustion from the overall level, based on the further understanding of the meridian system or even of the TCM system, is indeed very difficult. But on the other hand, maybe the studies of moxibustion should be helpful to the understanding of acupoint, meridian, and TCM. For example, some people had reported the phenomenon of “heat-sensitive points” [54]; it is a useful exploration of extending the study perspective from the part to the whole with moxibustion as the breakthrough point.

Second, pay more attention to scarring moxibustion (suppurative moxibustion). Scarring moxibustion had been the favorite to ancient doctors, “where there is moxibustion sore, there is cure.” Modern clinical practice has also shown that scarring moxibustion, compared with other moxibustions, has advantage of curative effect in the treatment of some chronic refractory diseases.

Third, it is necessary to introduce more new technologies and disciplines into the mechanism research of moxibustion effect, such as bioheat transfer theory, the interdisciplinary focus heat transfer phenomena in living organisms; its purpose is to reveal the rules of energy transport in the organisms by introducing the basic theory and research methods of the heat transfer into the field of biology and medicine. The application of the interdisciplinary approach will undoubtedly promote the research of moxibustion [55].

Fourth, study on the mechanism of moxibustion should be oriented to promote its clinical application. Many research achievements have already been applied in clinic, such as the applications of 650 nm–10.6 μm combined laser moxibustion on knee osteoarthritis and bradycardia [56, 57] and the multifunctional moxibustion instrument which simulate the

traditional moxibustion by heating artificial moxa (contains effective components of moxa) with electromagnetic-heating device [58]. There are enough reasons to believe that, with the progress of mechanism research, the new achievements will surely provide a larger space to improve the patient experience and the curative effect of moxibustion.

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Review Article

Moxibustion in Early Chinese Medicine and Its Relation to the Origin of Meridians: A Study on the Unearthed Literatures

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Moxibustion is an integral part of Traditional Chinese Medicine (TCM). It achieved higher level of recognition and had more general application in ancient times than in contemporary life. As the vital historical sources, the records of unearthed literatures offered precious insights to Chinese social life pattern and medical practice in *Qin* and *Han* dynasties (221 BC–220 AD). There was no surprise that the bamboo and silk documents excavated from *Mawangdui* (马王堆) tomb, *Hantampo* (旱滩坡) tomb, and other relics had a large amount of texts relevant to moxibustion. This research sorted moxibustion recordings from seven unearthed literatures and discovered that moxibustion had been developed into different modalities and utilized to treat many diseases at that time. In addition, the indications, contraindications of moxibustion, and the method of postmoxibustion care were also discussed. On this basis, some hints were provided to support the hypothesis that the practice of moxibustion led to the discovery of meridians. All our preliminary results in the research have drawn attention for this old therapy and given a new source for its application in clinic and scientific research.

1. Introduction

Moxibustion is an external therapy using burning moxa stick or cone to produce a warm sensation and moxa smoke on the acupoints [1]. It was regarded as a principal treatment in ancient China. The studies of the earliest known form of Chinese writing, Oracle Bone Script (*Jiagu Wen*, 甲骨文), indicated that moxibustion might have been applied in *Yin* dynasty (1600 BC–1046 BC) [2]. However, it is not as popular as acupuncture today, and *Zhenjiu* (针灸), acupuncture-moxibustion therapy, is often misconstrued as a medical practice that only uses needles to cope with diseases.

The meridians (*Jingmai*, 经脉) are core concepts for the practice of acupuncture-moxibustion and were first described in *The Yellow Emperor's Classic of Internal Medicine* (*Huangdi Neijing*, 黄帝内经). This theory was based upon earlier medical treatises that referred to the vessels (*Mai*, 脉). Many scholars agree that these earlier descriptions of the vessels influenced the development of the meridians. Modern Chinese researchers have worked for over 50 years on how the ancients discovered the vessels and gradually built the

meridian theory, but without a definite conclusion [3]. The purpose of the current paper is to explore how the treatment method employed for the vessels, moxibustion, might have contributed to the evolution of the vessels to the meridians and thus to the development of meridian theory.

In China, bamboo and silk were the primary writing instruments before the widespread use of paper [4]. Since the beginning of the 20th century, a large number of bamboo slips and silk books have been unearthed from tombs of *Qin* (221 BC–206 BC) and *Han* (202 BC–220 AD) dynasties in China [5, 6]. They documented valuable medical materials and partially illustrated how Chinese medicine originated [7].

The study on the bamboo slips and silk books contributed to understanding the development of moxibustion before *Qin* and *Han* dynasties and offers a new source for its application in clinic and scientific research. Furthermore, the exploration of the relevance between moxibustion and vessels could give an additional insight into the nature or basis of the meridians. Hence, our article commences with a summary of the textual contents that discussed moxibustion from the unearthed literatures. There were a total of seven bamboo slips and

silk books used in this research. From these we explored the practice of moxibustion in early China from such aspects as postmoxibustion care, indications, and different modalities of moxibustion by studying these records. After illustrating the circumstances of moxibustion's application at that time, some clues were offered to reflect the influence of moxa practice on the development of the meridians.

2. The Records of Moxibustion in the Unearthed Literatures

There are 25 bamboo slips and silk books involved with medicine among all unearthed literatures. Seven of them are closely related to moxibustion and they were listed in (Table 1).

Cauterization Canon of the Eleven Vessels of the Foot and Forearm and *Cauterization Canon of the Eleven Yin and Yang Vessels* excavated from Mawangdui tomb 3 (burial dated 168 BC) in Changsha of Hunan province are the earliest monographs covering not only vessels but also the application of moxibustion. The books presented the information of eleven vessels, a precursor of the twelve standard meridians. The vessel's names, trajectories, diseases generated from disharmony along those vessels, and therapeutic methods were set out. The majority of diseases mentioned in them were urological or pain-related and moxibustion was the only therapy [8]. As compared with *Cauterization Canon of the Eleven Vessels of the Foot and Forearm*, *Cauterization Canon of the Eleven Yin and Yang Vessels* discussed more diseases of vessels and classified them into two categories: disease that occurred when vessel perturbed (*Shidongbing*, 是动病) and disease that occurred when giving rise to vessel (*Suoshengbing*, 所生病) [9], so we inferred that its written time might be earlier. In the earlier book, *Cauterization Canon of the Eleven Vessels of the Foot and Forearm*, the sentence "it should be treated by moxibustion on a certain vessel" occurred at the end of introduction of each vessel. The explanation of this sentence was that the disease should be treated by moxibustion on the vessels that contributed to the onset of disease. Although the sentence was removed in *Cauterization Canon of the Eleven Yin and Yang Vessels*, the content of the postmoxibustion care was added.

Model of the Vessels is the book that mainly discussed the *Qi* (气) and vessels. *Qi* is usually described as the flow of energy around the body. The disrupted, blocked, or unbalanced *Qi* movement would lead to the generation of diseases. The book put forward the principle "taking the excess to fill up the deficiency" to treat diseases by moxibustion and *Bian* stones. The core idea contained in this principle is the concept "Balance," which became an important part of TCM theory later. The book regarded that *Qi* moved in accordance with a certain rule and it would be beneficial when it arrived at lower body but harmful at the upper body. The disease would arise when *Qi* ran along the vessel and gathered at the upper body, and then moxibustion should be employed to treat it. Also, as the disease got worse, the stimulating intensity should be increased by moxibustion on another area that was above the previous treating area. Another significant part in this book was the discussion of moxibustion contraindication by a case

study on treating carbuncle. The development of carbuncle was usually divided into incipient and later period. The main symptoms of the former one were redness, swelling, and ache, but without pyosis. When carbuncle continued to enlarge and the pus came into being at later period, moxibustion use was banned while flint and needle should be used to incise and drain [8].

Book of the Vessels, which was excavated in Zhangjiashan (张家山), is a collection of *Cauterization Canon of the Eleven Vessels of the Foot and Forearm*, *Cauterization Canon of the Eleven Yin and Yang Vessels*, and *Model of the Vessels* [10]. Therefore, its contents about moxibustion could be the duplication of these three books.

Recipes for Fifty-Two Ailments is the earliest manuscript of formulaology and moxibustion prescription. It contains about 14,700 words (maximum number of words in all silk books from Mawangdui tomb), 103 diseases, 283 formulas, and eight moxibustion prescriptions [11]. Some scholars proposed that there were eleven moxibustion prescriptions recorded in this silk book, but soon afterwards three prescriptions were found to be erroneously categorized to moxibustion for misprinting the word "炙" (*Zhi*, roast) as "灸" (*Jiu*, moxibustion) [12]. Thus Table 2 summarized eight moxibustion prescriptions in *Recipes for Fifty-Two Ailments*.

Recipes for Fifty-Two Ailments recorded moxibustion with different materials such as moxa, hessian, phaeodon, and *Scirpoides holoschoenus* in treating diverse diseases. The second prescription in "venomous snake bite" took advantage of white mustard seed to stimulate skin to blister, which was known as the earliest natural moxibustion. Nowadays, the famous "Sanfu moxibustion" (*Sanfu Jiu*, 三伏灸) which is primarily applied to cure winter diseases in summer has been the inheritance of this method. Fume moxibustion in the first prescription of "peritus ani," meant combusting moxa and other herbs to produce smoke and heat on the affected part. In order to apply fume moxibustion conveniently, modern Chinese doctors have developed a sitting-moxibustion apparatus instead of traditional manual method in treating anus diseases [13].

Recipes for Fifty-Two Ailments also recorded the characters concerned with postmoxibustion care. The eighteenth prescription in chapter "scrotal hernia" proposed a caution that patients should avoid the invasion of exogenous pathogenic wind after moxibustion [14]. Postmoxibustion sore appeared frequently in moxibustion therapy. Ancients believed that it is necessary to treat the sore appropriately to prevent further deterioration, although it tightly coupled with the therapeutic effect [15]. Thereby, the method using Chinese medicinal herbs to treat moxibustion sore was also introduced in the second prescription in chapter "post-traumatic leg."

The Ultimate Principles in the Universe is a sexual guide literature, in which the health care methods based on Taoist sexual practices were elaborated and moxibustion was a therapy to treat the diseases resulting from improper intercourse. "Seven impairments and eight supplements" (*Qisun Bayi*, 七损八益), a renowned guiding principle for sexual intercourse mentioned in the book, presented seven detrimental behaviors and eight beneficial behaviors for health [16]. People

TABLE 1: The moxibustion-related unearthed literatures.

Book involved with moxibustion	Excavated time	Excavated sites	Inferential completion date	Material	Main content
<i>Cauterization Canon of the Eleven Vessels of the Foot and Forearm (Zubi Shiyi Maijiujing, 足臂十一脉灸经)</i>	1973	Mawangdui Han tomb 3 (Changsha, Hunan province)	During late Qin and early Han dynasties	Silk book	Names, trajectories, and diseases of 11 vessels and moxibustion
<i>Cauterization Canon of the Eleven Yin and Yang Vessels (Yinyang Shiyi Maijiujing, 阴阳十一脉灸经)</i>	1973	Mawangdui Han tomb 3 (Changsha, Hunan province)	During late Qin and early Han dynasties	Silk book	Name, trajectories, and diseases of vessels
<i>Model of the Vessels (Maijia, 脉法)</i>	1973	Mawangdui Han tomb 3 (Changsha, Hunan province)	During late Qin and early Han dynasties	Silk book	(1) Relationship between Qi and vessels (2) Using moxibustion and Bian stone to treat diseases (3) Palpating the trajectories of vessels to diagnose diseases
<i>Recipes for Fifty-Two Ailments (Wushi'er Bingfang, 五十二病方)</i>	1973	Mawangdui Han tomb 3 (Changsha, Hunan province)	During late Qin and early Han dynasties	Silk book	Recipes for treating 52 diseases in internal medicine, surgery, and pediatrics
<i>The Ultimate Principles in the Universe (Tianxia Zhidao Tan, 天下至道谈)</i>	1973	Mawangdui Han tomb 3 (Changsha, Hunan province)	Before or during Han dynasty	Bamboo slips	Principles and skills of health care in sexual behavior
<i>Book of the Vessels (Maishu, 脉书)</i>	1983-1984	Zhangjiashan Western Han tomb 247 (Jiangling, Hubei province)	Before or during Western Han dynasty	Bamboo slips	(1) Diseases in different parts of the human body and their symptoms (2) Trajectories of the vessels and their related diseases
<i>Wuwei Medical Slips (Wuwei Handai Yijian, 武威汉代医简)</i>	1972	Hantampo Han tomb (Wuwei, Gansu province)	Before Eastern Han dynasty	Wooden slips and tablets	Recipes for treating diseases in internal medicine, surgery, gynecology, and andrology

TABLE 2: The moxibustion prescriptions in *Recipes for Fifty-Two Ailments*.

Disease	Serial number in each chapter	Modality	Material	Moxibustion method
Venomous snake bite	Number 2 prescription	Natural moxibustion	Mustard poultices	Putting mustard poultices on the patient's vertex cranii (GV 20)
Wart	Number 1 prescription	Sear moxibustion with moxa stick	<i>Scirpoides holoschoenus</i>	Lighting the rope of <i>Scirpoides holoschoenus</i> to cauterize the terminal of wart and then take it out
Dysuria	Number 6 prescription	Direct moxibustion	Unknown	Moxibustion on middle toe of right foot
Scrotal hernia	Number 10 prescription	Direct moxibustion	Mugwort leaves, tow	Burning tow wrapped with mugwort leaves on vertex cranii (GV 20) until moxibustion scar appeared
Scrotal hernia	Number 18 prescription	Moxibustion after stone needle therapy	Unknown	Moxibustion on the vulnus after stone needle cutting or "Taiyin" (太阴) and "Taiyang" (太阳)
Scrotal hernia	Number 23 prescription	Direct moxibustion	Unknown	Moxibustion on left shank (based on <i>A-B Classic of Acupuncture and Moxibustion</i> , the treatment points might be SP8, LR5, or KI8)
External hemorrhoid or anal fistula	Number 1 prescription	Sear moxibustion with moxa stick	Unknown	Taking moxibustion to cauterize the terminal of hemorrhoid and then twisting it off
Pruritus ani	Number 1 prescription	Fume moxibustion	Mugwort leaves, mushroom on the willow	Burning mugwort leaves and mushroom form the willow in a hole and applying moxibustion smoke to the patient's anus

would be abnormally sweaty, wheezy, and vexed if they failed to follow these guiding principles in sexual activity. Without immediate treatment, these symptoms would get worse and induce endogenous heat (*Neire*, 内热), pathogenic factors that would attack the body in TCM. At this point, Chinese herbs or moxibustion should be taken to treat this disorder by regulating *Qi* [8].

Wuwei Medical Slips, unearthed from the *Hantanpo* tomb built in early Eastern *Han* dynasty (25 AD–220 AD), have listed 45 prescriptions and more than 100 herbs on the 92 bamboo slips and wooden tablets, which were made by pine and poplar wood. The application rules of moxibustion are the important contents in these slips. On the one hand, it was stated that certain parts of the body were not suitable for application of moxibustion at certain ages. For example, the heart was forbidden to carry out moxibustion on at age one, abdomen at age two, and back at age three [14]. As demonology influenced Chinese medicine quite a lot in ancient time, above-mentioned issue might originate from demonological therapies and could not be validated by scientific and clinical studies. Thus some of these opinions were not appropriate for applying in treatment now [17, 18]. On the other hand the treatment timing of moxibustion was mentioned. The ancients believed it was a critical factor to enhance efficacy that moxibustion should be applied on the different acupoints in accordance with different time. Such a record is an embryonic form of “midnight-midday ebb-flow” (*Ziwu Liuzhu*, 子午流注), which is built on the basis of biorhythm by the medical practitioners in the successive dynasties. In addition, a treatment protocol for postmoxibustion care was also provided in the slips. The method was to boil smashed *Aconitum carmichaelii*, *Capsicum annuum*, and dry *Angelica* together with Bactrian camel milk and then apply them to the surface of sore [14].

3. The Practice of Moxibustion in Early China

Moxibustion was one of the oldest therapies for its invented time might trace back to primitive society. Mastering fire-making technique provided a prerequisite for moxibustion to take its shape. In cooking a meal or getting warm by using fire [19], people unexpectedly found that stimulating body's specific location could alleviate pain and suffering. Ancients summed up the regular stimulating methods and developed them into a new therapy. The scenario of doing moxibustion depicted on the oracle bones demonstrated that moxibustion had occurred in *Yin* dynasty [2]. Then it prevailed and became the mainstay of therapy during *Qin* and *Han* dynasties. Apart from unearthed literatures, the hand-down literatures (the literatures which were handed down through arrangement and transcription by generations of scholars) also indicated that moxibustion had been widely used in medical field and became a formal therapy at that time. The *Records of the Grand Historian* (*Shi Ji*, 史记), an official Chinese history book with a great level of influence, has covered 3000 years of history from *Yellow Emperor* to *Emperor Wu of Han*. It documented two moxibustion recipes in the biography chapter of *Cang gong*, whose medical cases were considered the earliest medical history records. Moreover, the moxibustion

physician, as an ancient's profession, also frequently appeared in poetry of *Tang* (618 AD–907 AD) and *Song* (960 AD–1279 AD) dynasties [20].

When analyzing the reasons for the prevailing of moxibustion, three plausible explanations could be discovered. First, with the limited production technology, the craftsmanship of needles was in primitive stage and a majority of them were made of stone. The patients suffered from bloodletting, incision, and drainage by using *Bian* stones. By comparison, moxibustion was easy to be accepted for less suffering by patients. Second, the flammable materials for moxibustion with a wide range items were apt to search. The materials such as mugwort leaf, *Scirpoides holoschoenus*, and mulberry and peach tree branches could be used. Moxa floss, which is processed by dried leaves of *Artemisia argyi* (an easily cultivated herbaceous perennial plant), is regarded more appropriate than any other combustion materials for moxibustion currently [15]. Third, moxibustion displayed certain effect on some unapproved indications of acupuncture. *The Yellow Emperor's Classic of Internal Medicine* (*Huangdi Neijing*, 黄帝内经) said, “a disease that may not be treated by acupuncture may be treated by moxibustion.”

As for the indications of moxibustion, which are associated with the prevalent diseases in different eras, they are always of concern to scholars. During the periods of *Warring States* (475 BC–221 BC), *Qin* dynasty and *Han* dynasty, war was frequent and iron weapon appeared. Many soldiers were injured and died from continual warfare. Agriculture and handicraft, yet, largely developed; the use of lacquer-ware permeated into every walk of life and people suffered from paints allergy and rhus dermatitis. Hence, the diseases treated by moxibustion documented in the unearthed books were mainly affiliated to surgery, including traumatism, animal bites, purulence, and urinary and anorectal diseases [21, 22]. A part of the above still continues today in contemporary medical treatment. With advanced moxibustion therapy, the indications of moxibustion have been expanded. Over 20 years, experts have investigated moxibustion treatment of 364 diseases with animal experiment and human trials [23].

Heat syndrome (*Rezheng*, 热证) was referred to as full heat syndrome (*Shi Rezheng*, 实热证) and empty heat syndrome (*Xu Rezheng*, 虚热证). The former one with the symptoms such as red face, red eyes, a red tongue with yellow coating, and full rapid pulse was caused by the excess of *Yang* (阳) in the body or invasion by an external pathogenic factor. The empty heat is caused by a deficiency of *Yin* (阴) rather than an excess of *Yang* and usually has the symptoms of dry mouth, dry throat at night, night sweats, a peeled tongue, and a floating and rapid pulse. Whether the heat syndrome pertains to the indications of moxibustion is a controversial subject [24]. In the late Eastern *Han* dynasty, *Zhang Zhongjing* first put forward the idea that “moxibustion is not appropriate for heat syndrome” since the heat could make the fire hurt veins [25]. But scholars disagree with it based on the studies of unearthed literatures. The records in *Cauterization Canon of the Eleven Vessels of the Foot and Forearm* and *Recipes for Fifty-Two Ailments* indicated that some diseases that belong to heat syndrome should be treated by moxibustion. The *Yellow Emperor's Classic of Internal Medicine* also had the

theory of “removing the stagnation of fire by heat” (*Yi Re Yin Re*, 以热引热). Moreover, the results of many clinical researches supported the idea that “heat syndrome could be treated by moxibustion” [26, 27], and the functions such as antipyretic, anti-inflammation, antiviral, and regulating immunity have been found to contribute to this therapeutic effect of moxibustion [15, 28, 29].

In terms of different materials and operating processes, various modalities of moxibustion have been developed in early China. By studying the earliest moxibustion monographs, it could be learned that different diseases occurring at the same vessel were treated with moxibustion in the same way. The operating method of moxibustion was relatively simple when it was incipiently practiced. With the compiling of *Recipes for Fifty-Two Ailments*, moxibustion was enriched and various modalities such as fume moxibustion, direct moxibustion, and natural moxibustion were exploited for different diseases. A range of combustible materials like tow or *Scirpoides holoschoenus* was mixed with moxa cone to make a fire for moxibustion. Another similar method of adding several materials to the moxa stick was developed into thunder-fire moxibustion (one of the moxibustion modalities that used moxa stick involved diverse herbs with different properties to serve different treatment purposes) during Ming dynasty (1368 AD–1662 AD) [30]. Although moxa stick moxibustion was the most commonly utilized among all moxibustion modalities in recent years, it had not yet occurred in the Qin and Han dynasties. The earliest record about moxa stick moxibustion was in *Medical Secretes of an Official* (*Waitai Miyao*, 外台秘要) at Tang dynasty [31].

In order to achieve better therapeutic effect, ancient Chinese doctors realized the significance of postmoxibustion care early. The postmoxibustion care was mainly from two aspects of the treatment of moxibustion sore and the notice of daily activity after moxibustion. For one thing, most medical practitioners believed that the moxibustion sore issued from cautery was closely associated with the curative effect, so ancients generally preferred to use scarring-moxibustion and realized that cauterized sore after strong stimulation was inevitable [15]. A study indicated that the thought of Greek medicine paralleled Chinese medicine. In the middle ages of French and Greek, the common treatment named “cauterization” had a similar core idea with ancient scarring-moxibustion [32, 33]. Nevertheless, it was necessary to treat moxibustion sore for the infection of sore could be harmful to the patients’ health. The records of *Recipes for Fifty-Two Ailments* and *Wuwei Medical Slips* were significant initiation at moxibustion sore treatment; then the later practitioners developed various methods for healing the postmoxibustion sore during a long-term medical practice. Additionally, *Cauterization Canon of the Eleven Vessels of the Foot and Forearm* and *Recipes for Fifty-Two Ailments* had put forward certain principles on diet, dressing, and exercise which contributed to promoting the effect of moxibustion. Although some of the clinical efficacy of these treatments should be further validated, the viewpoint of postmoxibustion care in ancient time still gave a lead to modern moxibustion therapy and offered valuable nursing experience after moxibustion for practitioners.

4. The Relationship between Moxibustion and the Origin of Meridians

Meridian theory is an important part of Chinese medicine; its origin and nature are still shrouded in mystery. The early development of vessels, a rudimentary model of meridians, is primarily in relation to moxibustion practice. In the *Cauterization Canon of the Eleven Vessels of the Foot and Forearm* and *Cauterization Canon of the Eleven Yin and Yang Vessels*, eleven vessels were presented in detail, but contemporary meridian theory that came out from *Yellow Emperor’s Classic of Internal Medicine* has twelve meridians [34]. As the content of meridians in *Yellow Emperor’s Classic of Internal Medicine* was influenced by the introduction of vessels in two silk books, the evolution of vessels to meridians could be interpreted by making a comparison between these three books (Table 3).

As the comparative study indicated, there were many differences between the descriptions of the vessels and meridians. Each of the eleven vessels has their starting point, terminal point, and trajectories, but no acupoints. The starting and terminal points on the vessels are all on the different area of body, while some of them on meridians are acupoints. The vessels are isolated from each other but the meridians are connected in a sequence with a cyclical circulation. The viscera (*Zangfu*, 脏腑) theory had not been built and the connections between viscera and vessels had also not been illustrated at the finishing time of two silk books; only some clues could be found from the relationship between diseases of vessels and viscera. For the treatment, at the beginning, moxibustion was applied on vessels to treat the diseases generated from disharmony of them. Later, acupuncture was discussed more in *Spiritual Pivot* (*Lingshu Jing*, 灵枢经). In the *Cauterization Canon of the Eleven Vessels of the Foot and Forearm*, the Chinese glyphs of the word “vessel” was in proximity to another word “温” (*Wen*, warm) which was an adjective meant moderate temperature [35]. When treating with moxibustion, warm sensation will be applied on the surface of the skin. If the ancients realized the existence of vessel when doing moxibustion, they might name the vessel with a character that had close relationship with moxibustion according to the principle of creating characters [36]. This could explain why the earliest Chinese character of vessel was “温” (*Mai*, vessel) and then provide a hint that the realization of vessel may be connected with the application of moxibustion.

The phenomenon of propagated sensation along meridians means that people can sense distension, numbness, itching, tingling, or warmth run from the treating sites to distal end along the trajectory of meridian after the stimulation of acupuncture, moxibustion, or electrical stimulator [37]. Scholars believed the line of propagated sensation contributed to the description of trajectory of vessels by ancients [38, 39]. The records of treatment in the two earliest vessel books suggested that moxibustion could be the principal therapy at that time. So it might inspire someone to conjure up that the ancients had the specific sensation propagated along a certain route after using moxibustion. This propagated sensation is also called moxibustion-esthesia

TABLE 3: The comparison between Yellow Emperor’s Classic of Internal Medicine, Cauterization Canon of the Foot and Forearm, and Cauterization Canon of the Eleven Yin and Yang Vessels.

Name of book	Cauterization Canon of the Eleven Vessels of the Foot and Forearm	Cauterization Canon of the Eleven Yin and Yang Vessels	The Yellow Emperor’s Classic of Internal Medicine
Nomenclature	Foot/hand Yin/Yang meridians	Yin/Yang meridians or regional anatomy position meridians	Affiliated viscus foot/hand Yin/Yang meridians
Writing form of a character of meridian	“Mat” (腧)	“Mat” (脉)	“Jingmat” (经脉)
Direction of meridians circulation	Centripetal	Shoulder meridian and hand Taiyin meridian: axofugal Others: centripetal	Hand Yin meridian: thorax to hand Hand Yang meridian: hand to head Foot Yin meridian: feet to thorax Foot Yang meridian: head to feet
Number of meridians	11	11	12
Relationship between meridians	No correlation	No correlation	Junction by head-tail in regular sequence
Amount of acupoints	None	None	160 points
Amount of diseases	78	Shidongbing: 60 Suoshengbing: 87	Shidongbing: 74 Suoshengbing: 143
Treatment for diseases	Moxibustion	Moxibustion	Acupuncture; moxibustion; decoction
Relations to viscera and bowels	Only two meridians connected with viscera and bowels	Only three meridians connected with viscera and bowels	12 meridians all have their own affiliated viscera and bowels

and it was recorded throughout the ancient literatures. *The Spiritual Pivot* stated that “when warm Qi travelled along the vessels and arrived around the body, then the blocked blood vessels will open up.” *Huangdi’s Mingtang Moxibustion Classic* (*Huangdi Mingtang Jiu Jing*, 黄帝明堂灸经) was a treatise on moxibustion created in *Tang* dynasty and the author’s name was not recorded. The theory presented in it was “when moxibustion on the inaccurate acupoints, the thermal power could not flow away to cure diseases.” Moreover, *Thousand Golden Prescriptions* (*Qianjing Yaofang*, 千金要方) described moxibustion-esthesia as the sensation of water running down when moxibustion was treated on the shoulder blades.

Likewise, modern scholars perceived the presence of moxibustion-esthesia and proved it by clinical research. In 2000, Chinese researchers enrolled a total of 829 patients to analyze their body’s reaction after moxibustion. It was reported that 733 patients had the propagated sensation travelling along meridians [40]. Professor *Zhou Meisheng*, a distinguished moxibustion specialist who is the author of *Moxibustion Criterion* (*Jiusheng*, 灸绳), believes that inducing moxibustion-esthesia is an important method to improve curative effect of moxibustion. He came up with the theory of *Three Stages of Moxibustion-esthesia*. The first stage is that the sensation of numbness, itching, tingling, or warmth would run along the meridian at the beginning of moxibustion. Secondly, the special sensation would arrive in the affected area and the intensity of sensation is correlated with diseases. The special sensation appearing in the affected area that represents the moxibustion is exerting the therapeutic action. Finally, special sensation may stop propagating or travel into the next meridian [41]. Based on this theory, some scholars developed a new method of moxibustion called *Thermal Sensitivity Moxibustion* [42, 43]. They suggested that some acupoints become sensitive when people are undergoing pathological conditions. Doctors should apply moxibustion on these acupoints to induce moxibustion-esthesia, because moxibustion at these heat-sensitive acupoints had a better efficacy than conventional moxibustion.

5. Conclusion

This study of bamboo slips and silk texts from two thousand years ago gives a preliminary description of the circumstances of medical practice and confirmed the important historical status of moxibustion during the *Qin* and *Han* dynasties. Moxibustion was used to treat various diseases and its indications contained almost all the common diseases when it appeared in these early texts. Throughout the records of moxibustion in unearthed texts we see that moxibustion developed from a unitary modality to multiple modalities. Different combustion materials and steps of the operation were chosen for different diseases, and some modalities were still applicable for treatment in modern life. Postmoxibustion care was usually neglected by modern people, while the ancients attached great importance to it and gave some advice not only for the treatment of moxibustion sore but also for the daily activity after moxibustion. This experience deserved to be further researched for its application at clinic in the future. We feel that there is little doubt that moxibustion

has close links with the meridians. As the preceding discussion has illustrated, moxibustion was developed earlier than acupuncture and its application has a greater chance to give rise to the origin of vessels and the evolution of the vessels to meridians. The ancients might have perceived the propagated sensation along some trajectories after having moxibustion. After analyzing, certain laws were found in the trajectories and they came up with the concept of vessels. Then the eleven vessels were gradually developed into a relatively complete meridians system over a more extended period of practice.

The unearthed texts contain rare historical information, many of them have not been made public or were damaged from lack of proper preservation. This paper collected seven existing bamboo and silk texts with records of moxibustion. In addition, there may have been interpretative mistakes due to deviation in the analyses of these unearthed texts since Chinese written characters have undergone significant changes over time. As the new bamboo slips and silk texts are further arranged and made public by archaeologists and scholars, further research on them might provide additional insight into the origin of moxibustion and the meridians. But, as importantly, we feel this is a good chance to draw people’s attention to the innovations of this conventional therapy.

Competing Interests

All authors declare that they have no conflict of interests.

Authors’ Contributions

Chang Huang and Jiankang Liang contributed equally to this work.

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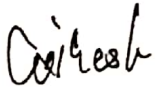





References


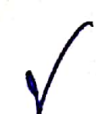


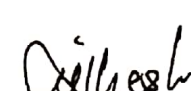





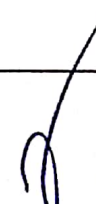
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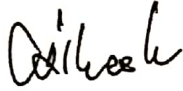

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8.	Jumat, 17 April 2020	Konsultasi BAB IV-V	<ul style="list-style-type: none"> - Perbaikan penulisan - Hubungkan dengan teori yang relevan dengan topik penelitian 	 Sri Lestariningsih, S.ST, M.Kes	
9.	Senin, 20 April 2020	Konsultasi BAB IV-V	<ul style="list-style-type: none"> - Penulisan kesimpulan - Saran sesuai dengan teori dan praktik 	 Sri Lestariningsih, S.ST, M.Kes	 Yoga Triwijayanti, SKM,MKM
10.	Kamis, 30 April 2020		ACC Seminar Hasil	 Sri Lestariningsih, S.ST, M.Kes	 Yoga Triwijayanti, SKM,MKM
11.	Sabtu, 16 Mei 2020	Konsultasi Pasca Seminar Hasil	<ul style="list-style-type: none"> - Perbaikan penulisan BAB IV-V - Perbaikan penulisan abstrak 	 Sri Lestariningsih, S.ST, M.Kes	
12.	Senin, 18 Mei 2020	Konsultasi Pasca Seminar Hasil	Perbaikan saran untuk sosialisasi kepada orangtua dan masyarakat		 Yoga Triwijayanti, SKM,MKM

13.	Rabu, 17 Juni 2020	Konsultasi Pasca Seminar Hasil	ACC Skripsi	 Sri Lestariningsih, S.ST, M.Kes	 Yoga Triwijayanti, SKM,MKM
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