

The efficacy of reflexology: systematic review

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Abstract

Title. The efficacy of reflexology: systematic review.

Aim. This paper is a report of a systematic review to evaluate the efficacy of reflexology in any condition.

Background. Anecdotal evidence has shown potential benefits of reflexology in a variety of health conditions. However, the efficacy of reflexology has yet to be determined.

Data sources. Cochrane library, PubMed, MEDLINE, EBM review, ProQuest Medical Bundle and SCOPUS databases were searched using the following medical subject headings or key words: reflexology, foot reflexotherapy, reflexological treatment, foot massage and zone therapy. Chinese articles were searched through the Chinese electronic periodical services and Wangfane database. The publication date was limited from 1996 to 2007.

Review methods. Studies were selected if they were written in English or Chinese, used a controlled clinical trial design, used reflexology as a stand-alone modality, and reported such outcomes as symptoms relief, quality of life and patients' perceptions of reflexology. Study quality was reviewed based on the evidence rating system of the United States Preventive Services Task Force, and studies with the evidence rating of II-2 fair or above were included in this review.

Results. Among the five studies suitable for review, there was only one report of a statistically significant treatment effect. Among the 12 outcome variables examined, the treatment effect size for urinary symptoms was large, whereas the effect size for other conditions was negligible.

Conclusion. There is no evidence for any specific effect of reflexology in any conditions, with the exception of urinary symptoms associated with multiple sclerosis. Routine provision of reflexology is therefore not recommended.

Keywords: complementary and alternative medicine, nursing, reflexology, systematic review, treatment effect

Introduction

The use of complementary and alternative medicines (CAM) has increased in conventional healthcare settings (Ernst & Fugh-Berman 2002, Pagan & Pauly 2005). Fear of medica-

tion side-effects and desire for symptom relief are possible reasons for the increasing use of CAM by patients (Montbriand 1994, Vincent & Furnham 1999). With consumer interest in CAM, nurses have increasingly incorporated these modalities into their practice. For example, reflexology has

been widely used in fields such as midwifery, orthopedics, neuroscience and palliative care (Griffiths 1996, Tiran 1996, Stephenson *et al.* 2003). However, many CAM modalities lack scientific evidence to support their efficacy and safety. Nurses are, therefore, in a unique position to assess client needs for these interventions, to evaluate the strength of evidence and to adopt evidenced-based modalities.

Reflexology is performed using the thumb and forefinger to apply pressure to specific areas on the feet that have been claimed to correspond to the internal organs, glands and body parts (Botting 1997). Reflexology is different from foot massage in that it involves more superficial contact, deeper pressure on certain parts of the foot and resembles a caterpillar-like movement (Griffiths 1996). It has been claimed that by pressing the 'reflex zones', energy blocks or disturbances such as calcium, lactate or uric acid crystals are reabsorbed and later eliminated – a process referred to as 'detoxification' (Botting 1997). It has also been suggested that reflexology may help release stress and tension, improve blood flow of the body and promote homeostasis (Botting 1997). Anecdotal evidence has shown that reflexology is beneficial in many conditions such as pre- and postnatal discomfort, pain, migraine and chronic obstructive pulmonary disease (Tiran 1996, Launso *et al.* 1999, Stephenson *et al.* 2003, Wilkinson *et al.* 2006). Other therapeutic effects, such as strengthening the immune system, improving sleep quality and wound healing, have also been claimed (Botting 1997, Xavier 2007). Reflexology has been offered to patients with cancer in an attempt to improve the adverse physical and psychological symptoms associated with the illness or its treatments (Hodgson 2000, Stephenson *et al.* 2000, Ross *et al.* 2002, Wright *et al.* 2002, Quattrin *et al.* 2006). In addition, the human touch accompanied by reflexology offers care and attention for patients, and this psychological comforting has been reported as a primary benefit of the reflexology (Gambles *et al.* 2002).

The supposed theoretical support for reflexology has been developed since ancient Chinese and Egyptian times (Botting 1997). However, patients' reports of benefits from reflexology may be influenced by bias in the lay literature or limited information about the use and effectiveness of the intervention (Montbriand 1994). As reflexology has become popular in nursing practice, its efficacy and safety should be evaluated.

The review

Aim

The aim of this review was to provide the first systematic evidence on the efficacy of reflexology in any condition.

Design

A systematic review was conducted following the procedure proposed by the Khan *et al.* (2003). In addition, the QUORUM statement was used as a guide for the report of the present systematic review (Moher *et al.* 1999).

Search methods

An online electronic database of Cochrane library, PubMed, MEDLINE, EBM review, ProQuest Medical Bundle and SCOPUS databases of papers published between 1996 and 2007 was searched, using the following medical subject headings or keywords: reflexology, foot reflexotherapy, reflexological treatment, foot massage and zone therapy. Chinese articles were also sought through Chinese electronic periodical services and the Wangfane database.

Studies were selected if written in English or Chinese, used a controlled clinical trial design, used reflexology as a stand-alone modality, and reported outcomes including symptoms relief, psychological well-being, quality of life and patients' perceptions of reflexology. Studies evaluating a combination of reflexology with other modalities, having fewer than 10 participants in each group, giving insufficient information about the principal measures of effect, or including a young age group were excluded.

Search outcome

The initial online search strategy generated 43 potentially relevant studies. After examining the titles and abstracts, papers on 27 studies were retrieved and reviewed. The reference lists of included reports and reviews were also searched for additional studies. Two project members independently reviewed each of the identified papers to determine eligibility. The common exclusion criteria were lack of comparison group (Launso *et al.* 1999, Stephenson *et al.* 2000, Chen 2001, Meng & Zhang 2001, Wang *et al.* 2001, Lai *et al.* 2002), examining non-specific foot massage rather than reflexology (Hayes & Cox 1999, Hulme *et al.* 1999, Grealish & Lomasney 2000, Hattan *et al.* 2002), extremely small sample size (Hodgson 2000, Ross *et al.* 2002, Wilkinson *et al.* 2006) and insufficient information about data quantification (Gambles *et al.* 2002, Wright *et al.* 2002, Stephenson *et al.* 2003). A total of 11 papers meeting the inclusion and exclusion criteria were finally identified for quality appraisal.

Quality appraisal

Two independent reviewers reviewed the selected studies based on the evidence rating system of the United States Preventive Services Task Force (USPSTE) (Harris *et al.* 2001). The quality and strength of the studies were evaluated in two separate categories: study design and internal validity. The research designs were classified into the following levels:

- I. Properly designed randomized controlled trial.
 - I-1. Well-designed controlled trials without randomization.
 - II-2. Well-designed cohort or case-control analytic studies.
 - II-3. Multiple time series with or without the intervention.
- III. Opinions of authorities, descriptive studies and case reports.

The degree of internal validity was judged by three elements of the study design: randomization, participation rate and description of withdrawals and/or dropouts. The rating is divided into three categories: good, fair and poor. A good study meets all criteria; a fair study meets some of the criteria but has no fatal flaw; a poor study contains a fatal flaw. Studies with the evidence rating of II-2 fair or

above were included in this review. Six studies were excluded because of poor internal validity (Gao *et al.* 2003, Zhang & Yang 2005, Li 2006, Liu & Chu 2006, Quattrin *et al.* 2006, Wang *et al.* 2006). The flow of studies from initial screening to inclusion was presented in Figure 1.

Synthesis

All outcome variables were assessed for treatment effect size. The difference between post-treatment means divided by the pooled standard deviation (SD) was used as the principal measurement of effect (Cohen 1988). For those studies for which only the median, range and sample size were provided, estimated mean and SD were calculated following the formula proposed by Hozo *et al.* (2005). A free online software program was used for the calculation (The Curriculum, Evaluation and Management Centre 2007). Interpretation of effect sizes was judged using the original criteria of effect magnitude (Cohen 1988). An effect of 0.2–0.5 was described as ‘small’, 0.51–0.8 as ‘medium’ and 0.8 and above as ‘large’. The ranges of effect-size values as well as confidence intervals were used to assess the magnitude of benefits.

For outcomes which could not be computed, a qualitative approach was used to synthesize the data. The magnitude of benefit depends on the amount of studies with statistically significant results. An overall rating of substantial benefit was determined when there were at least three studies with statistically significant results.

Intervention recommendation

Recommendation of reflexology for clinical practice followed the principles of the USPSTE (Harris *et al.* 2001). Five letter codes (A–D, I) were assigned after evaluating the quality of evidence and magnitude of benefits of the selected studies. The balance of benefits and harms was also weighted as follows:

- Codes A–B indicate that the improvements of health outcomes are supported by good or fair evidence and that the benefits substantially outweigh the harms.
- Code C indicates the quality of evidence is either good or fair. The service can improve health outcomes but the balance of benefits and harms is too close to justify a general recommendation.
- Code D is assigned where there is good or fair evidence but the net benefit is probably either zero or negative.
- Code I indicates that a recommendation cannot be made because of the poor evidence.

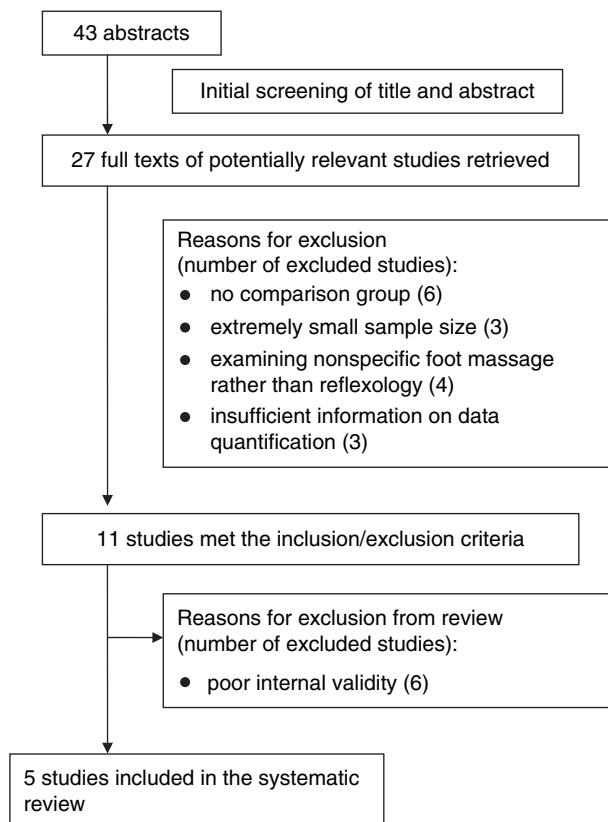


Figure 1 Flow of studies from initial screening to inclusion.

Results

Study quality

Five studies met the II-2 fair rating of methodological quality (Brygge *et al.* 2001, Tovey 2002, Williamson *et al.* 2002, Mollart 2003, Siev-Ner *et al.* 2003). All five had a randomized controlled design (see Table 1). One report did not give the participation rate (Brygge *et al.* 2001). The dropout rate in these studies was generally modest, ranging from 9% to 25%.

Population studied

The characteristics of the included studies are presented in Table 1. Reflexology was implemented in individuals with chronic conditions in most of the studies (Brygge *et al.* 2001, Tovey 2002, Williamson *et al.* 2002, Siev-Ner *et al.* 2003). One study assessed the therapeutic effects of reflexology on symptom distress related to pregnancy (Mollart 2003). Information on levels of satisfaction with the orthodox healthcare system was not available in all reports. However, two stated that the participants were on active conventional treatments during the experimental period (Brygge *et al.* 2001, Siev-Ner *et al.* 2003). In one study the participants were characterized as chronic sufferers and hard to treat (Tovey 2002).

Treatment conditions, duration and format

The efficacy of reflexology was examined in comparison with a sham treatment group and/or a no treatment control group in four studies (Brygge *et al.* 2001, Tovey 2002, Williamson *et al.* 2002, Siev-Ner *et al.* 2003). The effects of different techniques of the reflexology were compared in one study (Mollart 2003) (see Table 1). No reports provided a reference for the rationale for the selection of the optimal treatment dosage. The control group all had the same timeframe and the same number of contact sessions as the experimental group. After the completion of the weekly treatment sessions, in only one study was the reflexology implemented monthly to maintain the therapeutic effect for another 3 months (Williamson *et al.* 2002). Most of the reports described the procedure and the specific foot zones to which pressure was applied, but only one report mentioned the specific technique implemented (Mollart 2003). Reflexology was provided by one or more certified reflexologists in all studies.

Study findings

Multiple sclerosis

In the study by Siev-Ner *et al.* (2003) the reflexology group demonstrated statistically significant symptom relief in a study of patients with multiple sclerosis. Compared with no improvement in the massage group, scores for urinary symptoms, paresthesia and spasticity were statistically significantly improved, whereas muscle strength revealed only borderline improvement at the end of reflexology. The improvement in paresthesia remained statistically significant at the 3-month follow-up.

Menopausal symptoms

Statistically significant reductions in the severity of hot flushes and night sweats, measured by a visual analogue scale, were reported after 6 weekly sessions of reflexology, but no statistically significant difference was found between the groups receiving reflexology and non-specific foot massage for menopausal symptoms in the study conducted by Williamson *et al.* (2002). In terms of general well-being, both the reflexology and non-specific foot massage groups demonstrated an improvement in the Women's Health Questionnaire (WHQ) score. However, the difference between the two groups was not statistically significant. Similarly, although improvements in the two subscores (anxiety and depression) of the WHQ were detected, there was no statistically significant difference between the reflexology and foot massage groups.

Bronchial asthma

In the study by Brygge *et al.* (2001), the outcomes of lung function tests including peak expiratory flow (PEF) and the ratio between forced expiratory volume in 1s and forced vital capacity (FEV₁/FVC) did not improve after reflexology in patients with bronchial asthma. In addition, the reflexology group was not superior to the sham foot massage group in lung function improvement.

Irritable bowel syndrome

No statistically significant changes in patients with irritable bowel syndrome were observed either within or between the reflexology and sham foot massage groups in the study by Tovey (2002). Abdominal pain, constipation/diarrhoea, and bloating remained unchanged after the reflexology treatment.

Oedema of the feet in late pregnancy

Women with oedema in late pregnancy perceived less swelling and tightness as compared with the pretest level in the

Table 1 Characteristics of included studies

Study Authors (year) Treatment modality	Study design (blindness)	Symptoms or disease treated	Control or comparison condition(s)	Subjects <i>n</i> (total) Age mean (SD)/ mean(range)	No. sessions		Outcomes (tools)
					Frequency	Duration (minutes)	
1. Siev-Ner <i>et al.</i> (2003) Reflexology (not specified)	RCT (single)	Multiple sclerosis	Calf area massage	53 Treatment – 46.2 (9.3) Control – 49.2 (11.0)	11 Weekly 45	36	Urinary symptoms (AUA scale), intensity of paresthesias (VAS), spasticity (Ashworth scale) and muscle strength (BMRC scale)
2. Williamson <i>et al.</i> (2002) Reflexology (not specified)	RCT (single)	Menopausal symptoms	Non-specific foot massage	69 Treatment – 50.8 (2.7) Control – 51.9 (2.5)	9 6 weekly plus 3 monthly 45	4	Severity of flashes (VAS, 0–100), night sweats (VAS, 0–100), anxiety (WHQ), depression (WHQ), psychological and physical wellbeing (WHQ) Peak expiratory flow and FEV ₁ /FVC ratio
3. Brygge <i>et al.</i> (2001) Reflexology (not specified)	RCT (double)	Bronchial asthma	Non-specific foot massage	40 Treatment – 39 (22–56) Control – 38.3 (2.5–54)	10 Weekly 45	1	Peak expiratory flow and FEV ₁ /FVC ratio
4. Tovey (2002) Reflexology (not specified)	RCT (single)	Irritable bowel syndrome	Non-specific foot massage	34 48 (19–72)	6 4 weekly plus 2 biweekly 30	3	Abdominal pain, constipation/diarrhoea and bloatedness (author-designed health-assessment sheet)
5. Mollart (2003) Lymphatic reflexology	RCT (single)	Foot oedema in late pregnancy	1. Relaxing reflexology 2. Rest	55 Lymphatic – 28.6 (5.15) Relaxing – 27 (5.66) Rest – 29 (8.06)	2–3 Weekly 15	Not provided	Ankle, instep and metacarpophalangeal joints circumference

AUA, the American Urological Association; BMRC, British Medical Research Council; FEV₁, forced expiratory flow in 1s; FVC, forced vital capacity; RCT, randomized controlled trial; VAS, visual analogue scale; WHQ, Women's Health Questionnaire.

Table 2 Treatment effect size of reflexology on various conditions

Study	Variable	No. subjects/ study	Immediate		Follow-up	
			Effect size	95% CI	Effect size	95% CI
Brygge <i>et al.</i> (2001)	Morning PEF	40/1	0.21	-0.41 to 0.83		
	Evening PEF	40/1	-0.10	-0.71 to 0.53		
	FEV ₁ /FVC ratio	40/1	0.10	-0.52 to 0.72		
Williamson <i>et al.</i> (2002)	Hot flushes	69/1	-0.15	-0.63 to 0.32	-0.21*	-0.69 to 0.27
	Night sweats	69/1	-0.23	-0.70 to 0.25	-0.23*	-0.71 to 0.25
	Anxiety	69/1	-0.19	-0.66 to 0.29	-0.31*	-0.79 to 0.17
	Depression	69/1	0	-0.47 to 0.47	0*	-0.48 to 0.48
	WHQ	69/1	-0.04	-0.50 to 0.43		
Siev-Ner <i>et al.</i> (2003)	Intensity of paresthesia	43/1	-0.34	-0.93 to 0.27	†	
	Urinary symptoms	39/1	-0.91	-1.55 to -0.23	†	
	Muscle strength	43/1	0.40	-0.15 to 0.94	†	
	Spasticity	27/1	-0.13	-0.89 to 0.65	†	

*The follow-up period was 4 weeks after complementation of the treatment session, $n = 67$.

†The effect size of follow-up period was not able to calculate due to the lack of sample size.

FEV₁, forced expiratory flow in 1s; FVC, forced vital capacity; PEF, peak expiratory flow; WHQ, Women's health questionnaire.

reflexology treated group, according to Mollart (2003). However, there was no statistically significant improvement in mean ankle and foot circumference measurements after lymphatic reflexology. There were also no statistically significant differences among the lymphatic reflexology, relaxing reflexology and rest groups.

Effect sizes

A total of 12 outcome variables from three studies were analysed for treatment effect size. Physiological variables included urinary symptoms, paresthesia, muscle strength,

spasticity, menopausal symptoms (i.e. hot flushes and night sweats) and lung function (i.e. PEF and FEV₁/FVC ratio). Psychological variables included anxiety, depression and quality of life. Despite of a large effect size found in the treatment of urinary symptoms in patients with multiple sclerosis, the effect size of reflexology in other conditions was small (Table 2).

Narrative synthesis

In two reports sufficient data were not given to allow computation of the effect size (Tovey 2002, Mollart 2003).

Table 3 Effect of reflexology (determined by the narrative synthesis)

Study	Variable	No. participants/ studies	Results median (IQR)			Group difference
			Treatment	Control		
Tovey (2002)	Abdominal pain*	34/1	-0.10 (-0.8 to 0.1)	-0.40 (-0.8 to 0.1)		NS
	Constipation/diarrhoea*	33/1	0.05 (-0.53 to 0.43)	-0.30 (-0.8 to 0.2)		NS
	Bloating*	30/1	-0.10 (-0.6 to 0.2)	-0.40 (-1.05 to -0.15)		NS
	Leg circumference [†]		Mean difference (SD not provided)			
			Lymphatic	Relaxing	Rest	
Mollart (2003)	Right	55/1	-0.06	0.03	-0.12	NS
	Left	55/1	-0.1	0.01	-0.13	NS
Instep	Right	55/1	-0.03	-0.13	0.06	NS
	Left	55/1	-0.04	1.1	0.04	NS
MP joint	Right	55/1	-0.03	-0.14	-0.16	NS
	Left	55/1	-0.29	-0.02	0.14	NS

*Measured by health-assessment sheet (0-4 point scale).

†Measured by visual analogue scale (1-100 mm).

IQR, interquartile range; MP, metacarpophalangeal; NS, not statistically significant.

What is already known about this topic

- Reflexology is a complementary and alternative medicine modality which has been claimed to have an effect in promoting homeostasis, relaxation and the detoxification process.
- Reflexology is performed by pressuring on the 'reflex zones' of the feet that have been claimed to correspond to the internal glands and organs of the body.
- Reflexology has been increasingly incorporated into nursing practice.

What this paper adds

- There is no evidence for any specific effect of reflexology in any condition.
- Routine provision of reflexology is not recommended.

Reflexology did not have a statistically significant pre- to post-test effect on the reduction of ankle and foot oedema in late pregnancy and on symptoms related to irritable bowel syndrome. In addition, reflexology was no better than foot massage in treating these symptoms (Table 3).

Contraindications

None of the studies reviewed reported adverse events associated with the use of reflexology. Due to a lack of medical assessment data before and during the implementation of reflexology, it is difficult to determine the safety of reflexology.

Discussion

It has been claimed that local finger pressure on reflex points on the feet can influence the function of corresponding target organs to promote homeostasis, relaxation, and the healing response and that therefore, a variety of symptoms or diseases can be treated through reflexology. However, evidence from this systematic review suggests that reflexology does not have any beneficial effect other than the non-specific effects produced by foot massage in all conditions, with the exception of urinary symptoms associated with multiple sclerosis.

Methodological problems in the included studies

Methodological problems inherent in these studies might account for these unfavourable results. First, most of the

studies had a relatively small sample size and therefore might lack the power to detect statistically significant differences between groups. Secondly, foot massage was used as the control condition in all studies. Foot massage-induced general relaxation evidenced by physiological changes has been reported (Hayes & Cox 1999). The outcome measurements for these studies might lack the sensitivity and/or specificity to differentiate effects produced by reflexology treatment or foot massage. Finally, the question of whether the therapeutic effects of reflexology were associated with pressure on specific foot zones remains unanswered because none of the researchers used an objective indicator to verify changes in blood perfusion in the foot zones pressed. Further studies with other types of control conditions and more appropriate outcome measurements may be helpful in determining the effect, if any, of reflexology.

Limitations of the review

It should be acknowledged that the present review only included papers published since 1996 and was restricted to those published in English or Chinese. Hence, our findings should be interpreted with caution. However, in a previous review that included studies published before 1996 similar conclusions were reached, namely that the efficacy of reflexology is not supported by evidence from controlled clinical trials (Ernst & Koder 1997).

Conclusion

With the increasing usage of CAM by the general public, it is important that healthcare professionals, including nurses, can make informed decisions when advising clients who choose to seek help from CAM providers (Long *et al.* 2001). Based on the findings of this systematic review, routine provision of reflexology to treat symptoms related to multiple sclerosis, menopause, late pregnancy, bronchial asthma and irritable bowel syndrome is not recommended. Reflexology might be helpful in relieving the urinary symptoms associated with multiple sclerosis, but this result was based on one study with a small sample size.

It might be argued that reflexology should be evaluated as a holistic approach that treats the whole person rather than specific symptoms. However, the present review demonstrated that reflexology was effective on neither general well-being nor emotional distress. Moreover, the safety of reflexology cannot be determined. Nevertheless, nurses should bear in mind that many patients choose CAM as a way to empower themselves in the management of their illness (Dunwoody *et al.* 2002, Rose 2006) and thus may not be seeking evidence of efficacy.

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Author contributions

MW, PT, PL, WC and CY were responsible for the study conception and design. MW and PT performed the data collection, data analysis and were responsible drafting of the manuscript. PT made critical revisions to the paper for important intellectual content. MW provided statistical expertise. PT obtained funding, provided administrative, technical or material support, and supervised the study.

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