

Acupuncture for Chronic Foot Pain (CFP)
Wendy Hee 2023

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Introduction

Nurses are 55% of the nation's healthcare profession, with 453,515 registered nurses in Australia (Nursing and Midwifery Board, 2023) and there is a projected to be a shortfall of approximately 85,000 nurses by 2025 (Department of Health, 2014). The annual turnover rate for staff nurses in the United States was around 27% in 2021, with the average hospital in the USA losing \$5.2 million to \$9 million a year due to costs associated with nurse turnover (Lindquist, 2023).

One reason why nurses are leaving the profession or seeking administrative positions is chronic foot pain (CFP) (Mbue & Wang, 2023) which can lead to other musculoskeletal disorders (Smith, 2008, 2011). Nurses are at high risk of developing CFP because of the physical demands of prolonged standing. In Mbue's foot health survey, 59% of nurses reported high pain levels due to CFP (Mbue & Wang, 2023).

The condition often begins with overuse, trauma, poor footwear, prolonged immobilisation, and post-surgery. It can occur secondary to osteoarthritis, obesity and metabolic problems such as gout, alcoholism, diabetes or secondary neuritis (Erickson & Edwards, 1996). CFP is highly persistent (Menz, 2016) increasing the risk of falls and cause weight gain due to decreased exercise. Alleviating foot pain is vital to retaining the nursing workforce and the quality of life including loss of independence for older people (Erickson & Edwards, 1996; Mbue & Wang, 2023).

CFP affects at least one in four older people, the incidence of foot disorders may be 86% in residential care (Benvenuti et al., 1995; Oh-Park et al., 2019). Astonishingly, the management of CFP is a largely undervalued aspect of health care, resulting in many people needlessly enduring CFP and related disability (Erickson & Edwards, 1996; Mbue & Wang, 2023; Menz, 2016). Nurses claim CFP a major reason for leaving bedside care, and 20% of older people report CFP as the primary cause of their inability to leave their home (Mbue & Wang, 2023; Menz, 2016; Oh-Park et al., 2019).

Literature Review on Acupuncture for Chronic Foot Pain (CFP) Wendy Hee 2023

The purpose of this literature review is to find evidence-based practice for acupuncture treatment for dorsal mid foot pain, a common presentation by older women working as nurses, aged care, disability support or as primary carers.

Methodology

A database search of Western Sydney University's library was conducted using the keywords: 'foot pain, foot osteoarthritis, acupuncture, randomised control trials, systematic reviews, meta-analysis', yielding no results. Papers on plantar heel pain (fasciitis, Achilles tendinopathy) (Clark, 2022; Clark & Tighe, 2012; Reaves, 2011; Wang et al., 2021) or diabetic foot were excluded.

Erickson's case series of 67 patients treated for unmedically responsive foot pain was a close match to my patient cohort (Erickson & Edwards, 1996) and follows the Chinese Medicine tradition learning through case reports (Lumiere, 2022). The quality of Erickson's study was critiqued using the JBI critical appraisal tool for case series (Munn et al., 2020). As descriptive studies, case series and expert opinion rank low on the hierarchy of evidence-based medicine (EBM) (Guyatt, 2008).

Literature Review

Curiously, for its high incidence, chronicity, impact on disability and poor treatment outcomes, CFP is an overlooked in healthcare and EBM, with a scarcity of literature available. This knowledge gap is an research prospect and opportunity for acupuncture and Chinese Medicine. The quality of the case series and clinical guidance provided by expert opinion is correlated to the clinical experience, academic and publishing record of the authors. Erickson has over 60 years clinical experience and is published in journals such as Acupuncture in Medicine.

Biomedicine

Oh-Park describes age-related musculoskeletal changes in the foot including: widening of the forefoot (particularly in women), progressive atrophy of the plantar fat

pad of the entire foot, shortening of the gastrocnemius musculotendinous unit (GSMU) and stiffening of muscles and joints reducing the range of motion (ROM). Bed rest and limited activity after illness or surgery can often lead to the shortening of the GSMU (Oh-Park et al., 2019). Midfoot arthrosis or nerve entrapment of the superficial or deep peroneal branches over the dorsal osteophytes are possible diagnoses from tender points palpated on the dorsum of the foot (Oh-Park et al., 2019).

Conventional medical treatments include: footwear change, gel cushions, splints, orthotics, pain medications (e.g. NSAIDs), physiotherapy, exercise, corticosteroid injections or topical creams, surgery and avoidance of activities that aggravate the condition (Erickson & Edwards, 1996; Mbue & Wang, 2023; Menz, 2016; Smith, 2008).

Proper footwear is essential for nurses to improve overall health and reduce high rates of prevalence of musculoskeletal disorders. Many nurses were spending \$170/per pair of shoes and \$500/per year on shoes and an average of \$15–\$45 on compression socks to manage foot pain. Between 26% and 50% of older people wear shoes that are too short or too narrow due to fashion influences, don't measure foot dimensions when purchasing shoes, and there is a limited availability of footwear that caters for the altered shape of the older foot (Menz, 2016).

Two randomised trials found that foot orthoses were effective at reducing symptoms in people with osteoarthritis of the first metatarsophalangeal joint and midfoot joints (Menz, 2016) however, Mbue's survey found that most nurses changed their shoes more often than any other treatment options such as splints or inserts or NSAIDs (Mbue & Wang, 2023).

Traditional Chinese Medicine (TCM)

In TCM, the foot is connected to the rest of the body, many people develop dysfunction along the muscle regions that lie between the foot and back because of foot problems (Smith, 2008, 2011). CFP fall into the TCM pathogenesis of Bi

Syndrome along the affected channels of Bladder, Gall Bladder, Stomach, Liver, Spleen and Kidney (Legge & Vance, 2011). In nurses, exhaustion can lead to Qi and Blood deficiency, blood stasis and susceptibility to Cold Damp or Damp Heat Obstruction (Smith, 2008). In the elderly age groups, decline of Kidney Qi, Yin, Yang or Jing would be another factor as the lower limbs bear weight making them susceptible to degenerative pathologies (Smith, 2011).

Legge suggests the use of ST42 with trigger points (Legge & Vance, 2011). Smith identifies a number of TCM patterns and the importance of clearing the sinew channels involved in foot disorders (Smith, 2011). Smith is a teacher practitioner based in Pennsylvania, USA and published in journals including Journal of Chinese Medicine and Acupuncture Today, his treatments are summarised in Table 8.

Quality

Erickson's case series reported results positive towards acupuncture for improving foot pain (Table 5) and reducing subsequent treatment visits post-acupuncture regimen (Table 6). However, Erikson's case series was published 27 years ago, rated moderate for six questions and unclear for the remaining four questions (Munn et al., 2020) using the JBI tool. Sub-analyses of the results of the protocol versus usual meridian acupuncture and more analysis of patient demographics and would have improved the quality of Erickson's case series significantly.

Internal Validity

The main concern with Erickson's Case Series is internal validity. The VAS and Wisconsin Pain Questionnaire are validated reliable outcome-measures (The British Pain Society, 2019), however, the results of these were not tabulated or published. The measurement outcomes of '75% improvement' were subjective and vulnerable to measurement and reporting biases (Delgado-Rodríguez & Llorca, 2004). The statistical analysis of the results is incomplete and scant.

External Validity

This case series is a quasi-experimental trial involving real-life patients of the Kaiser Permanente Medical Centre departments of Paediatrics and Podiatry in Richmond, California, USA. The clinical relevance and usefulness of this case series is high, given the close match to my patient cohort of medically unresponsive CFP.

Patient Population

The inclusion criteria for the case series were the presence of persistent foot and ankle pain, with the failure of standard medical therapy. The failure of conventional treatment was ascertained through looking at the patient's medical record in the prior year for the number of acupuncture and physiotherapy sessions attended, number of prescribed pain medications and surgeries. Patients were aged from 13 to 72 years of age, categorised by causes of foot pain (Table 3) and duration of pain (Table 4).

Intervention

The protocol intervention was weekly sessions of local acupuncture points LR3, BL60, BL65, with SP3 and SP6 connected using a ITO electroacupuncture IC1107 stimulator at 110Hz with current intensity set at the maximum comfortably tolerated level. The positive electrode was attached to SP3 and the negative to SP6 for 15-20 minutes. Japanese #3 needles were used either 30mm long or 15mm for SP3 and BL65. An average of four to six treatments was given. Erickson's protocol is a local treatment described well, easily replicated in clinical practice.

Comparators

Case series, as a study design have no control group, and sham acupuncture was dismissed as the trial's primary duty was patient care and treatment (McDonald, 2019). The intervention's second arm was usual TCM meridian treatment along affected channels. It was not reported who received the first or second arms of

treatment and the acupuncture regimen for the second arm was not reported with descriptions of TCM rationale, point selections or use of electroacupuncture.

Outcomes

It is not uncommon for patients with CFP to come in for acupuncture without a diagnosis (Erickson & Edwards, 1996), imaging or having functional tests such as gait or footwear evaluation making baseline data problematic. The patients were followed up one year later to report improvements in CFP and their records were checked for the number of other medical treatments (acupuncture, physiotherapy, pain medication, surgery) attended for CFP since the case series 'intervention'. As the outcomes affect the person's walking ability, functional tests such as the length of step and number of steps taken for a certain distance could be considered in future trials.

As a case series, there was no randomisation or blinding processes in the methodology, and the number of participants was small. The intervention claimed better results for the difficult to treat RSD (reflex sympathetic dystrophy) patients without any explanation; and was less effective for post-surgery or trauma caused foot pain, with no further discussion. The results for Erickson's 'short protocol' are hidden in the combined results and it would have been useful to know which patients received which protocol.

Bias and the Placebo Effect

A positive attitude towards healing, normal function and mobilisation was projected to the patients, potentiating the placebo effect (McDonald, 2019), reporting and performance biases (Delgado-Rodríguez & Llorca, 2004). However, the patients had previously tried a number of therapies interacting with a variety of practitioners, with no effect. The 'powerful placebo effect' is thought to be as high as 30% of all treatments (Kaptchuk, 1998) which is why Erickson's 'success' was reporting an 'above 75% improvement' in CFP.

TCM and Modern Biomedicine: Benefits and Issues

The treatment of CFP by biomedicine or TCM is inadequately reflected in healthcare and EBM. The chronicity of CFP is a failure of current CFP treatments, and a consequential failure to acknowledge the everyday and long-term consequences of poor patient outcomes. Given dire workforce shortages of nurses and carers (Lindquist, 2023), the inferior treatment of CFP has major societal, workplace and economic implications. Nurses and older people with CFP continue to suffer from mobility issues leading to worsened co-morbidities, social isolation and deteriorating quality of life (Mbue & Wang, 2023; Menz, 2016; Oh-Park et al., 2019).

Patients were tired of medications, most were limited in their capabilities to do daily activities by relatively constant pain, with frequent flares in severity. The prescription of NSAIDs for CFP is controversial given neither CFP or arthrosis are inflammatory conditions (Mbue & Wang, 2023). Current conventional treatments are short-term, not sustainable and expensive (Mbue & Wang, 2023). Obesity is a significant factor contributing to CFP, yet none of the modalities address this.

Surprisingly, most nurses interviewed in Mbue's survey lacked knowledge on different ways to take care of feet (Mbue & Wang, 2023). TCM has a tradition of Tai Chi walks and prescribing herbal foot soaks which have had clinical trials in China for diabetic foot and peripheral neuropathy. The success of the acupuncture coupled with its lack of side effects supports acupuncture as a consideration for the treatment of foot pain (Erickson & Edwards, 1996; Smith, 2008, 2011).

Conclusion

CFP is under-researched and requires more advocacy for clinical trials from all modalities. The unsatisfactory treatments of CFP, a highly prevalent disabling condition with costly workplace, societal and economic implications need to attract interest in establishing clinical trials and publishing case reports. Case reports need to be encouraged and be simple to do for the everyday practitioner wanting to contribute to EBM. New industry developments such as TCMCR clinical software

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(Popplewell, 2023) collecting case report data and the Bastyr University supported “Convergent Points East-West Case Report Journal” (Lumiere, 2022) for TEAM practitioners platform should be supported to elevate and build the evidence base for acupuncture, Chinese Herbal Medicine, Tuina and Tai Chi treatments for this most burdensome condition.

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Appendices

Table 1 Glossary

Abbreviation	Description
CRF	Chronic Foot Pain
CRPS	Chronic Regional Pain Syndrome
CWM	Conventional Western Medicine
EA	Electro-acupuncture
EBM	Evidence Based Medicine
GSMU	Gastrocnemius musculotendinous unit
NSAIDs	Nonsteroidal anti-inflammatory drugs
PICO	Population, Intervention, Comparator, Outcomes elements in RCTs
RCT(s)	Randomised Control Trials
ROM	Range of Motion
RSD	Reflex Sympathetic Dystrophy now known as CRPS
SR(s)	Systematic Review(s)
STRICTA	STandards for Reporting Interventions in Clinical Trials of Acupuncture
TCM	Traditional Chinese Medicine
TCMCR	Traditional Chinese Medicine Clinical Registry software
VAS	Visual Analogue Scale

Table 2: JBI Checklist for Case Series

(Munn et al., 2020)

Reviewer	Wendy Hee	Date	1 November 2023
Author	Russell Erickson & Bart Edwards	Year	1996
		Case No	67

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#	JBIChecklist for Case Series	Yes	No	Unclear	N/A
1	Were there clear criteria for inclusion in the case series?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Was the condition measured in a standard, reliable way for all participants included in the case series?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Were valid methods used for identification of the condition for all participants included in the case series?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Did the case series have consecutive inclusion of participants?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Did the case series have complete inclusion of participants?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Was there clear reporting of the demographics of the participants in the study?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Was there clear reporting of clinical information of the participants?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Were the outcomes or follow up results of cases clearly reported?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Was there clear reporting of the presenting site(s)/clinic(s) demographic information?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Was statistical analysis appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include 6 Exclude Seek further info 4

Comments (Including reason for exclusion)

Require results of VAS and Wisconsin Pain Questionnaire, actual timeframe of prior and subsequent year, results by 5-point intervention compared to meridian intervention, statistical analysis was inadequate.

Table 3: Patient by Causes of Foot Pain

Causes of Foot Pain	# Patients	# >75% Benefit	% >75% Benefit
Neuritis	11	10	91%
Unknown	8	7	88%
Fasciitis, Tendinopathies, Bone Spurs	10	8	80%
Injury/post trauma	23	15	65%
Post-operative	14	9	64%
Gout	2	1	50%

Table 4: Duration of Foot Pain

Duration	# Patients
RSD	3
< 3 Months because of Pain Severity	3
3-12 months	16
1-3 years	21

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<i>Duration</i>	<i># Patients</i>
3-5 years	12
5-10 years	8
>10 years	6

Table 5: Results by 75% improvement in pain relief

Patient reported Improvement in Pain Relief	#	%
No recurrence during ensuing year	31	46%
>75%	19	28%
>50%	6	9%
<50%	2	3%
<25%	8	12%
Uncertain	1	2%

Table 6: Reduction in Treatment Visits

Modality	Prior	Subsequent	% Decrease
Acupuncture	292	59	↓79%
Physiotherapy	86	13 including 11 referred by the authors for RSD	↓84% or ↓97%
Medications & Injections	153	45 including 25 prescribed to 2 patients with chronic alcohol and narcotic problems, leaving 20 medications for foot pain alone	↓70% or ↓86%

Table 7: Smith's Sinew Channel points

(Smith, 2011)

Sinew Channel	Acupoints
Foot Taiyang	BL26, BL37, BL40, BL54, BL56, BL57, BL58, BL60
Foot Shaoyang	GB30, GB33, GB34, GB35, GB36, GB39, GB40
Foot Yangming	ST31, ST32, ST34, ST35, ST36, ST40, ST41
Foot Taiyin	SP11, SP10, SP9, SP6, SP5, SP4
Foot Jueyin	LR9, LR8, LR5, LR4, LR3
Foot Shaoyin	KD10, KD9, KD7, KD6, KD3, KD2, KD1

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Table 8: Smith's TCM Patterns

(Smith, 2008)

TCM Pattern	Acupoints	Herbal Formula with modifications
Cold Damp obstruction	SP9, ST36, CV6, GB34, KD1	Wu Tou Tang
Damp Heat obstruction	SP9, GB34, Ba Feng, ST37, ST43, LI4, LR6	Xuan Bi Tang
Blood stasis	ST36, LI4, LR3, BL17, BL62	Hou Luo Xiao Ling Dan
Spleen Qi deficiency	ST36, SP6, SP10, BL20	Ba Zhen Tang
Liver Blood deficiency	LR3, LR8, BL18	Xiao Yao San