

FOOT REFLEXOLOGY: DEMYSTIFYING THE SCIENCE BEHIND THE THERAPY

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ABSTRACT

Background: Reflexology is an ancient therapeutic treatment which activates the innate healing powers of the body by applying some pressure to the specific reflex points which are located on all part of the feet, hands, or ears. As claimed in many literatures, this intervention generally may improve body health condition and well-being in terms of physical, emotional, and spiritual level.

Methods: This paper summarizes the principle, concept and current evidence on the effects of foot reflexology therapy on various components of mental and physical health, by focusing on the evidence in review articles. Databases of PubMed, Scopus, Science direct as well as ProQuest were the sources used for findings the articles.

Results: Collectively, these reviews suggest a number of areas where foot reflexology may well be beneficial. There are some meta-analyses and several randomized control trials (RCT) indicate beneficial effects of foot reflexology therapy for pain management, quality of life, as well as mental health.

Conclusion: These review point to some potential of foot reflexology for various health condition in order to improve the physical and mental health as well as maintaining the good quality of life.

KEYWORDS: reflexology, complementary medicine and alternative therapy

INTRODUCTION

Reflexology is a complementary therapy which can be defined as the use of the sophisticated system of touch, applied to the specific reflex points which are located on all part of the feet, hands, or ears (Close et al. 2015; Brown 2013). According to the International Institute of Reflexology, by applying pressure on these reflex areas, it thought to correspond to a map of the whole body by stimulating the normal functions of glands, organs as well as parts of the body and finally will encourage the body healing process (Wu 2010; Yeung et al. 2012; Brown 2013). Recent evidence suggests that reflexology is a simple, less expensive and non-invasive method that effective to regulate the autonomic nervous system activities, coordinates physiological responses, alleviates anxiety, and induces relaxation (Ebadi et al. 2015).

The therapeutic application of reflexology can be a prime tool to provide caring, presence showing compassion in combination with a feeling of doing something that may help a patient to become more whole and feel better (Gunnarsdottir & Jonsdottir 2010). The literature implies that reflexology is useful for achieving and maintaining health, enhancing wellbeing, and helpful for relieving the symptoms of illness and disease (Williamson et al 2002). In recent years, it has been used as an intervention to relieve pain, stress, alleviates anxiety, improve blood circulation, promote homeostasis and has healing relaxing effect that brings harmony to the body, emotion, mind and spirit (Chumthi, Volrathongchai & Eungpinichpong 2011). By stimulating the reflexes on the top, bottom, as well as inside and outside edges of the feet and hands, reflexology may help the body expel toxins, release tension, and restore body natural state of balance (Gillanders 2008).

REFLEXOLOGY, AN ANCIENT MEDICAL THERAPY

Reflexology is an ancient therapeutic treatment which activates the innate healing powers of the body (Gunnarsdottir & Jonsdottir 2010; Vardanjani et al. 2013). These ancient techniques of pressure have been practice for thousands of years by many different cultures in the different part of the world including China, Egypt, and India (Fan 2006). It widely through, although never proven, that the concepts of reflexology has its origins in China roughly 5,000 years ago based on the system of Chinese medicine (Georgiou 2006). The using of thumbs to apply a deep pressure to the soles of the feet while acupuncture needles were in place, making reflexology sometimes referred to as acupuncture without the use of needles (Gillanders 2007). In the oldest classic of the theory of Chinese traditional medicine, practitioner was found a total of 600 points comprise the body, with 66 points located in the feet (Brown 2013).

Some people believe that reflexology was developed in Egypt as early as 2330 BC and it believed to be used for more than 4,500 years (Elshamy & Elsafety 2011). This is based on the pictograph evidence that was found in the tomb of Ankomohor, an Egyptian physician in Saqqara, Egypt (Samuel 2011). The tomb is often referred as the physician's tomb because of the painting within depicts two figures giving a clearly form of reflexology view by showing one practitioner is treating his patient's feet, while the other works on his patient's hand (Gillanders 2007).

The modern concept of reflexology was introduced to the United States in 1913 by Dr William Fitzgerald who an ear, nose, and throat surgeon (Wills 2004). He discovered the application of pressure to the tops of the fingers and the middle section of each finger could induce an anaesthetic effect on the facial area (Brown 2013). By this intervention known as

zone therapy, he was able to do simple ear, nose and throat surgery without any form of anaesthesia and some contemporary physician accept this theory and used it during minor surgery in order to treat particular illness (Gillanders 2007). The ideas were continues in the early 20th century through the work of individuals such as Dr Joseph Riley, a physician, physiotherapist Eunice Ingham, and others, who added their own ideas to the simple ten zone concept (Barbara & Kunz 2003). Applying zone therapy's basic principles to the feet, they added four lateral lines and further detail to create a map on the feet showing which pressure points correspond to different parts of body (Barbara & Kunz 2003).

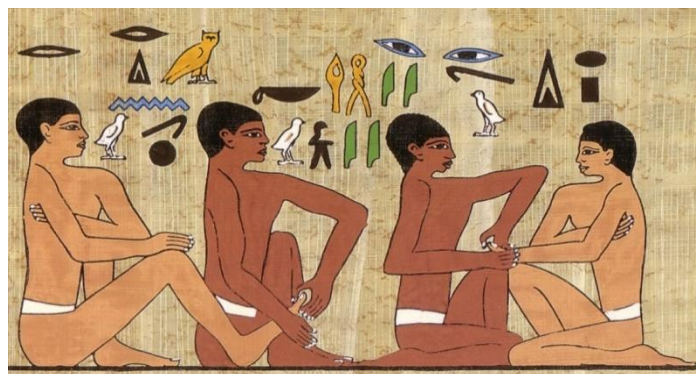


Figure 1: Illustration from Ankmahor's tomb in Saqqara, Egypt. Dated around 2330 BC
Source: Gillanders, 2007

PRINCIPLES OF FOOT REFLEXOLOGY

The principle goal in foot reflexology is to discover the sensitive spots in the feet by alternating pressure of the thumb and other fingers on all parts of the foot (Gillanders 2007). Pressure points on the feet reflect all the part of the body, both external and internal including torso, head, and limbs as well as organ and glands (Oxenford 2013). The pressure applied to a nerve ending constitutes a stimulus which evokes a functional reaction in tissues, including a physiological change (Mace, Ducharme & Murphy 2006). The process also initiates an electrochemical impulse that changes the nervous processes, transmitting a message through the nerve fibres (Gillanders 2007).

As illustrated in Figure 2, Dr William Fitzgerald divided the body into ten longitudinal zones of equal width running the length of the body, five zones on each side of the body (Gillanders 2007; Barbara & Kunz 2003). Each zone relates to the digit from the tips of the toes to the head and out to the fingertips and vice versa (Hall 2000). Zone one extending from the thumb, up the arm to the brain and then down to the big toe; zone two extends from the second finger up the arm to the brain and down to the second toe; zone three extends from third finger up the arm to the brain and down to the forth toe and zone five extends from the little finger up the arm to the brain and down to the little toe (Embong et al. 2016).

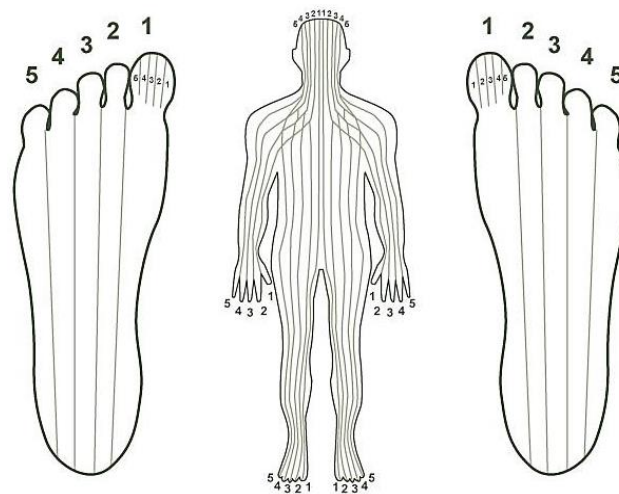


Figure 2: The longitudinal zones of reflexology
Source:

Apart from the longitudinal zones, the feet can also be divided into transverse or horizontal sections. Transverse zones were first described in year 1970 by the German reflexologist, Hanne Marquarett, who also trained with Eunice Ingham (Gillanders 2007). As illustrated in Figure 3, there are 4 guidelines in all, relating to the diaphragm, waist, pelvis, and shoulder. The first transverse zone in the body is found at the level of the shoulder girdle which is located just below the base of the toes and relates to the head and neck; the second transverse zone at diaphragm level located just below the ball of the foot or under the bases of metatarsals; the third transverse zone lies at waist level which is located in the middle of the foot and centre

of the foot arch and relates to the structure of the chest and upper abdomen; the fourth transverse zone is pelvic girdle that found above the heel are relates to the lower abdomen and pelvis (Gillanders 2007; Wills 2004).

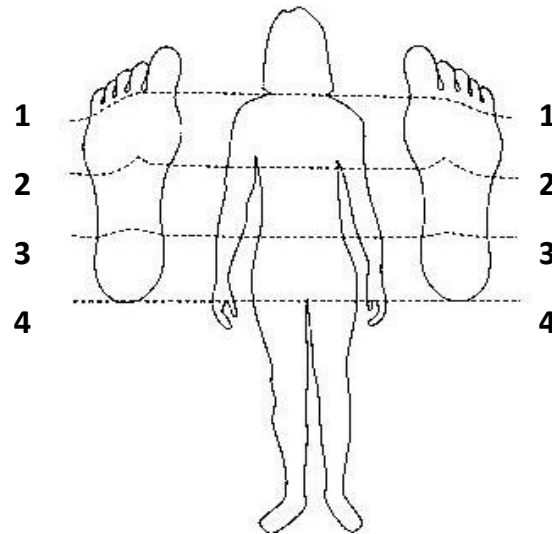


Figure 3: The transverse zones of reflexology
Source:

THEORY OF FOOT REFLEXOLOGY

There is still ambiguity regarding the mechanism behind the action of reflexology, but it has certainly been shown to have profound physiological effects, which may be partly attributed to the relaxation derived from the placebo effect, the therapeutic interaction, and the impact of touch. The explanation for the effect mechanisms of reflexology is based on various theories. There are theories that explain how reflexology actually has impacts on health. These theories include the gate control theory, the neural impulse theory, the lactic acid theory and the endorphins theory (Gozuyesil & Baser 2016).

The first and second basic theories are related to energy. Energy theory advocates that body parts can communicate using electromagnetic fields, and the communication can be blocked based on the surrounding fields (Embong et al. 2016). The third theory indicates that energy flow can be restored, and the fourth is about a blocked pathway which can be opened

(Embong et al. 2016). The last theory proposes that reflexology can break up the lactic acid crystals that are usually deposited in the feet and allow energy to flow efficiently (Embong et al. 2016).

Any physical therapy involves stimulation to the touch-sensitive sensory cells on the surface of the skin, called receptor cells. Stimulation of the reflex points on the skin sends messages from these cells through nerve pathways to control centers inside the body, which send other messages back to the muscles or internal organs. The purpose of all of these theories is to balance the energy in the body. Reflexology helps to maintain the balance of the body by stimulating the inactive parts or soothing those that are overactive.

REFLEXOLOGY IN PRACTICE

Thomas (2001) reported that reflexology usage had increased from 0.4% in 1993 to 2.4% in 1998, and that 5.4% of these numbers were lifetime users of the therapy. Reflexology is the one most popular CAM therapies used in Norway, Denmark, United Kingdom (Jones et al. 2013; Dyer et al. 2013), Northern Ireland, Scotland, England and Wales. Survey forms 2005 show that 21.6% of the Denmark population within the last year used CAM; 6.1% of these have been using reflexology with 75% claims to be satisfied with the result. A study form Norway showed that 5.6% of the Norwegian population in 2007 has used reflexology within the last 12 months. Over the recent decades, a substantial increase in the use of, and change in attitudes towards complementary and alternative medicine has been observed in Norway. Reflexology is widely used in the UK to treat conditions such as back and neck pain, migraine and headaches, chronic fatigue, insomnia, digestive problems and other stress-related disorders (Atkins and Harris 2008).

SCIENTIFIC EVALUATION OF REFLEXOLOGY

Complementary medicine including reflexology intervention have widespread acceptance (Vardanjani et al. 2013). Reflexology techniques have been used for the last 60 years and nowadays, it is the most popular forms of complementary medicine practice (Embong et al. 2016). The attractions factors of this therapy are its simplicity and it generally does not cause any harmful effects. All that is needed are two healing hands, and the knowledge. Reflexology is being embraced in many countries of the world for its provision of enhanced health, mental and physical relaxation coupled with its inherent simplicity and harmlessness (Gillanders 2007).

Recently, more scientific and clinical research has been conducted because of its positive effects in reducing and alleviating symptoms, especially those associated with chronic conditions such as diabetes mellitus, hypertension and muscular illness. Even though reflexology has been tested for a wide variety of conditions, specific medical claims should always supported by sound evidence. Table 1 provides details of scientific evaluation of clinical studies in reflexology and their outcomes. The condition for which the study was established, the amount and type of reflexology administered as well as controls are summarized in the table.

Unal and Akpinal (2016) examined the effectiveness of foot reflexology and back massage on optimizing the sleep quality of haemodialysis patients using the Pittsburgh Sleep Quality Index. The study includes 105 volunteer patients who were registered at a private dialysis clinic and were receiving haemodialysis treatment. Foot reflexology and back massage were administered to the patients two times a week for four weeks. The differences between the pre-test and post-test score averages of the patients were statistically significant ($p < 0.001$)

with foot reflexology was determined to be more effective to improve the sleep quality of haemodialysis patients compared to back massage.

This study aims to identify the effects of foot reflexology applied to women on their vasomotor complaints and quality of life. A randomised controlled study was conducted with 120 women. The experimental group received foot reflexology treatment, while the control group received nonspecific foot massage. The mean scores for hot flashes, sweats, and night sweats, were lower in the reflexology group than the control group after the practice; and the difference between the groups was statistically significant ($p < 0.001$). The mean scores for the sub-groups of the MENQOL demonstrated improvements in both groups after the application ($p < 0.001$). As for the sexual domain, there was a significant improvement in the reflexology group ($p < 0.05$), but no improvements were found in the control group ($p > 0.05$). Results showed that reflexology might be effective in decreasing vasomotor problems and increasing quality of life in women in the menopausal period (Gozuyesil & Baser 2016).

Many pregnant women with low back and/or pelvic pain (LBPP) use pain medications to manage this pain, much of which is self-prescribed and potentially harmful. Therefore, there is a need to find effective nonpharmacological treatments for the condition. Reflexology has previously been shown to help nonspecific low back pain. Therefore; a pilot RCT was conducted investigating reflexology in the management of pregnancy-LBPP. 90 primiparous women were randomised to either usual care, a reflexology or footbath intervention. Primary outcome measures were; the Pain Visual Analogue Scale (VAS). 64 women completed the RCT; retention rates for the reflexology group were 80%, usual care group 83.33% and footbath group 50%. The reflexology group demonstrated a Clinically Important Change (CIC) in pain frequency (1.64 cm). Results indicate it is feasible to conduct an RCT in this

area, although a footbath is an unsuitable sham treatment. Reflexology may help manage pregnancy-LBPP; however a fully powered trial is needed to confirm this (Close et al. 2016).

The aim of this study was to examine and compare the effects of aromatherapy massage and reflexology on pain and fatigue in patients with rheumatoid arthritis. The study sample was randomly assigned to either an aromatherapy massage (n=17), reflexology (n=17) or the control group (n=17). Aromatherapy massage was applied to both knees of subjects in the first intervention group for 30 minutes. Reflexology was administered to both feet of subjects in the second intervention group for 40 minutes during weekly home visits. Control group subjects received no intervention. Fifty-one subjects with rheumatoid arthritis were recruited from a university hospital rheumatology clinic in Turkey between July 2014 and January 2015 for this randomized controlled trial. Data were collected by personal information form, DAS28 index, Visual Analog Scale and Fatigue Severity Scale. Pain and fatigue scores were measured at baseline and within an hour after each intervention for 6 weeks. Pain and fatigue scores significantly decreased in the aromatherapy massage and reflexology groups compared with the control group ($p<.05$). The reflexology intervention started to decrease mean pain and fatigue scores earlier than aromatherapy massage (week 1 vs week 2 for pain, week 1 vs week 4 for fatigue) ($p<.05$). Aromatherapy massage and reflexology are simple and effective non pharmacologic nursing interventions that can be used to help manage pain and fatigue in patients with rheumatoid arthritis (Metin & Ozdemir 2015).

To conduct a pragmatic randomised controlled trial (RCT) to evaluate the effects of reflexology on quality of life (QoL) in women with early breast cancer. One hundred and eighty-three women were randomised 6 weeks post-breast surgery to self-initiated support (SIS) (comparator intervention), SIS plus reflexology, or SIS plus scalp massage (control for

physical and social contact). Reflexology and massage comprised eight sessions at weekly intervals. The primary end-point was 18 weeks post-surgery; the primary outcome measure was the Trial Outcome Index (TOI) of the Functional Assessment of Cancer Therapy (FACT-B)—breast cancer version. The secondary end-point was 24 weeks post-surgery. Secondary outcome measures were the Hospital Anxiety and Depression Scale (HADS) and the Mood Rating Scale (MRS). Reflexology and massage were both better than SIS for MRS relaxation. At secondary end-point, reflexology was better than SIS on the TOI and MRS relaxation. When compared to SIS, reflexology and massage have statistically significant, and, for reflexology, clinically worthwhile, effects on quality of life following surgery for early breast carcinoma (Sharp et al. 2010).

The aim of this study was to determine the effectiveness of reflexology massage on hair regrowth after chemotherapy induced alopecia in cancer women. This is a randomized clinical trial study and study samples were 60 women with stage I, II, or III cancer, that their chemotherapy or radiation therapy completed before and they had complete alopecia due to chemotherapy. They are divided randomly into two groups; control group and reflexology intervention group. Those in the intervention group received reflexology massage 15 min, 3 times (per 8 h) every day for 3 months. Those in the control group were instructed to continue their routine health care. Data were obtained from the patient information form and hair measurement form. Coulisse Vernier was used for hair regrowth measurement. Minimum and maximum hair lengths were measured in two groups every month after beginning of the intervention for 3 times in both groups. Controlling for baseline complete alopecia in two groups, those in the intervention group reported significantly improvement in regrowth of their hair as compared to control group ($p < 0.001$). Alopecia has a detrimental effect on body image among women undergoing chemotherapy and novel interventions are needed to

assist women in coping with this consequence of treatment. For women with cancer, reflexology massage can improve their hair regrowth (Ghavami 2016).

The aim of this study was to determine the effectiveness of reflexology massage on intravenous nitroglycerin induced headache in patients that admitted to the coronary care unit (CCU). This is a randomized clinical trial. The Study samples were 75 patients that divided randomly into three groups; control group, intervention group and placebo group. Then intensity of baseline headache of patients who received NTG measured by 0–10 numeric pain scale. Patients in the intervention group received reflexology massage two times for 20 min (the second application was 3 h after the first one.), which the upper part of the patient's toe that is a reflection point of the head, massaged in both feet. In the placebo group an unspecified point in the foot (heel) that is not related to head massaged. Patients in the control group were instructed to continue their routine health care. Data were obtained from the patient information form and 0–10 numeric pain scale that completed 3 times; just before the intervention and after two times intervention in all groups. No baseline differences existed between three groups for the mean of numeric pain scale ($p = 0.66$) before the study; but the difference between groups after the application was statistically high ($p = 0.000$). Applying reflexology massage in nitroglycerin induced headache can relief these patients pain. Additional research in other complementary and natural health care interventions also may be beneficial (Ghavami & Imani 2016).

Condition	Experimental design	Sample	Treatment	Result	Reference
Pain and fatigue	Randomized controlled trial	51 patients with rheumatoid arthritis	(A) Aromatherapy massage and foot reflexology: 40 minutes weekly (B) Control group: no intervention	Pain and fatigue scores significantly decreased in the aromatherapy massage and reflexology groups compared with the control group.	Metin & Ozdemir (2015)
Sleep quality	Randomized controlled trial	105 haemodialysis patients	(A) Foot reflexology: 30 minutes, twice a week for 4 weeks (B) Back massage: 30 minutes, twice a week for 4 weeks (C) Control group: neither reflexology nor back massage were given	Foot reflexology therapy is more effective to increase sleep quality compared to back massage.	Unal & Akpınar (2016)
Menopausal symptom	Randomized controlled trial	120 women	(A) Foot reflexology: 25 minutes, once a week for 6 weeks (B) Foot massage (control group): 25 minutes, once a week for 6 weeks	Reflexology effective in decreasing vasomotor problem and increasing quality of life in women in the menopausal period	Gozuyesil & Baser (2016)
Pelvic pain	Randomized controlled trial	90 primiparous women	(A) Reflexology: 30 minutes weekly, for 6 weeks (B) Footbath: 30 minutes weekly, for 6 weeks (C) Usual care	The Reflexology group demonstrated a clinically important change in pain frequency (1.64 cm).	Close et al. (2016)
Breast cancer	Randomized controlled trial	183 women who underwent breast surgery	(A) Self-initiated support. (B) Self-initiated support plus reflexology: 8 sessions a week. (C) Self-initiated support plus massage: 8 sessions a week.	Reflexology appeared to have clinically worthwhile effects on quality of life among breast cancer women.	Sharp et al. (2010)
Chemotherapy side effect	Randomized controlled trial	60 women with stage I, II, or III cancer who underwent chemotherapy procedure	(A) Reflexology group: 15 minutes, 3 times, every day for 3 month. (B) Control group: continue with routine health care.	Reflexology group significantly improve in growth of hair as compared to control group.	Ghavami (2016)
Migraine	Randomized controlled trial	75 patients	(A) Reflexology group: 20 minutes, twice a week. (B) Placebo group: unspecific point in the foot that is not related to head massage. (C) Control group: continue with routine health care.	Applying reflexology can relief migraine.	Ghavami & Imani (2016)

CONCLUSION

Each person has a different body system so results from reflexology treatment could vary from one person to another. Based on the latest research conducted, reflexology seems to be effective in helping body systems return to their natural state. It has been suggested by a Swiss study that patients having reflexology sessions show significant decrease in the amount of medication they require. The effectiveness of reflexology has been clinically reported in premenstrual symptoms increasing quality of life, increasing sleep quality in the postpartum and menopausal period, decreasing labour pain, shortening the duration of the first, second, and third phases of labour, treating constipation in women, decreasing stress, fatigue and tension, increasing blood circulation, and enhancing haemostasis.

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