

Reflexology Massage and Adolescents Undergoing Hemodialysis: Literature Review



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1.ABSTRACT

Hemodialysis (HD) is the most common treatment modality for end-stage renal disease (ESRD). Hemodialysis imposes a variety of physical and psychosocial stressors that challenge not only the adolescents but also the care givers. Muscle cramps and fatigue are common complications of HD treatment that adversely affects adolescent's wellbeing, activities, relationships and tolerance to treatment. There is no well-defined mean of preventing or treating these symptoms. Exercises are very important element in the overall health of people at any age. Reflexology massage have been used with apparent success in some patients. It may be the best measure in reducing or preventing muscle cramps and fatigue levels from occurring. The nurse can play an important role in management of these symptoms by applying a safe and an effective assistant method beside the standard medical care as reflexology massage that can promote well-being, relaxation and improve the severity of these symptoms. This article review describes the technique of reflexology massage, the physiology behind it, and discusses the available evidence for its efficacy in reducing common complications of HD such as muscle cramps and fatigue.

Keywords: Adolescents, Hemodialysis, Reflexology massage.

2.Introduction:

Hemodialysis (HD) is the treatment of choice which may be selected to supplement the function of the kidneys and the most prevalent renal replacement therapy for end stage renal disease (ESRD). It can be defined as a process that cleans the blood from excess waste products and removes excess fluid from the body. Excess water and waste products are removed through a semipermeable membrane by means of diffusion and osmosis. Although it sustains the life of adolescents, it disrupts their normal lifestyle. During HD sessions, the adolescents suffer from physical problems such as hypotension, fatigue, nausea, vomiting, muscle cramps, and headache. Also, they suffer from psychological problems such as stress, anxiety, depression and have a significant impact on their daily lives (Amini, Goudarzi, Masoudi, Ahmadi & Momeni, 2016).

Adolescents undergoing HD often experience muscle cramps that is defined as “an involuntary muscle contraction that lasts for a long time”. It is a painful and unpleasant symptom that causes individuals feel uncomfort, shortened dialysis session, affecting sleep and health-related quality of life of those adolescents (El-Deeb, Shadia, Montasser & Moursy, 2017). The next most prevalent symptom of HD is fatigue that is

defined as “a subjective feeling of weakness, loss of energy, exhaustion, and malaise”. Untreated fatigue may lead to increased reliance on others, weakness, loss physical and psychological comfort, which can lead to social isolation and depression (Shady & Ali, 2019).

Complementary and alternative medicine (CAM) may provide new therapeutic options for children with ESRD with the goal of improving symptoms and quality of life. The most commonly used CAM modalities include biologically based products (herbs and dietary supplements) and body-based practices (e.g., massage, acupressure and reflexology). Reflexology involves pressure and massage are applied to reflex spots on the palm or foot. Reflexology massage help in increasing endorphin release for pain control, improved lymph flow, immune system stimulation and blood circulation. Furthermore, it helps in enhancing blood flow which aids in the removal of toxins from the body (Sharifi, Navidian, Jahantigh & Shamsoddini, 2018).

Literature Searching Strategy

The authors searched electronic medical and health care databases, including Google Scholar,

Ovid, ScienceDirect, PubMed, ProQuest, ERIC, and EBSCOhost, to find appropriate literature on this subject.

Background about Chronic Renal Failure

End-stage renal disease characterized by an irreversible loss of kidney function that leads to mortality in the absence of dialysis or renal transplantation. In a developing country with limited national registry, limited diagnostic resources and poor-quality of primary health care for pediatric patients are diagnosed with renal disease when they have already reached the ESRD (Bello et al., 2017). Chronic renal failure is a major public health problem that affects people all over the world, approximately 18 / 1 million of children suffer from renal failure all over the world. In Egypt the reported prevalence of CRF in children is 225 / million populations, the estimated annual incidence of ESRD is around 74/million and the total prevalence of children under dialysis is 264/million (Ibrahim, Ouda & Ismail, 2019).

Children with early stages of CRF may be initially asymptomatic. In the early stages, the children may appear pale and complain of the following symptoms as headache, nausea, fatigue, confusion, lethargy and inability to concentrate. Anemia leading to tachycardia, tachypnea and dyspnea on exertion may occur. As the disease progress, the children experience loss of appetite, oliguria, hypertension, edema, failure to thrive or short stature, growth retardation and delayed fine & gross motor development (Amatya, Moxey & Hooper, 2021).

Diagnosis of CRF based on a child's medical history, physical examination and various tests to assess child's kidney function and determine underlying causes of the condition. This data is used to select the most effective treatment and prevent the condition from progressing rapidly (Mossad et al., 2018). The goals of ESRD treatment are preventing complications, diminishing renal damage and promoting growth and development. The treatment can be either conservative or replacement. The conservative treatment includes preservation of kidney function, dietary modification and drug therapy. Replacement therapy includes dialysis or kidney transplantation. Dialysis can be accomplished either by hemodialysis (HD) or peritoneal dialysis (PD) (Lise, Schwartz, Milbrath & Dall, 2018).

Background about Hemodialysis and Its Common Complication

Hemodialysis is the most common method used to treat advanced and permanent renal failure in children and adolescents and considered a widely used mode of renal replacement therapy. It is a procedure that eliminates extra fluid from the body and remove excess waste materials from the blood. Diffusion and osmosis are used to remove excess water and waste materials across a semipermeable membrane (Albadr, Azer, Abd Elhamed, Mostafa, 2020).

The primary goal of HD is to get rid of toxic toxins, excess salt, and fluids from the blood. It also regulates blood pressure and aids in the right balance of electrolytes like potassium, sodium, and chloride in the body. It also avoids hypervolemia-related side effects and consequences from uremic toxins. The procedure is performed 2-3 days per week in the hospital. Each session lasts for 3-4 hours according to child's condition and usually discharged thereafter (Cho, 2020).

Once the choice to begin HD has been made, the next step is to determine which dialysis modality is ideal for the teenager in order to deliver optimal dialysis. Adolescents and their parents prefer a dialysis treatment that takes as little time as possible, is painless, and allows them to interact with their peers and live a normal life. Conventional HD, everyday HD, and nocturnal HD are the three varieties of HD (Grewal, Mehta, Chakraborty, & Raina, 2020).

Although HD technology has advanced, there is always the possibility of problems during a treatment session. HD imposes a variety of physical and psychosocial stressors that challenge not only the adolescent but also the care givers (Ju et al., 2018).

The common complications of HD related to the patient include hypotension, muscle cramps, fatigue, nausea & vomiting, chest pain, headaches, infection, bleeding, access infection and access obstruction. In relation to school, peer and family life are disrupted because of the treatment schedule. Long-term complications of HD include [amyloidosis](#), [neuropathy](#), accelerated cardiovascular disease, mineral metabolic abnormalities, delayed growth and development (Clavé et al., 2019).

Adolescents with ESRD suffer from a variety of difficulties, including frequent hospitalizations, unpleasant medical procedures, irregular school attendance, and activity restrictions. To stay alive, they must adhere to

stringent nutritional and hydration regimens, as well as a life cycle of repeated dialysis and transplantation. Adolescents may experience emotional and psychosocial consequences as a result of this. Furthermore, adolescence is a critical age of transition that leads to empowerment, socializing, and personality development. Simply surviving is no longer adequate, and quality of life has emerged as a critical priority of comprehensive healthcare (Tjaden, Grootenhuis, Noordzij & Groothoff, 2016).

Muscle cramps are one of the seven main symptoms that adolescents undergoing HD treatment experience. It's characterized as the onset of a painful, long-lasting involuntary muscle contraction that can be seen or palpable and commonly found typically in the lower extremities, but muscles of the hand, arm and abdomen may be affected. Many adolescents find symptom very uncomfortable. Muscle cramps are affecting 33% to 86 % of children and adolescents who receive HD. Muscle cramps begin with extremely painful muscle jerks that is too difficult for the patients to move (Bordoni, Sugumar & Varacallo, 2020).

Muscle cramps are most common near the end of HD session. The exact etiology of muscle cramps in adolescents undergoing HD is unknown. Reduced fluid volume in the body, lower blood pressure, fluid and electrolyte imbalance, hyponatremia, tissue hypoxia, hypomagnesaemia, changes in plasma osmolality, and changes in extracellular fluid volume have all been linked to cramps. The main electrolytes that help the cells to function normally and affecting muscle cramps are potassium, sodium and calcium (Punj, Enaam, Marquez, Atkinson & Batlle, 2020).

There are currently no known safe and efficient treatments for muscle cramps. Massage treatment has been suggested to cure muscle cramps as well as preventing them. Muscle cramps have a substantial psychological impact on adolescents' mood and quality of life which is often underestimated. Repeated occurrences of muscle cramping cause chronic pain, lack of sleep, a decline in adolescent physical and social activity, which has been linked to adolescent withdrawal from dialysis therapy in extreme situations, also adolescents become critically ill due to inadequate dialysis and frequent admission to the hospital. For these reasons, the prevention of this symptom is considered to be one of the major challenges for adolescents undergoing HD (Bordoni, Sugumar, & Varacallo, 2020).

Fatigue is one of the most common and frequent symptoms that adolescents undergoing

HD experience. It is defined as a feeling of exhaustion, weakness, tiredness, lethargy and lack of energy which is often unrecognized. The prevalence of fatigue is ranging from 60 % to 97 % in HD pediatric patients. The causes of this fatigue in adolescents include uremia, anemia, sleep disturbances, and psychosocial distress. It has been associated with lower survival rates, increased risk for cardiovascular morbidity & mortality. Moreover, it is a stressful and debilitating condition that impacts teenagers' everyday activities which leads to decrease functioning, limiting their ability to work, socializing and engaging in physical activities and exercise (Salehi, Dehghan, Mangolian Shahrabaki & Ebadzadeh 2020).

Despite the availability of pharmaceutical interventions such as L-carnitine for fatigue relief, side effects such as gastrointestinal disorders, nausea, vomiting, stomach upset, heartburn, diarrhea, and sleep disorders, as well as drug interactions due to reduced renal excretion and increased drug toxicity, have led to a greater use of complementary and alternative medicine (CAM) such as reflexology massage, nutrition therapy, sleep disorder treatment, stress management, sport, Yoga, depression treatment, and acupressure are used to lower fatigue in adolescents undergoing HD (Salehi et al., 2020).

Control of fatigue and muscle cramps for adolescents undergoing HD required a multidisciplinary approach. Reflexology massage, as a CAM has been demonstrated in multiple studies to play a vital role in the management of these symptoms, notably in reducing their intensity. When these symptoms are adequately treated, the quality of life of adolescents increases significantly (Pawliuk et al., 2019).

Background about Reflexology Massage

Complementary and alternative medicine has become an integral part of health care worldwide. Complementary medicine refers to non-traditional therapy that is used as a supplement to traditional medicine. While, alternative medicine refers to non-traditional therapy that is used in place of traditional medicine (Khattab, Shehata & Soltan, 2018).

Furthermore, CAM is categorized into five classes, including alternative medical systems, mind-body interventions, manipulative and body-based practices, biologically based interventions (natural products), and energy therapies. Manipulative and body-based therapies are currently one of the main branches of

complementary medicine. Manipulative and body-based practices focus primarily on the body structures and systems, including the bones, joints, soft tissues, circulatory and lymphatic systems. Reflexology massage is among the most commonly used methods in body-based manipulation therapies (**Balouchi et al., 2018**).

Reflexology massage is defined as an ancient healing art that is based on the traditional Chinese medicine practice which help to balance energy channels in the body. Finger pressure is used to stimulate trigger points of energy or cosmic life force on the body which is called reflex-points. Pressing these points can help release muscle tension and promote blood circulation. The International Institute of Reflexology defines reflexology as a science that deals with the principle that there are reflex areas in the feet, and stimulating them properly can help many health problems in a natural way—a type of preventative maintenance. Furthermore, the institute emphasizes that its purpose is not to treat or diagnose for any specific medical disorder but to promote better health and well-being (**International Institute of Reflexology, 2012**).

Reflexology massage is based on the concept that specific areas of the feet, hands or ears which are called reflex points correspond to specific internal organs within the body. It has been reported that massaging these points can enhance the blood supply and circulation to related organs (**Dehghanmehr et al, 2018**).

Additionally, reflexology massage is a safe, non-invasive, efficient and reliable technique that hasn't reported side effects, helps to save time, energy and improves the quality of the nurse-adolescent relationship. Reflexology massage is considered beneficial alternative treatment in relieving headache, fatigue, pain, insomnia, muscle cramps, anxiety, menstrual disorders, arthritis, and digestive problems. It also improves early childhood growth and development (**Bernstein, Karkhaneh, Zorzela, Jou & Vohra, 2021**).

History of Reflexology

Earliest discovery of reflexology was found in Egypt based on the observation of daily life activities including the medical practices. Other studies have reported that reflexology emerges from China for the last 5000 years ago but there is no documentation found, so with the finding of hieroglyphic mural in the pyramid located in Saggara, reflexology is considered as a part of Egyptian culture from 2330 BC. At the late of 14th

century, reflexology was already applied throughout the Europe with another name; zone therapy. Father of modern reflexology, Dr. William Fitzgerald (1872–1942) has discovered that zone therapy has been used by Aboriginal American. Jenny Wallace from North American Indians tribes used pressure at the feet as one of the sources of healing process. Fitzgerald study has brought reflexology practice to be widely used in the United States. The discovery of zone therapy was developed from the finding of pressure applied on many parts of body such as hands, nose, ears, and many more can relieve pain sensation. Dr. Joe Shelby Riley from Washington has conducted many studies of therapy including reflexology and has used this therapy for many years. Eunice Ingham (1879–1974) has worked together with Dr. Riley in 1930's as the therapist and work greatly to help people understand reflexology she shared the technique of reflexology with others by writing many books such as "Stories the Feet Can Tell, Stories the Feet Have Told, and Stories the Feet Are Telling". Reflexology has greater recognition after the emergence of another eminent woman in this therapy world with her book; "Helping Yourself with Foot Reflexology" which reached more than 500,000 copies sold **Embong, Soh, Min & Wong, (2015)**.

Theoretical Basis of Reflexology Massage

Various theories have been presented to describe the clear working system on this holistic therapy. Collectively, there are four theories that support the reflexology mechanism which gives impacts to the body health. These theories were used for explaining biological, physiological, and metaphysical mechanisms of reflexology including the energy channel theory, pain gate control theory, reflexology zone theory and Chi theory (**Rejeh et al., 2020**). As it shows the mechanism of reflexology in reducing pain and fatigue in chronic diseases in adolescents. Applying pressure on a certain point on the hand and foot can increase blood circulation, neural impulses and secretion of endorphin and improve the body function (**Rambod, Pasyar, & Shamsadini, 2019**).

The first one, the energy channel theory was explicated by **Kandemir, and Oztekin (2019)** who advocating reflexology points that are linked to internal organs and structures by energy channels which become blocked in the event of illness and which are re-opened through reflexology. During physical suffering or discomfort caused by illness or injury, the human body do not function

effectively because the body in imbalance state and consequently blocked the vital energy pathways.

The second, pain gate control theory; painlessness is caused by the electrical stimulation of the nerve. Reflexology acts as the transcutaneous nerve stimulation (TENS), which transfers the pain message to the brain and blocks the pain perception path. Also, reflexology acts by releasing endorphin and enkephalin which help to resist pain (Heidari et al., 2017).

Based on the third, reflexology zone theory; the human body is divided into 10 vertical zones as five equal zones in each side of the body from the head to thumb. Therefore, the application of pressure by fingers on each side reduces pain at that side (Rejeh et al., 2020).

The fourth, chi theory, explained mechanism of reflexology as energy circulates in the body in certain pathways. The intentional models of pain perception describe pain reduction in response to reflexology and due to distraction. Therefore, the positive effects of reflexology are the result of the relationship between adolescent patients and the therapist, rather than the characteristics of the intervention. This method is often used for symptomatic treatments along with pharmaceutical treatments (Chandrababu, Rathinasamy, Suresh & Ramesh, 2019).

Reflexology Massage Intervention

The patient will be lying comfortably, covered by a blanket, somewhat higher than the chair in which the reflexologist sits, and will have pillows under the knees and the head to induce relaxation. In addition, the patient will be barefoot and in a comfortable position, with any tight clothes loosened so as not to hinder circulation. Then the patient will be assessed continuously for tolerance to the amount of pressure applied. The pressure needs to be firm enough to activate the body's healing potentials but must also be tolerable to the patient. Sensitivity varies in each individual, and the feet usually become more sensitive with subsequent treatments. Each area is worked, finishing the toe area on the one foot and then treating the toe area on the other foot, and so on, going from one foot to the other (Lindquist, Tracy & Snyder, 2018).

Although it is emphasized that reflexology is to be applied to the feet as a whole, it is important to work specifically on several systems of the body. These specific systems are, for example: the digestive system to increase proper elimination; the lymphatic system, to increase the

clearance of waste materials; the bladder and kidneys, to increase urine and energy flow; the solar plexus (where feelings and emotions are stored), to increase relaxation; all internal glands, to stimulate their respective functions; and the lungs, to increase oxygen consumption. A foot map with physical locations and corresponding body systems is illustrated in the interactive website (www.dk.co.uk/static/cs/uk/11/features/reflexology/footchart.html). By using reflexology on these body systems, the reflexologist is both increasing circulation and elimination (Lindquist, Tracy & Snyder, 2018).

Benefits of reflexology massage for adolescents

Reflexology massage is a very effective way for parents to help their adolescent to be healthy. It promotes an emotional bond between parents and their children. It is easy to learn if the parent is interested in being the one who performs the reflexology massage for their adolescent. Reflexology massage not only helps balance the organs, and energy but also stimulates blood circulation, helps to deliver nutrients to all body cells and stimulates the functioning of the endocrine glands (Canbulat Sahiner & Demirgoz Bal, 2017).

In addition to, reflexology massage reinforces and supports the body's defenses against lung problems such as colds, coughs, sore throats and tonsillitis. It helps to relax adolescents when they are upset, improves sleep, relieves insomnia and therefore, it improves concentration on school days and helps to regulate the digestive system. Moreover, it can help in regulating and reducing the symptoms of colic, diarrhea or constipation (Al Qahtani & Ahmed, 2021).

Reflexology massage possess many beneficial effects, besides, it has high level of safety and effectiveness. It also offers natural treatment without consuming drugs and it is easy to use. Its effectiveness in treating the root of some diseases may lead to many benefits in health concern to alleviate physiological problems (e.g. pain and physiological indicators) and enhance psychological dimensions (sleep, anxiety, depression) of individuals; thereby, it improves physical, psychological, and social aspects of pain (Alinia, Bagheri, Shorofi, Mousavinasab, Saatchi, 2020).

Reflexology massage helps to strengthen and balance the immune system. This is really important as it can help the adolescent to fight the germs and foreign substances that fill their

environment, strength the immune system to prevent infection and allergies for the rest of lives. It encourages the self-healing capacity of the body, unlike conventional medicines, which often focus on treating symptoms rather than addressing the causes of ailments (Karatas & Dalgic, 2020).

Additionally, Reflexology massage helps in easing day-to-day stresses and alleviates the effects from injury and illness. Reflexology massage offers common benefits and one of them is reducing stress by applying pressure to the specific area at feet and hands which induce general relaxation that help adolescent to relax and reduce fatigue. Additionally, it also allows the body to get ride off from any repetitive stress in everyday life by releasing endorphin, which is a body's natural pain-relieving chemical (Öztürk, Sevil, Sargin & Yücebilgin, 2018).

Research Studies of the Reflexology Massage Method

A number of clinical trials indicate that it may be a successful method in a variety of specialists. In a study by Ross et al., (2002), the effects of reflexology on anxiety and depression were compared with those of simple foot massage on two groups of cancer patients. These cancer patients received six sessions of intervention, and depression and anxiety were measured at baseline and within 24 hours after each session. No significant differences were found between the groups with respect to anxiety and depression, but both groups indicated experiencing relaxing effects from the treatment.

A case study design was used to test the effects of reflexology on six cases of women with fibromyalgia (Gunnarsdottir & Peden-McAlpine, 2010). Each case had 10 sessions of reflexology over a period of 10 weeks. Data were collected by observation, interviews, and diaries and then analyzed within each case and across cases. The findings showed that symptoms of pain in multiple areas started to localize and decrease in severity. The areas that responded best were the head, shoulders, neck, and arms.

In a study by Hodgson and Andersen (2008), 21 nursing home residents with dementia were given four reflexology treatments over 4 weeks. The primary efficacy endpoint that was obtained was a significant reduction of physiological distress as measured by salivary alpha- amylase. Furthermore, the residents demonstrated significant reduction in observed pain during the study period.

Quality of life (QOL) has been found to be enhanced in cancer patients after reflexology. To investigate patient satisfaction with reflexology therapy and its impact on QOL, an audit was undertaken in a Scottish hospice (Milligan et al., 2002). Twenty cancer patients completed self-report questionnaires after receiving from three to more than five reflexology sessions from a nurse trained in the therapy. The patients reported that reflexology reduced pain, improved sleep, enhanced relaxation, and reduced stress. In England, a similar study took place in which 34 cancer patients under palliative care were asked to comment about the reflexology therapy they had received (Gambles et al., 2002). The patients received from four to six individually tailored reflexology interventions. They commented on reflexology as being emotionally beneficial in reducing anxiety and tension, improving sleep, and coping with the side effects of medications.

Patients with multiple sclerosis (MS) tend to suffer from a variety of chronic muscular symptoms, and two studies have reported improvements in symptoms after sessions of reflexology. Siev-Ner et al. (2003) conducted a randomized controlled clinical trial to determine the effects of reflexology on the symptoms of MS. Statistically significant positive differences in the scores for paresthesia, urinary symptoms, and spasticity were found in the group receiving reflexology compared with the control group. Another study compared the effects of reflexology and progressive muscle relaxation training for 50 people with MS with a crossover design (Johns et al., 2010). Positive effects were found from both treatments on physiological and psychological outcomes.

Domestic partners can be taught by qualified professionals to perform foot reflexology on patients with metastases from cancer. Stephenson et al. (2007) showed that partner-delivered foot reflexology had significant effects, resulting in a decrease of pain and anxiety as compared with a control group that received reading sessions from their partners. Social benefits of such use of reflexology were reported by some participants.

Subjective reports in studies of reflexology are few but suggest that the experience is mostly positive, indicating relaxing, calming, and comforting effects. Patients receiving reflexology frequently experience relaxation as a benefit (Gambles et al., 2002), and feel more energy and a sense of well-being (Woodward et al., 2010). Patients have also commented on how reflexology can create space for them to talk about their worries

and concerns, which is an important part of the therapy as a whole (**Mackereth, Booth, Hillier, & Caress, 2009**).

A systematic review of randomized controlled trials was done to explore if reflexology can have specific hemodynamic effects (**Jones et al., 2012**). The findings indicated that reflexology can have some effect on hemodynamic variables.

After that, in the last ten years many researches and articles about reflexology are published. For patients undergoing HD, early on, this method was extended to adults and later to children undergoing HD. In recent years, it has been successful in improving common complications that occur in patients during HD session. As presented by **Ghazanfari et al., (2016)** how conducted an article review about "A Systematic Review of Potentially Effective of Reflexology for Reducing Fatigue among Iranian Patients Who Receive Hemodialysis" and concluded that, this simple, low-cost, and practical intervention can be used for the reduction of fatigue among HD patients by nurses. However, future well-designed studies are recommended to confirm the efficacy of these and other potentially effective interventions for reducing fatigue symptoms in HD patients.

Another article review conducted by **Bayülgen & Gün, (2022)** about "Effect of Complementary and Integrative Treatments on Fatigue Symptoms in Hemodialysis Patients: A Systematic Review" and found that acupressure, aromatherapy, reflexology, massage, and yoga practice were found to be applied to HD patients and be effective in reducing pain, nausea, fatigue and anxiety as well as improving sleep quality. It is recommended that these methods be included in the routine clinical care of patients receiving hemodialysis.

As presented by **Unal & Akpınar (2016)** how conducted a study about The effect of foot reflexology and back massage on hemodialysis patients' fatigue and sleep quality and concluded that Foot reflexology and back massage were shown to improve the sleep quality and reduce the fatigue of hemodialysis patients. Compared to back massage, foot reflexology was determined to be more effective. Another study conducted by **Shahgholian, Jazi, Karimian & Valiani (2016)** about The effects of two methods of reflexology and stretching exercises on the severity of restless leg syndrome among hemodialysis patients and concluded that reflexology and stretching exercises can reduce the severity of restless leg syndrome.

These two methods of treatment are recommended to the patients.

Also a study conducted by **Dehghanmehr, Sargazi, Biabani, Nooraiein & Allahyari, (2019)** about Comparing the effect of acupressure and foot reflexology on anxiety and depression in hemodialysis patients and concluded that reflexology massage is a safe and economical nursing intervention for decreasing fatigue in hemodialysis patients.

In Egypt, this technique was applied in different specialty of nursing practice, a study conducted by **Abusaad & Ali (2016)** about Effect of point 6 acupressure on chemotherapy associated nausea and vomiting among adolescents with cancer and concluded that acupressure has a significant role in the reduction of nausea, vomiting and retching associated with chemotherapy among adolescents with cancer, and use of this non-pharmacologic technique for oncology nurses is suggested. Another study conducted by **ELSHAMY & ELSAFETY (2011)** about the Effect of nursing interventions using foot reflexology on blood pressure and quality of life of hypertensive patients at Mansoura University hospitals and concluded that This study supported that foot reflexology can reduce blood pressure levels in patients with hypertension.

Another study conducted by **Badr, Gaafer & Ahmed (2020)** about the Effect of Foot Reflexology Versus Cryotherapy On Pain Associated with Arterial Puncture Among Critically Ill Children and concluded that foot reflexology and cryotherapy were effective in reducing critically ill children's pain during and immediately after arterial puncturing procedure.

Recently, there are some researches about reflexology massage and its effect on reducing common symptoms in patients undergoing HD as muscle cramps and fatigue are published. In Egypt, this technique was applied through three studies, two among adult patients and only one among children. first one conducted in Mansoura University by **Shady & Ali (2019)** about the "Effect of reflexology foot message on fatigue level for patients undergoing hemodialysis." That was applied on 72 patients and concluded that patients on HD who underwent a course of 40-minute reflexology massage after the HD session, 3 times per week, for 3 consecutive weeks with a total of 9 massage sessions; had significant decrease of fatigue intensity level, improvement of physical activities, emotional wellbeing and sleeping patterns and social activities. 2nd one conducted in Mansoura University by **El-Deeb,**

Shadia, Montasser & Moursy, (2017) about “Effect of Reflexology Foot Massage on Leg Cramps for Patients on Hemodialysis” and concluded that patients on HD who underwent a course of 40-minute reflexology massage after the HD session, 3 times per week, for 3 consecutive weeks with a total of 9 massage sessions; had significant decrease of leg cramp intensity levels, frequency and duration. The third study conducted at Minia University by **Mohamed, Farouk Abolwafa & Mahmoud Ahmed, (2021)** about “Effect of Foot Reflexology on Hemodialysis School Age Children on Fatigue and Sleep Quality” this study applied on 30 patients, amid to evaluate the effect of foot reflexology on hemodialysis school age children on fatigue and sleep quality and concluded that, the use of foot reflexology for school-age children with HD showed improved sleep quality and reduced fatigue levels.

3. Conclusion

This article review describes the reflexology massage method, the scientific basis about it, and discusses the available evidence for its efficacy. Currently, there is actually no pharmacological treatment for controlling and managing common complications that occur due to HD treatment, so treatments aims to control or relieve symptoms. Reflexology massage is a complementary therapy that have been discovered to serve this aim. In addition, current studies have shown that reflexology is a noninvasive and safe nursing intervention. Reflexology can be used to improve physical and psychological symptoms in adolescent with various types of health, but its effect on adolescents' undergoing HD has not been studied yet. Therefore, this study is applied to investigate the effect of reflexology massage on adolescents undergoing HD and found that, the use of reflexology massage for adolescents undergoing HD had appositve effect on muscle cramps and fatigue levels.

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