

Effect of Foot Reflexology on Physiological Stability, Weight and Fatigue among Children Undergoing Hemodialysis

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Abstract

Background: Hemodialysis is a common treatment modality among children, during hemodialysis children may complain of exhaustion, headache, changes in physiologic indices and body weight. Foot reflexology can overcome these complains and help practicing nursing care more efficiently. **Objective:** Determine the effect of foot reflexology on physiologic stability, weight and fatigue among children undergoing Hemodialysis. **Settings:** The study was conducted in the Hemodialysis Unit at Smouha Specialty Hospital in Alexandria, Egypt. **Subjects:** A convenience sampling of 60 children, who admitted to the previously mentioned unit and fulfilled the criteria, comprised the subject. The sample was divided into two equal groups (30 children in each group). **Tools:** Three tools were used. Tool I: "Socio-demographic Characteristics and Medical History of Children's Assessment Sheet. Tool II: "Physiologic profile Assessment Sheet ". Tool III: "Child Fatigue Scale (FAS)". **Results:** The study revealed that there was a significant improvement in physiologic indices, and body weight among children in the study group compared to those in the control group ($P= 0.005$, $P= 0.005$ and $P= 0.003$ respectively). Furthermore, children in the study group exhibited significantly lower fatigue levels than children in the control group ($P=0.000$, 0.000 and 0.000 respectively). **Conclusion:** The implementation of foot reflexology is an eminent technique that can improve physiologic stability, body weight, and lowered fatigue level. **Recommendations:** Pediatric nurses should implement foot reflexology in their practice for children undergoing hemodialysis. Moreover, hospital policies should establish educational programs about foot reflexology for children undergoing hemodialysis.

Keywords: Hemodialysis, foot reflexology, children, fatigue, weight, and physiological stability.

Background

Chronic kidney disease (CKD) is considered a permanent deterioration of kidney structure or function that continues over a minimum period of three months. The incidence of CKD in children has steadily increased (Melhem, 2021). During the past 20 years mortality in children with kidney failure with replacement therapy is

up to 30 times higher than the general population (McGuire, et al., 2018).

Hemodialysis represents the main mode for the treatment of CKD. The indications for initiating maintenance dialysis therapy in children consist of a combination of clinical and biochemical characteristics (Youssef, 2013). Children may have to undergo HD to replace the typical functions of the kidney when the estimated glomerular filtration rate is below the lower end of this range

(McGuire, et al., 2018). Furthermore, fluid overload results in systemic hypertension, overt edema, or cardiovascular instability, which is an absolute indication for HD. Uncontrolled hyperkalemia, and acidosis are further objective indications for hemodialysis (Bradley, et al., 2014).

Despite HD being critical to survival, it poses greater risks and is associated with numerous side effects involving lethargy, fatigue, irritable legs, muscle cramps, nausea, vomiting, dizziness, and perpetual systemic inflammation (Bradley et al, 2014). A common complication of HD treatment is post-dialytic fatigue which is present in 60–97% of children. It is speculated that this may be linked to impaired perfusion of the central nervous system as a direct consequence of decreased cardiac output due to hypovolemia and myocardial dysfunction. Children can need over five hours of sleep to recover from post-dialysis fatigue, affecting both HD compliance and quality of life (McGuire, et al., 2018).

Children undergoing hemodialysis experience fatigue for various reasons, including the accumulation of metabolic waste in the body, fluid-electrolyte imbalances, abnormal energy expenditure, anemia and depression (Hoppe, et al., 2014). Fatigue and sleeplessness negatively affect children's work, leisure activities, nutritional habits, and relationship with family and friends (Abass & Abdelhamed, 2019). It has been reported that between 50% and 83% of those children experience sleep disorders, and between 7% and 92.5% experience fatigue (Kevser & Reva, 2016). A solution to this problem would likely have a positive impact on the quality of life and morbidity among children undergoing hemodialysis (McGuire et al, 2018).

Children' weight is a fluctuating parameter, which is not static but dynamic over time. Many children do not show improvement of appetite, weight gain, or statural growth in children on chronic HD due to significant dietary and fluid restrictions that are needed

to prevent interdialytic weight gain during the “off dialysis” days. However, implementing these restrictions becomes challenging, especially in the pediatric age group. After 6 months, the only prepubertal child included showed a significant catch-up growth (Bonthuis, et al., 2021).

Pediatric hemodialysis requires good therapeutic plan which must be formulated by a multidisciplinary team of pediatric specialists. This plan to manage medical, nursing, nutritional, physiological parameters, growth, cognitive development, psychological aspects of care, and quality of life (Bradley, et al., 2014). Unfortunately, untreated fatigue among children may lead to increased dependency on others, weakness, loss of physical and psychological comfort that may lead to social isolation and depression (Mohamed, et al., 2021).

Non- pharmacological interventions as nutritional therapy sleep disorder management, stress management and complementary therapy can be used for management and relive of children's fatigue (Fischbach, et al., 2016).

Reflexology is a technique for helping to normalize body functions by applying the pressure to reflex points in the hands and feet that are related to the entire body's glands, organs and parts. It is the stimulation of neural pathways. Reflex areas are stimulated using the fingers in order to transmit nerve impulses, restore the proper flow of the bloodstream and maintain the homeostasis of the body. More particularly, foot reflexology is a pressure technique applied to the nerve endings in feet (El-Abd, et al., 2015).

Reflexology reduces anxiety, nausea and vomiting, pain, sleeplessness and fatigue . Reflexology was shown to have positive effects on emotions and the immune system. A pediatric nurse has a crucial independent role in children's care during hemodialysis. She plays a particularly important role in

eliminating or mitigating their complaints (Kevser & Reva, 2016).

The pediatric nurse should incorporate reflexology into their practices to overcome problems with sleeplessness, physiological instability and fatigue (Abass & Abdelhamed, 2019). Nowadays, evidence has shown that reflexology massage is beneficial in many conditions such as pre- and postnatal discomfort, pain, headache and fatigue. Reflexology back massage resulted in reduced pain, anxiety and sleep disorders and improved physiological parameters and children's moods by relaxing them (Kevser & Reva, 2016).

Aims of the Study

Determine the effect of foot reflexology on physiological stability, weight and fatigue among children undergoing Hemodialysis.

Research hypotheses

- Children who receive foot reflexology technique exhibit stable physiological indicators than those who do not.
- Children who receive foot reflexology technique exhibit stable body weight than those who do not.
- Children who receive foot reflexology technique experience less fatigue than those who do not.

Operational definition:

Foot Reflexology: refers to the application of gentle pressure on certain points (reflex areas) on the feet through specific techniques with the researcher's thumbs and fingers to release blockages or congestion of the nerve endings in the feet while stimulating circulation throughout the entire energy system (Afifi, et al., 2017).

Materials and Method

Materials

Design: A quasi-experimental research design was used to accomplish this study.

Setting: The study was conducted in the Hemodialysis Unit of Smouha University Specialty Hospital for children in Alexandria, Egypt.

Subjects: A convenience sampling of 60 children who fulfilled the following criteria comprised the study subjects:

- Age from 7-12 years.
- Free from foot injury.
- Free from other chronic disorders such as diabetes mellitus and hypertension.

Children were divided into two groups. Each group consists of 30 children as follows:

- Control group (group I): received routine hospital care.
- Study group (group II): received the foot reflexology

Children of the control group were chosen first and then the children of the study group will be randomly chosen to avoid sample contamination.

Tools: three tools were used

Tool 1: Socio-demographic Characteristics and Medical History of Children's Assessment record. It was developed by the researchers. It included two parts:

Part I: Socio demographic Characteristics of children such as age, sex, educational level, and body weight.

Part II: Medical history of children such as diagnosis, the onset of disease, and frequency of hemodialysis session.

Tool 2: Physiological profile Assessment record: It was developed by the researchers after a thorough review of the related literature (Miller, et al., 2016; Hayyu, et al., 2020). It included an assessment of heart rate, respiratory rate, blood pressure, and temperature.

Tool 3: Child Fatigue Scale (FAS):

It was developed by Eaton et al., (2003) and adopted by the researchers to assess and measure fatigue in children between 7- 12 years through self-report. It consisted of 14 items that describe the intensity of fatigue, based on a five-point Likert scale as follows:

Not at all (1), a little (2), some (3), quite a bit (4) and a lot (5). Total fatigue scores ranged from 1 to 70 as follows:

- From 1-13 score indicates no fatigue.
- Scores from 14 to 27 indicates low fatigue.
- Scores from 28 to 41 score denotes moderate fatigue.
- Scores from 42 to 55 score represents high fatigue.
- Scores from 56 to 70 indicates great experienced fatigue.

Method

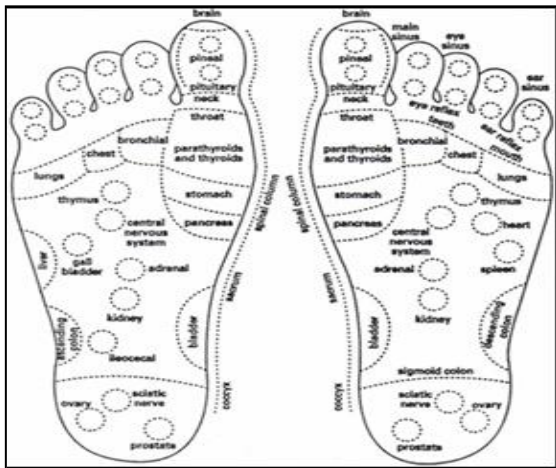
- Approval of the Research Ethics Committee of the Faculty of Nursing was obtained (13-3-2021). An official approval was obtained from director of the Hemodialysis unit of Smouha University Specialty Hospital for children in Alexandria Egypt, after providing full explanation of the aim of the study. Tool 1 and 2 were tested for content validity by 5 experts from pediatric nursing field and the necessary modifications were done accordingly. A pilot study was carried out on 10% (6 children) and those children were excluded from the study. A pilot study was conducted to test the clarity and applicability of the research tools. Reliability of the tools was tested using Cronbach's Alpha test, which revealed 0.830 for tool one and 0.798 for tool two; that denoted acceptable values. Data was collected by the researchers during the period from March 2021 to November 2021.
- Initially characteristics and medical history of each child in the two groups were assessed using the tool 1.
- Assessment of physiological parameters, body weight and signs of fatigue was also carried out before performing reflexology for each child in both groups using tools 1, 2 and 3.
- **For the control group (group I)**
The children were received only the routine care of the hemodialysis unit.
- **For the study group (group II)**
 - Foot reflexology was chosen because of the presence of a fistula in the children's arm plus routine care of the hospital.

- Foot reflexology was performed for 30 minutes before the hemodialysis session (15 minutes for each foot) in the morning shift for three consecutive hemodialysis sessions.

Reflexology was performed by the certified researchers as follows:

1. The child and his mother were prepared psychologically by the researcher through explaining the purpose, effects of foot reflexology and its importance to improve physiological stability and fatigue.
2. The children were placed in a supine position with an elevation of the head of the bed. Children's feet were placed in comfortable position with a small pillow placed under the knees to facilitate the massage.
3. The researcher's hands were warmed before starting the session. The researcher seated in front of the children's feet. Six drops of baby oil were applied to the researcher's hands to facilitate the massage and minimize skin friction of children's feet.
4. Reflexology began with the relaxation technique of rubbing the feet by lightly running the fingertips up, down, and on the sides of each foot in a feather-like motion.
5. The application of foot reflexology was performed from top to down manner, where the actual massage started on Head/brain (top of each toe) Pituitary (center of big toe), Thyroid (base of big toe). Neck/shoulders (ridge of toes), Chest/lungs (ball of foot) and kidney (base of toe to base of heel) to stabilize physiological parameters and relieve fatigue.
6. Each point was pressed and released by the thumb walking technique for 2 to 3 minutes. After that pressure was applied to the solar plexus reflex point by placing the thumb in the center of the foot to relieve stress.
7. After reflexology techniques are applied to the selected areas that are corresponding to the nerve supply on the feet. The foot reflexology ended with the

performance of the same relaxation technique as before.



Kevser, et al. (2016) The effect of foot reflexology and back massage on hemodialysis patients' fatigue and sleep quality. *Complementary Therapies in Clinical Practice*; 6(4):165-178.

- Assessment of physiological parameters body weight and signs of fatigue was carried out after performing reflexology for each child of both groups using tool 1, 2 and 3.

Ethical considerations:

Written informed consent of children/parents was obtained after explaining the aim of the study. Researchers were reassured them about their rights to withdraw at any time. Parent was ascertained about confidentiality of their children’s data and anonymity was ascertained.

Statistical Analysis

The collected data was computed and analyzed using the statistical package for social studies (SPSS) Version 25.0. Qualitative data were described using number and percent. Quantitative data were described mean ± standard deviation. Finally, analysis and interpretation of data were conducted. P-values of 0.05 or less were considered statistically significant.

Results

Table 1 clarifies the socio-demographic characteristics and medical history of children undergoing hemodialysis. It was found that 43.3% and 36.7% of children

aged from 11to12 years among the study and control groups respectively. Considering level of education, the same table illustrated that children in the study as well as those in control group had preparatory education (76.7% and 86.7 % respectively). Moreover, 76.7% and 66.6% of them in the study and control groups were females with mean body weight was 25.93±3.153 and 24.980±1.96 Kilograms respectively.

The same table also highlighted that 56.7 % and 50 % of children in the study and control groups respectively were diagnosed with chronic renal failure. Moreover, 40% and 43.3% of them had suffered from the disease science 3 to less than 6 years. The majority of children in the study and control groups were attending hemodialysis session three times per week (93.3%& 90.0% respectively).

Table 2 represents the effect of foot reflexology on physiological parameters of children undergoing hemodialysis among the control and study groups. Regarding temperature it was found that there were statistically significant differences on the three sessions during and after sessions among children in the control and study groups where (P=0.008, P=0.004, P=0.000, P=0.005, P=0.000 and P=0.000 respectively). Concerning pulse rate there were statistically significant differences after the three sessions between the control and study groups, where (P=0.012, P=0.013, and P=0.012). The table also illustrated that statistically significant differences were found during and after the first and third sessions and only after in the second session between the control and study groups regarding respiration, where (P=0.034, P=0.011, P=0.000, P=0.000, P=0.000 and P=0.000 respectively). Considering systolic the table highlighted that there were statistically significant differences only before the second and third sessions as well as during and after the three sessions between the control and study groups where (P=0.002, P=0.004, P=0.000, P=0.000, P=0.000, P=0.000 and P=0.000 respectively).

respectively), while in diastolic blood pressure, there were statistically significant differences during the second and third sessions as well as after the three sessions among children in the control and study groups, where ($P=0.000$, $P=0.028$, $P=0.004$, $P=0.000$, $P=0.013$ respectively)

Table 3 shows the effect of foot reflexology on mean weight of children undergoing hemodialysis among the control and study groups. It was found that before the three sessions there were no statistically significant differences between the control and study groups. While, after the three sessions the mean weight of children among the study group decreased to 21.86 ± 2.177 , 21.10 ± 3.110 and 21.10 ± 3.290 compared to 23.16 ± 2.177 , 23.01 ± 1.53 and 23.53 ± 1.55 among the control group respectively and the differences were statistically significant between the control and study groups where ($P=0.003$, $P=0.000$ and $P=0.001$) for the three session

Table 4 portrays the effect of foot reflexology on the fatigue level of children undergoing hemodialysis among the control and study groups. It was found that more than half of the children demonstrated a very high level of fatigue in the first session among the control group (56.7%) compared to none of children in the study group. On second session 60.0 % of children in the control group demonstrated a high level of fatigue compared to none of children in the study group. Moreover, more than three-quarters of children in the control group (76.7%) demonstrated high levels of fatigue compared to none of the children in the study group. Significant statistical differences were found between the two groups where ($P=0.000$ for each).

Discussion

Hemodialysis is a treatment modality in children as well as in adults. There are complications that are unique to children during hemodialysis such as hypertension, headache, muscle cramps and fatigue. Foot reflexology is one of the natural modalities

that have proved to relieve tension, improve circulation and help promote the natural function of the related areas of the body. It is based on reflexes in the feet through the application of pressure on these reflexes (Reflexology Association of Canada, 2011).

The findings of the present study showed that there were statistically significant differences after the three sessions concerning pulse rate as well as in respiration during and after the first and third sessions and only after in the second session between both study and control groups. It could be related to the fact of foot reflexology technique where the presences of nearly 15000 nerves in the feet enervate all body parts. Applying the reflexology technique causes relaxation for the nervous system and calmness effect. Massaging reflexology areas of the lung on the foot positively influence pulmonary function which in turn reduces ventilation dependence (Elsayed et al., 2019). The current study was in the same line with the findings of Polat & Ergüney, 2016; Miller, et al., 2016) who concluded that massaging the heart reflex point increases the blood supply to the heart which enables the heart to pump the oxygen-rich blood around the body and improves oxygenation.

Hypertension is one of the complications commonly visible among children undergoing hemodialysis and fortunately it can be improved by foot reflexology. The present study found that, there were statistical significant differences before second and third sessions between the study and control groups regarding systolic blood pressure in addition to, in diastolic blood pressure, there were statistically significant differences during the second and third sessions as well as after the three sessions among children in the control and study groups,. This result may be related to pressure techniques applied on the feet are believed to help unblock nerve supply and improve blood flow, which may help the body to function at its peak. It is claimed that reflexology relieves stress and tension by inducing relaxation. It brings about

vasodilatation, reduced blood pressure, improved blood flow and provision of oxygen-rich nutrients to cells. (Hayyu, 2020). The present study was in harmony with El-Abd, et al. (2015) findings and reported that foot reflexology had a significant positive effect on HR & BP. Khalili, et al. (2016) also support the findings of the current study.

Weight control in children on maintenance dialysis health reduces cardiovascular disorders and maintains optimal nutrition status. The current study revealed that the mean weight of children in the study group was stable after the three sessions compared to the mean weight of children in the control group. This may be related to the fact that foot reflexology accelerates blood circulation, sustain the body's equilibrium and enhance the healthy release of energy in different organs and cells connected to certain an acupoints (Song, et al., 2015).

Toxic substances in the bloodstream, fluid - electrolyte disturbances, irregular power consumption, anemia and distress lead to continues feeling of exhaustion even after rest among children undergoing hemodialysis (Unal & Akpınar, 2016). Fatigue and difficult sleep are major problems among children undergoing hemodialysis. The findings of the present study clarified that more than half of the children in the control group demonstrated a very high level of fatigue in the first and second sessions and more than three-quarters of them in the third session compared to none of the children in the study group. This could be justified by the fact that using reflexology trigger points improves blood circulation and removing waste from the body thus can enhance relaxation of children and experience lower fatigue level and improve sleep quality (Kishore et al., 2021). The findings of the current study were in the same line with

Mohamed et al. (2021) findings, where they studied the effect of foot reflexology on hemodialysis school age- children on fatigue and sleep quality. Unal & Akpınar (2016) also reported that foot reflexology and back massage were shown improvement of sleep quality and reduce fatigue. Moreover, Stephenson et al. (2013) support these findings and reported that reflexology has been shown to be successful in reducing fatigue and pain. The findings of EL-Fekey et al. (2018) also studied the effect of foot reflexology on stress and anxiety.

Conclusion

It could be concluded that, the implementation of foot reflexology is an eminent technique that can improve physiologic physiological indices and body weight. In addition, the implementation of foot reflexology technique lowered fatigue level associated with hemodialysis.

Recommendations

- Pediatric nurses should implement foot reflexology technique as non pharmacological modality for children undergoing hemodialysis.
- Hospital policies should establish educational programs about the foot reflexology technique as non-pharmacological modality for children undergoing hemodialysis to pediatric nurses.

Conflict of interest

The authors declare that they have no conflicts of interest

Acknowledgment

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Table (1): Socio-Demographic Characteristics and Medical History of Children Undergoing Hemodialysis

Socio Demographic and Medical Data	Control Group n=30		Study Group n=30	
	No	%	No	%
Age/year				
7-	3	10.0	8	26.7
9-	16	53.3	9	30.0
11-12	11	36.7	13	43.3
Mean ±SD	10.21±1.53			
Level of education				
Primary	4	13.3	7	23.3
Preparatory	26	86.7	23	76.7
Gender				
Male	10	33.3	7	23.3
Female	20	66.6	23	76.7
Mean ±SD	24.980±1.96		25.93±3.153	
Diagnosis				
CRF	15	50.0	17	56.7
ESRD	15	50.0	13	43.3
Onset of disease /year				
1-	9	30.0	11	36.7
3-	13	43.3	12	40.0
≥ 6	8	26.7	7	23.3
Frequency of Hemodialysis sessions				
3 sessions /week	27	90.0	28	93.3
4 sessions /week	3	10.0	2	6.7

Table (2): Effect of Foot Reflexology on Physiological Parameters of Children Undergoing Hemodialysis among the Control and Study Groups

Physiological parameters		Control			Study			Test of Significant T- test / P		
		Before	During	After	Before	During	After	Before	During	After
Temperature	First session	36.61±0.40	36.69±0.31	36.68±0.315	36.74±0.161	36.75±0.160	36.75±0.167	T = 1.44 P= 0.111	T = 7.49 P= 0.008*	T = 8.599 P= 0.005*
	Second session	36.61±0.40	36.69±0.31	36.68±0.315	36.93±0.157	36.90±0.130	36.86±0.129	T = 8.74 P= 0.061	T = 13.56 P= 0.004*	T = 13.955 P= 0.000*
	Third session	36.61±0.40	36.69±0.31	36.68±0.315	36.92±0.139	36.88±0.100	36.89±0.101	T = 3.04 P= 0.089	T = 14.654 P= 0.000*	T = 20.661 P= 0.000*
Pulse	First session	85.066±11.599	82.366±13.73	85.333±13.65	98.400±8.72	105.03±16.42	99.36±16.01	T = 0.081 P= 0.777	T = 0.451 P= 0.505	T = 6.700 P= 0.012*
	Second session	85.066±11.599	82.366±13.73	85.333±13.65	88.233±9.540	88.26±11.77	91.93±10.88	T = 2.602 P= 0.094	T = 2.903 P= 0.112	T = 6.621 P= 0.013*
	Third session	85.066±11.599	82.366±13.73	85.333±13.65	87.466±8.88	94.10±18.97	93.43±14.11	T = 0.391 P= 0.534	T = 1.667 P= 0.202	T = 6.766 P= 0.012*
Respiration	First session	24.80±1.494	25.93±2.33	24.00±3.151	23.80±0.714	20.56±1.406	20.66±0.660	T = 3.742 P= 0.058	T = 4.725 P= 0.034*	T = 15.47 P= 0.000*
	Second session	23.80±1.494	25.93±2.33	24.00±3.15	22.43±0.568	20.100±1.561	20.23±0.971	T = 3.905 P= 0.053	T = 3.916 P= 0.53	T = 18.393 P= 0.000*
	Third session	24.80±1.49	23.93±2.33	24.00±3.151	22.66±0.884	19.8±1.297	19.53±1.16	T = 0.731 P= 0.396	T = 6.84 P= 0.011*	T = 19.77 P= 0.000*
Systolic Blood Pressure	First session	120.00±16.37	108.00±16.17	108.53±13.86	120.93±12.1	99.33±13.2	99.00±13.80	T = 2.74 P= 0.08	T = 10.648 P= 0.000*	T = 14.490 P= 0.000*
	Second session	115.13±16.73	110.50±16.85	110.00±15.60	115.93±13.8	99.33±13.2	99.00±13.84	T = 3.163 P= 0.002*	T = 15.063 P= 0.000*	T = 12.781 P= 0.000*
	Third session	115.50±14.69	111.33±18.21	111.00±13.06	114.93±12.1	99.33±13.2	99.86±13.25	T = 2.98 P= 0.004*	T = 20.893 P= 0.000*	T = 16.383 P= 0.000*
Diastolic Blood Pressure	First session	77.00±16.37	74.00±16.17	75.53±13.86	77.93±12.1	63.33±13.2	60.00±13.80	T = 1.505 P= 0.138	T = 1.003 P= 0.320	T = 2.980 P= 0.004*
	Second session	76.13±16.73	73.50±16.85	74.00±15.60	77.93±13.8	64.33±13.2	63.00±13.84	T = 4.350 P= 0.071	T = 6.237 P= 0.000*	T = 4.482 P= 0.000*
	Third session	75.50±14.69	73.33±18.21	75.00±13.06	77.93±12.1	60.33±13.2	60.86±13.25	t = 2.913 P= 0.051	t = 2.258 P= 0.028*	t = 2.571 P= 0.013*

T: t test P: ≤ 0.05

Table (3): Effect of Foot Reflexology on Mean Weight of Children Undergoing Hemodialysis among the Control and Study Groups

Weight	Control Group		Study Group		Test of Significant T- test / P	
	Before	After	Before	After	Before	After
First session	24.980±1.96	23.16±2.177	25.93±3.153	21.86±2.177	T =8.452 P= 1.500	T =12.452 P= 0.003*
Second session	25.68±1.750	23.01±1.53	24.93±3.153	21.10±3.110	T =8.452 P= 1.500	T =10.452 P= 0.000*
Third session	25.86±1.696	23.53±1.55	24.93±3.15	21.10±3.290	T =4.464 P= 0.230	T =13.487 P= 0.001*

T: t test P: ≤ 0.05

Table (4): Effect of Foot Reflexology on Fatigue Level of Children Undergoing Hemodialysis among the Control and Study Groups

Fatigue Level	Control Group								Study Group								Test of Significant
	Low experience		Moderate experience		High experience		Very high experience		Low experience		Moderate experience		High experience		Very high experience		
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	
First session	0	0.0	0	0.0	13	43.3	17	56.7	0	0.0	28	93.3	2	6.7	0	0.0	$P^{MC} = 0.000$
Second session	0	0.0	12	40.0	18	60.0	0	0.0	26	86.7	4	13.3	0	0.0	0	0.0	$P^{MC} = 0.000$
Third session	0	0.0	7	23.3	23	76.7	0	0.0	10	33.3	20	66.7	0	0.0	0	0.0	$P^{MC} = 0.000$

MC: Monte Carlo test

$P: \leq 0.05$

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