Effect of Foot Reflexology versus Warm Water Foot Soak with Body Relaxation Techniques on Symptoms and Quality of Life of Preeclampsia

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Abstract:

Background: preeclampsia is the second most common cause of maternal death worldwide. Also it is considered a primary factor for preterm birth, stillbirth, and neonatal death. **Aim:** to evaluate the effect of foot reflexology versus warm water foot soak with body relaxation techniques (BRTs) on symptoms and quality of life (QOL) of preeclampsia (PE). **Design:** A comparative quasi-experimental study design was applied. **Setting**: It was carried out at high-risk pregnancy department and antenatal care outpatient clinics in Children and Maternity University Hospital in Minia City on a purposive sample of 90 pregnant women experiencing mild preeclampsia. **Tools:** Three tools for gathering the data included: A structured interviewing questionnaire, preeclampsia follow-up chart**,** and quality of life questionnaire. **Results:** The findings from this study showed a significant reduction in the degree of pitting edema among reflexology group compared to the control and warm water foot soaks with BRTs groups. Also, there was a statistically significant effect of reflexology and warm water foot soak with BRTs on reduction of the degree of proteinuria, the value of mean arterial blood pressure (MABP) and improvement in the quality of life in contrast to the control group**. Conclusion**: Reflexology and warm water foot soak with BRTs led to reduction in the degree of pitting edema, the value of MABP, degree of proteinuria and quality of life. However, the reflexology was more effective than warm water foot soak with BRTs in this respect. **Recommendation:** larger-scale studies are needed to confirm findings and refine protocols, and to verify the safety of reflexology and warm water foot soak with BRTs on symptoms of preeclampsia.

Keywords: Body Relaxation Techniques – Preeclampsia- quality of life-reflexology - warm water foot soak .

Introduction:

Pre-eclampsia is responsible for the death of maternal and fetus death annually around the world. Pre-eclampsia, which presently accounts for 60,000 maternal fatalities globally, primarily in low- and middle-income countries, is one of the major causes of maternal and perinatal morbidity and mortality and affects around 3−5% of all pregnancies. Pre-eclampsia is a condition that occurs abruptly, develops quickly, and has an immediate high acuity impact on both the mother and the fetus, necessitating prompt and complex medical decision-making for both the mother and the child. **(Rana etal.,2019).**

Gestational Hypertension is a significant contributor to maternal and neonatal morbidity and death, occurring in ten percent of pregnancies globally **(Zulfeen et al., 2019).** The most prevalent significant pregnancy condition, preeclampsia (PE), is the second leading cause of maternal death worldwide, responsible for 22% of all maternal deaths **(Demissie et al., 2022).**

Hypertension and proteinuria are the main symptoms of preeclampsia, which poses serious risks to the mother, fetus, and child's health **(Henderson et al., 2021).** The incidence rate of preeclampsia is 4-5% worldwide, with younger, primiparous women experiencing a greater incidence rate than older women (3–10%) **(Cunningham et al., 2022).** Small portion of the spiral arteries in the myometrium area experience trophoblast cell invasion in preeclampsia, which impairs placental function and prevents the placenta from providing the fetus with the blood it requires for nutrients and oxygen **(Haslan & Trisutrisno, 2022).**

Termination of pregnancy is the only recognized treatment for preeclampsia **(Cunningham et al., 2022).** Preeclampsia can be avoided with certain interventions, including low-salt diets, low-molecular-weight heparin, aspirin, calcium supplements, and vitamin D and E supplements **(Odigboegwu et al., 2020).**Pregnant women with preeclampsia require controlled treatment in order to reduce risk factors that could exposed both the mother and the fetus to danger during pregnancy **(Haslan & Trisutrisno, 2022).** The most common forms of medical treatment include nifedipine, labetalol, hydralazine, and methyldopa **(Cunningham et al., 2022).**

Women expose to psychological stress throughout pregnancy, childbirth, and breastfeeding including pregnancy termination, vomiting, diarrhea, hypertension, weight loss, early birth, weaker immune system that can

have detrimental effects, and an increased risk of miscarriage. Additionally, it may potentially have a role in different degrees of postpartum psychological problems such as depression and general health concerns. Studies have indicated a significant correlation between a lower quality of life and those factors (**Rodrigues et al., 2016**). Women start asking questions themselves regarding what caused their present situation after having a diagnosis of preeclampsia, as well as during hospital stays. This might make them feel guilty and anxious, which would lower their quality of life (**Ding et al., 2021).**

Reflexology was first introduced by Dr. William Fitzgerald as "zone therapy", for reducing pain and treating illness by applying pressure to the several "zones" where pain and illness are present **(Fitzgerald& Bowers,2017).** Foot reflexology is a method that applies pressure to specific spots on the foot to relieve pain, improve blood circulation, increase energy, reduce muscle tension, enhance relaxation and comfort, and reduce stress **(Chanif, 2017).**

Warm water soak and body relaxation technique are an efficient and easier nursing intervention approaches for patients with hypertension that enhance the body to relax and gets warmer. It has a beneficial effect on the client as it lowers the blood pressure **(Sukarmin et al., 2015&Aryani, 2020).** Warm water therapy benefits feet by enhancing blood circulation, promoting metabolic processes, and decreasing muscle tension, viscosity, and capillary permeability due to the body's physiological response to heat **(Sinurat et al., 2020).** Scientifically, Soaking feet is a natural therapy that helps lower blood pressure in pregnant women by reducing edema, increasing muscle relaxation, nourishing the heart, relieving stress, and increasing capillary permeability **(Lalendah,2018&Noviati et al., 2023).**

Using body relaxation techniques (BRTs) is one method to lessen tension and anxiety, which in turn lowers Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and (proteinuria) in pregnant women with preeclampsia. This method dilates blood vessels **(Astuti et al., 2022),** resulting in a reduction of blood pressure levels to normal **(Kurdi et al., 2021)**, lowers arterial blood lactate, heart rate, breathing rate, oxygen consumption, and carbon dioxide production. It also enhances oxygenation **(Pratiwi& Sunarjo, 2021).** The combination of Jacobson and Benson exercise is an applicable form of body relaxation **(Valiani et al., 2014).** The technique suggests that muscle relaxation leads to emotional distress reduction, as complete relaxation in the peripheral parts of the body could reduce arousal in the central and autonomic nervous systems, thereby enhancing psychological and physical wellbeing **(Abdelhalim et al., 2023).**

Understanding QOL is critical for improving patient symptom relief, care, and rehabilitation. Problems highlighted by patients' self-reported QOL may lead to changes and improvements in therapy and care or demonstrate that some therapies are ineffective. QOL is also utilized to detect the many challenges that patients may face. **(Wan, et al 2021)**

The nursing role in the care of patients with preeclampsia is crucial in monitoring and managing the condition to ensure the mother's and the fetus's health. Lifestyle changes, medical treatment, in addition to collaboration with the healthcare team for timely interventions and appropriate management of complications can effectively manage mild preeclampsia in pregnant women **(American College of Obstetricians and Gynecologists, 2020&Ali et al., 2022).**

Significance of the study:

Pregnant women with preeclampsia frequently experience high blood pressure as a result of a buildup of fluid in the tissues **(Asadi et al., 2023).** A number of health issues, including kidney damage, heart attacks, strokes, and Alzheimer's are associated with Preeclampsia. Hypertension, edema, and elevated proteinuria are the hallmarks of preeclampsia, which can strike pregnant women, during childbirth, and during the puerperium **(Komariah et al., 2023).** Preeclampsia affects about 6-8% of Egyptian women's pregnancies **(Ameen et al., 2023).**

Foot soak with warm water and BRTs is practical, safe for pregnant women with preeclampsia, as it provides relaxing effects, calm the heart and increase positive effects in the client **(Aryani & Zayani, 2020).** Moreover, swelling of pregnant women's legs has also been managed using reflexology and other forms of massage. Reflexology has been shown in a recent review to be effective in treating leg edema, and it may be suggested for women who experience uncomfortable leg symptoms. However, the number of participants was small to draw a conclusion **(Bamigboye & Hofmeyr,2006 & McNeill et al.,2016).** Additionally, foot reflexology lowers blood pressure in those who have hypertension **(Retnaningsih , 2020).**For this reason, the researchers are interested in researching the effect of foot reflexology versus warm water foot soak with BRTs on symptoms and quality of life of preeclampsia.

Aim of this study

To evaluate the effect of foot reflexology versus warm water foot soak with body relaxation techniques on symptoms and quality of life of preeclampsia.

Research hypothesis;

H0: Women with preeclampsia who receive foot reflexology or warm water foot soak with body relaxation techniques may exhibit similar symptoms of preeclampsia (pitting edema, elevated blood pressure and proteinuria) and quality of life level as women in the control group.

H1: Women with preeclampsia who receive foot reflexology may exhibit improved symptoms of preeclampsia and quality of life level than women in the control group.

H2: Women with preeclampsia who receive warm water foot soak with BRTs may exhibit improved symptoms of preeclampsia and quality of life level than women in the control group.

H3: Women with preeclampsia who receive foot reflexology or warm water foot soak with BRTs may exhibit improved symptoms of preeclampsia and quality of life level than women in the control group.

Operational definitions

Foot reflexology:

Is a therapeutic practice involving the application of pressure to particular foot spots that are thought to represent various bodily organs and systems **(Brown 2013).** The principle behind foot reflexology is that these points, or "reflex areas," can stimulate energy pathways and promote health and well-being by improving the flow of energy, reducing stress, and enhancing overall balance within the body. It is commonly used to relieve pain, reduce stress, and promote relaxation **(Ebadi et al. 2015).**

Warm water for soaking;

Generally, refers to water that is comfortably warm to the touch, typically 98–104 degrees Fahrenheit, or 37–40 degrees Celsius. This temperature range is often considered optimal for soaking purposes because it helps to relax muscles, improve circulation, and promote a soothing effect on the body. Warm water soaks are commonly used in various therapeutic treatments, such as for muscle relaxation, pain relief, and promoting overall relaxation and well-being. Adjusting the temperature based on individual preferences and the specific therapeutic goals is important to ensure comfort and effectiveness **(Mooventhan, & Nivethitha, 2014).**

Body relaxation techniques;

Encompass a variety of methods and practices aimed at reducing muscle tension, calming the mind, and promoting overall physical and mental relaxation. These methods can include massage therapy, deep breathing, yoga, meditation, progressive relaxation of muscles (PMR), and warm water soaks **(Ruano et al., 2021).**

Jacobson and Benson Relaxation Techniques

Jacobson and Benson are two different pioneers in the field of relaxation techniques:

Jacobson's Progressive Muscle Relaxation (PMR): Edmund Jacobson created PMR, which entails systematically tensing and relaxing each body muscle group. By consciously tightening and then releasing tension in muscles, individuals can learn to recognize and reduce overall muscle tension and promote relaxation **(Nathoo& Ayesha, 2016).**

Benson's Relaxation Response: Herbert Benson, a Harvard physician, coined the term "relaxation response" to describe a state of deep rest that is the opposite of the stress response. Benson's technique involves focusing on a repetitive word, phrase, or prayer and disregarding everyday thoughts to elicit the relaxation response, which includes decreased heart rate, metabolism, and breathing rate **(Mansour& Saadoon, 2022).**

Quality of life

The World Health Organization emphasizes the significance of subjective perceptions in the measuring of quality of life (QoL), characterizing it as an individual's view influenced by culture and value system**s (Arslan ,2024).**

Material and methods:

Setting:

This study was conducted at Minia Children and Maternity University Hospital's high-risk pregnancy department and antenatal care outpatient clinics in Minia City. This hospital provides services to all areas of Upper Egypt. This five-floor building includes four floors designated for governmental access and the first for private use. In addition to the private service, the hospital provides services to the entire state of Minia. Other than the private rooms and the operation rooms, an imaging and diagnostics department, pediatric clinic, and prenatal care clinics are located on the first floor of the hospital. The gynecological and obstetric services are located on the second floor. Critical care unit and the rooms for high-risk pregnancy, intrapartum care unit, and postpartum care unit are located on the third floor. While the pediatric department are located on the fourth floor.

Design:

A comparative quasi-experimental study design was applied.

Research Sample:

The study involved a purposive sample of 90 pregnant women with mild preeclampsia, divided into three groups with 30 women for each group, as follows:

1. Study group (A): received routine care in addition to foot reflexology

2. Study group (B): received routine care in addition to warm water foot soaks with BRTs.

3. Control group (C): received no intervention except for routine care.

The sample was calculated by the following equation using the Chandrasekharan equation for quasi-experimental study design **(Chandrasekharan, et al., 2019):**

n= N/ {1+N (e) 2}

Where n = sample size, N = population size is 118 e= 0.05 is the margin of error

n= 118/ {1+118(0.0025)} = 90 total study sample.

Inclusion criteria;

Primiparous and multiparous women who have mild preeclampsia, ranged in age from 20 to 36, and their body mass index (BMI) is less than 35 kg/m2 were included in the study.

Exclusion criteria;

- Any woman who has foot fractures, an infection or foot ulcer, an open cut on her foot,
- A history of heart problems, diabetes mellitus, severe preeclampsia, chronic hypertension prior to pregnancy, and stroke.

Tools of data collection:

The data were collected using three tools:

Tool I: Socio-demographic data form

After reviewing relevant literature, the researchers created and translated it into Arabic. It was divided into four parts:

Part 1: Examined the **socio-demographic data** of women, including their age, occupation, income, residence, and Body Mass Index (BMI).

Part 2: Including the women's obstetrical **history** related to gravidity, parity, previous abortion.

Part 3: Medical History of chronic illness as renal, respiratory, hepatic disorders.

Part4: Profile of the present pregnancy; Included the last menstrual cycle's first day, current gestational age (weeks), Antenatal visits (regular- irregular), and number of visits (4 and more, less than 4), additional warning signs during the present pregnancy, and expected date of delivery (EDD).

Tool II: Preeclampsia follow-up chart:

Part I: Pitting Edema Assessment Chart:

This tool was derived from **Brodovicz et al., (2009).** This grading method uses a scale from 1 to 4 to indicate how severe the edema is. The affected area is pressed up against a prominence of bone for five seconds to measure the depth of the depression and the time to rebound.

A system of grading:

Grade1: represent a depression of 2 millimeters that instantly rebounded.

Grade 2: represent a depression of 3–4 millimeters rebounds in 15 seconds or less.

Grade 3: represent a depression of 5-7 millimeters, rebounds in 60-second

Grade 4: take 2–3 minutes to recover from a depression of 8 millimeters.

Part II: The stethoscope and sphygmomanometer are standard instruments used for measuring blood pressure. The woman was advised to lie in a relaxed supine position. After taking her blood pressure, double the diastolic blood pressure and add the result to the systolic blood pressure to find the mean arterial pressure. Next, divide by three **(Hinkle et al., 2022).**

Assessment mean arterial blood pressure (MABP) thresholds **Melgarejo et al., (2021).**

Category of MABP	MABP
Normal	Less than 90 mmHg
Elevated or high blood pressure	From 90 to less than 92 mmHg
hypertension Stage 1	From 92 to less than 96 mmHg
hypertension Stage 2	More than 96 mmHg

Part III: Assessment of proteinuria:

With the exception of the first voided morning specimen and right prior to bedtime, a dipstick using an H-800 automated analyzer of urine were used to check for presence of protein in a freshly midstream evacuated urine **(Takmaz et al.,2022).**

Proteinuria grades (Takmaz et al., 2022).

The manufacturers provided the proteinuria grades which were displayed on the container as:

Proteinuria grades	Corresponding Color of dipsticks
0 for (negative)	Yellow
trace for (0-30 mg/dl)	Yellowish-green
+1 for (30-100 mg/dl)	Light green
+2 for(100-300 mg/dl)	Green
+3 for (>300 mg/dl)	Greenish-blue
+4for (greater than 1000 mg/dl).	Blue

Tool III; Quality of Life Assessment:

Assessment of life quality done by World Health Organization Quality of Life Questionnaire-BREF 2021. It includes four domains: social, psychological, physical, and environmental. The questionnaire scores were determined using the formula below:

(For each domain, multiply the total points received by the asked domain's question by four then, for every domain, subtract four from each domain total and multiply by 6.25. To compute overall quality of life, add the findings from all four domains. Zero points indicate low quality of life and 100 points indicate high quality of life **(World Health Organization (WHO). 2021).**

Scoring system

1- From 0 to 33% → severe affection indicates poor quality of life.

2- From 33.3 to 66.7% → Moderate affection indicates average quality of life.

3- More than 66.7% → Mild affection indicates good quality of life

Ethical Considerations:

After receiving approval from the committee of scientific research ethics to conduct the study. The director of Minia Maternity and Children University Hospital received an approval letter which included the study's title and objectives. Every woman involved in the study gave her informed permission and consent, and prior the study's conduct; each woman received an explanation of its purpose. Lastly, each woman was told that she could withdraw from the study at any moment and that she was free to choose whether or not to participate.

The Tools Validity and Reliability:

Tool I; after studying the relevant literature, the researchers created it. Then five joery of community health nursing and gynecology and obstetrics nursing experts confirmed the validity's contents. Pitting edema assessment chart was derived from **Brodovicz et al., (2009)** r = 0.872. Sphygmomanometer device for measuring the blood pressure variables was checked for integrity. Urinalysis dipsticks for proteinuria were checked for the integrity. The Cronbach's alpha values of the quality of life questionnaire was 0.901 **(World Health Organization (WHO). 2021).**

Pilot study:

A pilot study was carried out on 10 %(9 women) with mild preeclampsia for a month in order to evaluate the study tools simplicity, applicability, and clarity. Every woman who took part in the pilot study was a part of the basic sample because the instruments utilized remained unchanged.

Field work:

The study conducted through three phases.

First: preparatory phase

The researchers developed data collection tools and a booklet about preeclampsia, foot reflexology guidelines, and warm water foot soak steps , BRT and Quality of life in Arabic after reviewing the recent advanced literature related to the study topic.

The content of the supportive booklet about preeclampsia, foot reflexology guidelines, and warm water and BRTs and Quality of life :

Overview of preeclampsia, clinical manifestation, risk factors, causes, complications associated with it, diagnostic tests, and medical and nursing management. Definition of reflexology, its history, its advantages, its contraindications, maps of the feet, reflex zone therapy, its principles, and its technique of application. This method was derived from **Farnsworth (1995)**. Benefits of warm water foot soak, right temperature, duration and frequency, and practical tips. Jacobson's and Benson's progressive muscle relaxation overview, benefits and how to perform them, and Quality of life for women with preeclampsia including social, psychological, physical, and environmental items.

The data was collected over an eight-month period from June 2023 to the end of January 2024. The researchers evaluated the previously mentioned setting environments for privacy for performing and teaching women techniques of reflexology, foot soak and body relaxation exercises, and checked the number of women with mild preeclampsia, and their eligibility for inclusion.

The data collection process began at 9:00 am and ended at 2:00 pm .Researchers initially assessed the control group (C) to prevent cross-contamination, then they monitored group A on Sunday and Tuesday and group B on Wednesday and Thursday. The researchers conducted a 45-minute initial interview after obtaining informed consent from every women and explaining the study's purpose. Each women were assessed for socio-

demographic data (tool I), preeclampsia follow-up chart (tool II), and quality of life questionnaire (tool III). Sessions were tailored to women's availability and readiness, with individual sessions available if the group was unavailable.

Second phase: implementation phase:

The researchers provided a detailed description of reflexology and warm water foot soak with BRTs and Quality of life sessions, including their structure, frequency, techniques, research findings, importance of tracking, and recording contact information for follow up and addressing questions. The program of each group composed of 4 separate sessions (1 theoretical and 3 personal practical sessions). Followed by training their relatives about the techniques to practice it for the women for six weeks, three times a week at home. All available women in high-risk pregnancy wards and antenatal care out patient, s clinics were presented as one group in the theoretical sessions according to the available time for them.

Study group (A): Women who received routine care in addition to foot reflexology:

Theoretical Session (45-60 minute):

The researcher prepared women for foot reflexology treatment by providing health education about preeclampsia and the reflexology treatment and how to improve quality of life for them.

Practical Session (20-40 minute (5-minute) for each reflex zone):

Each reflexology session typically includes the following elements:

Performing initial assessment of patient history and symptoms review as blood pressure, level of pitting edema and other vital signs relevant to preeclampsia, the researchers instructed each women to wash her foot, empty her bladder, lie in comfortable positions, take deep breaths, and provide continuous feedback to adjust pressure and technique. They finally provided an initial foot massage, preparing the women for reflexology.

While sit observing the woman's feet, the researcher pressed certain reflex areas with her thumb;

1. Underneath the ball of each foot is **the solar plexus area,** connected to the nervous system, and lowers worry and tension.
2. The pituitary gland, which controls the endocrine glands, is represented by the **pituitary reflex area,** That's situated at the base of the big toe
3. **The region of cardiac reflex**, which stimulated to control pump of the heart and enhance health, is located on both feet sole beneath the largest toe.
4. The stimulation of the **adrenal gland reflex point,** that's situated at the bottom of the second and third metatarsals of each foot, can control body fluids and electrolytes,
5. **The renal reflex point,** whose stimulation promotes the functioning of the kidney, is located near the bottom of the 2nd metatarsal bone along the middle arches of each foot.

Study group (B): Women who received routine care in addition to warm water foot soak with BRTs.

Theoretical Session (45-60 minute):

The theoretical session aimed to educate women on Preeclampsia, the benefits of warm water soaks, Jacobson and Benson relaxation techniques, and the synergistic effects of combining these techniques and how to improve quality of life for them.

Practical Session (20-40 minute):

The researcher assisted the women to follow the steps of warm water foot soak with BRTs according to (Murwidi& Abdullah, 2019):

a) Create a calm and private environment;
b) Boil some water to 40 degrees Celsius and transfer it into a bucket;
c) Take a comfortable seat;
d) Carefully place the foot into a basin of warm water, allowing it to soak until it is about 10 centimeters above the ankle;
e) To keep the water at the proper temperature, cover the basin with a cloth.

f) Calming every muscle in the body;

g) Breathe in deeply and slowly. Then, begin to exhale using the diaphragmatic approach, which relies on the idea that stress may be reduced by breathing. Jacobson's method involves contracting the muscles for five seconds, followed by conscious muscle release for thirty seconds, to release tension in the muscles.

h) After that, the researchers use Benson's approach, asking the women to imagine that they are in a comfortable environment for the final 20 minutes. Establish a space that is simple to maintain and allow them to spend as much time as they wish in the designated rest area. Switch your mind and open your eyes.

i) Raise the feet and use a towel to dry them.

Control group (C)

The control group received routine care, regular investigations, medical treatment for preeclampsia and health education about mild preeclampsia management,

along with an educational booklet at the end of the study to adhere to the ethical guidelines.

The third phase: evaluation phase:

After the Sixth week of intervention, all outcome measures (pitting edema, blood pressure, proteinuria and quality of life) were evaluated by the same researchers for every women in groups A and B and C in the previously mentioned study setting.

A feedback was taken at the conclusion of the study period regarding the usefulness of the reflexology versus warm water foot soak with BRTs in managing symptoms of preeclampsia.

III- Statistical design

Version 26 of the IBM SPSS program was used to examine the data that were entered into the computer. (Armonk,NY: IBM Corporation) Utilizing percentages and numbers, the qualitative data was described. The quantitative data was characterized using the means and standard deviations. A 5% level of significance was applied to the results. Chi square tests were employed to compare several groups based on category factors. The F-test is utilized when comparing data among more than two distinct groups as well as greater than two time points or phases in an ANOVA involving repeated measurements for quantitative variables that are normallydistributed. To investigate the relative significance of the different stages, the Mc Nemar tests for Marginal Homogeneity were utilized.

Results

Table (1) presents that no statistically significant differences were discovered between the studied women socio-demographic data ($p > 0.05$) which denote homogeneity of the groups. As the mean age of preeclamptic pregnant women in the control, reflexology and warm water foot soak with BRTs groups was almost similar (27.00±5.59, 31.80±8.16, and 31.79±7.18 years, respectively). In relation to education (33.3%, 46.7% & 40 %) of the control, reflexology and warm water foot soak with BRTs groups did not have the ability to read or write. regarding occupation and residence (66.7%, 53.4% and 56.7%, 63.3%) of the control and warm water foot soak with BRTs groups were housewives and urban residents respectively. While, (63.3%& 60.0 %) of the reflexology group were housewives and rural residents. In addition, (46.7%) of the control group had normal BMI. While (36.7% & 30.0%, respectively) of the reflexology and warm water foot soak with BRTs groups were overweight.

Table (2) illustrates that there were no statistically significant differences between the groups of preeclamptic pregnant women under study with respect to their **obstetrical history** and the **profile of the present pregnancy** ($p > 0.05$). As the mean number of gravidity and parity (2.47±0.97, 2.43±1.16& 2.80±1.03and 2.07±0.739, 1.93±0.784and 2.13±0.860, respectively) of women in the control, reflexology and warm water foot soak with BRTs groups were almost similar. Likewise, (43.3%, 46.6) of women in control, and warm water foot soak with BRTs groups' current gestational age was more than 30 weeks. While; (56.7%) of the reflexology group were at their 26^{th} - 30^{th} weeks of gestation. Moreover, (66.7%, 70.0, respectively) of the reflexology and warm water foot soak with BRTs groups complained from presence of other warning signs during current pregnancy and (36.7%&33.3%, respectively)of them had blurred vision Also, (63.3%) of the control group had no other warning signs during present pregnancy.

When compared to the preeclamptic pregnant women's control and warm water foot soak with BRTs groups, the reflexology exercise group showed a statistically significant reduction in the **degree of pitting edema** ($p= 0.037^*$) as shown in **table (3).** As (53.3 %) of women experienced grade 4 of edema, and (10.0%) of them experienced grade 2 of edema pretreatment. While post treatment only (13.3%) had grade 4 of edema, and (63.3%) had grade 1.

While, a great reduction of pitting edema occurred in the warm water foot soak with BRTs groups as (50.0%) experienced grade 4 of edema and (6.7%) experienced grade 1 of edema pretreatment compared with (10.0%& 43.3%,respectively) post treatment with no statistically significant differences($p=0.070$). Moreover, there was no statistically significant reduction of the degree of pitting edema among the control group, ($p=0.326$).

Table (4) reveals statistically significant reduction in the value of MABP among reflexology and warm water foot soak with BRTs groups of preeclamptic pregnant women ($p \leq 0.01$), as the MABP decreased respectively in both groups from (103.256±7.05&101.67±5.87) pretreatment to (88.74±6.05&88.14±5.91) post treatment. On the other hand the MABP among the control group decreased from (102.22±18.33) pretreatment to (96.88±5.92) post treatment with no statistically significant differences ($p= 0.088$).

Table 5 demonstrate a clear effect of reflexology and warm water foot soak with BRTs on reduction of the degree of proteinuria as; (50.0%& 53.3%, respectively) of women in the reflexology and warm water foot soak with BRTs groups of preeclamptic pregnant women experienced grade 4 of proteinuria and only (6.7%& 3.3 % respectively) of them experienced grade 1 of proteinuria pretreatment. While post treatment, degree of proteinuria had been reduced as (50.0%& 36.7%, respectively) of them experienced grade 1 of proteinuria and only (10.0%& 13.3% respectively) of them experienced grade 4 of proteinuria in favor of reflexology exercises. With statistically significant difference ($p= <0.001^*$).While; (53.3%) of women in the control experienced grade 4 of proteinuria, and (6.7%) of them experienced grade 1 of proteinuria pretreatment, compared to (36.7 %& 6.7 %,

respectively) post treatment with no statistically significant differences (p= 0.183).

Regarding the quality of life **figure (1)** demonstrate a clear effect of reflexology and warm water foot soak with BRTs on improvement of quality of life post treatment phase compared to pretreatment phase as (80.0%& 60.0%, respectively) of women in the reflexology and warm water foot soak with BRTs groups of preeclamptic pregnant women experienced poor quality of life and only (6.7%& 16.7 %, respectively) of them experienced averaged (moderate) quality of life pretreatment. While post treatment, the quality of life had been improved as only (10.0%& 26.7%, respectively) of them experienced poor quality of life and (56.7%& 36.7%, respectively) of them experienced averaged (moderate) quality of life in favor of reflexology exercises. While; (63.3%) of women in the control experienced poor quality of life and (10.0%) of them experienced averaged(moderate) quality of life pretreatment, compared to (50.0 %& 13.3 % respectively) post treatment.

Table (1): Distribution of the studied women regarding to their socio-demographic data (n=90)

Items	Control group (n=30) Group C		Foot reflexology group (n=30) Group A		X^2	p value	Warm water foot soak with BRTs group (n=30) Group B		X^2	p value
	No.	%	No.	%			No.	%		
Age										
From 18 to 23 years	5	16.7	8	26.7			4	13.3		
From 24 to 29 years	9	30.0	5	16.7	16.564	0.056	10	33.3	11.156	0.265
From 30 to35 years	9	30.0	4	13.3			4	13.3		
More than35 years	7	23.3	13	43.3			10	40.0		
Mean±SD	27.00±5.59		31.80±8.16				31.79±7.18			
Education level										
Doesn't read and write	10	33.3	14	46.7			12	40.0		
Basic education	6	20.0	6	20.0	15.905	0.069	4	13.3	15.469	0.079
Secondary education	8	26.7	3	10.0			6	20.0		
University education	6	20.0	7	23.3			8	26.7		
Occupation										
Housewife	20	66.7	19	63.3	5.165	0.271	16	53.4	8.299	0.081
Employee	4	13.3	5	16.7			7	23.3		
Student	6	20.0	6	20.0			7	23.3		
Residence										
Urban	17	56.7	12	40.0	2.738	0.098	19	63.3	2.916	0.088
Rural	13	43.3	18	60.0			11	36.7		
Monthly income										
Enough	16	53.3	11	36.7			10	33.3		
Fairly enough	8	26.7	7	23.3	9.211	0.056	9	30.0	9.395	0.052
Not enough	6	20.0	12	40.0			11	36.7		
Weight					t test				t test	
Mean±SD	64.33±14.53		79.10±16.77		.603	0.551	79.93±15.74		.267	0.791
Height					t test				t test	
Mean±SD	163.63±4.99		163.97±3.95		.501	0.791	164.50±3.24		1.200	0.240
BMI										
Underweight	6	20.0	3	10.0			7	23.3		
Normal	14	46.7	7	23.3	13.836	0.128	5	16.7	13.043	0.161
Overweight	7	23.3	11	36.7			9	30.0		
Obese	3	10.0	9	30.0			9	30.0		

* Statistically significant at p≤0.05 ** highly statistically significant at p≤0.01

Table (2): Distribution of the studied women regarding to their obstetrical history and profile of the present pregnancy (n=90)

Items	Control group (n=30) Group C		Foot reflexology group (n=30) Group A		X^2	p value	Warm water foot soak with BRTs group (n=30) Group B		X^2	p value
	No.	%	No.	%			No.	%		
Gravidity										
1	4	13.3	9	30.0			4	13.3		
2	14	36.7	6	20.0			7	23.3		
3	6	20.0	8	26.7	14.997	0.091	10	33.3	16.608	0.055
4	6	20.0	7	23.3			9	30.0		
Mean±SD	2.47±0.97		2.43±1.16				2.80±1.03			
Parity										
1	7	23.3	10	33.3	9.487	0.06	9	30.0	9.467	0.050
2	14	46.7	12	40.0			8	26.7		
3	9	30.0	8	26.7			13	43.3		
Mean±SD	2.07±0.739		1. 93±0.784				2.13±0.860			
Current gestational age (weeks)										
20^{th} -25^{th}	5	16.7	4	13.3	8.121	0.087	8	26.7	8.520	0.074
26^{th} -30^{th}	12	40.0	17	56.7			8	26.7		
>30^{th}	13	43.3	9	30.0			14	46.6		
Mean±SD	29.50±3.15		28.97±3.68				29.07±2.78			
Presence of other warning signs during present pregnancy										
No	19	63.3	10	33.3	1.794	0.180	9	30.0	3.616	0.057
Yes	11	36.7	20	66.7			21	70.0		
If yes mention(Multiple choice)										
Severe headache	5	16.7	10	33.3			9	30.0		
Blurred vision	3	10.0	11	36.7			10	33.3		
Abdominal pain	3	10.0	6	20.0			9	30.0		

* Statistically significant at p≤0.05 ** highly statistically significant at p≤0.01

Table (3): Distribution of the studied women regarding to their Pitting Edema grades pre and post-intervention (n=90).

Items	Control group (n=30) Group C						Foot reflexology group (n=30) Group A						Warm water foot soak with BRTs group (n=30) Group B					
	Pre-intervention		Post-intervention		X^2	p value	Pre-intervention		Post-intervention		X^2	p value	Pre-intervention		Post-intervention		X^2	p value
	No.	%	No.	%			No.	%					No.	%	No.	%		
Grade 1	4	13.3	6	20.0			6	20.0	19	63.3			2	6.7	13	43.3		
Grade 2	5	16.7	7	23.3	10.313	0.326	3	10.0	2	6.7	17.525	0.041*	4	13.3	6	20.0	15.853	0.070
Grade 3	7	23.3	7	23.3			5	16.7	5	16.7			9	30.0	8	26.7		
Grade 4	14	46.7	10	33.4			16	53.3	4	13.3			15	50.0	3	10.0		

* Statistically significant at p≤0.05 ** highly statistically significant at p≤0.01

Table (4): Distribution of the studied women regarding to their mean arterial blood pressure pre and post-intervention (n=90).

Items	Control group (n=30) Group A				Foot reflexology exercise group (n=30) Group B				Warm water foot soak with BRTs group (n=30) Group B			
	Pre-intervention Mean±SD	Post-intervention Mean±SD	t test	p value	Pre-intervention Mean±SD	Post-intervention Mean±SD	t test	p value	Pre-intervention Mean±SD	Post-intervention Mean±SD	t test	p value
Systolic blood pressure	135.00±9.91	133.33±8.23	2.783	0.010**	138.83±8.37	121.67±6.20	12.722	0.000**	138.67±6.69	124.00±7.23	10.351	0.000**
Diastolic blood pressure	82.167±8.58	78.50±4.93	3.717	0.001**	85.47±7.21	72.17±6.39	10.358	0.000**	83.80±6.49	70.17±6.23	10.805	0.000**
Mean arterial blood pressure (MABP)	102.22±18.33	96.88±5.92	1.766	0.088	103.256±7.05	88.74±6.05	12.309	0.000**	101.67±5.87	88.14±5.91	13.508	0.000**

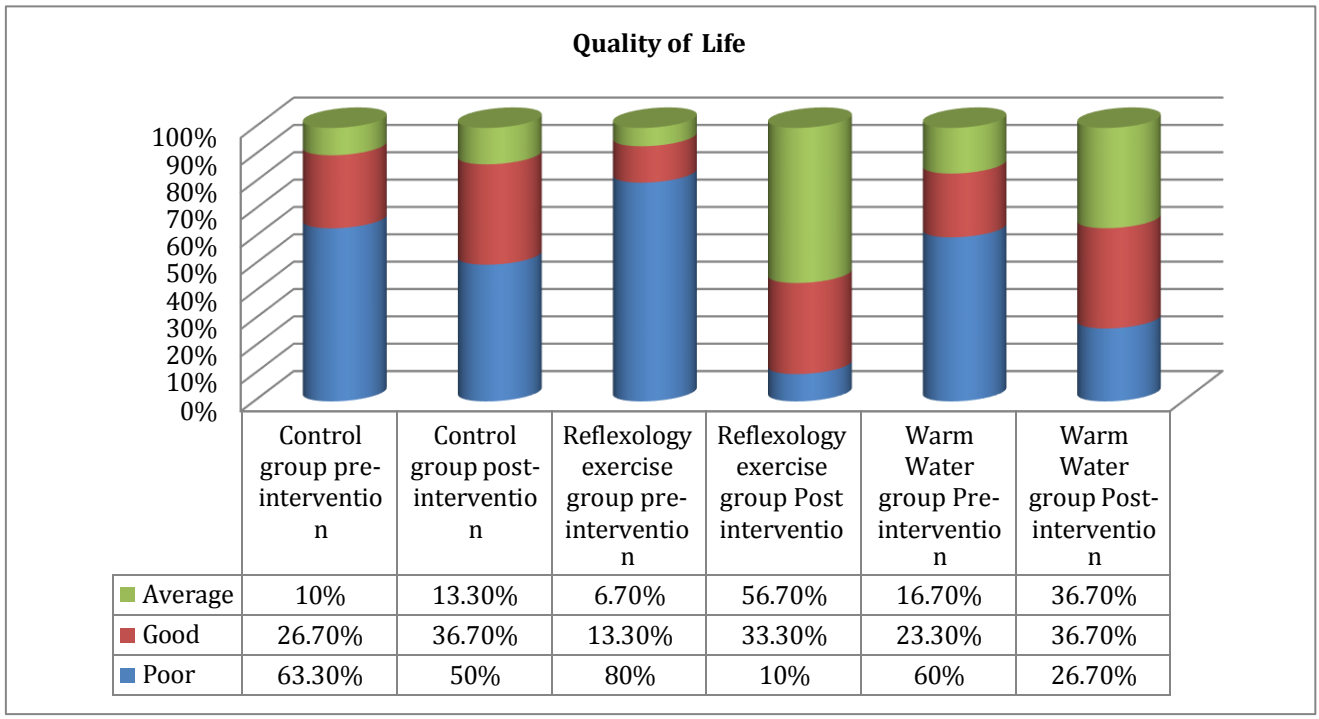
* Statistically significant at p≤0.05 ** highly statistically significant at p≤0.01

Table (5): Frequency and percentage distribution of the studied women regarding to their proteinuria grades pre and post-intervention (n=90).

Items	Control group (n=30) Group C						Foot reflexology exercise group (n=30) Group A						Warm water foot soak with BRTs group (n=30) Group B					
	Pre-intervention		Post-intervention		X^2	p value	Pre-intervention		Post-intervention		X^2	p value	Pre-intervention		Post-intervention		X^2	p value
	No.	%	No.	%			No.	%	No.	%			No.	%	No.	%		
Grade 1	2	6.7	2	6.7			2	6.7	15	50.0			1	3.3	11	36.7		
Grade 2	4	13.3	7	23.3	12.579	0.183	2	6.7	8	26.7	27.190	0.001**	1	3.3	6	20.0	25.198	0.003**
Grade 3	8	26.7	10	33.3			11	36.6	4	13.3			12	40.0	9	30.0		
Grade 4	16	53.3	11	36.7			15	50.0	3	10.0			16	53.3	4	13.3		

* Statistically significant at p≤0.05 ** highly statistically significant at p≤0.01

Figure (1): Distribution of the studied women regarding to their quality of life pre and post-intervention (n=90).



Discussion

Preeclampsia is a pregnancy-related medical condition causing elevated blood pressure and urine protein levels, affecting various body systems, affecting pregnancy, childbirth, and the puerperium **(Komariah et al., 2023)**. It is the second most frequent cause of maternal mortality globally **(Centers for Disease Control and Prevention, 2022).**Conventional medicine has influenced modern healthcare **(Giovanni, 2021)**. Various methods have been proven to be effective in self-care for expectant mothers and their fetuses to maintain their health such as exercise for pelvic and lower back discomfort **(Liddle & Pennick ,2015),** water immersion and reflexology for leg edema**(Smyth et al.,2015),** acupuncture for breech posture **(Miranda-Garcia et al.,2019),** as well as ginger for emesis **(McParlin et al.,2016).** The current research aimed to: examine the effect of foot reflexology versus warm water foot soak with body relaxation techniques on symptoms and quality of life of preeclampsia.

Concerning socio-demographic data, the findings of current research clarified that, the mean age of preeclamptic pregnant women in the control, reflexology and warm water foot soak with BRTs groups was almost similar (27.00±5.59, 31.80±8.16, and 31.79±7.18 years, respectively). In relation to education; one third and more of the control, reflexology and warm water foot soak with BRTs groups did not have the ability to read or write. Regarding occupation and residence; more than half of the control and warm water foot soak with BRTs groups were housewives and urban residents respectively. While; about two thirds of the reflexology group were housewives and rural residents. In addition, near to half of the control group had normal BMI. While; about one third of the reflexology and warm water foot soak with BRTs groups respectively were overweight.

There were no statistically significant differences found ($p > 0.05$) which denote homogeneity of the groups. To reduce unrelated factors that might compromise the intervention's effectiveness.

The above results were consistent with **Abdulaziz & Draz, (2016)** in Kasr El Eni Hospital, Cairo, Egypt , who aimed to compare the benefits of typical physical therapy program versus reflexology for pregnant women with preeclampsia who have ankle edema, and found that the mean of ages was (30.1±2.91 years). While **Mansour et al., (2023)** in Minia, Egypt who examined how foot reflexology affects average arterial blood pressure, level of cortisol , proteinuria, and quality of life in pregnant women with mild preeclampsia and discovered that the mean of ages of the control and study group was (25.00 ± 3.43& 26.20 ± 4.96 years respectively), and the BMI of the control and study group was (26.06 ± 3.38, 25.88 ± 4.18 respectively). Several studies have revealed a strong correlation between advanced maternal age and pre-eclampsia (**Fondjo et al., 2019**); however, no distinct relationship was found between age and pre-eclampsia (**Boene et al., 2016**).

Regarding the obstetrical history and the **profile of the present pregnancy**, the present study's findings showed no statistically significant variations between the studied groups of preeclamptic pregnant women ($p > 0.05$)**.** As the mean number of gravidity and parity (2.47±0.97, 2.43±1.16& 2.80±1.03and 2.07±0.739, 1. 93±0.784and 2.13±0.860, respectively) of women in the control, reflexology and warm water foot soak with BRTs groups were almost similar. Likewise, near to half of women in control, and warm water foot soak with BRTs groups' current gestational age was more than 30 weeks. While; more than half of the reflexology group were at their 26^{th} to 30^{th} weeks of gestation. Moreover, two thirds and more of the reflexology and warm water foot soak with BRTs groups complained from presence of other warning signs during current pregnancy and about one third had blurred vision Also, about two thirds of the control group had no other warning signs during present pregnancy.

These results also agree with the results of **Isnaeni et al., (2023**) in Aura Syifa Hospital Kediri who aimed to understand the impact of hydrotherapy against blood pressure drops in a preeclamptic mother and revealed that the gestational age of (57,1%) of responders was between 28 and 41 weeks. This is consistent with the placenta implantation theory of ischemia since fibrinogen levels rise at gestational ages greater than 28 weeks, which raises the risk of preeclampsia.

Concerning effect of the foot reflexology versus foot soak in warm water with body relaxation techniques on the studied women' pitting edema levels;

When compared to the preeclamptic pregnant women control and warm water foot soak with BRTs groups, the reflexology exercise group showed a statistically significant reduction in the degree of pitting edema ($p= 0.037$*). As, half of subjects in the reflexology exercise group experienced grade 4 of edema, and few women of them experienced grade 2 of edema pretreatment with reflexology exercise. While post treatment only (13.3%) of the reflexology group had grade 4 of edema, and about two thirds had grade 1.

While, a great reduction of pitting edema occurred in the warm water foot soak with BRTs groups as half of them experienced grade 4 of edema and (6.7%) experienced grade 1 of edema pretreatment compared with (10.0%& 43.3%,respectively) post treatment with no statistically significant differences($p=0.070$). Moreover, there was no statistically significant reduction of the degree of pitting edema among the control group, ($p=0.326$).

Findings of this study aligned with Mollart (2003) in Australia who investigated the differences in the effects of rest and two reflexology treatments techniques on late-

pregnancy ankle and foot oedema and discovered that the average measures of the circumference of the foot and ankle decreased after reflexology intervention. **Additionally, Abdulaziz & Draz, (2016)** in Al Kasr El Eni hospital, Cairo, Egypt , who found a substantial difference in the oedema volume, diastolic blood pressure, and systolic blood pressure between the two groups after treatment (with the reflexology group experiencing a greater decline). The reason for this could be that edema in the surrounding area of the ankles, the ball of the foot, and the dorsal portion of the foot, which are a reflex zones correspond to the highly vascularized areas of the growing uterus, the chest, the developing breast tissue, and the sites of the breasts. Reflexology can therefore be beneficial in reducing pitting edema in certain regions.

Moreover**, Ahmed et al., (2021)** in Alexandria Governorate, Egypt who compared the effect of exercise with water immersion versus effleurage foot massage on physiological edema of the foot in primigravida. It was discovered that, in contrast to the control group, both exercise with water immersion as well as effleurage foot massage improved significantly foot edema. The effleurage foot massage proved to be more beneficial in this regard than the exercise with water immersion. The results of this study may be explained by **Mollart,2003** who found reflexology is a useful treatment for certain lower limb diseases and widespread edema because it removes fluid from extravascular compartments without changing intravascular fluids. Also with finding of **Katy,(2012)** who found reflexology aids the lymphatic system by promoting lymph fluid circulation and regulating energy levels in filtration nodes and related organs.

Regarding the effect of foot reflexology versus foot soak in warm water with body relaxation techniques on the studied women' mean arterial blood pressure; the present study illustrated statistically significant reduction in the value of MABP among reflexology exercise and warm water foot soak with BRTs groups of preeclamptic pregnant women ($p \leq 0.01$), as the mean arterial blood pressure dropped respectively in both groups from (103.256±7.05&101.67±5.87) pretreatment to (88.74±6.05&88.14±5.91) post treatment. The findings of this study are in line with **ELShamy and ELSaftey, (2011)** in El Mansoura, Egypt, who evaluated how foot reflexology affected hypertensive patients' blood pressure and quality of life (QOL), and discovered that foot reflexology, can lower blood pressure in hypertensive patients. Additionally**, Ermiati et al., (2018) in** Jatinangor who investigated the efficacy of foot massage as an additional treatment to lower blood pressure in preeclamptic pregnant women. They showed that practicing foot massage for 20 minutes daily for a week might lower preeclamptic pregnant women blood pressure. While **Mansour et al.,(2023)** in Minia, who found that reflexology of the feet is a useful technique for lowering MABP of mild preeclamptic pregnant women.

Moreover, The findings were supported by **Amin et al., (2022)** study's in Cibungbulang who examined how heated footbath therapy affected the blood pressure and cortisol levels in women with pregnancy induced hypertension, they found heated footbath therapy at a temperature from 40 to 43 °C for about15 minutes over 14 days lowers systolic blood pressure via lowering cortisol levels. Additionally, the results of this study are supported by **Palanta et al., (2021)** in Watubangga who looked into how blood pressure of pregnant women with chronic hypertension changed after soaking their feet in warm water, and found that blood pressure had been affected after soaking their feet within the warm water.

The findings of this study could be explained by **Solechah et al., (2017);** Alternatives to pharmacological treatment, natural therapies such as aromatherapy, dietary counseling, herbal therapy, reflexology massage, and water foot baths are effective for hypertension. Warmth stimulates baroreceptors in arteries and aortic archus, reducing both systole and diastole blood pressure and ventricular muscle strain, thereby balancing the body's bio-regulator function **(Valado et al., 2022).**

Relaxation and calmness can lower The hypothalamus's levels of adrenocorticotropic and corticotrophin hormone (**Niken et al.,2022**), reducing sympathetic nerve activity and adrenaline levels**(Kordi et a., 2017),** thereby reducing blood vessel resistance, heart rate and cardiac muscle exertion, thus effectively controlling high blood pressure(**Niken et al.,2022**). The study results confirmed this, as an improvement in the value of MABP occurred among women in the warm water foot soak with BRTs groups. The study's outcome matched those of **Awad et al. (2019)** at Cairo University hospital in Egypt, who evaluated the benefits of autogenic training (AT) against stretching activities in pregnant mothers with mild preeclampsia, they discovered that following the intervention, women who had mild preeclampsia had much lower systolic and diastolic blood pressure following the stretching activities and the relaxation training. Similarly, with the study of **Azimian et al. (2017)** in Iran who examined the impact of deep muscular relaxation and mental imagery on pregnancy-related hypertension. They discovered that, in comparison to the control group, the intervention group's mean systolic blood pressure had significantly dropped. Also, **Ghorbannejad et al., (2022)** in Iran who evaluated the impact of Jacobson's progressive relaxation of muscles approach on the maternal, fetuses, and newborns outcomes in women with mild preeclampsia. The findings of this study demonstrated the beneficial effects of gradual muscular relaxation on improvements in both diastolic and systolic blood pressure ($P < 0.001$). While **Urech *et al.* (2010)** in Switzerland who examined the immediate effects on pregnant women's overall endocrine, psychological, and cardiovascular functioning of two short active relaxation exercises (guided imagery and progressive muscle relaxation(PMR)), and

found that the intervention group's systolic and diastolic blood pressure did not alter as a result of the body relaxation training. Because the body relaxation training was conducted alone, with headphones, and with just one relaxing session completed. Thus, the quantities of sessions and type of approach used have had varying outcomes.

Regarding the effect of reflexology and foot soak in warm water with BRTs on degree of proteinuria; this study demonstrated a clear effect of reflexology and warm water foot soak with BRTs on reduction of the degree of proteinuria as; half and more of preeclamptic pregnant women in the reflexology and warm water foot soak with BRTs groups experienced grade 4 of proteinuria and only (6.7%& 3.3 % respectively) of them experienced grade 1 of proteinuria pretreatment. While post treatment, degree of proteinuria had been improved as (50.0%& 36.7% respectively) of them experienced grade 1 of proteinuria and only (10.0%& 13.3% respectively) of them experienced grade 4 of proteinuria post treatment in favor of reflexology exercises.

The study's findings have been confirmed by **Mansour et al.,(2023)** in Minia, who discovered that proteinuria in mild preeclamptic pregnant women's can be reduced with the help of foot reflexology. Additionally, **Awad et al. (2018) ,** revealed that both groups' 24-hour proteinuria was considerably reduced when stretching activities and relaxation techniques were used. Also, **Ghorbannejad et al., (2022)** in Iran, demonstrated that the 24-hour urine levels of protein may be successfully reduced with the progressive relaxation of muscles technique ($P < 0.001$). In contrast, our findings disagreed with **Valiani et al., (2023)** in Iran who investigated how body relaxation methods affected the syndrome of pre-eclampsia. Their results showed that there was no noticeable difference in diastolic arterial pressure or urine protein level between the two groups. Accordingly, this may be due to low quantities of sessions and improper approach used for training.

Regarding the effect of reflexology and warm water foot soak with BRTs on quality of life, this study demonstrated a clear effect of reflexology and foot soak in warm water with BRTs on improvement of quality of life as; half and more respectively of preeclamptic pregnant women in the reflexology and foot soak in warm water with BRTs groups experienced poor quality of life and only (6.7%& 16.7 % respectively) of them experienced averaged (moderate) quality of life pretreatment. While post treatment, the quality of life had been improved as only (10.0%& 26.7% respectively) of them experienced poor quality of life and (56.7%& 36.7% respectively) of them experienced averaged (moderate) quality of life post treatment in favor of reflexology exercises.

Findings of this study aligned with **Mansour et al., (2023)** in Minia, who discovered that the quality of life (QOL) of mildly preeclamptic pregnant women can be improved using foot reflexology. Also **ELShamy and ELSaftey, (2011)** showed that twice-weekly, 30-minute foot reflexology sessions over a period of four weeks can improve the quality of life in hypertensive patients.

This is in line with research from **Ozdemir & Can,(2021)** in Istanbul, Turkey, who assessed the efficacy of foot soak in warm salty water in the treatment of fatigue brought on by chemotherapy, and they discovered that foot soaks in warm salty water can be a useful strategy for improving cancer patients' quality of life related -fatigue, not just in hypertensive patients.

Preeclampsia symptoms like edema, hypertension, and proteinuria significantly impact a patient's quality of life. These symptoms can cause anxiety and psychological distress. Effective management of these symptoms improves overall well-being and reduces discomfort. Reducing pitting edema decreases pain and discomfort; improves movement, sense of independence, and sleep quality, leading to better energy and activity levels.

Conclusions and Implications for Nursing Practice

Given the statistically significant reduction in the degree of pitting edema among the reflexology group of preeclamptic pregnant women, hypothesis (H3) is accepted while hypotheses H0, H1, and H2 are excluded. Along with improvements in quality of life, reflexology and warm water foot soak with BRTs groups of preeclamptic pregnant women also showed improvements in the mean arterial blood pressure, and degree of proteinuria. However, the reflexology was more effective than warm water foot soak with BRTs in this respect. So;

1. Preeclamptic pregnant women can utilize the study's findings as a guide to follow on independently when they start exhibiting preeclampsia symptoms.
2. Hospital protocols for the treatment of preeclampsia symptoms have to incorporate reflexology and warm water foot soaks with BRTs with the conventional medical care.
3. The findings of this study should have implications for nursing education and in the provision of preeclamptic patient care.
4. Larger-scale studies are needed to confirm findings and refine protocols, and to verify the safety of reflexology and warm water foot soak with BRTs on symptoms of preeclampsia.

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