Effect of Foot Reflexology Technique on Diabetic Neuropathy Patients' Health Outcomes

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Abstract

Background: Self-foot reflexology is effective in patients with type 2 diabetes mellitus (T2DM) by reducing symptoms of peripheral neuropathy, as numbness and pain, tingling and stimulate the circulation of blood to the feet directly which help in reducing the loss of sensation to the foot. **Aim of study:** Was to evaluate effect of foot reflexology technique on diabetic neuropathy patients' health outcomes. **Design:** A quasi-experimental design will be utilized to achieve the aim of this study. **Setting:** The study was conducted at inpatient and outpatient internal medicine department at Benha University Hospital. **Subjects:** A Purposive sample of 95 patients in the previous mentioned setting. **Tools of data collection: I:** Structured questionnaire assessment which composed of demographic data of patients, medical health history and neuropathy specific quality of life. **II**: Clinical base data assessment which composed of modified neuropathy sensory disability scale, blood glucose level and peripheral circulation test. **Results:** All (100%) of studied patients aged between 45-≤60 years old, all items of neuropathy-specific quality of life, modified neuropathy sensory disability, peripheral circulation and blood glucose level were improved post reflexology intervention for 90%, 87%, 72% & 60% of studied patients, respectively compared with pre-reflexology intervention with significant difference p≤0.01. **Conclusion:** Reflexology intervention is endorsed in improving QOL, diabetic peripheral neuropathy sensory, lowering blood glucose level and improve peripheral circulation of the diabetic neuropathic studied patients. **Recommendations:** Increase public awareness about efficacy & tolerability of foot reflexology in improving health outcomes as quality of life, sensation, blood glucose level and peripheral circulation of diabetic neuropathic patients.

Keywords: Diabetic Neuropathy, Patients' Health Outcomes, Reflexology

Introduction

Reflexology is a scientific art based on the premise that there are reflex areas in the feet and hands that correspond to all the body part, also, called the physical act of applying specific pressure using thumb, figure and hand techniques results in stress reduction and causes physiological changes in the body. The importance of foot reflexology as the integration of philosophy of oriental medicine and western medicine which is the combined approach for health care that has been continuously used from the past to present. Reflexology is based on zone theory and meridian theory. It is both science and art based on scientific principles, which describes the effects of foot reflexology to all the organs, glands and body parts **(Editors of Chase's, 2021).**

The self-foot reflexology effective in patients with T2DM by reducing peripheral neuropathy, especially numbness and pain and stimulate the circulation of blood to the feet directly which help in reducing the loss

of sensation to the foot and the foot pressure. Reflexology also decreases HbA1c two hours after a meal and reduces pain and numbness of the feet which was the result of peripheral nervous system complications in people with diabetes **(Yodsirajinda et al., 2016).**

The nurse has an important role during the reflexology sessions as educator and applying reflexology intervention. Before reflexology session the nurse take full history and well assess patients' health condition and exclude any contraindications for reflexology, during reflexology session she addresses all internal organs and glands and carefully apply different reflexology techniques **(Naseri-Salahshour, et al, 2019).**

Significance of the study:

National data in Egypt confirms that more than 60% of Egyptian diabetic patients suffer from neuropathy. Also, National data in Egypt confirmed that 29.3% of Egyptian diabetic patients suffer from peripheral neuropathy **(El-Kebbi, et al, 2021).**

Aim of Study

This study aimed to evaluate effect of foot reflexology technique on diabetic neuropathy patients' health outcomes.

Research hypotheses:

1- There would be difference in neuropathy disability score between pre and post foot reflexology technique intervention at the end of 6 weeks of practice.

2- There would be more improvement in neuropathy specific quality of life scores post foot reflexology technique intervention at the end of 6 weeks of practice than before.

3- The diabetic neuropathy patients' peripheral circulation and blood glucose level would be improved post foot reflexology technique than before .

4-There would be a relation between neuropathy disability, peripheral circulation, neuropathy specific quality of life and blood glucose level for patients with diabetic neuropathy pre and post they will be exposed to foot reflexology technique management.

Subject and Methods

Research design:

A quasi-experimental design was utilized to achieve the aim of this study.

Setting:

This study was conducted at inpatient and outpatient internal medicine department at Benha University Hospital.

Subjects:

Purposive sample of 95 patients in the previously mentioned setting.

The sample size calculation based on power analysis Herbert Equation (Herbert, 1980) was as follow:

$$\frac{0.50(1\text{-}0.50)}{}$$

n= (0.05÷1.96)+[0.50(1 0.50)÷125]

N = 125 t = 1.96

SE = 0.05 P = 0.50

n = 95

Inclusion criteria:

- Adult Conscious patients who have diabetic neuropathy of both sex (male and female), their age from (25 to 60 years old) and have diabetes mellitus more than or equal 10 years.

Exclusion criteria:
- Patients who have peripheral thrombosis.
- Arterial occlusion.
- Peripheral burn, injury, fracture.
- Amputation and paralysis.

Tools of data collection:

Two tools were used to collect necessary data to fulfill the study aim.

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Tool (1): Structured questionnaire:

This tool was designed by the researcher after reviewing the related literature **(Papadakis et al., 2019) (Polansky 2019).** It included 3 parts:

Part (I):- Patients' sociodemographic data:

It included patients' age, gender, marital status, level of education, residence, occupation, and monthly income.

Part (II): Medical and health history: It was used to assess patients' past history such as past hospital admission, past history of foot ulcer other chronic disease as hypertension and family history diseases. Present history as type of diabetes, type of treatment, and duration of diabetes and neuropathy.

Part (III): Neuropathy-Specific QoL Instrument (Neuro QoL): It was adapted from **(Vileikyte, et al, 2003)** It was aimed to assess health related quality of life outcomes for patients with diabetic neuropathy.

- **Scoring system:**

Total global score of 108 for 27 subitems, were rated on four ranks as (Never= Zero, occasionally = 1, some of the time= 2, more of the time= 3 and all of the time= 4). A highest mean score refers as a low QOL. The total score of this scale classified into three results based on the following:

- Good improved Neuropathy-Specific QoL <60% of total score (<65 scores)

- Moderate Neuropathy-Specific QoL ≥ 60% to <80% of total score (65 - <87 score)

- Poor Neuropathy-Specific QoL ≥80% of total score (≥87 scores)

Tool (2):- Clinical base data Assessment:

It was aimed to assess clinical base data outcomes for diabetic neuropathic patients. It divided into three parts.

Part I: Modified neuropathy sensory disability score: It was adapted from **(Vileikyte, et al, 2003).** It was aimed to assess health related neuropathy outcomes for patients with diabetic neuropathy.

- **Scoring system:**

The sum of 4 tests = 5 for each foot. For test (1, 2 & 3) was rated on two ranks (normal= 0, abnormal =1), for test 4 was rated on three ranks (present= 0, present with reinforcement=1, absent=2).

The total maximum abnormal score is 10 score of this scale classified into three results based on the following:

- Mild neuropathy 2-5 neuropathy score

- Moderate neuropathy 6-8 neuropathy score

- Sever neuropathy 9-10 neuropathy score

Part II: Blood glucose level: It was aimed to assess random blood glucose level for diabetic neuropathic patients. It was adapted from **(Rodriguez-Saldana, 2019).**

- **Scoring system:**

The normal level in an average adult is 80–140mg/dl. The total score of this scale classified into two results based on the following:

- Mild elevations 150- <200mg/dl

- Moderate elevations 200 ≤ 250 mg/dl

- Sever elevations > 250 mg/dl

Part III: Peripheral circulation test: It was aimed to assess peripheral circulation which includes peripheral pulse, and skin color, hotness and coldness for both left and right foot. It was adapted from **Lima & Bakker, (2015).**

- **Scoring system:**

The sum of 3 components = 3 for each foot.

For peripheral pulse force test was rated on four ranks (none-palpable or absent= 3, weak or thread =2, normal or strong= 1, bounding or full= 0), skin capillary refill color was rated on two ranks (10 seconds or less= 0, more than 10 seconds=1) and hotness and coldness sensation in feet was rated on two ranks (tangible= 0, none-tangible= 1). The total maximum abnormal score is 6 score of this scale for two feet classified into three results based on the following:

- Good   2-3 score

- Moderate   4-5 score

- Poor   6 score

Designed reflexology technique management program: It aimed to reduce and manage the pain, RBS, QOL, peripheral sensory disability and circulation of the neuropathic diabetic patients and it was developed and designed by the researcher through a review of recent and related literature as: history of reflexology, it's definition, indications and benefits and contraindications as well as maps of foot reflexology, reflex zone therapy and principles of foot reflexology. The reflexology technique was explained to studied subjects with explain its map and different zone therapy this technique was adopted from (**Sidawy & Perler, 2018) & (Farnsworth, 1995)**. The researcher applied it on the patients after become trained under supervision and advice from reflexologist.

Content validity and reliability

Content validity: Validity was tested by a jury of (5) experts, three assistant professors of Medical Surgical Nursing, and one lecturer of Medical Surgical NURSING at the Faculty of NURSING at Beni suef University and one assistant professor of physiotherapy at Beni-suef University. The experts reviewed the tool for clarity of sentences, relevance, accuracy, comprehensiveness, simplicity and applicability, minor modifications were done.

Testing reliability: In the present study, reliability was tested using Chronbach's Alpha coefficients for tool 1 part III was 0.843, tool 2 part I was 0.713, part II was 0.860 and part III was 0.603.

Pilot study:

Pilot study was conducted on 10% of the total study subjects (10 patients) for testing clarity and applicability of the study tools. Depending on the results of the pilot study no modifications or refinements were done and the patients weren't included in the actual study sample.

Ethical consideration:

The ethical research consideration in this study included the following:

- The researcher obtained informed oral consent from the patients included in the study prior to data collection.

- Patients informed about their rights to participate or withdraw from the study at any time without given a reason and they were assured that anonymity and confidentiality of information was protected. Ethics, values, culture, and beliefs were respected.

Field work:

Data collection took a period of 7 months started from the end of December 2019 at the end July of 2021.

Data collection passes throughout three stages as the following:

Phase 1: Assessment phase:

The data was collected by the researcher throughout assessing patients' sociodemographic data, medical, health history and neuropathy specific quality of life using (**tool I**) and clinical base data as modified neuropathic sensory disabilities,

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blood glucose level and peripheral circulation were recorded using **tool II** as a baseline data assessment pre reflexology intervention.

Phase II: Planning and implementation phase:

Once the initial assessment finished, the researcher planned the sessions of individualized patients for start explanation of theoretical part and applied the foot reflexology technique.

- Patients were divided into small groups (2-4 patients/session) each group perceived the same content using the same teaching strategies and handout.

- The total number of sessions was 2-3/week for each group according to their level of neuropathy.

- Theoretical session: (30 minutes including explanation and discussion) about the reflexology meaning, benefits and contraindication.

- Practical session: 90 minutes including discussion and application of reflexology techniques. The total number of groups were (19 groups) and total time for achieving reflexology technique was (2) hours for each group under the study. Each patient was take a time for 24 minute.

- The media was used in the reflexology techniques sessions as following: data show, power point presentation, map of foot reflexology and poster hooking, discussion, demonstration and re-demonstration as a method of teaching were also conducted during each session.

- During each session the researcher used simple, brief and clear words. At the end of each session, a brief summary was given by the researcher, emphasizing the most important points included in each session and ask each patient to follow this technique in the home (10 minutes for each foot).

- Before starting of each session, patients were asked questions related to the topics discussed in the previous session to ensure that they remember the instruction was given and to reinforce the knowledge. Missed or unclear points were re-emphasized by the researcher.

- Reflexology technique management booklet was given to each patient in the study to grasp his attention, motivate, help for reviewing at home and support teaching and practicing.

Phase III: Evaluation phase (Post program):

This phase aimed to evaluate the effect of the foot reflexology technique on diabetic neuropathy patients' outcomes; it was done by the researcher as following:

- Evaluation of patients' immediately after applying reflexology technique sessions using modified neuropathy sensory disability, blood glucose level and peripheral circulation (tool II; part I, II and III).

- On 4th and 6th week post reflexology intervention, the researcher was evaluate patients' neuro-quality of life using tool I part III and modified neuropathy sensory disability, blood glucose level and peripheral circulation using tool II.

- Comparison of each patient's findings with the preceding one by comparing between pre-test results with immediate, post and findings on 4th & 6th weeks to evaluate the impact of implementing reflexology technique sessions on patients

Statistical analysis:

Data were summarized, tabulated, and presented using descriptive statistics in the form of means and standard deviations as a measure of dispersion. A statistical package

for the social science (SPSS), version (26) was used for statistical analysis of the data, as it contains the test of significance given in standard statistical books. Qualitative data were expressed as a percentage. For quantitative data, a comparison between two variables was done using a student's t-test. Probability (P-value) is the degree of significance, less than 0.05 was considered significant. The smaller the P-value obtained, the more significant is the result (*), less than 0.001 was considered highly significant (**) and the correlation coefficient was done by using the Pearson correlation test. Fisher's Exact Test is a way to test the association between two categorical variables. When in case of small cell sizes (expected values less than 5). T- test is used when the cell sizes are expected to be large. If the sample size is small (or you have expected cell sizes <5). Chi-square (X2) test of significance was used in order to compare proportions between qualitative parameters.

Results

Table (1) shows that, all (100%) of studied patients aged between 45 - ≤60 years old with a mean age of (55.09± 4.22), 50.5% of them were females and 80% were married, 65.3% of them were illiterate and 43.2% had no work, although 73.7% of studied patients had insufficient income for medication cost.

Table (2) clarifies that, there was a statistically significant improvement in patients' neuro QOL in 4th and 6th weeks post reflexology intervention and comparing with pre-reflexology with (p-value = 0.000), and it was noticed that, a highest mean score as low QOL was concern "emotional burden" and painful symptoms and paresthesia during pretest with mean (23.75± 1.62) and (23.13 + 1.71), respectively, it improved to become (7.16±2.74 and 5.71±2.33) and (7.16±2.74

and 5.71+2.33), respectively. On 4th and 6th weeks post reflexology intervention.

Figure (1): shows that, 98% of studied patients had sever neuropathy during pretest regarding to modified neuropathy sensory disability score, 30% of them had moderate neuropathy during immediate-test and it improved to become mild neuropathy (70%, 76% & 87%), respectively in immediate posttest, 4th & 6th weeks post reflexology intervention.

Table (3) shows that, there was a statistically significant improvement of the studied diabetic neuropathy patients regarding their blood glucose level during the immediate posttest, 4th and 6th weeks post reflexology intervention with p-value=0.001, and it noticed that, a highest mean of random blood glucose level during pretest was 244.71±47.68 which improved to become (212.44±49.59, 186.25±31.21 & 175.94±24.44), respectively in immediate posttest, 4th & 6th weeks post reflexology intervention.

Figure (2) shows that, 7% of studied diabetic neuropathy patients had good peripheral circulation, which improved to become (8%, 22% & 60%), respectively during immediate test, post 4th and 6th weeks post reflexology intervention.

Table (4) shows that, there was a strong positive correlation between total neuropathy-specific QOL score, total modified neuropathy sensory disability score and random blood glucose level and between total modified neuropathy sensory disability score and total peripheral circulation test. While, there was no correlation between total neuropathy-specific QOL score and total peripheral circulation test and between random blood glucose level, total modified neuropathy sensory disability score and total peripheral circulation test.

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Table (1): Demographic characteristics of the studied patients (N=95).

| Demographic characteristics frequency	No.	%
Age		
- 45≤60 years	95	**100**
Mean ± SD	55.09± 4.22	
Gender		
- Male	47	49.5
- Female	48	**50.5**
Marital status		
- Married	76	**80.0**
- Widow	19	20.0
Level of education		
- Illiterate	62	**65.3**
- Read & write	24	25.3
- Secondary education	5	5.3
- High education	4	4.1
Occupation		
- No work	41	**43.2**
- Employee	24	25.3
- Free business	20	21.1
- Retired	10	10.4
Income (Monthly)		
- Sufficient for medication cost	25	26.3
- Insufficient for medication cost	70	**73.7**
Residence		
- Urban	33	34.7
- Rural	62	64.3

Table (2): Frequency distribution of the studied diabetic neuropathic patients regarding their neuropathy-Specific QoL Instrument (Neuro QoL) pre & post reflexology intervention (n=95).

Neuropathy-specific QOL instrument	TS	Pre	Post intervention	
			4th week	6th week
Painful symptoms and paresthesia	28			
Good N (%)	<17	0(0.0%)	91(95.8%)	92(96.8%)
Moderate N (%)	17<23	29(30.5%)	2(2.1%)	2(2.1%)
Poor N (%)	≥23	66(69.5%)	2(2.1%)	1(1.1%)
Symptoms of reduced/lost sensation in the feet	12			
Good N (%)	<7	0(0.0%)	93(97.9%)	90(94.7%)
Moderate N (%)	7<10	22(24.2%)	1(1.1)	4(4.2%)
Poor N (%)	≥10	73(76.8%)	1(1.1%)	1(1.1%)
Diffused sensory motor symptoms	12			
Good N (%)	<7	0(0.0%)	93(97.9%)	92(96.8%)
Moderate N (%)	7<10	23(24.2%)	1(1.1%)	3(3.2%)
Poor N (%)	≥10	72(75.8%)	1(1.1%)	0(0.0%)
Limitations in daily activities	12			
Good N (%)	<7	0(0.0%)	94(98.9%)	94(98.9%)
Moderate N (%)	7<10	15(15.8%)	1(1.1%)	1(1.1%)
Poor N (%)	≥10	80(**84.2%**)	0(0.0%)	0(0.0%)
Interpersonal problems	16			
Good N (%)	<9.7	0(0.0%)	94(98.9%)	95(100.0%)
Moderate N (%)	9.7<12.8	32(33.7%)	1(1.1%)	0(0.0%)
Poor N (%)	≥12.8	63(66.3%)	0(0.0%)	0(0.0%)
Emotional burden	28			
Good N (%)	<17	1(1.0%)	94(98.9%)	95(100.0%)
Moderate N (%)	17<23	16(16.9%)	1(1.1%)	0(0.0%)
Poor N (%)	≥23	78(82.1%)	0(0.0%)	0(0.0%)

(*) statistically significant at p ≤ 0.05   P1= between pre& post 1 (4th weeks)

(**) highly statistically significant at p ≤ 0.00   P2 = between pre& post 2 (6th weeks)
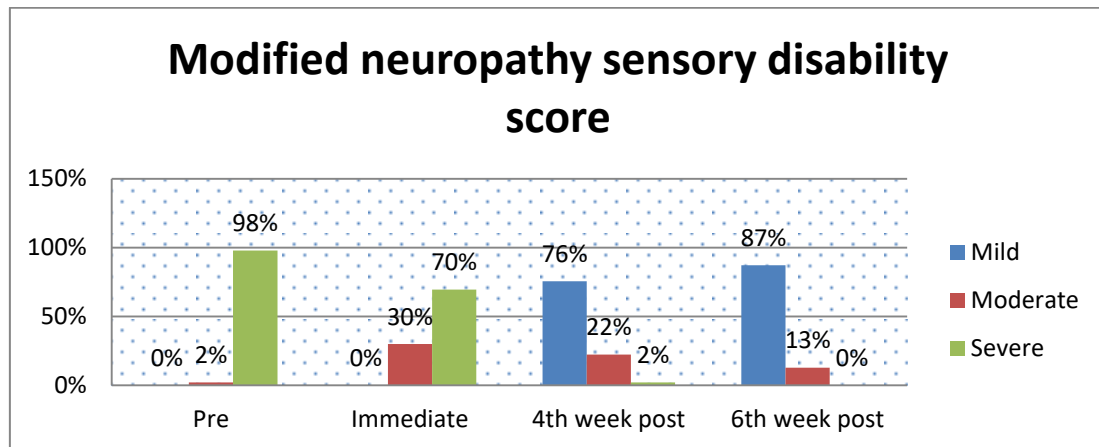
Figure (1): Total studied diabetic neuropathic patients' percent score regarding their modified neuropathy sensory disability score, pre and post reflexology intervention (n=95).

Table (3): Mean, standard deviation and significant differences of the studied diabetic neuropathic patients regarding their blood glucose level, pre & post reflexology intervention (n=95).

Blood glucose level	Pre	Post intervention			Pre & immed P1 (P-value)	Pre & post1 P2 (P-value)	Pre & post2 P3 (P-value)
		Immediate posttest	4th week	6th week			
	M±SD	M±SD	M±SD	M±SD			
Random blood glucose level	244.71±47.68	212.44±49.59	186.25±31.21	175.94±24.44	6.29 (0.000**)	11.15 (0.000**)	12.96 (0.000**)

(*) statistically significant at p ≤ 0.05   P1= between pre& post 1 (4th week)

(**) highly statistically significant at p ≤ 0.00   P2 = between pre& post 2 (6th week)
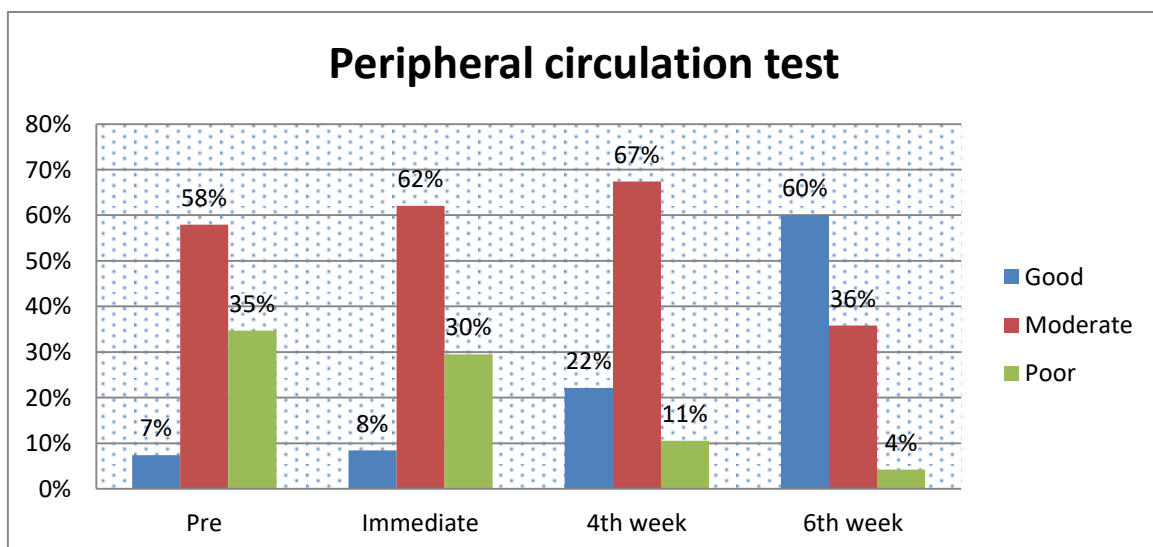
Figure (2): Total subject diabetic neuropathy patients' percent score regarding their peripheral circulation test, pre and post reflexology intervention (n=95).

Table (4): Correlation between patients' total neuropathy- specific QOL, modified neuropathy disability score, random blood glucose level and peripheral circulation test. (n=95)

		Total neuropathy-specific QOL score	Total modified neuropathy disability score	Total peripheral circulation test
Total neuropathy-specific QOL score	**R**			
	P			
Total modified neuropathy disability score	**R**	0.309		
	P	0.002**		
Total peripheral circulation test	**R**	0.022	0.316	
	P	0.832	0.002**	
Random blood glucose level	**R**	0.263	0.186	0.061
	P	0.010**	0.071	0.554

(*) statistically significant at $p \leq 0.05$ (**) highly statistically significant at $p \leq 0.00$

Discussion

The aim of the present study was to evaluate effect of foot reflexology technique on diabetic neuropathy patients' health outcomes

Regarding demographic characteristics, the results of the present study showed that, all of studied patients aged between 45-≤60 years. It may be due to increasing the average age of the diabetes neuropathy patients that affected on long time suffering patients with diabetes mellitus. This finding is in agreement with a study carried out by **Megda, et al, (2020)** about "Immediate effect of foot reflexology in patients with diabetic neuropathy -randomized clinical trial" and revealed that more than two third of studied patients aged 55 to 75 years old.

Regarding gender, the present study presented that, slightly more than half of studied patients were females. It may be due to the fact that diabetes mellitus occurs more in females than males. This finding is supported by **Yodsirajinda et al., (2016)** in

their study entitled "Effects of foot reflexology integrated with medical use on hemoglobin A1c and ankle brachial index in older adults with type 2 diabetes mellitus" and mentioned that two third of studied patients were females.

Concerning the marital status, the current study revealed that, more than two third of studied patients were married. This result is in agreement with a study by **Dalal, et al, (2014)** entitled "Determination of efficacy of reflexology in managing patients with diabetic neuropathy" and reported that two third of studied patients were married.

Regarding their educational level, the current study revealed that, more than half of studied patients were illiterate. This finding is supported by **Martínez, et al, (2018)** in their study entitled "Reflexology and Quality of Life in Diabetic Patients: Randomized Clinical Trial" and revealed that more than half of studied patients were illiterate.

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As regarding their occupational status, the present study reported that, more than one third of studied patients had no work. It may be related to that they were females and illiterate. This result is in agreement with **Abu-Shennar et al., (2020)** in their study entitled "Prevalence of peripheral neuropathic pain among adult diabetic patients (T2DM) with peripheral neuropathy and quality of life of the patients with peripheral neuropathic pain", it was found that more than one third of studied patients had no work.

Also**,** the current study revealed that, more than two third of them had insufficient income for medication cost. From the researcher point of view, it may be related to that they had no work. This study is in agreement with **Gurmit, (2021)** that carried out a study titled "A pre-experimental study to assess the effectiveness of foot reflexology on diabetic peripheral neuropathic pain among patients with diabetes from selected urban community" and revealed that more than half of studied patients had insufficient income for medication cost.

Also, The present study revealed that, there was a statistically significant improvement in patients' neuro QOL on 4th and 6th weeks post reflexology intervention and comparing with pre-reflexology, and it was noticed that, a highest mean score as low level of QOL was concern "emotional burden" and painful symptoms and paresthesia during pretest, it improved on 4th and 6th weeks post reflexology intervention.

This result is in agreement with **Aslan & Kiliç, (2022)** who conducted a study about "The effect of reflexology based on Watson's caring model on Lombalgia and quality of life in older adults" and revealed that there was a statistically significant improvement in patients quality of life post reflexology intervention and reported that the pain main

score were high mean pre reflexology intervention which reduced post reflexology intervention.

Concerning to modified neuropathy disability score. The instant study revealed that, a majority of studied patients had sever neuropathy during pretest regarding to modified neuropathy sensory disability score, and it improved to become mild in immediate posttest, 4th & 6th weeks post reflexology intervention. It is may be attributed to a positive effect of reflexology by increasing circulation and nerve stimulation as reported by **(Salvo, 2020).**

This study is agreed with a study carried out by **Cicek, et al, (2021)** titled "Effect of reflexology on ankle brachial index, diabetic peripheral neuropathy, and glycemic control in older adults with diabetes: A randomized controlled trial" and reported that a foot reflexology practice can be a useful for improving the glycemic control and diabetic peripheral neuropathy in the older adults with diabetes as there was no significant between-group difference regarding post-test ankle brachial index score.

Concerning their blood glucose level, the present study showed that, there was a statistically significant improvement in studied neuropathic patients regarding their blood glucose level during the immediate and on 4th and 6th weeks post reflexology intervention. From the researcher point of view, it may be related to enhance insulin secretion and insulin uptake by body cells.

This study is supported by **Yodsirajinda et al., (2016)** who conducted a study entitled "Effects of foot reflexology integrated with medical use on hemoglobin A1c and ankle brachial index in older adults with type 2 diabetes mellitus" showed that there was a highly statistically significant improvement in

studied patients regarding their blood glucose level during immediate post reflexology intervention and on follow up.

Regarding peripheral circulation test, The current study mentioned that, a minority of studied patients had good peripheral circulation, which improved during immediate, on post 4th and 6th weeks post reflexology intervention. From the researcher point of view, it may be related to effectiveness of foot reflexology on improving peripheral circulation and enhancing foot sensation. This result is in agreement with **Dalal, et al, (2014)** in their study entitled "Determination of efficacy of reflexology in managing patients with diabetic neuropathy" and found that reflexology group showed more improvements in pain reduction, glycemic control, nerve conductivity, and thermal and vibration sensitive outcomes measures than those of control subjects.

Concerning correlation between study variables, the constant study revealed that, there was a strong positive correlation between total neuropathy-specific QOL score, total modified neuropathy disability score and random blood glucose level and between total modified neuropathy disability score and total peripheral circulation test. While, there was no correlation between total neuropathy-specific QOL score and total peripheral circulation test and between random blood glucose level, total modified neuropathy disability score and total peripheral circulation test.

This study is supported by **Ibrahim & Rizk, (2018)** in their study entitled "The Efficacy of Foot Reflexology on the Reduction of Peripheral Diabetic Neuropathic Pain" and mentioned that there was a strong positive correlation between neuropathy sensory disability scale and random blood

glucose level. Also, this result is on the same line with **Gurmit, (2021)** who conducted a study "A pre-experimental study to assess the effectiveness of foot reflexology on diabetic peripheral neuropathic pain among patients with diabetes from selected urban community" and showed that there was a positive correlation between QOl, neuropathy score, blood glucose level and peripheral circulation test post reflexology intervention.

Conclusion

The neuropathy-specific QoL, modified neuropathy sensory disability, blood glucose level and peripheral circulation were improved on post and follow up post reflexology intervention for the majority of studied neuropathic patients compared with pre foot reflexology intervention. Finally, there was strongly positive correlation between total neuropathy-specific QOL score, total modified neuropathy sensory disability score and random blood glucose level.

Recommendations

- Increase public awareness about efficacy & tolerability of foot reflexology in improving health outcomes as quality of life, sensation, blood glucose level and peripheral circulation of diabetic neuropathic patients.

- Provide the current Arabic reflexology booklet for large numbers of diabetic neuropathic patients to increase their awareness about benefits of reflexology on their health outcomes.

- Providing continuous education and update for nurses regarding foot reflexology.

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تأثير إستخدام تقنية الريفلكسولوجى للقدم على النتائج الصحية لمرضى اعتلال الأعصاب السكرى

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تعتبر تقنية الريفليكسولوجى فعالة في مرضى السكري من النوع الثانى عن طريق الحد من أعراض اعتلال الأعصاب السكرى مثل التنميل والألم والوخز كما انها تقوم بتنشيط الدورة الدموية في القدمين بشكل مباشر مما يساعد على تقليل فقدان الإحساس بالقدمين. لذا هدفت هذة الدراسة الى تقييم تأثير تقنية الريفلكسولوجى للقدم على النتائج الصحية لمرضى اعتلال الأعصاب السكري. تم استخدام تصميم شبه تجريبي لإجراء هذه الدراسة. أجريت هذه الدراسة داخل اقسام الباطنه الداخليه والعيادات الخارجيه بمستشفى بنها الجامعى. تم تطبيق هذه الدراسة علي (٩٥) مريضا تم تشخيصهم بمرض الإعتلال العصبى السكرى خلال فترة ٦ أشهر وكانت العينة غرضيه . حيث كشفت النتائج عن أن هناك تحسن معتد به إحصائيًا في جودة الحياه العصبي ، درجة اعتلال الأعصاب ، نسبة الجلوكوز بالدم والدوره الدمويه الطرفيه لدى المرضى بعد تطبيق الريفلكسولوجى والمقارنة مع ما قبل تطبيق الريفلكسولوجى. واوصت الدراسة الي زيادة الوعي العام حول التأثير الجيد وفعالية الريفلكسولوجى للقدم في تحسين جودة الحياة ، والنتائج الصحية لمرضى اعتلال الأعصاب السكرى.