

Home Care for Clients with Diabetic Peripheral Neuropathy

Fatma Gomaa Mohmed, Faten Khyrat El Guindi DNS, Omaima Mohmed Esmat
Community Health Nursing - Faculty of Nursing, Ain Shams University

Abstract

Background: Diabetic peripheral neuropathy (DPN) is one of the most frequent complications of diabetes mellitus leading cause for disability due to foot ulceration and amputation, gait disturbance, and fall-related injury. **The aim of this study** was to evaluate the effect of home care program of clients with diabetic peripheral neuropathy. **Setting:** This study was conducted at the diabetic Outpatient Clinics at Ain Shams University Hospital through clients home. **Sampling:** A purposive sample of 50 clients with DPN were included, male & female aged from 35 years and above 56, and registered for follow up in the previous setting. **Tools:** For data collection three tools were used, an interviewing questionnaire for the DPN clients include four parts; 1st part socio-demographic characteristics, home environmental assessment, Past and present medical and family history, knowledge regarding diabetic peripheral neuropathy and. 2nd tool: Healthy practices assessment sheet for client's with diabetic peripheral neuropathy client's lifestyle toward DPN & Foot Care, 3rd tool: A neurological examination includes physical assessment measurements. **Results:** of this study revealed that majority from clients had unsatisfactory knowledge regarding DPN. Regarding total lifestyle practices most of clients had positive lifestyle practices; two third of clients had correctly done foot care practice toward DPN after program implementation. **Conclusion:** The study concluded that the Home Care program showed remarkable improvement in patient's knowledge, and practices regarding their DPN. There was highly statistically significant difference in relation to client's knowledge and, practices toward DPN pre/post home care program. **Recommendations:** The study recommended that Continuity of health education programs to raise the health awareness and knowledge of family and clients about risk factors for diabetic peripheral neuropathy and encourage them to adopt a healthy dietary behavior, and promote physical exercise. Providing diabetic outpatient clinics in governmental hospitals with rehabilitation centers to follow-up lifestyle promoting for diabetic patients.

Keywords: Home Health Care, Diabetic Peripheral Neuropathy. Diabetic foot, life style, Transcutaneous Electrical Nerve Stimulation

Introduction:

Diabetes mellitus (DM) is a devastating metabolic disorder that places an economic burden for every country around the world with the global increasing trend. As a cost of urbanization, the overall status of diabetes according to

IDF estimates in 2017 showed that there are now 425 million adults with diabetes and 352 million adults with impaired glucose tolerance worldwide (IDF, 2017).

Diabetic neuropathies are a heterogeneous group of disorders of varying a etiology and clinical

presentation. The most common form is symmetrical diabetic peripheral neuropathy (DPN), which mainly affects the lower extremities and is a major cause of morbidity because of its effects on risk for subsequent ulcers, amputation and disability (Kluding, et al., 2017).

Most common among diabetic neuropathies is chronic Diabetic peripheral neuropathy, accounting for about 75% of the diabetic neuropathies. A simple definition of DPN for clinical practice is the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after the exclusion of other causes. (Pop-Busui, Rodica, et al., 2017).

Peripheral neuropathy (PN) is the predominant variety in patients with diabetes whether type 1 or type 2. It manifests as distal symmetrical polyneuropathy (DSPN), also known as diabetic peripheral neuropathy (DPN), causing nerve damage in the extremities particularly the feet, in addition to radiculopathy and mono neuropathy (Khawaja N, et al., 2018).

Patients with DSPN might suffer from pain and discomfort in the lower extremities, loss or absence of protective sensation in the lower extremities leading to balance problems, risk of foot ulcerations, and a reduced quality of life in adults with diabetes patients (JemberG, et al., 2017).

Lifestyle management is a fundamental aspect of diabetes care and includes diabetes self-management education and support (DSMES), medical nutrition therapy (MNT), physical activity. Patients and care providers should focus together on how to optimize lifestyle from the time of the initial comprehensive medical evaluation, throughout all

subsequent evaluations and follow-up, and during the assessment of complications and management of co morbid conditions in order to enhance diabetes care (American Diabetes Association, 2018).

The home care nurse should assess how well the patient is managing the disease in order to try to prevent foot problems from occurring from the start. Make sure the patient is adhering to a balanced diet, getting enough exercise, and adequately monitoring their blood sugars. Education is key to prevention and wellness (Mehravari F, et al., 2016).

Community health nurse have an ideal opportunity to enhance health-promoting activities that can reduce the risk of diabetic foot as educators and role models for their families, communities and patients. For effective prevention and treatment, it is important that nurses consider the psychosocial and cultural parameters that may affect health behaviors. CHN can promote healthy lifestyle patterns that reduce the risks OF DPN. Nurses are health care providers who actively involved in prevention and early detection of diabetes and its complications (Dimitriadou and Lavdaniti, 2017).

The nurses' role could be in health care, health, community education, health systems management, patient care and improving the quality of life. Diabetes Nurses play their educating role in the field of prevention of diabetic foot, foot care and preventing from foot injury. In care dimension, nurses responsible for early detection of any changes in skin and foot sensation & foot care (Pandarakutty & Raj, 2017).

Justification of the problem:

The global estimates of Diabetic peripheral sensory neuropathy (DPSN) prevalence vary widely from 9.6 to 88.7% in different populations. This may be attributed to different types of diabetes, existing health care facilities, sample selection, different diagnostic criteria used, variable methods etc. (Jember, Gashaw et al., 2017).

According to the International Diabetes Federation, in 2017, approximately 38.7 (27.1-51.4) million people, or 9.6% (6.7-12.7) of adults aged 20-79 years are living with diabetes in MENA. About 49.1% of these are undiagnosed. The reported prevalence of diabetic peripheral neuropathy ranges from 16% to as high as 66%.9. Every 30 seconds a lower limb or part of a lower limb is lost to amputation somewhere in the world as a consequence of diabetes

The most frequently occurring complication in type 2 diabetes is diabetic peripheral neuropathy (DPN) or distal symmetrical polyneuropathy. DPN affects up to 50–70% of the population with diabetes (Dixit, Snehil, et al., 2017).

Aim of the Study:

The study aimed to evaluate the effect of Home care for clients with diabetic peripheral neuropathy through:-

1. Assessing of health needs of clients with diabetic peripheral neuropathy according to their knowledge and practices.

2. Developing and implementing home health care intervention program according to their needs and problems.

3. Evaluating effectiveness of home health care intervention program

for diabetic clients with peripheral neuropathy on their knowledge and practices.

Research Hypothesis:

Implementing home health care intervention program will improve knowledge and practices toward of clients with diabetic peripheral neuropathy

Subjects and Methods:**Study design:**

A quasi-experimental design used to determine the effectiveness of home care intervention program on lifestyle of among clients with diabetic peripheral neuropathy .

Technical Design:

The technical design includes; the setting, subject & tools were used in the study.

Setting:

The study was conducted in diabetic outpatient clinics at Ain Shams University hospital and home visit which the total number of attending clients during the year 2015 was (6108 diabetic patient) who represent about 5 % of total clients from medical record (1000) about (50) attended Diabetes outpatient clinic in Ain Shams University Hospital (Hospital Statistical Office 2015).with the average daily number of (20-30) clients/day. Follow-up days for diabetic clinic work every day except Monday and Friday.

Sampling:

Type: A purposive sample was used.

Size: A fifty clients with diabetic representing 5% of the yearly average from the total (1000) clients with diabetic peripheral neuropathy

Technique: The first client with the inclusion criteria who meets the researcher in the first day of the study period was included. Once the data covered, the next client was included and so on, till the sample size achieved.

Criteria:

Inclusion criteria: Study inclusion criteria were age between 35 years and older, Male and female clients, physician-diagnosed type 1 & type 2 diabetes mellitus and clients who were able to communicate effectively were approached to participate in the current study in the home. Clients were assigned to the same usual medical management.

Exclusion criteria: Clients were excluded if they had one of the following: lower limb amputation; any medical contraindication for physical activity and/or physiotherapy; non-diabetic neuropathy.

Tools of data collection:

Three tools were used for data collection:

First Tool: An interviewing questionnaire:

This tool is an Arabic interviewing questionnaire sheet constructed by the researcher after reviewing the recent related literature. This tool is divided into 4 parts.

Part one: clients' socio-demographic characteristics, as age, gender, educational level, occupation, residence, marital status and monthly income per-capita (questions No.1-5).

Part two: Home environment assessment, expressed by the client. It included: type of lodging, crowding index, home utilities as: electricity, ventilation, safe running water supply, bathroom, sewage disposal, noise inside home, and characteristics of home surrounding (questions No.6-10).

Scoring system: Crowding index measured by: number of persons /number of rooms, more than 3 considered overcrowded, less than 3 considered no crowded. For home utilities, such as electricity, ventilation, running water supply, sewage disposal and garbage basket more than 5 items considered good, 3-5 items considered average and less than 3 items considered poor.

Part three: It was concerned with past and present medical history and family history as: duration of disease, smoking, degree of kind relations related to family history types of diabetes, medication used of diabetes, surgical extremities' type of co morbidity diseases, past history of diabetic ulcer, and medication used of neuropathic (questions No.11-22).

Part four: Client's knowledge regarding complication of diabetes mellitus and diabetic peripheral neuropathy includes: anatomy and physiology of central nervous system & DPN as: function & component of PNS, function of CNS, definition of DPN, causes of DPN types symptoms, diagnostic measures, complications, and control measures of diabetic

peripheral neuropathy, definition & important of TENS (questions No23-45).

Pre/post home health program:

Scoring system: Related to client with diabetic peripheral neuropathy knowledge assessment; a correct answer scored two and each incorrect answer scored one, the whole knowledge questions scored 46 points, a total of 50% and above were considered satisfactory and less than 50% were considered unsatisfactory

Second Tool: Healthy practices assessment sheet including two parts for clients' with diabetic peripheral neuropathy:

Researcher to assess health needs and problems of clients with diabetic peripheral neuropathy, adopted from (American Diabetes Association. (2016).) Lifestyle Management and modified by the researcher included two parts pre/post home care program

Part I: life style assessment included: (dietary requirement- exercise-rest and sleep- compliance with treatment regimen and follow up).

Scoring system: The total assessment scored 84 point. And classified as 50% and above was considered positive style, less than 50% was considered negative life style.

Part II: foot care assessment, adopted from (American Diabetes Association. (2016). Micro vascular complications and foot care. Included: (inspection, foot care, cutting nails and wearing shoes.)

Scoring System:

The checklist consisted of two points scale, it has a score ranging from zero to one distributed as; done =1, Not done= 0, it included 20 statements; the total scale scored 20 points. The final score of clients responses was classified either 60% and above representing done correctly or less than 60% denoting not done.

Third Tool: neurological examination scale was adapted from (Selvarajah, et al., 2016) and modified by the researcher it includes:

Part I: Physical assessment completed by the researcher It was developed to assess and evaluate physical measurements of client's included: blood pressure assessment, random blood sugar, body mass index, weight, height, appearance of feet, nail problems and ulceration.

The researcher used mercury sphygmomanometer for measuring blood pressure, (glucose star) for measuring random blood sugar and weight measurement scale for measuring weight and a meter tape for measuring the height.

Scoring system: According to physical assessment of client with diabetic peripheral-neuropathy. Blood pressure score level distributed as systolic > 140 mmhg 1 mark and more than 140 mmhg zero. As for random blood sugar distributed as controlled < 200= 1 and uncontrolled >200=0. Body mass index (BMI) was categorized as follow: Underweight 16- 18.4=0.5, normal weight 18.5 - 24.9=2, overweight 25 - 29.9 =1 and obesity 30=0 and more. $BMI = \text{Weight (Kg)} / \text{Height (m)}^2$. The physical measurements was measured times during program implementation then taken Mean \pm SD for each measurement. Foot physical examination

included foot appearance =1 and nails problems=0

Part II: diabetic peripheral neuropathic pain through (The Leeds Assessment of Neuropathic Symptoms and Signs pain and numeric pain rating scale adapted from (Eckeli et al, 2016).

Scoring system: Examination items on the original LANSS scale were reworded, asking the patients to five question examine themselves, and were allocated the same scores as in the original LANSS Q1, Q2 (score 5) Q3 (score 3) Q4 (score 2) & Q5 (score 1) Total marks of LANSS questions scored 16 marks, a total of 50% and above were considered pain and less than 50% were considered no pain.

The grades of severity of neuropathy are classified as follows:

Mild (scores: 3–5), moderate (scores: 6–8), and severe (scores: 9–10).

Part III: neurological test completed by the researcher

a- Michigan hand outcome questionnaire

Scoring system

- The Michigan hand outcome scale was consisted of three points scale, it has a score ranging from zero to two distributed as the following; good =2, fair = 1, poor = 0, the scale included 15 statements as the highest score is two then the total scale scored 44 points divided as following:

- Question refer to the function of your hand(s)/wrist(s) (Q1-5 it has a score ranging from zero to two distributed as the following; good 2, fair 1 mark, poor 0

mark, the scale included 5 statements (10 marks).

- Questions refer to how much pain had in your hand(s)/wrist(s) (Q6-8) it has a score ranging from zero to two distributed as the following; always 2, sometime 1, relay 0, the scale included 3 statements (6 marks)

- Questions refer to the ability of hand(s) to do certain tasks(Q9-15) it has a score ranging from one to four distributed as the following; 4-Not at All Difficult 3-A Little Difficult 2-Moderately Difficult 1- Very Difficult the scale included seven statements (28 marks).

- According to client's answers, their question was (total mark 44) categorized normal health hand function more than 50% and abnormal less than 50%.

Michigan Neuropathy Screening Instrument (lower limb)

The Michigan Neuropathy Screening Instrument (MNSI) was used to evaluate the presence of DPN. MNSI is a validated simple noninvasive and inexpensive measurement tool that incorporates sensory and motor components of neuropathy. Since its development, it became imperatively important to diagnose DPN as early as possible in order to prevent amputations, disability and improve the quality of life.

The MNSI consists of two-steps:

The MNSI is an instrument including, a questionnaire the first step of MNSI is the history questionnaire that assessed the presence of neuropathic symptoms. **This part consists of 15 items, (13) items assessed symptoms of DPN,**

Scoring the Michigan Neuropathy Screening Instrument for Michigan Neuropathy Screening Instrument Responses are added to obtain a total score. 'Yes' responses to questions (1-3-5-6- 8-9- 11-12, 14-15) are each counted as one mark. 'No' responses to questions (7 – 13) each count as one mark. Question 4 was considered to be a measure of impaired circulation and question 10 a measure of general asthenia and were not included in the A score of ≥ 7 was considered abnormal lower limb.

The second step of the MNSI is During the MNSI examination; a health professional inspects each foot for deformities, dry skin, calluses, infections and fissures. Each foot with any abnormality receives a (score 1).

Neuropathy Disability Score:

A modified form of the Neuropathy Disability Score (NDS) adapted from (Smith, et al. (2016) is a relatively simple, quick clinical assessment tool that aims to combine a number of clinical tests to provide an assessment of the risk of neuropathic ulceration and severity of diabetic peripheral neuropathy

Vibration perception threshold – Using a 128-Hz tuning fork, can the patient distinguish between vibration/no vibration when the tuning fork is applied to the apex of the big toe (**score 2mark if normal, 1mark if abnormal**)

Temperature perception –Using the tuning fork and a beaker of ice or warm water, can the patient distinguish temperature on the dorsum of the foot (**score 2 if normal, 1 if abnormal**)

Pin prick testing –Using a sharp single use neurological examination pin

applied proximally to the big toe nail, with just enough pressure to deform the skin, can the patient distinguish between sharp and not sharp Monofilament sensory testing uses a 10 g monofilament to assess a patient's ability to feel light pressure at a number of separate sites on the foot. Examination of 12 sites in total – six on each foot although some clinicians believe that fewer sites are required, e.g. four sites on each foot if the patient cannot detect the light pressure at more than one of the designated testing sites, then loss of protective sensation is deemed to be present (**score 2mark normal never , 1 if abnormal**)

Achilles tendon reflex –Achilles tendon reflex – Is the reflex present 2marks, present with reinforcement 1mark and absent zero

II-Administrative design and ethical design:

An official permission including the title and purpose of the study were submitted from the Dean of faculty of nursing Ain Shams University and forwarded to the director of diabetic department and outpatient's clinics in El Demerdash hospital, to get an approval for data collection to conduct the study.

Ethical consideration:

Approved from Ethical reserach committe of faculty of nursing ,Ain shams unversity was obtained Consents from patients to make home visit were obtained to ensure willingness to engage in the study after explaining its purpose and nature, the researcher also provided strict concern to keep their privacy. It haven't any harmful effect on them, the information was confidential and they can withdraw from the study at any time.

Content validity and reliability of tools:

In order to test validity and reliability of the research tools they were tested for content validity by jury of five experts in the field of community health nursing department. The required modifications were carried out accordingly. Then test-retest reliability was applied. The questionnaire was tested to be reliable with Cronbach's alpha coefficient of 0.78 for items showed tool proved to be strongly reliable

Operational design:

The study to be completed passed through different phases included: preparatory phase, pilot study and field work phase.

Preparatory phase:

A review of the past and current available related literatures covering all aspects of the researcher subject using the available textbooks, articles, nursing magazines and internet search. In order to get a clear picture on the research problem and to assist in the development of data collection tools and preparation for home visit.

Pilot study:

It was conducted on 10 patients with diabetic peripheral neuropathy diagnosis representing 20% of the total study sample, the aim of the pilot study was to evaluate clarity, visibility, applicability and content validity as well as the time required to fulfill the developed tools. According to the obtained results, modifications such as omission, addition and rewording were done. The number of the pilot study excluded from the study sample.

Field work: An official permission including the title and purpose of the study were submitted from the Dean of Faculty of Nursing Ain Shams University and directed to the director of outpatient clinics at Ain Shams University hospital, to get an approval for data collection to conduct the study that forwarded to the head nurse of outpatient clinics where the study was conducted.

After obtaining a permit the researcher met the head nurse of outpatient clinics and explain the aim and program content. After permission the researcher started with introducing herself to the selected clients and explaining the aim of the study, assured that data collected will be confidential and will used only to achieve the purpose of the. The researcher visits the diabetic outpatient clinic units days/ week to fill the questionnaire sheet by asking the clients. The practices checklist was filling during home visit. The time which taken for complete the questionnaire sheet was about 20-30 minutes/clients, and time needed for completing the practice checklist (during home visit) was about 60-70 minutes selected clients be included in the study with average four-five clients/day. For collecting the data from 50 clients, it lasted one month and half to be fulfilled before implementation of the home care program

- The researcher visited the clients home in afternoon shift from 1:00 pm to 3:00 pm for two days / weekly (Monday and Wednesday) in the period from beginning at October 2016 until the end of July 2017 (ten months) The researcher at a suitable place in the clients home interviewed. The home care program consists of 10 sessions (4 educational and 6 practical). The program implemented 5 weeks/ 2 sessions per week. The duration of each session was one hour.

Home-care program construction:**The program construction conducted in four phases:-****Phase 1: preparatory phase:**

The program was designed by the researcher and based on the result obtained from the study tools; also, review of recent, current, national and international related literature in various aspects of lifestyle promoting for DPN. This program content was revised and validated by experts in Faculty of Nursing, community health nursing department.

Phase 2: Assessment phase:

Two days/ week, one hour / day (8.30Am- 11Am) were allocated for data collection (pretest), which was carried out through six weeks, the average time consumed to fill tools was 20-30 minutes

Phase 3: Program Implementation:

Program implementation based on conducting sessions plan using different educational methods and media in addition to the use of guiding booklet specifically designed and developed based on clients assessment needs.

Implementation of the program took eight month and two weeks, two days/week, one hours/day from (1pm- 2pm) and sometimes from (4pm- 5pm) "this was determined by clients were visited / day, also number of hours differed from one session to another to accomplish health education sessions and practice training

Overall goal of the program:

Is to promoting home health care for DPN client's knowledge, and practices toward lifestyle practices.

General objectives of the program: by the end of the home care program each client will be able to:

- Acquire basic knowledge about the anatomy and physiology of the central nervous system and the nature of the diabetic peripheral neuropathy.
- Gain knowledge related to diabetic peripheral neuropathy.
- Realize basic knowledge about identify diagnosis, complications and treatment of Diabetic Peripheral Neuropathy (DPN).
- Comprehends knowledge about nutritional needs for control of diabetic peripheral neuropathy.
- Acquire basic knowledge and develop skills related to essential physical exercises for control of diabetic peripheral neuropathy (DPN).
- Acquire basic skills for neuropathic pain management, rest and sleep hours for diabetic peripheral neuropathy (DPN).
- Acquire knowledge and skills for commitment to medications and follow up toward (DPN).
- Demonstrate basic skills for performing foot care of diabetic peripheral neuropathy.
- Develop skills of BMI and blood sugar measurements.

• Assemble skills related to performing Severity Neuropathy disability for diabetic peripheral neuropathy interpret knowledge and develop skills about Transcutaneous Electrical Nerve Stimulation (TENS) to regenerative nerve and reduce neuropathic pain of diabetic peripheral neuropathy.

Program sessions:

Time allowed: 12 hours has been allocated for health education sessions. Distributed as (4.30minute for theory and 7.30 minute for practice).

At the beginning of the first session, an orientation about the program and its purposes was given. From the second session and so on each session started by a summary about what was given through the previous sessions and objectives of the new one, taking into consideration using simple and clear language to suit the level of all students.

By the end of each session a summary were made and time allocated for questions and answers& plan for next session were made. Except for the last session a termination of sessions through feedback.

Teaching methods and media used are; lectures, discussion, demonstration and re-demonstration. Suitable teaching aids prepared especially for the program were used such as printed materials and video clips about neurological disability screening, foot care , Anatomy & physiology of central nervous system, and physical exercises.

Program Booklet:

A Booklet including all content of the program was designed and given to clients as an educational reference during program implementation and as self-learning reference after program implementation. Its aim was providing accurate knowledge & practice related guideline instructions about lifestyle for DPN clients.

Phase 4: Program evaluation

This phase aimed to evaluate the level of improvement in client knowledge and health practices of DPN client, through implementation of post-test after the program. As well as to identify differences, similarities, areas of improvement and defects. Evaluation was done after implementation with one month and took two month to be done.

Statistical Design:

Data were revised, coded, analyzed and tabulated using the number and percentage distribution and carried out in the computer. Using appropriate statistical methods.

The following statistical techniques were used:

Percentage, mean value, standard Deviation, chi-square (X²), T paired test, correlation test (r) and proportion probability (P-value).

Significance of results

When $P > 0.05$ it is statistically insignificant difference.

When $P < 0.05$ it is statistically significant difference.

When $P < 0.01$ or $P < 0.001$ it is high statistically significant difference.

Results

Table (1): Distribution of Clients with Diabetic peripheral Neuropathy According to their Socio Demographic Characteristics (N=50)

Socio Demographic Characteristics	N	%
Gender		
Male	11	22.0
Female	39	78.0
Age		
35-45	19	38.0
46: 55	21	42.0
More than 56	10	20.0
	Mean \pm SD 46.25. 1.9	
Educational level		
Illiterate	25	50.0
Read & write	16	32.0
Basic education	5	10.0
Secondary	4	8.0
Marital status		
Single	3	6.0
Married	14	28.0
Widow	30	60.0
Divorced	3	6.0
Job		
Don't currently Laborer	6	12.0
Employer	5	10
Retried	6	12.0
Professional	11	22.0
Housewife(females)	22	44.0
Income		
Insufficient	30	60.0
Sufficient	20	40.0
	Mean \pm SD 49 \pm 1.4	

Table (1) shows the demographic characteristics of studied sample. The table reveals that, age range of the sample is 35 to more 56 years; the mean age of the study group was 46.25 \pm 1.9. As regards the gender the females were. (78%). This table also demonstrate that clients with diabetic peripheral neuropathy were widow (60%), house wife (44%) and illiterate were (50%). Finally, the monthly income was insufficient (60%) of the studied sample, with a mean 49 \pm 1.4 SD.

Figure (1): Distribution of DPN Clients According to their total Knowledge Score Pre/Post Home Care Program(N=50).

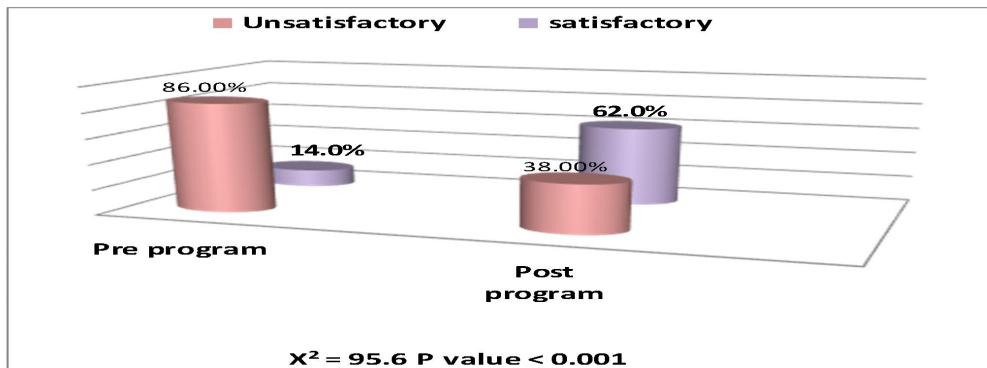


Figure (1): Illustrates that in pre program assessment 14.0%% had satisfactory knowledge while in post program 62.0 % had satisfactory knowledge. With a highly statistically significant difference $P < 0.001$

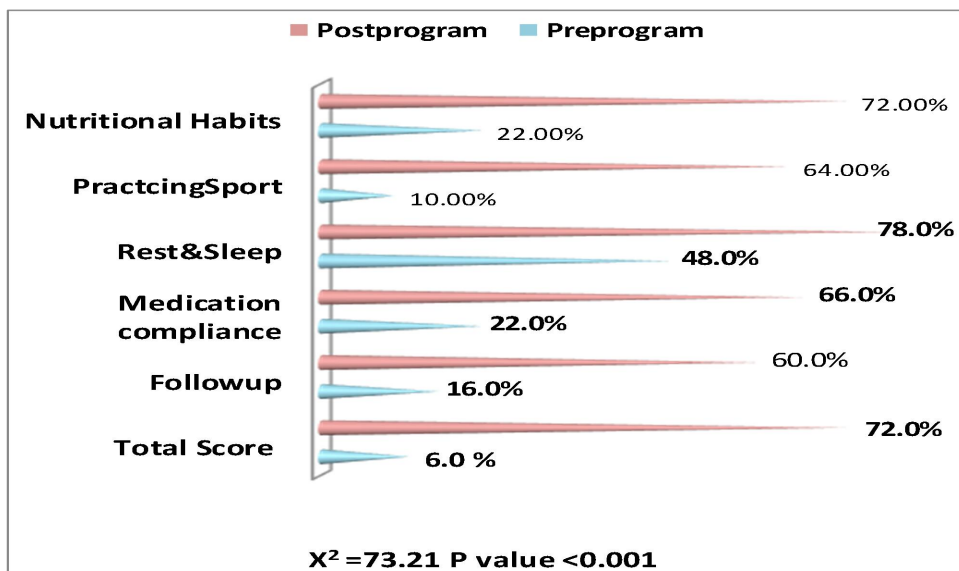


Figure (2): Distribution of DPN Clients according to their Positive Score level regarding Life Style (Nutrition, Sport, Rest and Sleep, Medication Compliance & Follow-up) (N=50).

Figure (2): Illustrates that in pre program assessment 22.0%reported positive score level regarding Mean while changing nutritional habits & medication compliance which

became 10.0% practicing sport reported 48.0%. Related to rest & sleep habits & follow up which became 16.0% in pre program 12.0% had positive pattern, while in post program 72.02% had positive pattern. With highly a statistically significant difference $P < 0.001$ 72.0 % had a positive life style.

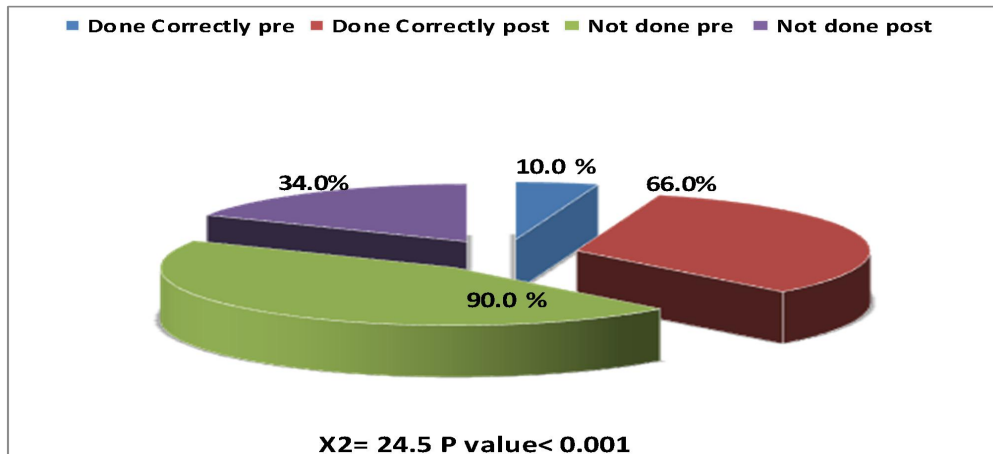
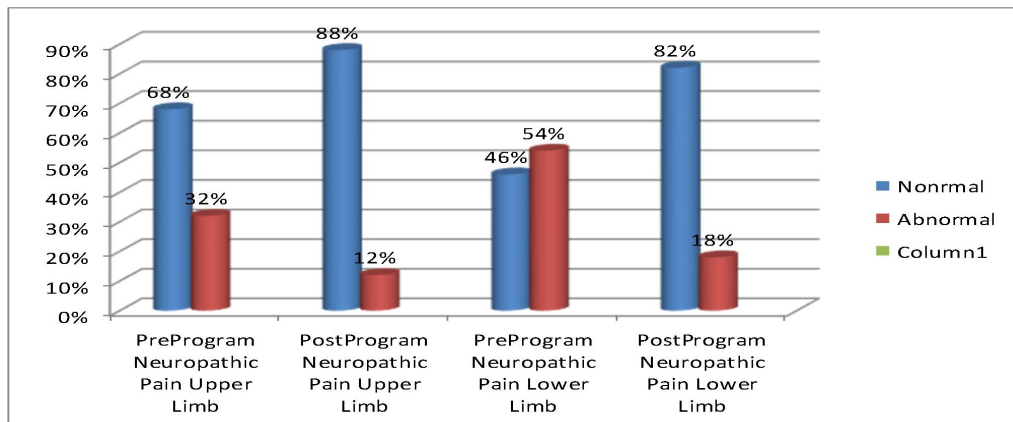


Figure (3): Reveals that (90.0%) not done foot care in pre program, while in post program

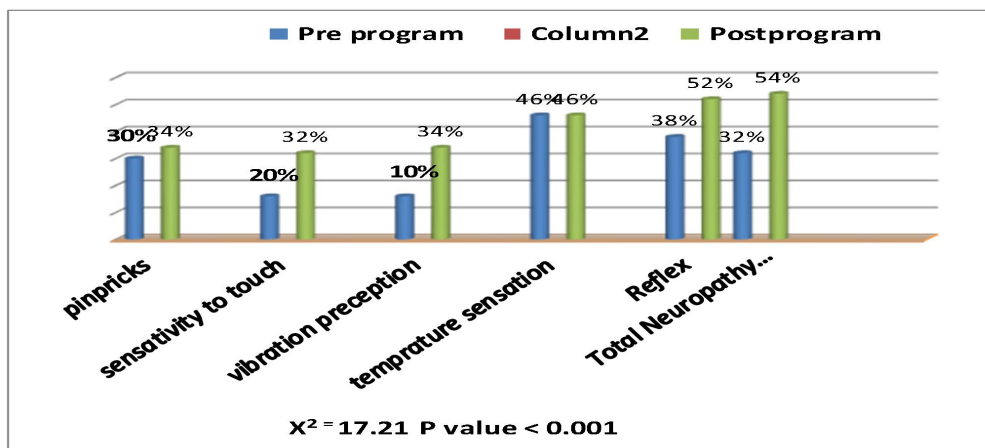


(66.0%) done it correctly. With a highly statistically significant difference.

Figure (4): Distribution of DPN Clients According to their Total Score of Neuropathic Pain Upper & Lower Limb Pre/Post Health Promotion Program (N =50).

Figure (4) illustrates that 68% of clients had normal sensation pain upper limb and 46% normal sensation of pain in lower limb in preprogram and raised to 88% normal sensation pain upper limb and 82% normal sensation of pain in lower limb in post program with statistically significance $X^2 = 30.8$ & $P \text{ value} < 0.001$.

Figure (5): Distribution of DPN Clients According to their normal neuropathy disability scoring measurements Pre/Post Health Promotion Program (N=50)



* Responses are not mutually exclusive

Figure (5): States that in the preprogram assessment 46%, 38%,32%,30%& 16%respectively normal neuropathy disability &, while in the post program 54%, 52%, 46%, 34% & 32 respectively normal neuropathy disability. With a highly statistically significant difference P <0.001.

Table (2): Relation between Socio-Demographic Characteristics of diabetic peripheral neuropathy clients and their total knowledge Score Level pre \ post home care ' (N=50)

Socio-Demographic	TOTAL KNOWLEDGE				Chi-square	P Value
	Satisfactory No	Satisfactory %	Unsatisfactory N	Unsatisfactory %		
Age						
35-45	15	30	4	8	9.998	< 0.05
46-55	14	28	7	14		
Above 56	2	4	8	16		
educational level						
Illiterate	11	22	14	28	31.54	<0.001*
Read &write	12	24	4	8		
Basic education	4	8	1	2		
Secondary education	4	8	0	0		
occupation						
employee	5	10	0	0	14.66	< 0.05
profession	9	18	2	4		
house wife	11	22	11	22		
Don't work	1	2	5	10		S
Private	5	10	1	2		
Family income						
Enough	11	22	9	18	4.17	>0.05

Not enough	20	40	10	20
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Table (2): Discusses that there were a statistically significant differences between client's total knowledge score and their age, and occupation and highly statistically significant differences educational level no statistically significance difference between income P value 0.001 p,<0.05& p> 0.05.

Table (3): Relation among Total Score Knowledge ,life style and foot care of DPN Client's pre/post home care program (n=50)

Total Score of Clients' Items	Paired Differences		Paired Samples Test	
	Mean	SD	T test	P value
Knowledge	-.51136	.50274	-9.542-	<0.001*
Life style	-.65909-	47673	-12.969	<0.001*
Foot care	-.62500-	.53202	-11.020-	<0.001*

Table (3): Shows that there was a highly statistical significance difference between pre &post program in relation to client's knowledge, life style & foot care about DPN (p< 0.001).

Table (4): Correlation between Transcutaneous electrical nerve stimulation (TENS) &Severity of diabetic peripheral neuropathy among diabetic peripheral neuropathy clients.

Transcutaneous Electrical nerve	Severity of diabetic peripheral neuropathy			R	Correlation
	Mild	Moderate	Sever		
Improve	7	14	6	0.46	positive
Not improve	6	7	10	0.51	positive

Table (4): Illustrates a positive correlation between TENS & Severity of diabetic peripheral neuropathy.

Discussion:

Diabetic peripheral neuropathy is one of the most common long-term complications of diabetes. It develops in up to half of all people with diabetes, and is one of the main risk factors contributing to foot ulceration and eventual amputation. In developed nations the main cause of non-traumatic lower limb amputation is "diabetic foot", which is a result of a combination of decreased sensation and reduced arterial supply (Turkiew, et al., 2017).

Assessing for peripheral neuropathy is a routine part of ongoing care for patients with diabetes. Treatment of diabetic peripheral neuropathy includes optimal control of hyper glycaemia, appropriate foot care (often involving input from a podiatrist), and symptomatic management of any neuropathic pain (Juster-Switlyk & Smith, 2016).

Regarding socio demographic characteristics of diabetic peripheral neuropathy in the study sample aged between 35 years to more than 56 years with a mean

age was 46.25 ± 1.9 years, where more than two third of them were females. Regarding marital status, there more than half of them were widow. As regards to level of education, half of them were illiterate. In relation to monthly income, where more than half of them were insufficient with a mean monthly income was 49 ± 1.4 . (**table 1**) These findings are in accordance with many previous studies **Albargawi et al. (2016)** all have agreed that more than half of Egyptian diabetic clients were females and more than half of diabetic clients were married while the majority was illiterate. Conversely, with the results of **Khawaja, et al, (2018)** had mentioned that most of their studied clients with diabetic were male and had junior middle school education with above 60 years old. Other demographic characteristics of clients in the present study revealed that more than two thirds low socioeconomic and insufficient income. These findings are in congruence with **Ueno ,et al (2017)** who have specified that the treatment approaches were affected by their low socioeconomic factors and low-income status and low social class level are especially vulnerable risk to no improve in their health status. Contrariwise with the results of **Amente et al. (2016)** who have mentioned that patients relatively in high-income class can get healthy foods that are suggested and recommended for diabetic patients.

Sustainable development goals (2016) Globally, more than 800 million people are still living on less than \$1.25 a day; many lack access to adequate food, clean drinking water and sanitation.

Related to total knowledge score level before program implementation nearly majority had unsatisfactory knowledge while after program implementation most of the study sample had satisfactory knowledge. With a highly statistically significant difference ($P < 0.001$) (**Figure 1**)

The previous results are compatible with **Alanazi, et al. (2017)**, in an interventional educational study that was conducted in outpatient clinic out in Arar city, the capital of the Northern Province of Kingdom of Saudi Arabia (KSA), founded that an improvement in the knowledge score after the intervention has been detected. A significant improvement in knowledge was observed in the contents of diabetic peripheral neuropathy especially on the diagnosis and prevention of certain complication of diseases. The total knowledge score showed an improvement, with a significant P value < 0.001 . This slightly differ from **Kisozi et al. (2017)**, in a study done in the Mulago National Referral Teaching Hospital diabetic clinics and wards including knowledge about the severity and factors associated with peripheral neuropathy and newly diagnosed diabetics was based on symptoms, the study demonstrated high knowledge scores in the pretest which may be due to the medical nature of the participants, but also there was a significant difference after implementation.

According to the research hypothesis: implementing home health care intervention program will improve knowledge and practices toward of clients with diabetic peripheral neuropathy

Less than one third & less than half of studied sample respectively reported adequate habits, practicing sport pattern, rest & sleep, medication compliance &. Follow up after program implementation more than two thirds reported adequate changing nutritional habits, rest & sleep pattern while changing nutritional habits presented the most highly significant difference as the total study sample reported positive pattern. And less than two thirds became physically active. More than two third of study sample had always positive life style (**figure 2**).

This finding can be related to important lifestyle aspects that clients can theoretically influence and act on, with greater or less practical difficulty. In particular, some physical characteristics known to be associated with DN are also implicated in PDN. dietary habits.

Related to foot care showed that before implementation most of study sample didn't know how to foot care practice, while after implementation the two third study sample done it. With $P < 0.001$ a highly statistically significant difference (**Figure 3**). These results are consistent with the research hypothesis, study revealed statically significant improvements in elderly practices at post intervention all of them as (examine feet well daily, wash feet daily and a good-dry between finger, avoid use of very hot or cold water, nails cut carefully to avoid leaving a sharp edge and cut fingernails in a circular fashion, keen to massage the feet and legs from time to time avoided wear high heel shoes, use of moistening cream, wearing shoes without socks, wearing sandals or walking barefoot, use of woolen socks in winter and cotton in the summer.

The present study revealed that there was a highly statistically significant difference & a statistically significant difference respectively between normal sensation pain up per limb and normal sensation of pain in lower limb in post program (**figure 4**)

Regarding the MNSI questionnaire, previous studies by **Gómez et al (2017)** have shown that it underestimates the prevalence of diabetic peripheral neuropathy the patients presenting DSPN were significantly showed worsening symptoms markers. The results agreement with of this study demonstrate that patients with symptomatic neuropathy

related to diabetes can have unrecognized lower extremity chronic nerve compression in the four medial ankle tunnels, and, when this is present, neurosis of the tibia nerve predictably will prevent new ulceration and amputation, and reduce hospitalization from foot infections .

Contrariwise with **Ihhanli, et al (2015)** the results of found no statistically significant difference between the diabetic peripheral neuropathy patients and the controls regarding all subscales of the MHQ. This result showed the positive productiveness' of the MHQ.

The clinical component of the MNSI was used to determine the presence of DSPN. One of the potential reasons for the low neuropathy prevalence in diabetic is that these clients belong to a specialized screening program for diabetes complications and are carefully followed and treated to achieve adequate glycemetic control

Less than one third that respectively normal neuropathy disability in the preprogram assessment & while more than half respectively normal nerve in the post program With a highly statistically significant difference $P < 0.001$. (**figure 5**)

These results are in agreement with **vethakkan ,etal (2017)** utilized clinical neuropathy symptoms and physical examination scores (e.g. NSS and NDS) The 10 g monofilament testing lacked significant correlational relationships, the usefulness of this tool has been well established in diabetic peripheral neuropathy .

The weakness of this study by **Willits, et al (2015)** is the comparison of devices assessing different modalities of

sensory loss (vibration, touch, pain) in peripheral neuropathy. The sensitivity of the VibraTip is more than double that of the tuning fork in PN +ve subjects. The integration of these testing methods provided foundational work necessary to develop a better understanding of the onset of dysfunctional physiological processes within diabetic peripheral neuropathy during the beginning of disease onset, shedding light on associations between symptoms and severity of diseases.

This study utilized used to evaluate nerve function in clients with diabetic peripheral neuropathy Using low-cost screening tools, early DPN signs and symptoms and complication were detected with a combination of methods that can be used on site, reliably, in a climate-controlled location.

Statistical Association and correlation between Study Variables

Related to the statistical association the following study find out that there was a highly statistically significant difference & significant difference respectively between total knowledge and socio demographic and their age & occupation either education level except for the income reported no statistically significant difference related to knowledge (**Tables 2**). The previous results correspond with **Khawaja, et al. (2018)**, as regards relations between socio demographic characteristics and total knowledge of the studied sample there were highly statistically significant differences between their total knowledge and their sex, education grade and family history.

The present study revealed that there was a highly statistically significant difference & a statistically significant

difference respectively between socio-demographic characteristics including " age ' occupation, educational level and except gender and past history and severity of DPN and their duration of diabetes and past foot ulceration "(**Tables 2**)

There are several studies that suggest that the socio demographic variables play an important role in diabetic peripheral neuropathy and not just the clinical factors. In the study by **Qureshi, et al.(2017)** the severity of diabetic neuropathy complications was higher in older patients, those with limited formal education and a low socio demographic status, divorced or widowed with greater duration of diabetes, high HbA1c, treated with insulin, and with micro and macro vascular complications.

Related to correlation between study variables there was positive correlation between TENS device & Severity of diabetic peripheral neuropathy. (**Tables 3**) This is in accordance with **Upton et al. (2017)** study suggests that daily home use of plantar electrical-stimulation a positive correlation existed between a practical means to enhance motor-performance and plantar-sensation in patients with DPN. This study confirmed by **Najafi,,etal (2017)** that daily basis electrical stimulation therapy could be effective to enhance plantar sensation as quantified by correlation between TENS device & reduction severity of diabetic neuropathy.

This finding of result Transcutaneous electrical nerve stimulation (TENS) is a non-invasive treatment more effective on regenerative nerve and reduce severity of pain neuropathic but in the study found of result effect mild and moderate of diabetic neuropathy improvement

sensation during the study and client with sever of diabetic neuropathy treatment of placebo

According to effect of the home care program the present study revealed that there was a highly statistically significant difference pre & post program implementation respectively between the clients with diabetic peripheral neuropathy ' knowledge, life style & foot care health Practices total score level (Table 4).

This result complies with **Somesh (2017)** the study was conducted at Divisional Railway Hospital in Kota. study shows that significant differences were found between knowledge and practice of diabetic patients towards the self-care activities for quality of life.

This finding agreement with **American Diabetes Association. (2018)**. in examined the association between lifestyle and knowledge of diabetic peripheral neuropathy found that significant association was found between lifestyle practices as daily fruit and vegetable consumption and more exercise and knowledge of participant, but the effects were in the expected direction.

And similar to **Ahmed, (2018)**. There was a significant main effect of the intervention program in optimal self-care has the potential to reduce long-term complications, a better understanding of how disease interpretations influence foot self-care behavior in patients with diabetic peripheral neuropathy as they begin to assume responsibility for maintaining and promoting their own health is important by **Bruschiet (2017)**. Illness interpretation is

increasingly being shown to be related to important outcomes in a number of illnesses. Interpretation refers to how patients understand and make sense of disease and/ or disabilities

All of these results confirm that giving health education to clients with diabetic peripheral neuropathy can help improving their knowledge, and practices subsequently leading to promoting life style and prevention diabetic peripheral neuropathy complication. This accentual that the home care program applied through health education in the present study was useful and effective

Conclusion:

On the light of the results and answers on research hypothesis the study was concluded that:

The study sample aged between 35 years to more than 56 years with a mean age was 46.25 ± 1.9 years, where more than two third of them were females. Regarding marital status, there more than half of them were widow. As regards to level of education, half of them were illiterate. In relation to monthly income, where more than half of them were insufficient with a mean monthly income was 49 ± 1.4 .

As regarding total client's knowledge about DPN nearly majority had unsatisfactory knowledge while after program implementation most of the study sample had satisfactory knowledge. With a highly statistically significant differences after program implementation.

Regarding total score lifestyle practices of DPN clients mostly of clients was positive change lifestyle practices after implementing home care program with a highly statistically significant

difference between pre and post program. As regarding total clients foot care practice toward DPNs two third of clients had correctly done toward foot care practice of DPN with highly statistically significance difference between pre and post program implementation.

There was a positive correlation between TENS device & Severity of diabetic peripheral neuropathy pre and post home care program implementation.

In conclusion, health education through the home care program reported remarkable improvement clients' knowledge and health practices toward diabetic peripheral neuropathy

Recommendations:

The findings of this study highlight the following recommendations:

1-Continuity of health education programs to raise the health awareness and knowledge of clients about risk factors for diabetic peripheral neuropathy and encourage them to adopt a healthy dietary behavior, promote physical exercise and smoking cessation.

2-Regular continuing home care programs should be designed to enhance elderly skills ability to care for their foot with emphasis on the most important risk factors and appropriate management

3-Health care team for diabetics (e.g. nurses, general practitioners, diabetologists etc.) should consciously avoid the delivery of disease-centered (biomedical) care; they should specifically consider impacts on the QoL of diabetic patients and regularly assess and improve lifestyle issues along with treatment

4-Screening programs for early detection, diagnosis, treatment and prevention of diabetic peripheral neuropathy complication.

5-Positive mass media (television) and internet impact should be guaranteed through organized health awareness programs and advertisements by diabetic expertise.

6-Allocation of training programs health providers to ensure regular foot examination and foot care education must be a priority of any strategy to control diabetes.

7-Providing diabetic outpatient clinics in governmental hospitals with rehabilitation centers to follow-up diabetic foot ulcer promoting for diabetic peripheral neuropathy patients.

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