TURKISH REPUBLIC OF NORTH CYPRUS

NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

THE EFFECT OF EDUCATIONAL PROGRAMS ON PAIN MANAGEMENT, SELF-EFFICACY BEHAVIOR, AND THE QUALITY OF LIFE IN ADULT DIABETIC PATIENTS WITH PERIPHERAL NEUROPATHY PAIN: A RANDOMIZED CONTROLLED TRIAL

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Ph.D. IN NURSING (SURGICAL NURSING)

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APPROVAL

The Directorate of Institute of Graduate Studies,

This study has been accepted by the thesis committee in nursing program as a PHD nursing thesis.

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According to the relevant article of the Near East University Postgraduate Study-Education and Examination Regulation, this thesis has been approved by the above-mentioned members of the thesis committee and the decision of the board of Directors of the Institute.

Professor, K. Hüsnü Can BAŞER

STATEMENT (DECLARATION)

Hereby I declare that this thesis study is my own study, I had no unethical behavior in all stages from planning of the thesis until writing thereof, I obtained all the information in this thesis in academic and ethical rules, I provided reference to all of the information and comments which could not be obtained by this thesis study and took these references into the reference list and had no behavior of breeching patent rights and copyright infringement during the study and writing of this thesis.

Jawad Ahmad Abu- Shennar

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The effect of educational programs on pain management, self-efficacy behavior, and the quality of life in adult diabetic patients with peripheral neuropathy pain: a randomized controlled trial

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ABSTRACT

Objective:

Jordan has a high prevalence of painful diabetic peripheral neuropathy (PDPN), leg complications, and amputations due to diabetes. This study aimed to evaluate the effect of educational programs on pain management, self-efficacy behaviors, and quality of life (QoL) among adult patients with PDPN.

Methods:

The study was conducted at the Jordanian Ministry of Health hospitals using a randomized controlled trial study design between October 2019 to March 2020. It included a sample of 72 adult patients with PDPN randomized to an experimental group of 36 patients who attended an educational program and a control group who followed routine diabetic care in the study setting. The data collection instruments were a socio-demographic and diabetes clinical/laboratory data form, the Numeric Rating Scale (NRS), Diabetes Self-Efficacy Scale (DSES), and the Quality-of-Life Questionnaire (EQ-5D). The intervention program consisted of four educational sessions at weekly intervals. Pre-test and post-test evaluations were carried out.

Results:

The results of the study showed that, after the educational intervention, the mean scores of the NRS ($p = 0.020$), DSES ($p < 0.001$), and EQ-5D ($p < 0.001$) in the

experimental group were significantly improved compared to the control group. Additionally, in the pre-test stage, no significant correlations between the three study outcomes were found, whereas significant correlations were reported among all three after the educational intervention.

Conclusion:

According to the results of this study, the design and implementation of educational intervention combined with routine diabetic care provided effective enhanced pain management, self-efficacy behaviors, and QoL of PDPN patients. It is suggested that health care providers use the educational programs for PDPN patients at various levels of services in both health centers and diabetes clinics.

Keywords: Painful diabetic peripheral neuropathy, type 2 diabetes mellitus, peripheral neuropathy, self-efficacy behaviors, quality of life.

Periferik nöropatik ağrısı olan erişkin diyabetik hastalarda eğitim programlarının ağrı yönetimi, öz-yeterlik davranışı ve yaşam kalitesi üzerindeki etkisi: randomize kontrollü bir çalışma

Öğrencinin Adı: Jawad Ahmad Abu-Shennar
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ÖZET

Amaç:

Ürdün'de diyabete bağlı ağrılı diyabetik periferal nöropati (PDPN), bacak komplikasyonları ve ampütasyon prevalansına yüksektir. Bu çalışma, PDPN'li erişkin hastalarda eğitim programlarının ağrı yönetimi, öz-yeterlik davranışları ve yaşam kalitesi (QoL) üzerindeki etkisini değerlendirmeyi amaçlamıştır.

Yöntemler:

Araştırma, Ürdün Sağlık Bakanlığı hastanelerinde Ekim 2019 ile Mart 2020 arasında randomize kontrollü bir çalışma tasarımı kullanılarak yürütülmüştür. Çalışmaya, 72 yetişkin PDPN hastası dahil edilmiştir; eğitim programına katılan oluşan 36 hastadan deney grubuna, rutin diyabet bakımı alan aynı sayıda hasta kontrol grubuna randomize edilmiştir. Veri toplamada Sosyo-Demografik ve Diyabet Klinik/Laboratuvar Veri Formu, Sayısal Derecelendirme Ölçeği (NRS), Diyabet Öz-yeterlik Ölçeği (DSES) ve Yaşam Kalitesi Anketi (EQ-5D) kullanılmıştır. Müdahale programı, bir haftalık aralıklarla dört eğitim oturumundan oluşmuştur. Ön test ve son test değerlendirmeleri yapılmıştır.

Sonuçlar:

Çalışmanın sonuçları, eğitim müdahalesinden sonra, deney grubundaki NRS ($p = 0.020$), DSES ($p < 0.001$) ve EQ-5D ($p < 0.001$) ortalama puanlarının, kontrol

grubundakilere kıyasla önemli ölçüde iyileştiğini göstermiştir. Ayrıca, ön test aşamasında, üç sonuç değişkeni arasında anlamlı bir ilişki bulunmazken, eğitim müdahalesinden sonra önemli korelasyon rapor edilmiştir.

Tartışma:

Bu çalışmanın sonuçlarına göre, rutin diyabet bakımı ile birlikte eğitim müdahalesinin tasarımı ve uygulanması, PDPN hastalarında ağrı yönetimi, öz-yeterlik davranışları ve yaşam kalitesinde etkili bir gelişme sağlamıştır. Sağlık hizmeti sunucularının hem sağlık merkezlerinde, hem de diyabet kliniklerinde PDPN hastalarına yönelik eğitim programlarını kullanmaları önerilmektedir.

Anahtar Kelimeler: Ağrılı diyabetik periferal nöropati, tip 2 diabetes mellitus, periferik nöropati, öz-yeterlik davranışları, yaşam kalitesi.

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T2DM:	Type2 Diabetes Mellitus.
PN:	Peripheral Neuropathy.
DPN:	Diabetes Peripheral Neuropathy.
PDPN:	Painful Diabetic Perephral Neuropathy.
QOL:	Quality of life.
NSS:	Neuropathy symptom score.
NDS:	Neuropathy disability score.
ADA:	The American Diabetic Association.
DSES:	Diabetes Self Efficacy Scale
BMI:	Body Mass Index.
WHO:	World Health Organization.
HbA1c:	Hemoglobin Glycosylated.
LDL:	Low-density lipoprotein.
HDL:	High-density lipoprotein.
SPSS:	Statistical Package for Social Science.
SD:	Standard Deviation.

1. INTRODUCTION AND AIMS

1.1. The Statement of the Problem

During the last twenty years, the prevalence of diabetes has increased dramatically in many parts of the world and the disease is now a worldwide public health problem. Just under half a billion people are living with diabetes worldwide and the number is projected to increase by 25% in 2030 and 51% in 2045. (International Diabetes Federation (IDF). 2019). In Jordan, a high prevalence of diabetes was evident with the overall prevalence of T2DM in 2020 was 16% and is projected to reach over 20% in 2050 (Awad et al, 2020). The increasing prevalence of the disease and thereby which leads to also increasing social costs combined with the fact that the disease is associated with increased morbidity and mortality, so emphasizes the importance of effective diabetes care (Diabetic Neuropathies.2009, Tesfaye et al. 2012 & American Diabetes Association. 2017).

Diabetes is recognized as a continuing health challenge for both developed and developing countries. According to IDF, in most recent estimates 9.3% (463 million people), rising to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045, with the greatest number between 40 to 59 years of age and higher in urban than rural ereas (IDF, 2019). In Jordan, the prevalence of T2DM in 2020 is 16% (Awad et al. 2020). While in the neighboring Arab countries, the prevalence of diabetes mellitus (DM) is increasing. In Kingdom of Saudi Arabia, the prevalence of DM was 30% by the (Alqurashi et al. 2011); in the United Arab Emirates, Bahrain, Kuwait and Oman the prevalence of DM was 18.7%, 15.4, 14.6 and 13.4% respectively (Alhyas et al. 2012). On the other hand, the top five in the European countries for many people with diabetes were the Russian Federation, Germany, Turkey, Spain, and Italy respectively (Cho et al. 2018).

Diabetes Mellitus (DM) is a group of metabolic derangements characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. There are many classifications of DM: Type 1 Diabetes Mellitus (T1DM), Type 2 Diabetes Mellitus (T2DM), and are the most common ones. T1DM results from autoimmune-mediated destruction of the beta cells of the pancreas (Norris, et al. 2011).

Insulin is vital for individuals with T1DM to avoid ketoacidosis, coma, and death. While, T2DM is common and a serious chronic disease resulting from a complex inheritance-environment interaction along with other risk factors, for example, sedentary lifestyle and obesity (American Diabetes Association. 2017). T2DM and its complications constitute a main worldwide public health problem, affecting people in both developed and developing countries with high rates of diabetes-related mortality and morbidity (Report of the expert committee. 2003 &American Diabetes Association. 2017). and is characterized by resistance to the action of insulin and disorder of insulin secretion, either of which may be the predominant feature. Individuals with this type of diabetes do not need insulin to survive.

Diabetes has several complications, such as stroke, nephropathy, neuropathy, retinopathy, diabetic foot disease, and cardiac vascular disease (CVD) (American Diabetes Association. 2017). There is strong evidence that hyperglycemia influences the development of diabetic complications and impact on the quality of life for those patients (Report of the expert committee. 2003, Fowler et al. 2008 & Niranjan et al. 2012). Besides, complications associated with diabetes have a considerable negative impact on patient well-being and economic contribution and place a large burden on health care and welfare systems. So, the cellular elements of the microvasculature appear to be most sensitive to injury from sustained hyperglycemia. This injury (and responses by the body directed toward its repair) causes organ/tissue dysfunction that affects the duration and quality of life for individuals with either T1DM or T2DM. Despite the disparate pathogenesis of these two common forms of diabetes, they (along with secondary forms of diabetes resulting from genetic mutations or pharmaceutical or surgical interventions) all share microvascular dysfunction/ injury as a chronic result. (Neuropathies.2009, Tesfaye et al. 2012 & American Diabetes Association. 2017).

The frequency of complications of diabetes mellitus in patients with T2DM is high, and the presence of diabetes mellitus plays an important role in the development of neuropathies. It is a heterogeneous group of disorders of diabetes encompassing a wide range of clinical presentations. It is commonly manifested as distal symmetrical polyneuropathy (DSPN), also known as diabetic peripheral neuropathy (DPN) or

sensorimotor neuropathy among diabetic patients, causing nerve damage in the arms and legs, which estimated between 50-70% (Tesfaye et al. 2012). Diabetic neuropathy the most important cause of disability that requires continuous medical care to reduce the risk of developing long-term complications such as lower extremity amputation (Diabetic Neuropathies.2009, Tesfaye& Selvarajah . 2012).

Clinically, DPN is recognized by the American Diabetes Association (ADA) as "the presence of symptoms or signs of peripheral nerve dysfunction in people with diabetes after other possible causes have been excluded" (American Diabetes Association. 2017). This variety may reflect the different diagnostic criteria in diverse studies that used to define diabetic neuropathy. The symptoms are not a reliable indicator in the disease course; it depends on types of neuropathy and which nerve is affected. Up to 50% of patients with the conditions are asymptomatic and consequently, develop insensate foot complications (Wu et al. 2007& Neuropathies.2009). The common symptoms of DPN are often a loss of sensation in the toes which extends to involve the feet and leg in a stocking distribution. Besides, loss of vibratory sensation, thermal perceptions, abnormal distal lower reflexes, and pain or tingling feeling are early signs of DPN. Generally, these symptoms worsen at night and causing disturbed sleep for those patients (Fowler et al. 2008, Diabetic Neuropathies. 2009 & Tesfaye& Selvarajah . 2012).

Diabetic peripheral neuropathy has a significant impact on a diversity of nerve fibers causing dysfunction in peripheral nerves, ultimately leading to deep tissue destruction and this is an important predictor of the outcome of ulceration in feet, leading to amputation among diabetic patients. Besides, it is considered one of the three main important risk factors for the occurrence of falls among patients with diabetes, along with vestibular dysfunction and diabetic retinopathy. In fact, the risk of falls is 2-3 times more likely in patients with DPN than those without DPN (Agrawal et al. 2010). Overall, DPN has a significant impact on the quality of life and it is associated with high costs of treatment and health care resources utilization due to prolonged length of hospitalization stay, causing a heavy burden on the society and lowers the quality of life among those patients (Callaghan et al. 2012 & Niranjan et al. 2012).

More than 11% of patients with DPN are suffering from diabetic peripheral neuropathic pain (PDPN) (Gilron et.al. (2015). All over the world, many studies in Europe showed that the PDPN prevalence range from 8 to 26% (Abbott et al. 2011, Reed et al. 2013 & Hall et.al. 2013). Additionally, data from a cohort study in the UK showed the estimated incidence of PDPN at 15.3 cases per 100,000 person-years in the primary care population in 2002, increasing to 27.2 cases per 100,000 people in 2005 (Hall et.al. 2013).

According to the American pain society (APS) defined PDPN as “an unpleasant sensory and emotional experience associated with acute or potential tissue damage or described in terms of such damage" (Treede et.al. 2018). PDPN is characterized by burning, aching, or shooting in nature. The pain usually interferes with daily living activities, mood, work, mobility, and social relations. Additionally, the impaired patients' health could have a negative impact on the patients’ quality of life (QoL) and may cause in some cases sleep disruption and depression. PDPN causes higher societal and health care costs compared to diabetes but without neuropathic pain (Gilron et.al. 2015). Besides, PDPN has a significant impact on a diversity of nerve fibers causing dysfunction in peripheral nerves, ultimately leading to deep tissue destruction and this is an important predictor of the outcome of ulceration in feet, leading to amputation among diabetic patients. On the other hand, it is a condition that is associated with high costs of treatment and care due to its prolonged stay of the hospital, causing a heavy burden on the society and lowers the quality of life among those patients. Accordingly, several risk factors are with associated accelerated PDPN such as obesity, hypertension, dyslipidemia, gender, and age. Also, patients with poor glycemic control and longer duration of diabetes were more likely to develop PDPN (Tabatabaei-Malazy et al. 2011, Reed et al. 2013, Jacovides et.al, 2014 & Moein, et.al. 2017). For example, a study was conducted in the UK by Reed et al in 2013 showed that the incidence of PDPN increased with age among both females and men. A similar study used a cross-sectional design by Suljic et.al in 2013, the results showed that the chronic pain with neuropathic characteristics was associated with middle age group (50 to 64 years). Also, the authors found that the degree of neuropathy is associated with the degree of blood glucose control (as assessed by glycosylated hemoglobin (HbA1c)) and duration of diabetes (Suljic et.al. 2013). Therefore, the early detection

of PDPN, with enhancement programs, and proper management deserves attention in a primary care setting. Thus, it leads to reduce or delay in long-term complications, improves outcomes, and higher quality of life for those patients with PDPN. Determination of the outcome of pain management among PDPN treated patients in Jordan. This leads to help in the development of pain management strategies, development of health services for a better outcome, increase in patient satisfaction rate which may lead to improving planning and selecting the appropriate interventions on the patients' quality of life.

Psychological factors, such as self-efficacy, are important in understanding the progress and management of diabetic patients, and how patients make lifestyle modifications to compensate for the disease. The key main to preventing diabetes complications are lifestyle and having a self-management/self-care plan for the disease. Self-efficacy, according to Bandura (1982), is one of the personal factors important for self-care and self-management. Self-efficacy combines the cognitive, social, and skills capabilities that an individual possesses to carry out a course of action (Bandura. 1982). Bandura indicates a three-dimensional relationship or interaction among personal, behavioral, and environmental factors. Bandura's self-efficacy model (Bandura. 1982), specific variables were derived (diabetes knowledge, self-efficacy, social support, and diabetes self-management) and operationalized. Researchers have explored self-efficacy has been successfully used in educational programs for diabetes patients. The self-efficacy in predicting self-care behavior relating to diabetes has been verified in the literature. It has been related to desired outcomes such as a decrease in glycemic blood level and the perceived improvement of general health and social functioning (Atak et.al, 2008, Al-Khawaldeh, et.at 2012, Mohebi et.al. 2013& Sharoni, et.al. 2018).

Moreover, the concept of self-efficacy has been extensively used in nursing research. Self-efficacy is described as the evaluation of his or her capacity to manage or to change behavior. As a result, a patient's self-efficacy is found by determining factors in the achievement of the therapeutic regimen (Atak et.al, 2008, Pouladi. 2018, Khawaldeh et.al. 2012 & Didarloo, et.al in 2012). It is investigating whether participants who know about diabetes have better diabetes management performance

and glycemic control. It also looks into whether participants with higher self-efficacy have a better outcome such as diabetes self-management in general, which results in better glycemic control and a healthy lifestyle through diet maintenance and physical exercise. Alternatively, low self-efficacy results in failure to achieve a desirable outcome. Diabetes management and control seek to include personal factors such as diabetes knowledge and self-efficacy in addition to environmental factors such as social support and behavioral factors such as self-management in the daily performance of suggested activities; therefore, self-efficacy theory is relevant to this study (Atak et.al, 2008, Pouladi. 2018, Khawaldeh et.al. 2012 & Didarloo, et.al in 2012).

Moreover, the management of patients with PDPN is complex, requiring a multifaceted approach to reduce complications in the future such as disability and limb loss (Tabatabaei-Malazy et al. 2011, Reed et al. 2013, Jacovides et.al, 2014 & Moein, et.al. 2017). Although clinical trials may have reduced our enthusiasm for tight glycemic control, the consensus is that an HbA1C target of less than 7% is still desirable for most patients, and there is little doubt that risk factors such as blood pressure, obesity patients and LDL should be controlled. The current studies strongly suggest that more frequent encounters substantially shorten the time required to reach desired targets, although some of these large studies could be explained by the fact that more frequent encounters likely led to more treatment intensification or better adherence to existing therapies, isn't that the point? What the present study could not address is the extent to which the duration of an uncontrolled period is associated with microvascular or macrovascular outcomes. Because increased encounter frequency does not come without a cost, we need more research to determine the right balance between investment in risk factor reduction and avoidance of expensive events (Tabatabaei-Malazy et al. 2011, Reed et al. 2013, Jacovides et.al, 2014 & Moein, et.al. 2017).

However, not all diabetes-related complications can be prevented, but it is possible to achieve reductions in the incidence and morbidity of some of these complications through appropriate evidence-based prevention and management protocols with educating the patients about these complications (Tabatabaei-Malazy

et al. 2011, Reed et al. 2013, Jacovides et.al, 2014 & Moein, et.al. 2017). On top of that, nurses are responsible for educating the patients about complications of PDPN with early detection in the primary care setting is necessary to increase awareness improve planning, and to initiate the appropriate interventions in order to decrease disability and limb loss. Patients with these conditions require more frequent follow-up with self-efficacy enhancement programs, specific attention to foot inspection to enhance the need for regular self-care. It is argued that patients can play a pivotal role in preventing the occurrence of PDPN. Patients are required to practice lifelong self-management for them to reduce these complications, thereby patients should be knowledgeable of diabetes self-efficacy, pain management, social support, and diabetes self-management diabetes. The majority of researchers and clinicians have investigated a person who is involved in his/her disease management has a better chance of learning about the disease process, is more likely to maintain satisfactory glycemic control and adhere to self-management skills and actions that can delay complications (Atak et.al, 2008, Al-Khawaldeh, et.at 2012, Mohebi et.al. 2013& Sharoni, et.al. 2018). This should offer an opportunity to improve health and reduce health care costs with higher and improve quality of life among those patients.

With the increasing prevalence of DM in Jordan (Awad et al. 2020), the rate of amputation is expected to rise significantly causing an alarming health problem. It has been increasingly recognized as the most serious and costly complication of diabetes. PDPN often leads to amputation, if not detected early and annual screening for diabetes-related complications is recommended in treatment guidelines with managed properly, causing severe morbidities, mortalities and associated the largest number of hospital admissions among patients with PDPN.

Studies are necessary for a better understanding of self-efficacy enhancement among patients with PDPN. Thus, evaluation of the impact of educational self-efficacy enhancement program on quality of life, pain management, self-efficiency behaviors, and its impact of satisfaction among adult diabetic patients with PDPN can provide evidence data that fulfill the gap in the literature. Also, the results of this study may lead the health care providers who provide care for patients with diabetes to screen patients for the occurrence of PDPN and thus help in planning the right management.

Correspondingly, the findings of this study can be integrated into nursing and medical curricula to help them understand the burden upon the Jordan community and orient them to plan for health care practices. Besides, it helps the researchers to understand the nature of this disease and its seriousness and to be able to do more scientific researches to develop this field and reduce diabetes mortality.

Although the Jordan healthcare system has implemented diabetes education for years, diabetes has traditionally been managed by nurses. Thus, there is a need for a systematic educational protocol for all healthcare providers who are involved in patient care. Accordingly, the development of educational self-efficacy enhancement programs can help to Jordan diabetes clinic nurses have started to organize an educational program. Evaluation of the impact of educational self-efficacy enhancement program on quality of life, pain management, self-efficiency behaviors, and its impact of satisfaction among adult diabetic patients with PDPN may establish knowledge and support the nursing profession for improving nursing practice and help researchers to develop new interventions to support patients involved in the management of their health problems in Jordan.

1.2. Study Hypotheses and Goals:

The purpose of this study is to investigate the impact of educational self-efficacy enhancement program on quality of life, pain management, self-efficiency behaviors, laboratory findings, clinical findings, and its impact of satisfaction among adult diabetic patients with PDPN. It was hypothesized that:

H_1 1: The diabetic patients who attend the educational self-efficacy enhancement program will have enhanced self-efficacy behaviors, compared with those who did not attend an educational program.

H_1 2: The diabetic patients who attend the educational self-efficacy enhancement program will have improved quality of life, compared with those who did not attend an educational program.

H_1 3: The diabetic patients who attend the educational self-efficacy enhancement program will have improved clinical and laboratory findings, compared with those who did not attend an educational program.

H_1 4: The diabetic patients who attend the educational self-efficacy enhancement program will have relieved pain, compared with those who did not attend an educational program.

2. BACKGROUND

2.1. Definition of Diabetes Mellitus

Diabetes is defined as comprises a heterogeneous group of disorders characterized by high blood glucose levels resulting from defects in insulin production, insulin action, or both (American Diabetes Association. 2017). Diabetes is a metabolic disease that is diagnosed based on the sustained high concentration of glucose in the blood. According to the American Diabetes Association (ADA), the current diagnostic principles for diabetes are: 1) plasma glucose concentration measured after an overnight fast above 7.0mmol/l and/or 2) plasma glucose concentration measured two hours after a 75g oral glucose load above 11.0mmol/1(American Diabetes Association. 2017).

2.2. Complications of Diabetes Mellitus

Diabetes mellitus is associated with the number of vascular complications divided into microvascular and macrovascular. Microvascular complications in DM consist mainly of an accelerated pathogenic change of dysfunction/ injury that ended up as a chronic result with nephropathy, neuropathy, retinopathy, and CVD (American Diabetes Association. 2017).

2.2.1 Diabetic peripheral neuropathy

Peripheral neuropathy is a regular microvascular complication associated with DM. Diabetic peripheral neuropathy (DPN) is defined as the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after exclusion of other causes (Chawla et al. 2016).

As with other microvascular complications, there is a strong relationship between the chance of developing DPN and the magnitude and duration of hyperglycemia. Nevertheless, some individuals may possess genetic characteristics that affect their predisposition to developing such complications. (Gore et al. 2005). The accurate nature of the injury to the peripheral nerves caused by hyperglycemia is not known but is likely related to other mechanisms such as polyol accumulation, injury from advanced glycation end products (AGEs), and oxidative stress (Ziegler et

al. 2006). As this condition progress, the damage to peripheral nerves can be permanent, with loss of sensation leading to sores, ulcers, and, lower limb amputation (Tesfaye et al. 2010).

Besides, DPN appears in several different forms, such as sensory, focal/multifocal, and autonomic neuropathies, diabetic polyneuropathy is symmetrical sensory neuropathy (Fowler et al. 2008). This type primarily affects the distal lower extremities, as the disease progresses, sensory loss increases, and when it reaches approximately mid-calf, it appears in the hands. This gradual development causes the typical "stocking-glove" sensory loss (Vinik et al. 2000). This type reflects preferential damage according to axon length; the longest axons are affected first, motor involvement with frank weakness occurs in the same type, yet in more advanced cases (Kanji et al. 2010). The primary signs of diabetic neuropathy are a loss of vibratory sensation and altered Proprioception reflect large-fiber loss, and impairment of pain, light touch, and temperature secondary to loss of small fibers (Vinik et al. 2008). A retrospective study was conducted in Jordan by Elrefai et al (2009), aimed to find out detect the prevalence of different types of neuropathy among patients having a diabetic foot. This aim was assessed by the patient's history (presence of pain), neurological testing, the absence of ankle reflexes, and abnormal quantitative sensory testing. At least one type of neuropathy was detected in 89% of the study participants. Symptoms of peripheral neuropathy, symptoms of different autonomic neuropathy, diagnosed with proximal neuropathy, and focal neuropathy were present in 11.8%, 2.5%, and 1.5% respectively (Elrefai et al. 2009). The most common symptoms of neuropathy among patients with the diabetic foot were stocking sensory loss which was present in 77% of the study sample followed by pricking sensations in 70% of the participants. Concluding that distal symmetrical sensorimotor diabetic neuropathy is common in patients with diabetic foot and early diagnosis and control is important to prevent diabetic foot and amputations (Elrefai et al. 2009).

A randomized clinical trial showed that intensive glycemic control can prevent or reduce the progression of DPN in patients with T1DM; intensive insulin treatment reduced the risk of clinical neuropathy by 60-69% (Diabetes Control and Complications Trial Research Group. 1993& Diabetes Control and Complications

Trial Research Group. 1998). As the incidence, diagnosis is increasing of T2DM every year; it has been recommended that early prevention and/or control become a high priority matter at the primary care level to reduce the development of complications including DPN (Diabetic Neuropathies.2009, Tesfaye et al. 2012 & American Diabetes Association. 2017).

2.2.2 Prevalence and incidence of DPN

Large population studies have shown that the incidence and prevalence of DPN are higher in patients with DM, through the use of simple testing with a comparison between these methods to detect the DPN for those patients (Al-Geffari et al. 2012, Tabatabaei-Malazy et al. 2011, Al-Kaabi et al 2014&Won et al. 2012).

An important study was conducted by Al-Geffari et al. (2012), in Qassim, to evaluate different screening test in the detection of DPN among T2DM. This study includes four types of screening tests to use of evaluated of DPN, these tests are MNSI, Semmes Weinstein Monofilament (SWM), vibration sensation, and ankle reflex in this multi-center. The detection rates of DPN were 45%, 32.6%, 31.4%, and 23.1% using MNSI, SWM, vibration sensation, and ankle reflex respectively. Also, the results showed that the prevalence of DPN using two combined tests was 38.79%, with a significant correlation between the tuning fork and SWM (Al-Geffari et al. 2012). A cross-sectional study conducted by Tabatabaei-Malazy et al. (2011) in Tehran, to evaluate the prevalence of DPN and related risk factors using the questionnaires United Kingdom (UK), MNSI, Neuropathy Disability Score (NDS) and SWM testing. The prevalence of DPN was 54%, 31.9%, 38.1%, and 31.7% using UK, MNSI, DNS, and SWM respectively (Tabatabaei-Malazy et al. 2011). Another study was done in the United Arab Emirates, a recent cross-sectional study carried out by Al-Kaabi et al (2014), to estimate the prevalence and the relevant determine of DPN among T2DM patients using the MNSI. The prevalence of DPN based on history score was 10.4% and 25.6% based on physical examination based on the score of ≥ 3 using MNSI (Al-Kaabi et al. 2014). A larger multi-center cross-sectional observation trial conducted by Won et al (2012), to investigate the prevalence and clinical characteristics of DPN among diabetic patients with T2DM based on medical records review or MNSI and 10-g monofilament. The prevalence of DPN was 35.5% in this study (Won et al. 2012).

In Jordan, a recent cross-sectional study was carried out by Al-Sarihin et al (2013), the investigators in this study used MNSI to find out the prevalence of DPN. The overall prevalence of DPN was found to be 54.4% (Al-Sarihin et al.2013). A study was done by Liu et al in (2010) to illustrate the prevalence of DPN among Chinese patients with T2DM, using 10-g monofilament and tuning fork to detected impairment in pressure sensation and vibration perception. The prevalence of DPN was 17.02% in the total population (Liu et al. 2010).

Another cross-sectional trial that was carried out in the far east in India, to evaluate the prevalence and risk factor of DPN among DM by a combination of more than one abnormal test using 10-g monofilament, pinprick sensations, and ankle reflexes. The prevalence of DPN was 33.7% among patients who are known to have DM and 9.2% among those who are newly diagnosed to have DM (Bansal, et al. 2014).

2.2.3 Factors affecting the prevalence of DPN

Several risk factors are with associated accelerated DPN such as obesity, hypertension, dyslipidemia, gender, and age. Also, patients with poor glycemic control and longer duration of diabetes were more likely to develop peripheral neuropathy (Pop-Busui et al. 2009, Jaiswal et al. 2013& Al-Kaabi et al. 2014). For example, a cohort study of patients diagnosed with DM, and developed cardiac vascular disease (CVD) (Pop-Busui et al. 2009) in the USA and Brazil. Was done to assess the relationships between DPN and that relationship to glycemic control among patients with T2DM. The results showed that significantly associated with duration of diabetes, gender, older age, HbA1c $\geq$ 7, albuminuria, and history of hypertension. Also, the study showed that the current cigarette use, and none lipid variables were significantly associated with DPN (Pop-Busui et al. 2009).

2.2.4 Diabetic peripheral neuropathic pain

Diabetic peripheral neuropathic pain (PDPN) is unpleasant and high personal experience that may be invisible to others, that affects the quality of life (QoL)of a person. More than 11% of patients with DPN are suffering from diabetic peripheral neuropathy pain (PDPN) (Gilron et.al. (2015). PDPN is a condition of tissue injury together with muscle spasm usually interferes with impaired patients' health could

have a negative impact on the patients' quality of life (QoL). it is experienced interferes with different aspects of a patient's life, negatively affecting their activities of daily living, mental and physical health, family and social relationships, patients with chronic pain usually suffer from affective disorders and cognitive decline, which significantly impairs their quality of life. Besides, many of these patients also experience stress unrelated to their illness, which can aggravate their symptoms (Gilron et.al. 2015).

2.2.5 Prevalence and incidence of PDPN

Various studies have shown that the prevalence and incidence of PDPN are higher in patients with DM, such as a study in the UK (Reed et al. 2013), aimed to determine the incidence in PDPN, using the United Kingdom General Practice Research Database among subjects with DM. This study showed the overall incidence of newly diagnosed PDPN during the whole study period was 17.8 per 100,000 person-years. Similar findings were explored by a study conducted by Mark et.al. (2006) to determine the prevalence of PDPN among diabetic patients. The authors found that the prevalence of PDPN is 19% (Mark et.al. 2006).

Likewise, a cohort study included 15,692 patients with diabetes in the U.K. study by Abbott et al (2011), to assess the prevalence of painful neuropathic symptoms among PDPN. The researchers used neuropathy symptom score (NSS) and neuropathy disability score (NDS). The results showed that the prevalence of painful symptoms (NSS) and PDPN and (NDS) was 34 and 21% respectively (Abbott et al. 2011). A similar study used a cross-sectional design by Jacovides et.al (2014) to determine the prevalence of PDPN among diabetic DM. The results showed that the prevalence of PDPN was 30% (Jacovides et.al. 2014). Another cross-sectional study conducted by Bouhassira et.al (2008) aimed to estimate the prevalence of chronic pain among PDPN, by the DN4 questionnaire. The results showed that 81.2% were returned 96.8% could be assessed 7,522 respondents reported chronic pain (prevalence 31.7%), and 4,709 pain intensity was moderate to severe (prevalence= 19.9%). Neuropathic characteristics were reported by 1,631 respondents with chronic pain (prevalence = 6.9 %), which was moderate to severe in 1,209 (prevalence =5.1%) (Bouhassira et.al. 2008).

A study was done by Bouhassira et.al (2005) in France among diabetic patients, the DN4 interview questionnaire, which was used to assess the pain. In this study, the prevalence of PDPN with characteristics was 20.3% (Bouhassira et.al.2005)

2.2.6 The risk factor of PDPN

A great number of studies were carried out, have shown that the risk factor of PDPN is patients with DM (Reed et al. 2013, Jacovides et.al, 2014, Abbott et al. 2011& Bouhassira et.al. 2008). A study was conducted in the UK by Reed et al (2013) aimed to determine the incidence of PDPN, using the United Kingdom General Practice Research Database. This study showed the incidence of PDPN in this study increased with age among both females and men (Reed et al. 2013).

Also, in cohort study which included patients with diabetes in the U.K by Abbott et al (2011) to assess the prevalence of painful neuropathic symptoms; the relationship between symptoms and clinical severity of neuropathy; and the role of diabetes type, gender, and ethnicity in painful neuropathy. The results showed that the risk of diabetic peripheral neuropathy in T2DM was double that of T1DM and, females had a 50% increased adjusted risk of painful symptoms compared with men (Abbott et al. 2011).

A similar study used a cross-sectional design by Jacovides et.al (2014), to determine the prevalence of PDPN among South African adults with T1DM or T2DM. In this study, PDPN was significantly increased in people aged 50-64 years, with diabetes duration of ten years or more, female patients (Jacovides et.al, 2014). A study conducted by Bouhassira et.al (2008), to estimate the prevalence of PDPN in the French general population. The results showed that chronic pain with neuropathic characteristics was associated with the middle age group (50 to 64 years), manual professions, and those living in rural areas (Bouhassira et.al. 2008).

2.3. Management

2.3.1 Pain

The widely agreed-upon definition of pain is "an unpleasant sensory and emotional experience associated with acute or potential tissue damage, or described in

terms of such damage" (American pain society (APS). 2003). It is a defensive instrument to which the body reacts to harmful stimuli. Pain is subjective in that every individual learns the utilization of the word through their very own encounters (Treede, 2018). In like manner, pain is associated with genuine or potential tissue harm. It is a sensation in a section or parts of the body. Numerous individuals report pain without tissue harm or any possible pathophysiological cause, and there is normally no real way to recognize their experience from that because of tissue harm. In spite of the fact that pain researchers have put in a great amount of effort into understanding the impact of pain at an individual level, the effect on population up until now have not been largely considered (Treede et.al. 2018). Evidence has shown that pain is one of the major symptoms experienced by hospitalized patients and the global burden of chronic pain revealed that at least 10% of the world's population is affected by a chronic pain condition that causes higher societal and health care costs (Gilron et.al. 2015).

Effective pain management is an important aspect of care to promote healing, prevent complications, reduce suffering, improve QoL, and prevent the development of incurable pain states. Pain is more than a symptom of a problem. It is a high priority problem. Pain presents both physiological and psychological dangers to health and recovery. Severe pain is viewed as an emergency deserving attention and prompt professional (Wells, et.al. 2008).

Key strategies to reduce pain include acknowledging and accepting the patients' pain, assisting support persons, reducing misconceptions about pain, reducing fear and anxiety, and reducing or preventing pain (Treede et.al. 2018).

Treatment options for pain in diabetic patients are limited, but the first step for all patients is to maintain glucose concentrations within the normal range (Tabatabaei-Malazy et al. 2011, Jaiswal et al. 2013& Al-Kaabi et al. 2014). Over time, diabetes can increase the risk of painful neuropathy among diabetic patients including nerve damage, and amputation of lower limbs. Although painful neuropathy in diabetic patients cannot be cured, the disease can be managed by non-pharmacological and pharmacological strategies, where improvements in glycaemic control are important factors in delaying the onset and progression of painful neuropathy with diabetic patients related complications. A study conducted by Boulton et al (2005), there has

been no randomized, controlled trials of intensive insulin therapy in the management of painful neuropathy among DM patients, but data from this study clinical trial study suggest that stable glycemic control is of the greatest import (Boulton et al. 2005). Similarly, several studies used continuous glucose monitoring confirmed and indicated that painful symptoms were associated with erratic blood glucose control (Oyibo, et al. 2002, Tabatabaei-Malazy et al. 2011, Jaiswal et al. 2013& Al-Kaabi et al. 2014).

2.3.2 Quality of Life

Because of illness manifestations following PDPN, the health-related quality of life (HRQoL) could be harmed. The World Health Organization (WHO) describes the quality of life (QoL) as an individual's realization of his/her position in life in the context of the prevailing culture and beliefs and relation to his/her goals and concerns (Murphy. 2019). In modern medicine, QoL is a predictor of general wellbeing that is an important outcome in the treatment of any chronic disease. Outcomes of treatment of any chronic disease are not merely predicted by the frequency and severity of the disease, but also by how this treatment will affect the patient's QoL and general wellbeing (Daaleman, et al. 2007). Quality of life in PDPN patients is affected by many factors such as gender, social support, personality, socioeconomic factors, and psychological symptoms (e.g. depression and anxiety). There is no doubt that chronic diseases have an important and adverse effect on QoL, and it is well known that improvement in it is the final and important goal of nurses (Gore et al. 2005).

The prevalence of distal chronic pain with neuropathic and its impact on the quality of life, mood, anxiety, sleep, and health care utilization was studied by Bouhassira et al (2005) in France. The study included subjects with DM, assessment of the health-related QoL. This study showed that patients with chronic pain had more sleep disturbances and poorer QoL, depression, and anxiety than patients without pain and the presence of neuropathic characteristics was predictive of such impairments (Bouhassira et al. 2005). Similar findings were explored by a study conducted by Gore et al. (2005) in the USA, to evaluate pain severity, pain-related interference with function, sleep impairment, symptom levels of anxiety and depression, and QoL among patients with PDPN. The results revealed that pain substantially interfered with walking ability, normal work, and sleep, enjoyment of life, mood, and general activity.

Moderate to severe symptom levels of anxiety and depression occurred in 35% and 28% of patients, respectively (Gore et al. 2005). Patients reported greater QoL problems compared with the general U.S. Additionally, the study showed significant population impairment in both physical and mental functioning compared with subjects with diabetes. Greater pain levels in PDPN (mild to moderate to severe) corresponded with higher symptom levels of anxiety and depression, more sleep problems, and lower utility ratings and physical and mental functioning. Also, PDPN is associated with decrements in many aspects of patients' lives: physical and emotional functioning, affective symptoms, and sleep problems. The negative impact is higher in patients with greater pain severity (Gore et al. 2005).

Till now, there is a lot of physicians who focus merely on the physical aspect of diseases, despite its importance, it is not the only aspect to care of; a good nurse is the one who helps the patient to achieve a better QoL, in terms of physical, psychological, mental and social life. nurses focus on several ways for improvement in QoL (Kieft, et.al. 2014). An important way for achieving this is by engorging patients to participate in decision making in issues that relate to their health and disease management, when the patient understands the disease and the best way to deal with it, this will capable him/ her to live with the disease and try to minimize its adverse effects on him/ her life. A holistic approach to the patient's physical and psychosocial well-being, a focus on the family, an emphasis on QoL, and continuity of care are the main principles that make the nurses exclusively appropriate to care for chronically ill patients, as patient-centered indices of quality (Kieft, et.al. 2014).

2.3.3 Self-Efficacy Enhancement Education

The patient's role in diabetes recognition and treatment of the requirement to educate patients in diabetes self-management has long been considered to be significant. The concern about educating patients to take care of their diabetes began more than 100 years ago and was emphasized with the publication of the Diabetic Manual for the Doctor and Patient by Elliot Proctor Joslin in 1918 (Martins, et al. 2009). Since then several guidelines for diabetes care counting education have been developed, among these the WHO recommendation for a national program for diabetes mellitus, which stressed the importance of developing effective patient education

programs to maintain the health and quality of life of persons with diabetes. (Knight, et al. 2009). On the other hand, managing the daily care of diabetes seems to be a challenging task for many patients, and a patient's ability to be involved in the daily routine of diabetes care seems to be grounded in psychological, motivational as well as educational factors, such as diabetes self-management intervention has occurred as a resource to assist patients in managing daily diabetes care through the dissemination of information and facilitation of self-management behaviors (Twentyman, et al. 2006). Accordingly, Knowledge about the disease and specific lifestyle strategies is essential but not an adequate factor to facilitate the appropriate behavioral changes. In the development of the educational intervention, there has consequently been an interest in identifying approaches that could strengthen the individuals' beliefs in their competency to handle their diabetes, and hopefully thus enabling them to control the disease. This indicates a need for health professionals to focus on the patients, their lives, and their health problems, rather than on the disease and disease management in diabetes treatment. The person's ability to conduct self-care activities and to assume responsibility for daily diabetes care is supposed to be reflected in good outcomes such as an increase in patient satisfaction rate, and control HbA1, which may lead to improving planning and selecting the appropriate interventions on the patients' QoL to diabetes-related complications (Twentyman, et al. 2006).

Managing the daily care of diabetes seems to be a challenging task for many patients, and a patient's ability to be involved in the daily routine of diabetes care seems to be grounded in psychological, motivational as well as educational factors. Diabetes self-management intervention has occurred as a resource to assist patients in managing daily diabetes care through the dissemination of information and facilitation of self-management behaviors (Twentyman, et al. 2006). Knowledge about the disease and specific lifestyle strategies is essential but not an adequate factor to facilitate the appropriate behavioral changes. In the development of the educational intervention, there has consequently been an interest in identifying approaches that could strengthen the individuals' beliefs in their competency to handle their diabetes, and hopefully thus enabling them to control the disease. This indicates a need for health professionals to focus on the patients, their lives, and their health problems, rather than on the disease and disease management in diabetes treatment. The person's ability to conduct self-

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Many studies conducted in different countries to impact self-efficacy enhancement programs on diabetic patients and to determine the effects of disease variables, quality of life, and pain on peripheral neuropathy in patients with diabetes (Wu, et.al.2007, Atak, et al. 2008, Al-Khawaldeh, et al, 2012; Moein, et al, 2017& Sharoni, et.al.2018). The self-efficacy enhancement programs during proper clinical evaluation, education, pain management, and investigations can help to improve the quality of care among adult diabetic patients with PDPN such as, population studies, which assessed the association that exist between self-efficacy enhancement programs and diabetic patients with T2DM. Several studies have shown that self-efficacy enhancement programs had a significant effect on diabetic patients, for example, In Iran, a clinical trial study was carried out by Moein, et.al. (2017), regarding the impact of empowerment programs on self-efficacy in T2DM patients by a randomized block method. Based on the intervention was accomplished through educational sessions scheduled twice a week for four weeks. The authors found that using an empowerment program had positive effects on self-efficacy in patients with T2DM (Moein, et.al. (2017).

Another study was done in Singapore, a randomized controlled trial examined study carried out by Tan, et.al (2018), to determine the effect of a diabetes self-efficacy enhancing program (DSEEP) on older adults with T2DM. Based on intervention was accomplished through educational sessions scheduled at 8 weeks. The authors found a significantly higher increase in self-efficacy and diabetes self-care activities, lower HbA1c, and lesser unplanned health service usage (Tan, et.al .2018). In Malaysia, (Sharoni, et.al.2018) conducted a study in 2018, to evaluate the effectiveness of health education programs based on the self-efficacy theory on foot self-care behavior for older adults with diabetes, using a randomized controlled trial was conducted for 12 weeks. The authors found the foot self-care behavior, foot care self-efficacy, foot care

outcome expectation, and knowledge of foot care improved in the intervention group compared to the control group. Consequently, the authors concluded that the self-efficacy enhancing program improved foot self-care behavior concerning the delivered program. So, it is expected that in the future, the self-efficacy theory can be incorporated into diabetes education to enhance foot self-care behavior for the elderly with diabetes living in other institutional care facilities. Similarly, in Taiwan, a recent cross-sectional study was carried out by Wu, et.al in 2007, to explore differences in self-care behavior according to demographic and illness characteristics; and relationships among self-care behavior and demographics and illness characteristics, efficacy expectations and outcome expectations of people with T2DM. The authors found a significant between self-care behavior and complications and patient education (Wu, et.al.2007). The authors found also the self-care behavior was significantly and positively correlated with the duration of diabetes, efficacy expectations, and outcome expectations. An overall of 39·1% of modification in self-care behavior can be explained by efficacy expectations, duration of diabetes, and outcome expectations. Accordingly, the user of the self-efficacy model as a framework for understanding adherence to self-care behavior for people with T2DM will enhance self-management routines and assist in reducing major complications in the future (Wu, et.al.2007).

A study conducted in Turkey by Atak, et.al (2008), to evaluate the effect of patient education on knowledge, self-management behaviors, and self-efficacy in patients with T2DM. A randomized single-blind controlled study. The results showed that the significant differences between the intervention and control groups. Improvements were observed in taking regular walks, recognizing nutrients with high caloric content, recommended daily fat distribution, regulating blood glucose levels to avoid complications, and in diabetes, self-efficacy mean scores (Atak, et.al. 2008).

An additional study was conducted by Al-Khawaldeh, et al. in 2012, to evaluate the relationships between diabetes management self-efficacy and diabetes self-management behaviors and glycemic control with T2DM. The results showed that the diet self-efficacy and diet self-management behaviors predicted better glycemic control. Besides, the Authors found also patients with higher self-efficacy reported

better self-management behaviors in diet, exercise, blood sugar testing, and taking medication (Al-Khawaldeh, et.at. 2012). So, the authors recommend strategies to enhance and promote self-efficacy, and self-management behaviors for patients are essential components of diabetes education programs. Moreover, behavioral counseling and skill-building interventions are critical for patients to become confident and be able to manage their diabetes (Al-Khawaldeh, et.at. 2012).

2.3.4 Nurses' roles

The nursing roles are committed to generating knowledge using nursing science and research. Nursing science is a source of knowledge that influences nursing practice and the health of individuals who seek care from nurses. Furthermore, the scientific knowledge generated in a practice discipline must have clinical relevance to be useful to the practitioners or professionals in clinical practice as well as to society (Institute of Medicine (US).2011). Besides nurses have important roles in the assessment and help of diabetic patients to improve outcomes and QoL among those patients by the goals of pain management are to determine evaluation the severity of the pain, assist in choosing the dose for analgesic suitable for that particular level of pain and document the effectiveness of pain treatment (Gore et al. 2005). Ideally, the patient is encouraged to actively participate in pain assessment, evaluation of pain regularly on a standard scale, and reassessment of the pain when an unexpected increase occurs. Thus, Nurses spend a significant amount of their time with patients, and for this reason; they have a key role to play in the decision-making process regarding pain management. Nurses have to be well educated, well prepared, and knowledgeable on pain assessment and management techniques and should not hold false beliefs about pain management, which can lead to inappropriate and inadequate pain management practices. It is important to increase new bits of knowledge and practice into the mechanism of PDPN in trial and clinical settings to create helpful choices with more prominent viability and less danger of unfriendly impacts than those accessible today during investigations enhance knowledge and self-care but should be executed into clinical practice too among those patients. Determination of the outcome of pain management among PDPN treated patients, which is key to help in the development of pain management strategies, development of health services for a better outcome,

increase in patient satisfaction rate which may lead to improving planning and selecting the appropriate interventions on the patients' QoL (Bukhsh et al., 2018).

Gaining nursing knowledge is a continuing process; however, it is important to make sure that the knowledge comes from evidence-based research and that it is reflected in our day-to-day nursing practice and care. Besides, the aim of nursing research is the development of knowledge for nursing science and practice. Accordingly, patient education is essential in the empowerment of people with PDPN, helping them to develop an effective partnership with healthcare professionals, which is key to achieve effective care (Tingen et al., 2009). Optimal diabetes management, daily foot care, education for the person with diabetes, and their family, along with screening and risk assessment are all critical aspects for prevention further of diabetic complications and improve quality of life among those patients. Accordingly, for effective education of diabetic patients, especially those at high risk of complications it is critically important that healthcare professionals develop their understanding of the patient perspective to increase their self-confidence and self-efficacy with improving QoL (Mcinnes, et.al. 2011).

Several researchers have participants who received educational interventions showed improvements in knowledge and self-care and better HbA1c levels with QoL, yet lower health literacy levels have been found to be associated with lower levels of baseline knowledge and poorer glycemic control (Atak et.al, 2008, Al-Khawaldeh, et.at 2012, Mohebi et.al. 2013& Sharoni, et.al. 2018), these studies showed a significant association and there was a positive relationship between educational interventions and self-efficacy, self-management behaviors, and improving outcomes such as improving QoL, clinical and laboratory findings. Consequently, the key components to preventing diabetes complications are lifestyle and having a self-care/self-management plan for the disease. One of the main concerns that affect patients' ability to control their diabetes is understanding the disease and managing the behaviors that lead to greater glycemic control and fewer complications (Atak et.al, 2008, Al-Khawaldeh, et.at 2012, Mohebi et.al. 2013& Sharoni, et.al. 2018).

Furthermore, the nursing roles of educational programs based on self-efficacy management of diabetes are needed since the patient's self-care depends on the

patient's education, empowerment, and self-monitoring results of self-care. So, self-efficacy depends on primary and second-hand experiences, verbal encouragement, and physiological and affective states. Therefore, diabetic patients with enhanced self-efficacy would be more- able to self-care management which may lead to improving planning and selecting the appropriate interventions on the patients' quality of life. (Al-Khawaldeh, et.at 2012, Mohebi et.al. 2013& Sharoni,et.al. 2018). However, still more research is needed to provide robust evidence of the effectiveness of patient education in the prevention of diabetic complications and improve the quality of life among those patients (Golden, et.al. 2017).

Besides, the current study presented certain benefits for the academic and scientific community of the health care providers in Jordan, by increasing the body of knowledge regarding the caring concepts in Jordanian hospitalizes as baseline data for future training programs for nursing. The nurses are prepared as leaders within the health care organization to enhance the integration of the educational self-efficacy enhancement program and move the theory from a theoretical to the clinical level. So, this study presented an empirical connection between theory and practice to them to get a high quality of care from treating patients under the umbrella of holistic care.

3. MATERIAL AND METHODS

3.1. Study design

A randomized controlled trial study was designed to assess the effect of an educational program on a number of outcomes, using a pretest and posttest design.

3.2. Setting

The study was conducted at the Jordanian Ministry of Health. The three hospitals are integrated under the name of the Jordan Ministry of Health. The researcher chose this setting because it receives referrals from all medical sectors in different parts of Jordan. It was assumed that the selected setting would have a reflection of a patient with diabetes from different parts of Jordan. This center was established in 1921 Amman, Jordan with an annual admission rate of 25,000 patients of all disease that provides services to all patients from all around Jordan. Also, that provides screening services for each patient attending the Jordanian Ministry of Health center (clinics or hospitals), the services include following up of patients every three months, in addition to routine measurements of blood glucose HbA1c, blood pressure, weight, height, and waist circumference that are carried out in each visit. Not every patient is sent to the nutrition clinic in the center, only those diabetic patients who are obese and/or have uncontrolled HbA1c levels. Also, there are several specialized clinics in the center to deals with the complication of diabetes.

Every day, the medical records staff in each clinic picked up all the medical files of patients. They made them available on the nursing desk. Once the patients show up, they were received by a qualified nurse who performs some physical examinations that are needed for them before seeing their treating physician.

This study was conducted at the Bashir Governmental Hospital, which was inaugurated in 1954 and is considered one of the ministry's largest hospitals in the Kingdom, has 1,110 beds, employs 3,125 people and received 584,000 patients through its emergency department and 560,000 through the outpatient clinics in 2017, according to the Health Ministry. Also, this study was conducted at the Prince Hamzah Governmental Hospital, which was established in 2006 in the Jordanian capital of

Amman, and has a capacity of 436 beds. Besides, this study was conducted at educational self-efficacy enhancement program Al Hussein Governmental Hospital, which was established in 1961 in the Jordanian capital of Amman, and has a capacity of 152 beds.

3.3. The sample selection

It is estimated that about 39.5% of T2DM patients in Jordan suffer from diabetic peripheral neuropathy (Khawaja et al, 2018). The study included a sample of 72 adult patients with diabetic peripheral neuropathy with self-reported pain, who were randomized using simple random lists of numbers found in https://www.random.org/ into an experimental group of 36 patients who attended the educational program and an equal control group who followed routine diabetic care in the study setting. The randomization was based on the recruitment number, which provided single blinding of the researchers. The sample size was large enough to demonstrate an improvement of 1 point in the patients' educational program with an estimated effect size from the intervention of 0.70 (Polit & Beck. 2012) at a 95% level of confidence and 80% power for two groups with 50% proposition in each. The calculation resulted in requiring a total sample of 68 subjects with 34 in each group. An additional 5% was added to account for possible dropouts, yielding a total projected sample of 72 subjects with 36 in each group.

Ninety potential participants were approached by the researcher and the purpose and merit of the study were briefly explained to each of them. At a response rate of 80%, a convenience sample of 72 subjects who agreed to participate in the study was recruited. Those who refused to participate mostly said they had no time for participating in an educational program. All 72 subjects continued the study until the post-test phase.

- **Inclusion criteria:**
  - All patients with adult diabetic patients with PDPN who visited the Jordanian Ministry of Health at least six months,
  - And who are ≥ 18 years of age having regular follow up in the center was included in the study.

- **Exclusion criteria:**
  - Type 1 diabetes (T1DM) because those patients are beyond the purpose of this study.
  - And, any patient who didn't give verbal consent or respond to the questionnaire.

3.4. Study instruments

An assessment tool package was used in the current study. This package consisted of five parts including Descriptive Data Questionnaire, Quality of Life Questionnaire (EQ-5D), Numeric Pain Rating Scale (NRS), and Diabetes Self-Efficacy Scale (DSES).

3.4.1 Descriptive Data Questionnaire:

The descriptive data questionnaire was developed by the researcher and consists of the demographic data, anthropometric measurement (last reading), laboratory measurement (last reading), and type of treatment that was obtained from the subjects who met the inclusion criteria (Appendix B). The measurements and data were collected using the following sources: From the patient's files (which will be available in the medical records department) at the time of presentation to the Jordanian Ministry of Health. A medical file was used to obtain the last data about anthropometric measurements, laboratory measurements, and clinical data.

3.4.1.1 Anthropometric measurements

Anthropometric measurements include weight, height, waist circumference, and blood pressure systolic/diastolic. The last reading from the medical file was taken at the end of the interview. These measures were documented according to the standardized measures in the center by qualified staff nurses who work in the center (Appendix C).

3.4.1.2 Laboratory measurements

Laboratory measurement includes the last reading of Glycosylated Hemoglobin (HbA1c), fasting blood glucose (FBG), or random blood glucose (RBG), total cholesterol (TC), triglyceride (TG), high-density lipoprotein (HDL), vitamin B12

levels and low-density lipoprotein (LDL). They were documented by a laboratory technician in the medical file. After ending his/her visit to the patient's doctor, data was taken from the medical file at the time of the interview (Appendix C).

3.4.1.3 Clinical data

Clinical data include complications of diabetes and comorbidities. The complications of diabetes are nephropathy and retinopathy. Comorbidities included hypertension, dyslipidemia, and cardiovascular disease. The clinical data were documented according to the physician diagnosis, with a duration of diabetes, type of treatment (such as insulin, oral hypoglycemic agents (OHA's) or both OHA's and insulin) and type of medication (such as metformin, anti-hypertensive treatment, and statin), that documented in the medical file (Appendix C).

3.4.2 Quality of Life Questionnaire (EQ-5D):

Quality of Life Questionnaire entitled EQ-5D was used in the current study (EuroQol, 1990). In 1990, the EuroQol group published the findings of their work developing a quality of life measure. The EQ5D is a generic instrument for describing and evaluating health status; it is used in a variety of different research and clinical settings. This standardized instrument includes five domains that measure the QoL: mobility, self-care, usual activities, discomfort**,** and anxiety/depression. The overall score was (1, indicating no problems; 5, indicating extreme problems) as shown in Appendix C (EuroQol, 1990). In 2005, a EuroQol Task Force investigated methods to improve the sensitivity of the EQ5D. It was decided that the number of dimensions should remain the same, but reliability and sensitivity could be increased by using five levels of severity while maintaining feasibility and potentially reducing ceiling effects. Each dimension now has five levels such as no problems, slight problems, moderate problems, severe problems, and extreme problems. According to the authors would like to ask participants to know how good or bad participant's health, responses were rated on a scale of 0 to 100 where 100 indicating the best health, and 0 indicating the worst health. Besides, the EQ5D has been tested for reliability and validity in a variety of different patient groups e.g. patients with osteoarthritis referred for hip and knee replacement (Conner-Spady et.al. 2015).

The Jordanian reliability and validity studies of the EQ-5D was performed by Jawad Ahmad Abu-Shennar et.al. in 2020. Each of the 5 dimensions comprising the EQ-5D descriptive system is divided into five levels of perceived problems. According to the authors, responses were rated on a scale of 1 to 5 where 1 indicating no problems, 2 indicating slight problems, 3 indicating moderate problems, 4 indicating severe problems, and 5 indicating extreme problems. According to our authors would like to ask participants to know how good or bad participant's health status to imagine, responses were rated on a scale of 0 to 100 where 100 indicating the best health status to imagine, and 0 indicating the worst health status to imagine. The Cronbach's alpha of the revised scale was 0.88 (Appendix E) (Abu-Shennar, Bebis, and Bayraktar . 2020).

3.4.3 Numeric Pain Rating Scale (NRS):

Four usually used pain intensity scales are the Faces Pain Rating Scales (FPSs), the Numerical Rating Scales (NRSs), the Verbal Rating Scales (VRSs), and the Visual Analogue Scales (VASs) are valid measures of pain intensity. The VAS, like the NRS, may consequently be a purer measure of pain intensity (Thong, et.al. 2018).

In our study, the researcher has measured the intensity of pain using the NRS. Each patient was asked to point to the number that represents the intensity of his current pain experience. According to our authors in the current study, responses were rated on a scale of 0 to 10 where ≤ 3 indicating mild pain, 4-7 indicating moderate pain, and 8-10 indicating severe pain (Appendix D) (Abu-Shennar, Bebis, and Bayraktar . 2020).

3.4.4 Diabetes Self-Efficacy Scale (DSES):

The Diabetes Self-Efficacy Scale (DSES) was first published in 1999 as an appendix to an article written by Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, it was done in the psychometric properties of the diabetes management self-efficacy scale for patients with T2DM. The scale consists of 42 items that were originally developed and tested in Spanish for the Diabetes Self-Management Study (Bijl et.al. 1999). Copy right DSES, by the authors later developed by the Stanford Self-Management Resource

Center (SMRC) in 2009. All rights reserved reproductive with permission (Lorig, et.al. 2009).

The researcher has used the DSES. The scale consists of eight items that were originally developed and tested in Spanish for the Diabetes Self-Management Study (Appendix F). This self-efficacy scale was developed based on the self-care activities these patients have to carry out to manage their diabetes. The following psychometric properties of this scale were established: content validity, internal consistency, construct validity, and stability. The original scale contained 42 items. A panel of five experts in diabetes and four self-efficacy experts evaluated the original scale two times for relevance and clarity. This content validity procedure resulted in a final scale that consisted of 20 items. Then, patients with T2DM were asked to complete this 20-item scale and further tests were done with the 94 usable responses. Factor analysis identified four factors, all of which were related to clusters of self-care activities used to manage diabetes which comprised this scale. The internal consistency of the total scale was alpha=0.81 and the test-retest reliability with a five-week time interval was r=0.79 ($P < 0.01$) (Bijl et.al. 1999).

Otherwise, the items were modified according to originally developed by the Self Management Resource Center (SMRC) in 2009 (Lorig, et.al. 2009). The internal consistency reliability of the revised scale was 0.83. There is another way that we use to format these items, which takes up less space on a questionnaire, shown also in the PDF document. This scale is available in English and Spanish (Lorig et.al. 2009).

By SMRC all right were reserved, reproduced with permission of the DSES after modification scales. According to our authors in the current study, the score for each item is the number circled. If two consecutive numbers are circled, code the lower number indicates less self-efficacy. If the numbers are not consecutive, do not score the item. The score for the scale is the mean of items. If more than two items are missing, do not score the scale. A higher number indicates a higher self-efficacy. So, responses were rated on a scale of one to five where 1 to corresponded to never self-efficacy, 2 to low self-efficacy, 3 to moderate self-efficacy, 4 to good self-efficacy, and 5 to very good self-efficacy. To validate the knowledge test, it was administered to 100 participants among adult diabetic patients with T2DM who were asked to

complete this scale. Factor analysis identified four factors, all of which were related to clusters of self-care activities used to manage diabetes which comprised this scale and according to the results no changes. Pilot study participants were excluded from the main study. The Cronbach's alpha of the revised scale was 0.85.

The Jordanian reliability and validity study of the self-efficacy, and self-care activities in adult Jordanians with T2DM. The DSES was performed by Al-Amer et.al in 2016 and was taken into consideration. The DSES was translated into Arabic. According to the authors, responses were rated on a scale of one to five were 1 (Yes, definitely) to 5 (No, definitely not); higher scores indicating greater levels of self-efficacy. The Cronbach's alpha of the revised scale was 0.81 (Al-Amer, et.al. 2016). Similarly, in Turkey, a randomized single-blind controlled study was carried out by Atak, et.al in 2008, to evaluate the effect of patient education on knowledge, self-management behaviors, and self-efficacy among patients with T2DM. The DSES was translated into Turkish. Responses were rated on a scale of one to five where 1 corresponded to never, 2 to low; 3 to moderate, 4 to good, and 5 to very good. The reliability of the original scale is 0.85. The Cronbach's alpha of the revised scale was 0.75 (Atak et.al, 2008).

Generally, The DSES was translated into different languages around the world (International and neighboring Arab countries), such as Qatar, Jordan, and Iran (Pouladi. 2018, Khawaldeh et.al. 2012 & Didarloo, et.al in 2012). The Cronbach's alpha of the revised scale was 0.78, 0.81 & 0.80 respectively.

Moreover, DSES is a clinical scoring system developed as a quantitative instrument to document the effect of education on knowledge, self-management behaviours, and self-efficacy of diabetic patients. Also, DSES is a rapid, simple, sensitive, reliable, and valid test for knowledge of the self-efficacy among patients with diabetes. Additionally, DSES specific tools design is considered an inexpensive and non-invasive measurement tool, which can be used in primary care settings or other providers.

3.5. Educational Tools and Program

The truth is that educational tools and programs are a specially-designed instrument for adult diabetic patients with peripheral neuropathy pain. These educational tools and programs were prepared by the researchers to write all educational tools and program sessions to write in good academic English after then translated to the Arabic version. This new edition of the Near East University (N.E.U) Academics has been fully revised to help patients and researchers to reach the goal. The educational tools including a booklet, demonstrative pictures, videotapes were prepared and the programs were organized, the course explains the educational intervention from start to finish, from selecting suitable sources, reading, note-making, and through to planning the Appendix (Q).

The educational program was especially designed for adult patients with PDPN. The program was structured and adopted by the authors after a review of the relevant literature (Moein, et.al. 2017, Tan, et.al. 2018 &Sharoni, et.al. 2018, Diabetic Neuropathies.2009, Tesfaye et al. 2012 & American Diabetes Association. 2017). Since the management of patients with PDPN requires a holistic approach, lifestyle modification, glycemic control, and pain relief, the educational program was focused on improving pain management, self-efficacy behavior, and the QoL of the patients. Education on glycemic control and pain relief was provided for optimal pain management. The authors developed the educational program according to the self-care efficacy philosophy (Tan, et.al. 2017). Self-management activities such as adherence to the medication regime, foot care, blood glucose testing, and regular follow-up were included and preventive strategies against complications were included in the program to improve self-efficacy behaviors and QoL. The program guided patients to recognize their problems and provided methods to help them make decisions and take proper actions as they encountered complications and changes in their disease.

The educational tools included demonstrative pictures, a booklet, videotapes, and a power-point presentation. They were content-validated by three specialized experts in pharmacology, internal medicine (medical doctor), and medical-surgical nursing. The educational program was designed for small groups (8 to 10 patients) and

one-hour sessions. A session was also held with the staff of the center and the doctor of the diabetes center present and modifications were done accordingly, which was followed content :

- **The first session:** Educating patients about disease entity, information about diabetes and hypoglycemia, its causes, signs and symptoms, and effects on body system; the meaning of diabetic foot and wound healing, its causes, signs and symptoms and how to avoid; prevention of diabetes complications through self-care, compliance with medication and regular follow-up, and hygienic. This was through a 30-min DVD presentation in the Arabic language.

- **The second session (the practical part):** Assisting PDPN among adult diabetic patient's rehabilitation activities concerning focused on foot care training (care of skin, nails, between fingers, daily checking, etc.), feet exercise, selection of suitable diet, testing own blood glucose level, pain management, self-monitoring tips, exercise, and medication intake it takes around 30 minutes for each patient. The training methods involved questioning, discussion, and demonstration. The teaching media included demonstrative pictures, videotapes, and hand out.

- **The third session:** Further PDPN among adult diabetic patient's rehabilitation in terms of thought and suggestion and dealing with lack of information on health maintenance (ways to prevent or minimize uncontrolled HbA1c, ways to maintain an expected nutritional status, ways to preserve energy or to minimize hyperglycemia/ hypoglycemia, fatigue, and pain, instructing the use of insulin, informing patients on the side effects and necessity of the administered drugs, care guide for using insulin at home, and situations when visiting the physician is necessary).

- **The fourth session:** A review of the mentioned material and handing out an educational booklet (containing a complete account of the classes will include the introduction of diabetes and diabetic complications, pain management, self-monitoring of blood glucose, self-care activities such as care and prevention of complications of the diabetic foot, hygienic, also patients are received the

diabetes self-care demonstrated booklet), with necessary explanations and ensuring that patients can utilize them.

3.5.1 Implementation:

The study was conducted on adult patients diagnosed with PDPN during October 2019 to March 2020.

- **Experimental group implementation:**
  - The author administered the educational intervention to the PDPN patients in the study setting.
  - The intervention program consisted of four educational sessions in a small group at weekly intervals. Patients were chosen for the small groups using a convenience sampling technique (Polit & Beck. 2012).
  - The educational intervention was implemented using demonstrative pictures, a booklet, videotapes, and a power-point presentation in the Arabic language. It took approximately an hour to 90 minutes for each group to complete the tasks.
  - Telephone follow-up was started one month after the end of the educational program and continued on a bi-weekly basis for five months to refresh the patient on the provided information and booster the program effect.

- **Control group implementation:**

  The control group received routine diabetic care (i.e. medication administration and assessment for any complications) provided to adult patients with PDPN who were at high risk for developing PDPN complications in the study setting.

- **Post-evaluation**

  Evaluation of the educational program for adult patients with PDPN was carried out at the MoH hospitals. Five months after the educational intervention, questionnaires were completed by both the experimental and control groups, and the results were compared (pre- and post-test). The same data collection instruments were used in all study phases.

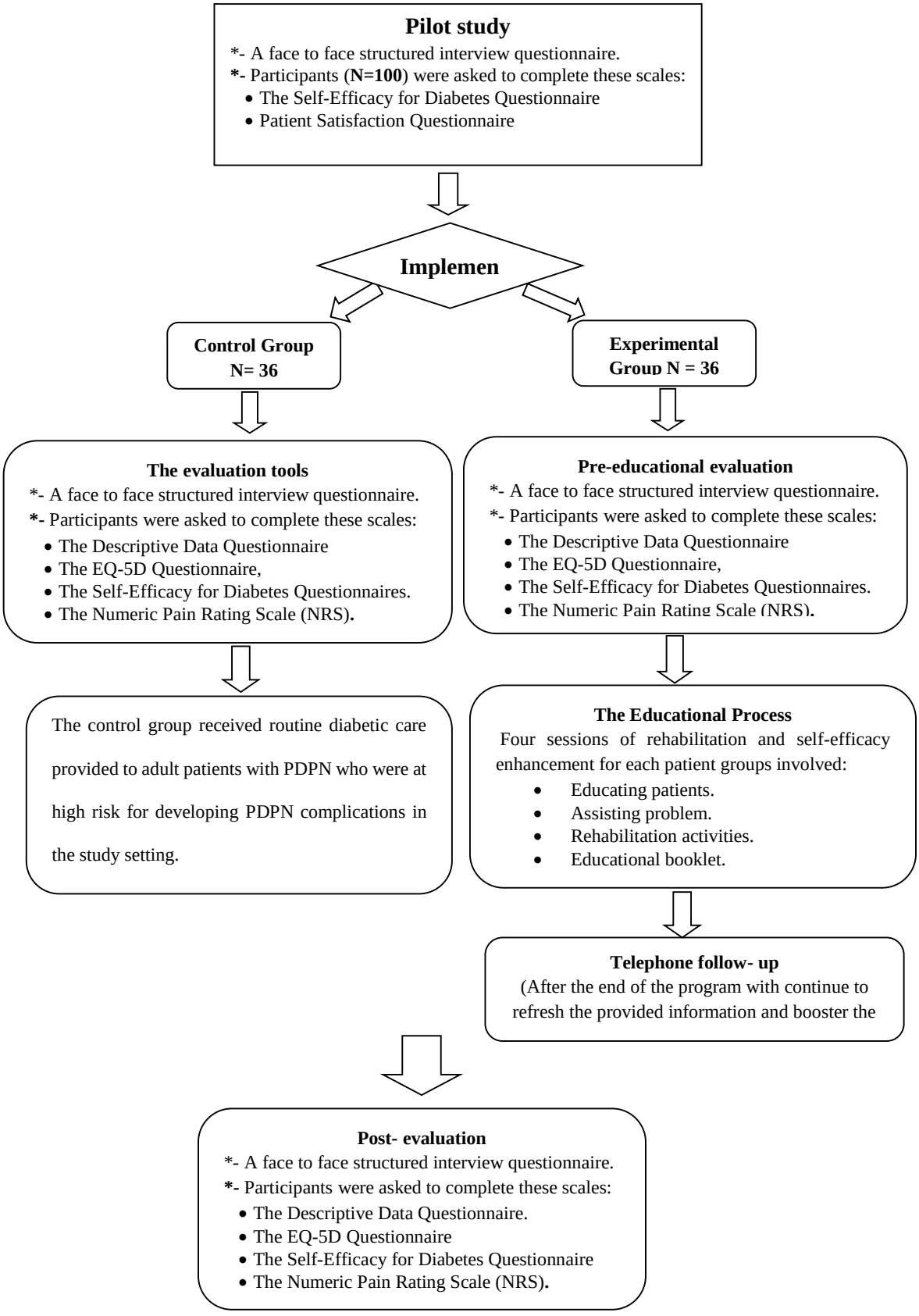

Figure 1: Implementation steps of the study

3.6. Pilot study

A pilot study was performed among Jordanian patients having PDPN at the Jordanian Ministry of Health for clarity of Patient Satisfaction Questionnaire. According to the results of the pilot study, necessary revisions were made on the questionnaire.

3.7. Ethical consideration

Before starting data collection, the ethical approval was obtained from the ethical write and scientific committee of the Jordanian Ministry of Health and Near East University (N.E.U) as documented below in Appendix (M, N & O), A consent form was signed for each of those who accepted to participate in the study. The EQ-5D Questionnaire by EuroQol Research Foundation this scale is free to use without permission. While, by SMRC all right were reserved, reproduced with permission of the DSES, then modification scales according to our authors in the current study, which the observed range with a 5-point scale response. The patients who meet the inclusion criteria were invited to participate after receiving detailed information from the researcher, who was available at the time of the data collection at the Jordanian Ministry of Health to approach them if they have any questions and to ensure that the questionnaire filling is in the proper way. The information was about the purposes of the study, significance, benefits, and risks.

Moreover, the consent form is obtained from all participants who meet the inclusion criteria after informing them that it is voluntary to be a participant and they can withdraw from the study at any time without any physical or emotional harm in their marks. Also, the consent form has a clear statement that participation is totally voluntary without any risk of participation or withdrawal from the study. Finally, identified information was kept strictly confidential and the data was used for the scientific purpose by the researchers only.

3.8. Statistical analysis

The data were entered into EpiData v3.1 (Copenhagen, Denmark) and analyzed using statistical software (SPSS v25.0; SPSS IBM Inc., Chicago, IL, USA). Continuous variables, such as QoL, pain score, and self-efficacy score were presented

using the descriptive statistics of mean ±SD when normally distributed. Categorical variables such as the soiodemographic characteristics of gender, marital status, educational level and smoking status were presented using the descriptive statistics in of frequencies and percentages as appropriate.

A number of inferntial statistics were used in order to test study hypotheses. Inter-group differences in continuous outcome scores were evaluated using an independent-sample *t*-test, paired-samples *t*-test as appropriate. Furthermore, multiple linear regression models were used to identify determinants of continuous outcome scores, such as QoL, pain, and Self-Efficacy scores. Spearman's rank-order correlation coefficient (*Spearman's Rho*) was used to assess the inter-relationships among the quantitative variables and ranked variables. A *p*-value less than 0.05 was considered statistically significant.

4. RESULTS

This chapter presents results of the ststistical analysis in order to test the research hypotheses and answer research questions.

4.1. Characteristics of the participants

Table 4.1: Characteristics of the participants (*N*=72)

Variables	**Experimental group** *n=36*	**Control group** *n=36*	***P-value***
Age , *mean (± SD)* year	66.3 (± 5.5)	60.9 (± 5.8)	0.052
Gender: Male, *n (%)* Female, *n (%)*	 27 (75) 9 (25)	 23 (63.9) 13 (36.1)	0.222
Marital status: Single / Divorced /Widowed, *n (%)* Married, *n (%)*	 3 (8.3) 33 (91.7)	 4 (11.1) 32 (88.9)	0.691
Educational Level : High school or less, *n (%)* Diploma, *n (%)* Bachelor degree or higher, *n (%)*	 15 (41.7) 9 (25) 12 (33.3)	 8 (22.2) 14 (38.9) 14 (38.9)	0.185
Smoking status: No, *n (%)* Yes, *n (%)*	 25 (69.4) 11 (30.6)	 22 (61.1) 14 (38.9)	0.168
Visit to the diabetes physician: Yes, *n (%)* No, *n (%)*	 12 (33.3) 24 (66.7)	 11 (30.6) 25 (69.4)	0.800
Job status: Unemployed, *n (%)* Employed, *n (%)* Retired, *n (%)*	 3 (8.3) 13 (36.1) 20 (55.6)	 9 (25) 11 (30.6) 16 (44.4)	0.164
HbA1C (%), *mean (± SD)* Uncontrolled ≥7%, *n (%)* Controlled < 7%, *n (%)*	11.2 (± 1.7) 36 (100) 0 (0)	9.2 (± 1.2) 35 (97.2) 1 (2.8)	0.317
Comorbid Diseases \ conditions: Hypertension, *n (%)* Dyslipidemia, *n (%)* Retinopathy, *n (%)* Nephropathy, *n (%)* Cardiovascular diseases, *n (%)*	 12 (33.3) 16 (44.4) 29 (80.5) 12 (33.3) 30 (83.3)	 16 (44.4) 20 (55.5) 30 (83.3) 15 (41.7) 28 (77.8)	0.560
Body mass index (BMI) (Kg/m^2) *, *mean ± SD* Normal, *n (%)* Overweight, *n (%)*	37.59 ± 4.8 0 (0) 1 (2.8) 35 (97.2)	39.44 ± 4.9 0 (0) 2 (5.6) 34 (94.4)	0.984

Obese, *n (%)*			
Family history of diabetes: Yes, *n (%)* No, *n (%)*	 30 (83.3) 6 (16.7)	 27 (80.6) 7 (19.7)	 0.759

** = Normal: 18.5-24.9 kg/m^2; overweight: 25-29.9 kg/m^2; obese: ≥30 kg/m^2.*

Table (4.1) summarizes demographic variables for study participants. Of particular note was that participants in both groups were obese, with means of 37.59 for experimental group participants and and 39.44 for cnotrol group participans. All participants suffered from comorbid diseases and conditions such as hypertension (33.3% and 44.4%, in experimental and control groups, respectively), dyslipidemia (44.4% and 55.5% respectively), retinopathy (80.5% and 83.3% respectively), nephropathy (33.3% and 41.7% respectively), and cardiovascular diseases (83.3% and 77.8% respectively). The majority had uncontrolled HbA1c readings of 7% or more, with means 11.2 and 9.2 respectively. No statistically significant differences between the means of the two groups were found.

4.2. Pre and post-test scores of the control group

Item	**Pre-test** ***mean (±SD)***	**Post-test** ***mean (±SD)***	***T-test***	***P-value***
NRS score (out of 10)	**7.81 (±1.32)**	**7.38 (±0.83)**	**1.987**	**0.878**
EQ-5D overall score (out of 4)	**2.68 (±0.81)**	**1.78 (±0.67)**	**0.993**	**0.454**
EQ-5D Mobility domain score (out of 4)	2.28 **(**±1.09)	2.13 **(**±0.79)	0.676	0.778
EQ-5D Self-care domain score (out of 4)	2.42 **(**±0.94)	2.03 **(**±0.88)	0.490	0.671
EQ-5D Usual activities domain score (out of 4)	2.86 **(**±0.80)	1.44 **(**±1.05)	1.237	0.133
EQ-5D Pain/ Discomfort domain score (out of 4)	2.92 **(**±0.87)	1.47 **(**±0.91)	1.966	0.173
EQ-5D Anxiety/ Depression domain score (out of 4)	2.94 **(**±0.83)	1.99 **(**±0.90)	1.870	0.155

DSES overall score (out of 5)	**1.78 (±0.42)**	**1.82 (±0.48)**	**1.022**	**0.651**
Self-efficacy Q1 score (out of 5)	1.78 **(**±0.87)	1.89 **(**±0.55)	0.343	0.661
Self-efficacy Q2 score (out of 5)	1.69 **(**±0.67)	1.42 **(**±0.73)	0.987	0.575
Self-efficacy Q3 score (out of 5)	1.67 **(**±0.76)	1.83 **(**±0.59)	1.090	0.401
Self-efficacy Q4 score (out of 5)	1.75 **(**±0.77)	1.47 **(**±0.74)	1.087	0.412
Self-efficacy Q5 score (out of 5)	1.69 **(**±0.62)	1.64 **(**±0.68)	0.223	0.785
Self-efficacy Q6 score (out of 5)	1.94 **(**±0.86)	1.72 **(**±0.81)	0.905	0.561
Self-efficacy Q7 score (out of 5)	1.72 **(**±0.78)	1.56 **(**±0.50)	0.778	0.542
Self-efficacy Q8 score (out of 5)	2.00 **(**±0.86)	1.72 **(**±0.85)	1.174	0.299

Table 4.2: Pre and post-test scores of NRS, EQ-5D and DSES in the control group (*n=36*)

Table (4.2) indicates that for participants in the control group there was no statistically significant improvement in NRS, EQ-5D, and DSES scores over the six months of the study, during six months (*T-test*= 1.987, *p*= 0.878), (*T-test*= 0.993, *p*= 0.454), and (*T-test*= 1.022, *p*= 0.651 respectively).

4.3. Pre and post-test scores of the experimental group

Table 4.3: Pre and post-test scores of NRS, EQ-5D and DSES in the experimental group (n=36)

Item	**Pre-test** ***mean (±SD)***	**Post-test** ***mean (±SD)***	***T-test***	***P-value***
NRS score (out of 10)	**6.53 (±3.33)**	**5.08 (±1.46)**	**5.694**	**0.02***
EQ-5D overall score (out of 4)	**1.07 (±0.61)**	**3.12 (±0.70)**	**176.242**	**0.001****
EQ-5D Mobility domain score (out of 4)	1.11 (±0.71)	3.03 (±0.81)	114.212	0.001**
EQ-5D Self-care domain score (out of 4)	1.14 (±0.72)	3.08 (±0.91)	101.240	0.001**

EQ-5D Usual activities domain score (out of 4)	1.36 (±0.68)	3.17 (±0.91)	90.665	0.001**
EQ-5D Pain/ Discomfort domain score (out of 4)	1.31 (±0.71)	3.42 (±0.77)	146.281	0.001**
EQ-5D Anxiety/ Depression domain score (out of 4)	0.44 (±0.61)	2.89 (±0.92)	177.382	0.001**
DSES overall score (out of 5)	**1.43 (±0.16)**	**3.46 (±0.59)**	**386.545**	**0.001****
Self-efficacy Q1 score (out of 5)	1.00 (±0.01)	3.31 (±0.89)	242.327	0.001**
Self-efficacy Q2 score (out of 5)	1.39 (±0.50)	3.42 (±0.77)	165.356	0.001**
Self-efficacy Q3 score (out of 5)	1.40 (±0.49)	3.44 (±0.69)	217.062	0.001**
Self-efficacy Q4 score (out of 5)	1.00 (±0.01)	3.25 (±0.87)	238.458	0.001**
Self-efficacy Q5 score (out of 5)	1.31 (±0.47)	3.53 (±0.61)	301.887	0.001**
Self-efficacy Q6 score (out of 5)	1.53 (±0.51)	3.53 (±0.61)	229.671	0.001**
Self-efficacy Q7 score (out of 5)	2.36 (±0.64)	3.83 (±0.65)	93.190	0.001**
Self-efficacy Q8 score (out of 5)	1.42 (±0.50)	3.36 (±0.64)	206.627	0.001**

** = Statistically significant, p<0 .05; ** = Statistically significant, p< 0.001.*

The results of the pre-test scores in the entire sample (*n*=36), revealed that the mean score of the participants was 6.53 out of 10 in their overall NRS score, where a higher score indicates the worst pain levels. The overall DSES score was 1.43 out of 5, while the scores for DSES questions were 1.00, 1.39, 1.40, 1.00, 1.31, 1.53, 2.36, and 1.42 respectively, where a lower score indicates a poor level of self-efficacy behaviors. The overall EQ-5D score was 1.07 out of 4, while the mobility domain score was 1.11, self-care domain score was 1.14, usual activities domain score was 1.36, pain/discomfort domain score was 1.31, and anxiety/depression domain score was

0.44, where a lower score indicates a negative level of QoL in the experimental group (Table 4.3).

At the post-test evaluation after the intervention program in the experimental group (Table 4.3) a dependent-sample t-test was conducted to assess the improvements in the overall NRS, EQ-5D, and DSES scores among the experimental group members (n=36). The results revealed that the experimental group members had shown a statistically significant improvement in their overall NRS, EQ-5D, and DSES scores [(*T-test* = 5.694, p= 0.02), (*T-test*= 176.242, p<0.001), and (*T-test*= 386.545, p<0.001) respectively]. Besides, statistically significant improvements in every subdomain (mobility, self-care, activity, pain/ discomfort, and anxiety/depression) of the EQ-5D instrument and every question (Q1 through Q8) of the DSES instrument were found.

4.4. Comparison of NRS, EQ-5D and DSES overall scores of the experimental and control group patients

Table 4.4: Comparison of NRS, EQ-5D and DSES overall scores of the experimental and control group patients'

Variables	Groups**	Pre-test	Post-test	P value
		mean score ± SD	mean score ± SD	
NRS overall score (out of 10)	Experimental group	6.53 (±3.33)	5.08 (±1.46)	0.02**
	Control group	7.81 (±1.32)	7.38 (±0.83)	0.878
	P value	0.133	0.001**	0.001**
EQ-5D overall score (out of 4)	Experimental group	1.07 (±0.61)	3.12 (±0.70)	0.001**
	Control group	2.68 (±0.81)	1.78 (±0.67)	0.454
	P value	0.078	0.002**	0.001**
DSES overall score (out of 5)	Experimental group	1.43 (±0.16)	3.46 (±0.59)	0.001**
	Control group	1.78 (±0.42)	1.82 (±0.48)	0.651
	P value	0.055*	0.001**	0.001**

***In comparisons: Pre and post-test scores of the experimental group were compared with the scores of the control group (inter-group comparison).*

** = Statistically significant, p<0 .05; ** = Statistically significant, p< 0.001.*

As regards the changes in patients' outcomes after implementing the educational intervention throughout the study phases, Table (4.4) demonstrates no statistically significant dereferences between the experimental and control groups at the pre-intervention phase. At the post-intervention phase, the patients in the experimental group had statistically significant improvement in the NRS, EQ-5D, and DSES scores (p= 0.02, p<0.001, and p<0.001 respectively).

4.5. Variance in the experimental group as predicted by risk factors and the educational Intervention

Table 4.5: 2-step Multiple Linear Regression Model of Variance in the DSES, EQ-5D, and NRS scores as predicted by (Step 1: Time, Gender, BMI, Duration of DM, and HbA1C result) and (Step 2: Educational intervention)

DSES	**Factor**	***Unstandardized B***	***95% CI of B****		***Standardized Beta***	***T-test***	***P-value***
			Lower	***Upper***			
Step (1)	**Time (pre vs. post)**	0.137	-0.095	0.276	0.091	1.650	0.442
	Gender	0.066	-0.554	0.685	0.026	0.210	0.812
	BMI	-0.029	-0.080	0.025	-0.134	-1.209	0.266
	Duration of DM	-0.023	-.069	0.089	-0.107	-.698	0.511
	HbA1C result	-0.428	-2.187	1.943	-0.055	-.386	0.696
Step (1) ANOVA F (df) = 0.634 (5), p = 0.546, R= 0.199, ***R^2 =0 .041.***							
Step (2)	**Educational intervention**	-2.113	-2.262	-1.971	-0.971	-20.855	0.001**
*Step (2) ANOVA F (df) = 91.609 (6), p = 0.001**, R= 0.929,* ***R^2 = 0.886.***							
R^2 change = 0.845, p = 0.001**							

EQ-5D	Factor	*Unstandardized B*	*95% CI of B*		*Standardized Beta*	*T-test*	*P-value*
			Lower	*Upper*			
	Time (pre vs. post)	0.144	-0.109	0.267	0.088	1.70	0.45
Step (1)	**Gender**	-0.051	-0.718	0.615	-0.019	-0.207	0.908
	BMI	0.023	-0.031	0.079	0.101	0.922	0.449
	Duration of DM	0.059	0.001	0.118	0.240	2.076	0.049*
	HbA1C result	0.129	-2.454	2.781	0.019	0.110	0.902
Step (1) ANOVA F (df) = 1.443 (5), p = 0.298 , R= 0.245, ***R^2 =0 .060***							
Step (2)	**Educational Intervention**	2.074	1.797	2.352	0.858	14.916	0.000**
*Step (2) ANOVA F (df) = 49.699 (6), p = 0.001**, R= 0.89,* ***R^2 =0 .794*** ***R^2 change = 0.734, p = 0.001*****							

NRS	Factor	*Unstandardized B*	*95% CI of B*		*Standardized Beta*	*T-test*	*P-value*
			Lower	*Upper*			
	Time (pre vs. post)	0.209	-0.660	0.901	0.122	1.091	0.509
Step (1)	**Gender**	0.261	-1.149	1.671	0.043	0.367	0.715
	BMI	0.123	0.009	0.240	0.247	2.099	0.046*
	Duration of DM	0.114	-0.011	0.235	0.216	1.855	0.069
	HbA1C result	-1.981	-7.097	3.331	-0.091	-0.811	0.466
Step (1) ANOVA F (df) = 2.237 (5), p = 0.081 , R= 0.359, ***R^2 =0 .128***							
Step (2)	**Educational Intervention**	1.498	0.290	2.646	0.270	2.402	0.010*
*Step (2) ANOVA F (df) = 3.122 (6), p = 0.011**, R= 0.500,* ***R^2 =0 .250*** ***R^2 change = 0.122, p = 0.001*****							

CI: Confidence Interval

*** Statistically significant, p<0 .05; ** = Statistically significant, p<0.001.*

In order to assess the impact of educational intervention on DSES, EQ-5D, and NRS scores, a two-step multiple linear regression model (Table 4.5) was conducted on the whole sample (N=72), where DSES, EQ-5D, and NRS scores were entered as the dependent variable and time (pre vs. post), gender, BMI, duration of DM, and HbA1C result were entered in the first step as independent factors. The results of the first step of the multiple linear regression model showed that the combination of time (pre vs. post), gender, BMI, duration of DM, and HbA1C result were unable to significantly explain variance in DSES, EQ-5D, and NRS scores (Step $^{(1)}$ $ANOVAF_{(df)} = 0.634_{(5)}$, $p = 0.546$), (Step $^{(1)}$ $ANOVA\ F_{(df)} = 1.443_{(5)}$, $p = 0.298$), and (Step $^{(1)}$ $ANOVAF_{(df)} = 2.237_{(5)}$, $p = 0.081$) respectively. The percentage of explained variance of the first step of the model was very small (Step $^{(1)}$ $R^2 = 0\ .041$), (Step $^{(2)}$ $R^2 = 0\ .060$), and (Step $^{(1)}$ $R^2 = 0\ .128$) respectively.

However, after adding the educational intervention in the second step of the multiple linear regression, the model became statistically significant (Step$^{(2)}$ $ANOVAF_{(df)} = 0.845_{(5)}$, $p<0.001$), (Step $^{(2)}$ $ANOVAF_{(df)} = 49.699_{(6)}$, $p<0.001$), and (Step $^{(2)}$ $ANOVA\ F_{(df)} = 3.122_{(6)}$, $p = 0.011$) respectively. The percentage of explained variance in DSES score noticeably increased (Step $^{(2)}$ $R^2 = 0.886$), (Step $^{(2)}$ $R^2 = 0\ .794$), and (Step$^{(2)}$ $R^2 = 0.250$) respectively. The increase in R^2 was statistically significant (R^2 change = 0.845, $p\leq0.001$), (R^2 change = 0.734, $p<0.001$), and (R^2 change = 0.122, $p<0.001$) respectively. The statistically significant improvement in the multiple linear regression model's percentages explained variance (R^2) indicates that the implementation of the educational intervention significantly improves DSES, EQ-5D, and NRS scores among adult patients with PDPN.

4.6. Correlation between the pre and post-test scores of NRS, DSES, and EQ-5D in the experimental group

Table 4.6: Correlation between the pre and post-test scores of NRS, DSES, and EQ-5D in the experimental group

Variable	***Correlation Coefficient***	**NRS score**	**DSES score**	**EQ-5D score**
Pre-Educational Evaluation				
NRS score	*Spearman's Rho*	1.000	- 0.08	- 0.19

	P-value	-	0.662	0.271
DSES score	*Spearman's Rho*	- 0.08	1.000	- 0.03
	P-value	0.662	-	0.865
EQ-5D score	*Spearman's Rho*	0.19	- 0.03	1.000
	P-value	0.271	0.865	-
Post-Educational Evaluation				
NRS score	*Spearman's Rho*	1.000	0.06	- 0.04
	P-value	-	0.731	0.820
DSES score	*Spearman's Rho*	0.06	1.000	0.76*
	P-value	0.731	-	0.001
EQ-5D score	*Spearman's Rho*	- 0.04	0.76*	1.000
	P-value	0.820	0.001	-

** = Spearman Rank-Order Correlation Coefficient (Spearman's Rho) is significant at the 0.001 level (2-tailed).*

Results of a Spearman's Rho correlation model (used to evaluate the correlations between the NRS, DSES, and EQ-5D scores were conducted both in the pre and post-test scores of an educational intervention) were shown in Table (4.6). In the pre-test stage, there were no statistically significant correlation found among NRS, DSES, and EQ-5D scores. While in the post-test stage, after implementing an educational intervention, there was a statistically significant positive correlation between the scores of DSES and EQ-5D (*Spearman's Rho* = 0.76, $p<0.001$), while the NRS score correlated negatively with the score of EQ-5D (*Spearman's Rho*= 0.04, $p=0.820$). The NRS score correlated positively with the score of DSES (*Spearman's Rho*=0.06, $p=0.731$).

5. DISCUSSION

Recent results analyses have reported that in the follow-up intervention, health-related improvements gained from self-management programs. The self-management methods effectively increase participants' knowledge, symptom self-management, other self-management behavior such as weight control, self-efficacy behaviors, testing blood glucose, and aspects of health status, besides the quality of life, and pain management significantly (Anekwe & Rahkovsky. 2018).

The results of the current study did not show significant differences between the study and control groups in terms of the mean DSES, NRS, and EQ-5D scores in the baseline assessment before the intervention program. The findings of the study indicated an increase in the mean scores of DSES, NRS, and EQ-5D in the experimental group compared to the control group after intervention. This indicated that the educational program, including telephone follow-up, was effective in the improvement of self-efficacy behaviors, pain management, and QoL of the patients with PDPN; therefore, the primary aims of the study were achieved. Recent meta-analyses have reported that, in the absence of follow-up intervention, health-related improvements gained from self-management programs do not continue over the long term and it is not easy to distinguish between the specific benefit of such interventions and the non-specific effects of study participation (Aminuddin et al., 2012).

The achievement of the present study intervention program in enhancing the self-efficacy behaviors of adult patients with PDPN can be attributed to the self-efficacy enhancement resulting from the educational intervention, including self-management activities such as adherence to the medication regime, foot care, blood glucose testing, and regular follow-up, and preventive strategies against complications. These results of this study were concordant with those from other epidemiological studies (Moein, et al. 2017, Tan, et al. 2018, Sharoni, et al. 2018, Al-Khawaldeh, et al. 2012, Mariyama, et al.2009, Atak, et al.2008, Wu, et al. 2007& Sarkar, et al. 2006), where patients with DM had significantly lower self-efficacy behaviors than those without DM. This might be attributed to the that was associated with lower levels of self-efficacy behaviors by poor self-management skills practicing, and lower knowledge of the patients about the disease with uncontrol of the

complications, which leads to negative feedback was frequently implemented among patients with PDPN.

The essential findings of this study suggest the importance of incorporating self-efficacy enhancing interventions in diabetes self-efficacy (DSE) programs, emphasizing the requirement to build confidence specific to a given self-management behavior as a portion of the health care providers communication or as a component of an educational, counseling, and skill-building program that can enhance the likelihood of maintaining the preferred outcomes of PDPN. Diabetes nurse educators and other health care providers need to develop effective methods for promoting self-management among adult Jordanian individuals. A combined approach of counseling, education, and behavioral interventions in DSE behaviors is supported to enhance effective DSE. Diabetes educators must emphasize to individuals and their families that the diabetes education needs to be an ongoing means starting initially at the time of investigation as well as throughout the lifelong disease system. The findings of the studies by Aminuddin et al., (Aminuddin, et.al. 2019), Goodall et al., (Goodall, et.al. 2020), Hailu et al., (Hailu, et.al. 2019), ElGerges et al., (El Gerges, et.al. 2020), Qasim et al., (Qasim, et.al. 2020), Chan et al., (Chan, et.al. 2020), Wong et al., (Wong , et.al. 2020), Tanimura et al., (Tanimura, et.al. 2020), and Tay et al., (Tay, et.al. 2020), also showed the effectiveness of educational intervention on improving self-efficacy behaviors among adult patients with T2DM. when comparing these results with the current study results, we found that there is a consensus that diabetic patients have a statistically significant negative effect on the self-efficacy behaviors status. It was observed that patients' knowledge of diabetes and self-management skills practicing has improved after exposure to the educational program leads to improve self-efficacy behaviors. But it is difficult to compare the highest self-efficacy behaviors with the educational self-efficacy enhancement program among PDPN due to the not found the studies associated with the educational self-efficacy enhancement program with self-efficacy behaviors among PDPN.

Currently, no studies have shown convincing reversal of the effect of an educational intervention that improved pain management among adult patients with

PDPN. It has been especially important to identify patients with prediabetes and neuropathy pain since these interventions can be most effective in this population (Naranjo, et.al. 2020). The findings of the present study indicated lower mean NRS scores in the experimental group compared to the pre- and post-test scores after the intervention program. Reports have indicated that educational intervention, including glycemic control and pain management, is effective for managing peripheral neuropathy pain, and a certain degree of pain relief was improved when combined with the routine diabetic care provided. In view of the outcomes observed in the investigation, it is worth highlighting that, in addition to appropriate control of pain, it is necessary to pay attention to other factors, such as impairment of cognitive function or anxiety, to prevent complications in patients with PDPN. According to most studies, foot care, control of HbA1c, and modifying lifestyle behaviors benefit diabetic patients when managing complications (Hicks, et.al. 2019; De la Fuente Coria et al., 2020; Mikhael et al., 2020 & Hildebrand et al., 2020). Aerobic exercise can significantly reduce the prevalence and severity of PDPN complications; exercise intervention trials showed that physical activity significantly improves glycemic control, reduces visceral and subcutaneous adipose, improves dyslipidemia, and enhances insulin sensitivity, which ultimately alleviates pain and neuropathic symptoms in patients with PDPN (Kluding, et.al. 2012). This might be attributed to the possible explanation for this association that could be related to the educational interventions program's existence of modifying lifestyles among patients including control HbA1c%, dietary regimen, foot care, and exercise among patients with PDPN. However, it is difficult to compare the pain management with other studies due to the not found the associated with educational self-efficacy enhancement program with better manage pain.

In general, lifestyle modification such as good adherence to a health plan, in particular diet, physical activity, and treatment are a cornerstone in the prevention and management of PDPN and its complications. Aerobic exercise can significantly reduce the prevalence and severity of diabetes complications; exercise intervention trials showed that physical activity significantly improves glycemic control, reduces in visceral and subcutaneous adipose, improves dyslipidemia, enhances insulin sensitively, ultimately improving pain and neuropathic symptoms in patients with DPN (Kluding et al. 2012). Our data showed that none adherence to a health plan, in

particular diet, lack of physical activity, smoking, and irregularly visited their treating physician were significant with PDPN. Similarly, other studies showed that the lack of physical activity was a significant risk factor associated with DPN (Katulanda et al. 2012 & Al-Kaabi et al. 2014). This finding emphasizes the importance of better access to health care facilities and proper education in the prevention of PDPN. Another interesting observation in our study is the trend towards the benefits of exercise and diet regimen in controlling blood sugar, improving metabolic problems and reducing obesity (American Diabetes Association. 2012), exercise was the health behavior that had the highest level of participation amongst trial respondents in this study. These findings are in accordance with a report released through the Jordanian Ministry of Health in 2011, indicating that approximately 80% of adult patients were physically inactive (Al-Amer, et.al. 2016). The current study similarly found low adherence levels to a diet plan and exercise during the educational program self-efficacy enhancing interventions behaviors management by comparing the pretest and posttest means. In contrast, were low exercise and dietary adherence, the participants have adhered highly to insulin and/or oral hypoglycaemic agents. These findings suggest that participants might be considering medications to be a "quick solution," unlike exercise or diet therapy, both of which necessitate ongoing commitment.

Moreover, in the previous research's studies described that perceived high levels of self-efficacy behaviors are related to good adherence to a health plan, in particular diet, physical activity, reduce weight and encouragement stop smoking, and compliance of treatment (Broadbent et al. 2006). In general, self-efficacy behaviors were indicated to impact self-care management and adherence to a health strategy (Wu et al. 2007, Sacco & Bykowski. 2010;). In our study has added to the increasing body of evidence that educational program self-efficacy enhancing interventions is being a universal and pivotal interest in self-care management in patients with diabetes. accordingly, this result suggests that nurses need to spend additional efforts to encourage diabetic subjects to enhance and maintain a regular habit of walking, a diet plan, reduce weight, and encouragement to stop smoking as a portion of comprehensive lifestyle intervention. Besides, our study findings suggest that insulin

self-management should be evaluated and assessed regularly to monitor the accuracy of insulin dosing.

Regarding QoL, Degu et al. (Degu, et.al. 2020) showed that health-related QoL is lower in PDPN patients and that anxiety, depression, usual activities, mobility, self-care, pain, and discomfort are strongly related to QoL problems in these subjects. These authors suggested that strong negative moods may increase or perpetuate the impact of QoL on patients' pain levels, possibly through increased physiological or cognitive arousal, or as a result of deregulated diurnal patterns (Degu, et.al. 2020). Similar outcomes were found in a 2020 study that revealed PDPN patients were more likely to have problems with mental alterations and physical activities compared to those without PDPN, which may explain their lower QoL. An in-depth explanation of the multiple brain mechanisms common to these disorders and a hypothesis about the complex ways they are associated highlight the importance of the problem and the need to pursue an adequate solution (Vinik , et.al. 2020). Another recent study that agrees with the results of our study was performed in South Africa. In this study, the results suggested that PDPN has a negative impact on QoL of 1036 patients with diabetes from 50 health care clinics. (Jaco evidest. al 2014), when comparing these results with the current study results, we found that there is a consensus that PDPN has a statistically significant negative effect on the QoL of the patient with diabetes including both physical and mental status. In a more recent study conducted in France, the results showed that PDPN was associated with disturbances in sleep, higher anxiety levels, and depression (Bouhassira et.al 2013). This might be attributed to the negative impact on QoL with the bad health status to imagine by self-efficacy behaviors including poor self-management skills practicing, and negative feedback was frequently implemented among patients with PDPN. These are in congruence with the results from our study at the baseline assessment before the intervention program.

At the post-test and follow-up after the intervention program in this study, the results revealed that the experimental group members had statistically significant improvements in every subdomain (mobility, self-care, activity, pain/ discomfort, and anxiety/depression) of the QoL scale. A large body of studies has shown the relationship between self-management programs and improvement of QoL in patients

with DM (Jiang, et.al. 2019 & Rasoul, et.al. 2019). Therefore, the relationship between self-efficacy behaviors and QoL in patients with PDPN (where obesity is very prevalent) could be expected. In line with our results, previous studies have reported that prolonged interventions and self-management programs have a significant impact on a high QoL among T2DM patients, and the studies indicated that QoL is an important factor related to the long-term prognosis of diabetes (Jiang, et.al. 2019 & Rasoul, et.al. 2019). While data obtained from a study in Saudi Arabia on contrary to our study, this was not significantly associated with the effect of the educational program and QOL among diabetic patients with T2DM (Mokabel, et.al. 2017). Similarly, a study was done in Taiwan failed to show any significant association between the effect of the educational program and QOL among T2DM (Wu. 2007). However, the variation in magnitude between these findings and others may be attributed to either the differences in sample size or the characteristics of the study participants. This might be attributed to the educational interventions program that was associated with a positive impact on QoL with the best health status to imagine by control HbA1c%, dietary regimen, foot care, and exercise, and lifestyle behavior. Also, it helped to enhance self-efficacy behaviors including self-management skills practicing, and positive feedback was frequently implemented in the enhancement of self-efficacy among patients with PDPN.

Still, it is difficult to compare the impact on QoL with other studies due to the not found the associated with educational self-efficacy enhancement program which leads to a positive impact on QoL with the best health status to imagine among patients with PDPN, when comparing these results with the current study results, we found that there is a consensus that diabetic patients have a statistically significant positive effect on the QoL with the best health status to imagine. It was observed that patients' knowledge of diabetes has improved after exposure to the educational interventions program.

The lack of a significant correlation between this study’s results in the pre-test stage can be explained by the subjects’ wide variability in experiences of pain management, self-efficacy behaviors, and QoL. On the other hand, after implementing the educational program, significant correlations among the study’s three outcomes were found. This can be explained by the effectiveness of the educational program in

positively shaping study group members' self-efficacy behaviors, relieving their pain, and enhancing their QoL. The significant correlations that were found in the post-test stage of the study serve as additional evidence of the positive impact the educational program had on study group members' outcomes compared to the control group.

The results showed that self-efficacy behaviors were significantly, but negatively, correlated with total QoL levels (showing a high level of QoL due to reverse evaluation). In other notions, higher self-efficacy behaviors were predictive of a high level of QoL over an extended period. These findings were consistent with the relevant studies (Rasoul, et.al.2019, Wattana, et.al. 2007, Jiang, et.al. 2019, Didarloo, et.al. 2016, Grey, et.al. 2013, Moriyama, et.al. 2009, Landsman-Dijkstra, et.al.2006, Aghamolaei, et.al.2005, Marks & Allegrante 2005).

While, the results showed that self-efficacy behaviors beliefs were not significantly, but positively, correlated with total pain intensity behaviors, not only at initial assessment but also prospectively over three months. It was also found that self-efficacy behaviors beliefs were predictive of total pain intensity behaviors, although not complaint behaviors, importantly, this association held even after controlling for the possible effects of pain intensity and duration, as well as gender, age, and QoL levels. In other concepts, higher self-efficacy behaviors beliefs were predictive of lower pain behaviors over an extended period (Miller et al.2020, Asghari & Nicholas.2001).

This might be attributed to the that was associated with the dependence on self-report measures may be viewed as a weakness in this investigation, but as others have noted before many of the variables investigated are only accessible through self-report (such as pain, coping strategies, mood, and belief). While there is still an argument that a patient's judgment of his/her pain behavior is a valid purpose of evaluation and intervention (such as Philips & Jahanshahi.1986). It was also noted earlier that many of the common pain behaviors reported of daily life (naturalistic settings) for example pain complaints and avoidance maneuvers are not incorporated in the objective pain behavior evaluation (established by Keefe & Block.1982) which was used in previous studies of self-efficacy behaviors beliefs and pain behaviors (Buescher et al.1991& Buckelew et al.1994).

Besides, the results showed that pain intensity behaviors were not significantly, but negatively, correlated with total QoL levels (showing a high level of QoL due to reverse evaluation). In other notions, lower total pain intensity behaviors were predictive of a high level of QoL over an extended period. These findings were consistent with these studies (Jongen, et. al 2017, Jaco evidest, et. al 2014, Bouhassira et.al. 2013, Van Acker et.al 2009, Davies et al. 2006& Gore et al 2005).

6. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

According to the results of this study, the design and implementation of the educational intervention combined with routine diabetic care provided effective enhancement of self-efficacy behaviors, QoL, and pain management of PDPN patients. Each of these three outcomes was significantly improved when tested separately, and a significant correlation was found among all three when tested after program implementation. Therefore, the program is effective in improving these three outcomes at once in PDPN patients. Consequently, to promote patient self-care activities, it is crucial to improve their self-efficacy behaviors and modify lifestyle behaviors, such as eating an appropriate diet, participating in exercise, and regularly visiting the diabetes physician. These changes are more achievable with the help of professionally developed and delivered educational interventions, such as the self-efficacy behaviors and self-care activities.

Recommendations

It is suggested that health-care providers should use the educational programs for PDPN patients at various levels of providing services, including health centers and diabetes clinics. These results reinforce the importance of educational interventions, including an illustrated booklet for adult diabetic patients who are at risk for PDPN complications. Further studies are required to investigate the long-term effects of such educational interventions.

7. STRENGTHS AND LIMITATION

Our study is the first study to investigate the effect of an educational program on pain management and self-efficacy behaviors in adult patients with PDPN and determine the effects of this intervention program on their QoL at the Jordanian Ministry of Health. It is the first study that assessed the effect of an educational program on pain management and self-efficacy behaviors in adult patients with PDPN and determine the effects of this intervention program on their QoL. Also, the large sample size utilized in this study is considered another strength. The study objectives were achieved in a short time at relatively low cost and important research questions were answered using the rich and complete data sources from the structured interview with the participants and data from the medical records of the Jordanian Ministry of Health.

A randomized controlled trial study design was used in the current study is considered one of the strengths that make the effect of an educational program on pain management and self-efficacy behaviors in adult patients with PDPN and determine the effects of this intervention program on their QoL of potential validity. The strength of this study may also be related to the large sample size which empowers the validity of the impact of the educational self-efficacy enhancement program.

There are limitations in this study that need to be addressed. Although the focus of this research was to investigate adult patients with PDPN, data collection did not identify patients who had been taking pharmacological and non-pharmacological pain therapies. Implementation of all stages of the study by the researchers might be considered as sources of bias. Also, some comorbidities, such as some cardiovascular and respiratory diseases, which may affect self-efficacy behaviors and QoL, were not accounted for in the analysis.

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9. APPENDICES:

Appendix (A): Informed Consent for Participants (The Arabic Version)

Information sheet

شكرا لاهتمامكم ورغبتكم بالمشاركة في هذا البحث العلمي.

عنوان البحث :مدى تأثير تأثير برامج تعزيز الكفاءة التعليمية الذاتية على جودة الحياة والألم وسلوك الكفاءة الذاتية لدى مرضى السكري البالغين الذين يعانون من ألم اعتلال الأعصاب المحيطي.

هدف الدراسة -:

تهدف هذه الدراسه إلى تحديد مدى تأثير تأثير برامج تعزيز الكفاءة التعليمية الذاتية على جودة الحياة والألم وسلوك الكفاءة الذاتية لدى مرضى السكري البالغين الذين يعانون من ألم اعتلال الأعصاب المحيطي.

من هم المستهدفين في هذه الدراسة-:

عزيزي المريض ادعوك إلى المشاركة في هذه الدراسة والتي تشمل المرضى المصابين بمرض السكري الذين يشكون من ألم إعتلال الاعصاب الطرفيه.

ما المطلوب منك خلال الدراسة؟

عـــــزيـزي المريـــض : المطلوب منك هو بعد موافقتك المشاركة أن تجيب على أسئلة استمارة الدراسة التي سيقدمها الباحث والتي تتطلب نحو (15) دقيقه من وقتك ومن ثم سيقوم الباحث بفحص درجة الألم و نوعه في العياده التي تراجع فيها.

هل موافقتك في الدراسة اختيارية طوعية؟

المشاركة في البحث طوعية وبمحض اختيارك وهي مشاركة غير مدفوعه, لا يتطلب الاشتراك في البحث ذكر الاسم أو ما يدل عليه ومهما كانت الإجابة أو رأيك فإن هذه الإجابات والآراء لن تؤثر بأي شكل كان على وضعك الصحي و لن تؤثر في نوعية الرعاية الصحية المقدمة لك . و لك الحق بالاشتراك أو رفض الاشتراك في البحث.

هل المعلومات في الدراسة المستخدمة سرية-:

كل المعلومات التي سيتم جمعها **ستعامل بسرية تامة** ولن يذكر اسمك على أي من صفحات الاستبانة وستعامل الاستبيانات بسرية تامة من قبل فريق البحث ولن يطلع على هذه الاستبيانات إلا فريق البحث ولن تخرج هذه المعلومات لأي جهة او شخص كان، وستستخدم فقط لغايات الدراسة . وقد حصلت هذه الدراسة على موافقة المؤسسة التي تقدم الرعاية الصحية للمريض بحيث يسمح للباحثين بجمع البيانات منهم حسب اختيارهم .يحق للمشارك في البحث سؤال الباحثين عن أي أمر يتعلق بالبحث وكذلك يحق له الحصول على نتائج البحث عند الانتهاء منه.

لقد تم توضيح كل النقاط السابقة الذكر لي بشكل مفصل .وفهمت كل المعلومات المذكورة بسهولة .وفهمت إن لي الحق بطرح أي سؤال حول الدراسة في أي وقت كان .وان هذه الأسئلة ستجاب من خلال الباحث الرئيسي المدرج اسمه في أسفل هذه الصفحة .

إن تعبئة هذه الاستبانه تعد بمثابة موافقة على المشاركة في هذه الدراسة البحثية

اسم الباحث :جواد أحمد أبو شنار

طالب دكتواره في جامعه الشرق الادني , قبرص - نيقوسيا.

البريد الإليكتروني: Jawad _0799@ yahoo .com

Appendix (B): Socio-demographic Data for Participants (The English Version)

Demographical data:

File no… ……. Date……. …

Age...

1-Gender:

a) Male b) Female

2- Education Level:

a)- Illiterate b) High school or less than c) Diploma d) Bachelors e) Master or doctorate

3- Occupation:

a) Employed b) Not employed c) Retired

4-Marital status:

a) Married b) Single

5- Total Family income monthly……JD

6- Smoking:

a) Not smoker b) Ex-smoker c) Current smoker

7-Medical insurance:

a) Yes b) No

8- How many times have you been the physical activity for at least 30 minutes over the past week (Including walking)?

a) Regular (4-7 days) b) Semi-regular (1-3 days) c) No physical activity

9- How many times have you followed the nutrition plan as planned by a nutritionist :or a doctor in the past seven days?

a) Regular (4-7 days) b) Semi-regular (1-3 days) c) No diet regimen

10- Is there a Family history of diabetes?

a) Yes b) No

11- Do you regularly check and follow up with your doctor?

a) Yes b) No

Appendix (C): Clinical and Laboratory Data for Participants (The English Version)

Anthropometric measurement (Last reading):

Weight ……..kg Height…….cm

Waist circumference……cm Body mass index (BMI) …….

Clinical data: -

Duration of diabetes …… month/years. Hypertension: Yes ….. No……

Dyslipidemia Yes ……. No…… Nephropathy: Yes..….. No……

Cardiovascular disease: Yes …….. No…… Retinopathy: Yes ….. No……

Laboratory measurement (Last reading):-

HbA1c ..... % Fasting blood glucose (FBG) ..mg/dI

Random glucose level (RBG) ..... mg/dI Vitamin B12 ……..pg/ml

S.TG ..... mg/dI S.HDL ..... mg/dI

S.LDL..... mg/dI Total cholesterol ..... mg/dI

Type of treatment:

1. Insulin 2. Oral hypoglycemic agents (OHA's) 3.Oral and insulin

Medications:

Metformin Yes……. No……

Anti-HTN Yes…….. No…….

Statin Yes…….. No……..

Blood pressure (Bp): ……

Appendix (D): Numeric Pain Rating Scale (NRS) (The English Version)

0-10-numerical-rating scale

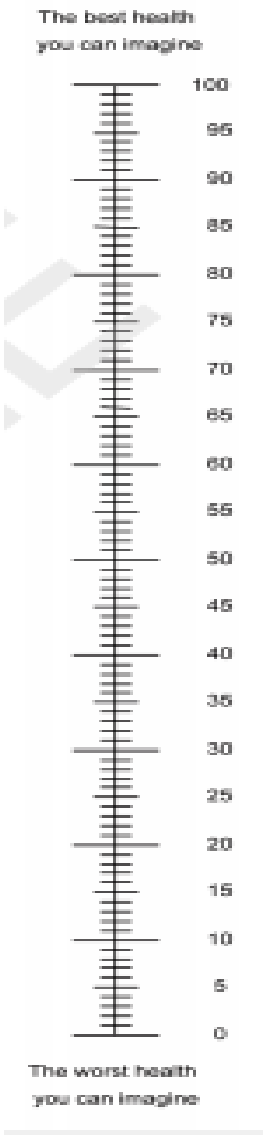
Appendix (E): Quality of Life Questionnaire (EQ-5D) (The English Version)

A. Under each heading, please tick the ONE box that best describes your health TODAY

MOBILITY
I have no problems walking about
I have slight problems in walking about
I have moderate problems in walking about
I have severe problems in walking about
I am unable to walkabout
SELF-CARE
I have no problems washing or dressing myself
I have slight problems washing or dressing myself
I have moderate problems washing or dressing myself
I have severe problems washing or dressing myself
I am unable to wash or dress myself
USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)
I have no problems doing my usual activities
I have slight problems doing my usual activities
I have moderate problems doing my usual activities
I have severe problems doing my usual activities
I am unable to do my usual activities
PAIN / DISCOMFORT
I have no pain or discomfort
I have slight pain or discomfort
I have moderate pain or discomfort
I have severe pain or discomfort
I have extreme pain or discomfort
ANXIETY / DEPRESSION
I am not anxious or depressed
I am slightly anxious or depressed
I am moderately anxious or depressed
I am severely anxious or depressed
I am extremely anxious or depressed

B. Mark an X on the scale to indicate how your health is TODAY. Now, please write the number you marked on the scale in the box below

YOUR HEALTH TODAY = ☐



Appendix (F): Diabetes Self-Efficacy Scale (DSES) (The English Version)

We would like to know how confident you are in doing certain activities. For each of the following questions, please choose the number that corresponds to your confidence that you can do the tasks regularly at the present time.

1. How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?

5 4 3 2 1

2. How confident do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes?

5 4 3 2 1

3. How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)?

5 4 3 2 1

4. How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?

5 4 3 2 1

5. How confident do you feel that you can do something to prevent your blood sugar level from dropping when you exercise?

5 4 3 2 1

6. How confident do you feel that you know what to do when your blood sugar level goes higher or lower than it should be?

5 4 3 2 1

7. How confident do you feel that you can judge when the changes in your illness mean you should visit the doctor?

5 4 3 2 1

8. How confident do you feel that you can control your diabetes so that it does not interfere with the things you want to do?

5 4 3 2 1

Appendix (G): Socio-demographic Data for Participants (The Arabic Version)

ورقه المعلومات

شكرا لاهتمامكم ورغبتكم بالمشاركة في هذا البحث العلمي.

عنوان البحث :مدى تأثير برامج تعزيز الكفاءة التعليمية الذاتية على جودة الحياة والألم وسلوك الكفاءة الذاتية لدى مرضى السكري البالغين الذين يعانون من ألم اعتلال الأعصاب المحيطي.

هدف الدراسة - :

تهدف هذه الدراسه إلى تحديد مدى تأثير برامج تعزيز الكفاءة التعليمية الذاتية على جودة الحياة والألم وسلوك الكفاءة الذاتية لدى مرضى السكري البالغين الذين يعانون من ألم اعتلال الأعصاب المحيطي.

من هم المستهدفين في هذه الدراسة- :

عزيزي المريض أدعوك إلى المشاركة في هذه الدراسة والتي تشمل المرضى المصابين بمرض السكري الذين يشكون من ألم إعتلال الاعصاب الطرفيه.

ما المطلوب منك خلال الدراسة؟

عـــــزيـــزي المريـــض **:**المطلوب منك هو بعد موافقتك المشاركة أن تجيب على أسئلة استمارة الدراسة التي سيقدمها الباحث والتي تتطلب نحو (15) دقيقه من وقتك ومن ثم سيقوم الباحث بفحص درجة الألم ونوعه في العيادة التي تراجع فيها.

هل موافقتك في الدراسة اختيارية طوعية؟

المشاركة في البحث طوعية وبمحض اختيارك وهي مشاركة غير مدفوعة، لا يتطلب الاشتراك في البحث ذكر الاسم أو ما يدل عليه ومهما كانت الإجابة أو رأيك فإن هذه الإجابات والآراء لن تؤثر بأي شكل كان على وضعك الصحي ولن تؤثر في نوعية الرعاية الصحية المقدمة لك .ولك الحق بالاشتراك أو رفض الاشتراك في البحث.

هل المعلومات في الدراسة المستخدمة سرية- :

كل المعلومات التي سيتم جمعها **ستعامل بسرية تامة** ولن يذكر اسمك على أي من صفحات الاستبانة وستعامل الاستبيانات بسرية تامة من قبل فريق البحث ولن يطلع على هذه الاستبيانات إلا فريق البحث ولن تخرج هذه المعلومات لأي جهة او شخص كان، وستستخدم فقط لغايات الدراسة . وقد حصلت هذه الدراسة على موافقة المؤسسة التي تقدم الرعاية الصحية للمريض بحيث يسمح للباحثين بجمع البيانات منهم حسب اختيارهم .يحق للمشارك في البحث سؤال الباحثين عن أي أمر يتعلق بالبحث وكذلك يحق له الحصول على نتائج البحث عند الانتهاء منه.

لقد تم توضيح كل النقاط السابقة الذكر لي بشكل مفصل .وفهمت كل المعلومات المذكورة بسهولة .وفهمت إن لي الحق بطرح أي سؤال حول الدراسة في أي وقت كان .وان هذه الأسئلة ستجاب من خلال الباحث الرئيسي المدرج اسمه في أسفل هذه الصفحة .

إن تعبئة هذه الاستبانه تعد بمثابة موافقة على المشاركة في هذه الدراسة البحثية

اسم الباحث :جواد أحمد أبو شنار

طالب دكتوراه في جامعه الشرق الأدنى، قبرص -نيقوسيا.

البريد الإليكتروني: Jawad _0799@ yahoo .com

Appendix (H): Clinical and Laboratory Data for Participants (The Arabic Version)

البيانات الشخصية

استبانة رقم :..... رقم الملف :..... التاريخ/اليوم:.....

1. **العمر..... سنة**
2. **الجنس: 1. ذكر 2. أنثى**
3. **الحالة الاجتماعية: 1. أعزب 2. متزوج**
4. **العمل: 1. لا يعمل 2. يعمل بدوام كامل 3. يعمل بدوام جزئي 4. متقاعد**
5. **التحصيل العلمي: 1. الثانوية العامة أو أقل 2. دبلوم 3. بكالوريوس 4. دراسات عليا 5. غير متعلم**
6. **نوع التأمين الصحي : 1. وزارة الصحة 2. قطاع خاص/عسكري 3.غير مؤمن**
7. **الدخل الشهري للعائلة : ..... دينار**
8. **التدخين : 1. مدخن سابق 2. مدخن حاليا 3. لا أدخن**
9. **ما عدد المرات التي شاركت فيها بنشاط رياضي لمدة نصف ساعة في الأيام السبع الماضية (نشاط متواصل بما فيه المشي) : 1. بانتظام (4-7ايام/أسبوعيا) 2. شبه منتظم (1-3ايام/أسبوعيا) 3. ولا مرة**
10. **ما عدد المرات التي اتبعت فيها الخطة الغذائية كما هو مقرر من أخصائي التغذية أو الطبيب المعالج في الأيام السبع الماضية:**
    1. بانتظام (4-7ايام/أسبوعيا) 2. شبه منتظم (1-3ايام/أسبوعيا) 3. ولا مرة
11. **هل يوجد أحد من الأقرباء يعاني من مرض السكري : 1. نعم 2. لا**
12. **هل تقوم بالفحص الدوري والمتابعة بشكل منتظم عند الطبيب : 1. نعم 2. لا**

Appendix (I): Clinical and Laboratory Data for Participants (The Arabic Version)

هذا الجزء يخص الباحث، وسوف يتم أخذ المعلومات التالية من الملف الطبي:

Anthropometric measurement (Last reading):-

Weight …….kg Height…….cm

Waist circumference……cm Body mass index (BMI) ……

Clinical data: -

Duration of diabetes …… month/years. Hypertension: Yes …. No……

Dyslipidemia Yes …. No…… Nephropathy: Yes …. No……

Cardiovascular disease: Yes …. No…… Retinopathy: Yes …. No……

Laboratory measurement (Last reading): -

HbA1c ..... % Fasting blood glucose (FBG) …… mg/dI

Random glucose level (RBG) ..... mg/dI Vitamin B12 ……pg/ml

S.TG ..... mg/dI S.HDL ..... mg/dI

S.LDL..... mg/dI Total cholesterol ..... mg/dI

Type of treatment:

1. Insulin 2. Oral hypoglycemic agents (OHA's) 3.Oral and insulin

Medications:

Metformin Yes……. No……

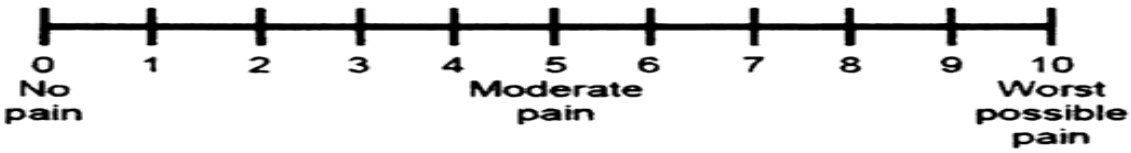
Anti-HTN Yes……. No…….

Statin Yes……. No…….

Blood pressure (Bp): ……

Appendix (J): Numeric Pain Rating Scale (NRS) (The Arabic Version)

0-10-numerical-rating scale



Appendix (K): Quality of Life Questionnaire (EQ-5D) (The Arabic Version)

مقياس كفاءه جوده الحياة

A .تحت كل عنوان، يرجى وضع علامة (X) في أحد المربعات التي تمثل وصف صحتك اليوم: لصحتك اليوم.

الحركه:

- ☐ ليس لدي أي صعوبة عند المشي (السير)
- ☐ لدي صعوبة طفيفة عند المشي
- ☐ لدي صعوبة متوسطه في المشي
- ☐ لدي صعوبة كبيره في المشي
- ☐ أنا غير قادر على المشي إطلاقا

الرعاية الذاتية:

- ☐ ليس لدي أي صعوبة في الاعتناء بنظافتي الشخصية والملبس
- ☐ لدي القليل صعوبة في الاعتناء بنظافتي الشخصية والملبس
- ☐ لدي مشاكل متوسطة صعوبة في الاعتناء بنظافتي الشخصية والملبس
- ☐ لدي الكثير من الصعوبة في الاعتناء بنظافتي الشخصية والملبس
- ☐ أنا غير قادر على القيام بالاعتناء بنظافتي الشخصية والملبس

الأنشطة المعتادة (مثل العمل والدراسة والأعمال المنزلية، الأنشطة العائلية أو الترفيه)**:**

- ☐ ليس لدي أي صعوبة في القيام بالأنشطة المعتادة
- ☐ لدي القليل من الصعوبة عند القيام بالأنشطة المعتادة
- ☐ لدي صعوبة متوسطه عند القيام بالأنشطة المعتادة
- ☐ لدي الكثير من الصعوبة عند القيام بالأنشطة المعتادة
- ☐ أنا غير قادر على القيام بالأنشطة المعتادة

ألم / إزعاج:

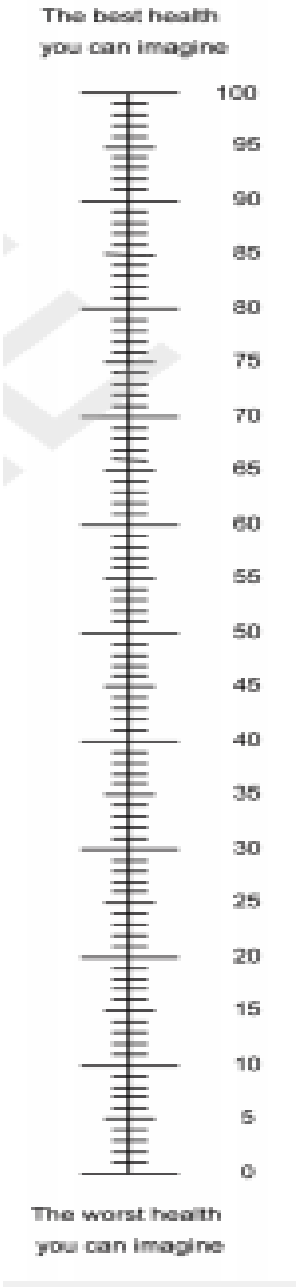
- ☐ ليس لدي ألم أو انزعاج
- ☐ لدي ألم طفيف أو انزعاج
- ☐ لدي ألم أو انزعاج معتدل
- ☐ لدي ألم شديد أو عدم الراحة
- ☐ لدي ألم شديد أو انزعاج

القلق / الاكتئاب:

- ☐ أنا لا أشعر بالقلق أو الاكتئابب
- ☐ أنا أشعر بالقليل من القلق أو الاكتئاب
- ☐ أنا أشعر بالقلق بشكل متوسط أو الاكتئاب
- ☐ أنا أشعر بالقلق بشدة أو الاكتئاب
- ☐ أنا أشعر بأعلى درجه من القلق أو الاكتئاب

B. ضع علامة X على المقياس للإشارة إلى مدى صحتك اليوم. الآن، يرجى كتابة الرقم الذي حددته على المقياس في المربع أدناه.

صحتك اليوم =



Appendix (L): Diabetes Self-Efficacy Scale (DSES) (The Arabic Version)

قياس الكفاءة الذاتية لمرض السكري

نود أن نعرف مدى ثقتك في أداء بعض الأنشطة. لكل من الأسئلة التالية، يرجى اختيار الرقم الذي يتوافق مع ثقتك في أنه يمكنك القيام بالمهام بانتظام في الوقت الحالي:

1- ما مدى ثقتك في شعورك حيث يمكنك أن تأكل وجبات الطعام الخاصة بك كل 4 إلى 5 ساعات كل يوم ، بما في ذلك وجبة الإفطار كل يوم؟

5	**4**	**3**	**2**	**1**

2- ما مدى ثقتك في شعورك حيث يمكنك اتباع نظامك الغذائي عندما يكون لديك مناسبه أو مشاركة الطعام مع الآخرين الذين ليس لديهم مرض السكري؟

5	**4**	**3**	**2**	**1**

3- ما مدى ثقتك في شعورك حيث يمكنك اختيار الأطعمة المناسبة لتناول الطعام عندما تكون جائعًا (مثال، وجبات خفيفة)؟

5	**4**	**3**	**2**	**1**

4- ما مدى ثقتك في شعورك حيث يمكنك ممارسة النشاط الرياضي لمدة 15 إلى 30 دقيقة، 4 إلى 5 مرات في الأسبوع؟

5	**4**	**3**	**2**	**1**

5- ما مدى ثقتك في شعورك حيث يمكنك أن تفعل شيئا لمنع انخفاض مستوى السكر في الدم عند ممارسة النشاط الرياضي؟

5	**4**	**3**	**2**	**1**

6- ما مدى ثقتك في شعورك حيث في أنك تعرف ما يجب فعله عندما يرتفع أو ينخفض مستوى السكر في الدم؟

5	**4**	**3**	**2**	**1**

7- ما مدى ثقتك في قدرتك على الحكم عندما تعاني من مضاعفات ومشاكل صحية حيث أنه يجب عليك زيارة / مراجعه الطبيب الخاص بك؟

5	**4**	**3**	**2**	**1**

8- ما مدى شعورك بالثقة في قدرتك على التحكم في مرض السكر حيث لا تتداخل مع الأشياء التي تريد أن تفعلها؟

5	**4**	**3**	**2**	**1**

Appendix (M): Ethical approval from Near East University

EK-936-2019

YAKIN DOĞU ÜNİVERSİTESİ
BİLİMSEL ARAŞTIRMALAR ETİK KURULU

ARAŞTIRMA PROJESİ DEĞERLENDİRME RAPORU

Toplantı Tarihi :25.07.2019
Toplantı No : 2019/71
Proje No : 862

Yakın Doğu Üniversitesi Hemşirelik Fakultesi ogretim üyelerinden Prof. Dr. Nurhan Bayraktar'ın sorumlu araştırmacısı olduğu, YDU/2019/71-862 proje numaralı ve **"Impact of Educational Self-Efficacy Enhancement Program on Quality of Life, Pain, Self-Efficiency Behaviors, and Its Impact of Satisfaction among Adult Diabetic Patients with Peripheral Neuropathy Pain"** başlıklı proje önerisi kurulumuzca değerlendirilmiş olup, etik olarak uygun bulunmuştur.

1. Prof. Dr. Rüştü Onur (BAŞKAN)
2. Prof. Dr. Nerin Bahçeciler Önder (ÜYE)
3. Prof. Dr. Tamer Yılmaz (ÜYE) KATILMADI
4. Prof. Dr. Şahan Saygı (ÜYE)
5. Prof. Dr. Şanda Çalı (ÜYE)
6. Prof. Dr. Nedim Çakır (ÜYE)
7. Prof. Dr. Kaan Erler (ÜYE) KATILMADI
8. Prof. Dr. Ümran Dal Yılmaz (ÜYE) KATILMADI
9. Doç. Dr. Nilüfer Galip Çelik (ÜYE) KATILMADI
10. Doç.Dr. Emil Mammadov (ÜYE)
11. Doç. Dr. Mehtap Tınazlı (ÜYE)

Appendix (N): Ethical approval from recruited the Jordanian Ministry of Health

وزارة الصحة

الرقم تطوير/خطط/ ٨٠١٤

التاريخ

الموافق ٢٠١٩/٨/٦

مدير مستشفى .....

تحية طيبة وبعد ،،،

أرفق طياً صورة عن كتاب مدير ادارة مستشفيات البشير / رئيس لجنة أخلاقيات البحث العلمي رقم م ب أ / لجنة أخلاقيات /١٢٤٧٣ تاريخ ٢٠١٩/٨/٤ بخصوص الموافقة لطالب الدكتوراة **جواد احمد ابو شنار** إجراء بحث بعنوان :

(Impact of Educational Self-Efficacy Enhancement Program on Quality of Life, Pain and Self-Efficiency Behaviors among Adult Diabetic Patients with Peripheral Neuropathy Pain)

وذلك عن طريق توزيع الاستبيان المرفق صورة عنه على المرضى المصابين بمرض السكري الذين يشكون من الم اعتلال الأعصاب الطرفية في المستشفيات الحكومية التابعة لوزارة الصحة .

أرجو التكرم بالإيعاز لمن يلزم تسهيل مهمة إجراء البحث أعلاه .

وتفضلوا بقبول فائق الاحترام ،،،

مدير مديرية التعليم وتطوير الموارد البشرية المكلف

الدكتورة رهام الحمود

هـ م

المملكة الأردنية الهاشمية
هاتف: ٥٢٠٠٢٣٠ ٦ ٩٦٢+ فاكس: ٥٦٨٨٣٧٣ ٦ ٩٦٢+ ص.ب: ٨٦ عمان ١١١١٨ الأردن . الموقع الإلكتروني: www.moh.gov.jo

Appendix (O): Certificate approval from the hospitals' Government directors

الرقم .....
التاريخ .....
الموافق.....

TO WHOM IT MAY CONCERN

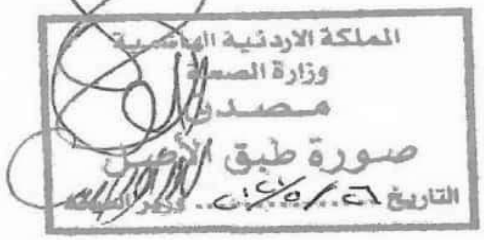
This is to certify that the work of Mr. Jawad Ahmad Abu Shennar (Doctoral degree student at the Near East University, Nicosia, Cyprus), in the hospitals of the Jordanian Ministry of Health as a researcher. To prepare research entitled:

Impact of Educational Self-Efficacy Enhancement Program on Quality of Life, Pain Management, Self- Efficiency Behaviors, and Its Impact of Satisfaction among Adult Diabetic Patients with Peripheral Neuropathy Pain

Before starting the research strategies, the hospital director was informed of his thesis, practical and educational instruments, where it was approved for implementation. He also undertook all thesis steps and pursued health education, self-efficacy enhancement program and he had collected data among adult diabetic patients with peripheral nerve pain.

Accordingly, this certificate is issued at his request.

Director of Al - Hussein Government Hospital



رئيس شعبة السجلات
أحمد السكر

المملكة الأردنية الهاشمية
هاتف: 65200230 962+ فاكس: 5688373 962+ ص.ب: 86 عمان 11118 الأردن . الموقع الالكتروني: www.mho.gov.jo

وزارة الصحة

الرقم .....
التاريخ .....
الموافق.....

TO WHOM IT MAY CONCERN

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Before starting the research strategies, the hospital director was informed of his thesis, practical and educational instruments, where it was approved for implementation. He also undertook all thesis steps and pursued health education, self-efficacy enhancement program, and he had collected data among adult diabetic patients with peripheral nerve pain.

Accordingly, this certificate is issued at his request.

Director of the Prince Hamzah Government Hospital

المملكة الأردنية الهاشمية
وزارة الصحة
مصدق
صورة طبق الأصل
التاريخ ٦/٥/٢٠١٦

رئيس شعبة السجلات
أحمد السكر

يصادق مفتش العمل في مديرية عمل عمان
على توقيع / ختم مستشفى الأمير حمزة الحكومي
الرقم ٢١٦١ التاريخ ٦/٥/٢٠١٦
اسم وتوقيع مفتش العمل
أصدق على توقيع مفتش العمل
توقيع المدير

المملكة الأردنية الهاشمية
مديرية عمل عمان
وزارة العمل

المملكة الأردنية الهاشمية
وزارة الصحة
مستشفى الأمير حمزة الحكومي

وزارة الصحة

الرقم .....
التاريخ .....
الموافق.....

TO WHOM IT MAY CONCERN

This is to certify that the work of Mr. Jawad Ahmad Abu Shennar (Doctoral degree student at the Near East University, Nicosia, Cyprus), in the hospitals of the Jordanian Ministry of Health as a researcher. To prepare research entitled:

Impact of Educational Self-Efficacy Enhancement Program on Quality of Life, Pain Management, Self- Efficiency Behaviors, and Its Impact of Satisfaction among Adult Diabetic Patients with Peripheral Neuropathy Pain

Before starting the research strategies, the hospital director was informed of his thesis, practical and educational instruments, where it was approved for implementation. He also undertook all thesis steps and pursued health education, self-efficacy enhancement program, and he had collected data among adult diabetic patients with peripheral nerve pain.

Accordingly, this certificate is issued at his request.

Director of the Bashir Government Hospital

رئيس شعبة السجلات
أحمد السكر

المملكة الأردنية الهاشمية
وزارة الصحة
إدارة مستشفيات البشير
22 MAY 2020
مستشفى الاسعاف والطوارئ
العيادات الخارجية

المملكة الأردنية الهاشمية
مديرية عمل عمان

يصادق مفتش العمل في مديرية عمل عمان
على توقيع / ختم
الرقم ..... التاريخ .....
اسم وتوقيع مفتش العمل
أصدق على توقيع مفتش العمل
توقيع المدير .....

Appendix (P): Educational Tools and Program

Educational Self-Efficacy Enhancement Program for Diabetic Patients

By

Jawad Ahmad Abu-Shennar

The Doctoral Program of Nursing

Supervisor

Prof. Dr. Nurhan Bayraktar

Nicosia, North Cyprus. 2020

Table of Contents

Diabetes

Diabetes is a serious, chronic condition. According to the American Diabetes Association (ADA), the condition is the seventh leading cause of death in the U.S. While diabetes itself is manageable, its complications can severely impact on daily living, and some can be fatal if not treated immediately.

Type 2 diabetes (previously known as non-insulin dependent diabetes) Type 2 diabetes is the most common form of diabetes, affecting 85-90% of all people with the disease. This type of diabetes, also known as late-onset diabetes, is characterized by insulin resistance and relative insulin deficiency. The disease is strongly genetic in origin but lifestyle factors such as excess weight, inactivity, high blood pressure, and poor diet are major risk factors for its development. Symptoms may not show for many years and, by the time they appear, significant problems may have developed.

Complications of diabetes include:

- dental and gum diseases
- eye problems and sight loss
- foot problems, including numbness, leading to ulcers and untreated injuries and cuts
- heart disease
- nerve damage, such as diabetic neuropathy
- stroke
- kidney disease

How insulin problems develop

Doctors do not know the exact causes of type I diabetes. Type 2 diabetes, also known as insulin resistance, has clearer causes. Insulin allows the glucose from a person's food to access the cells in their body to supply energy. Insulin resistance is usually a result of the following cycle:

1. A person has genes or an environment that make it more likely that they are unable to make enough insulin to cover how much glucose they eat.
2. The body tries to make extra insulin to process excess blood glucose.
3. The pancreas cannot keep up with the increased demands, and the excess blood sugar starts to circulate in the blood, causing damage.
4. Over time, insulin becomes less effective at introducing glucose to cells, and blood sugar levels continue to rise.

Criteria for the Diagnosis of Diabetes

- A1C ≥ 6.5%

OR

- Fasting plasma glucose (FPG) ≥126 mg/dL (7.0 mmol/L)

OR

- 2-hour plasma glucose ≥200 mg/dL (11.1 mmol/L) during an OGTT

OR

- A random plasma glucose ≥200 mg/dL (11.1 mmol/L).

❖ ***Regularly monitoring blood glucose levels and moderating glucose intake can help people prevent the more damaging complications of type 2 diabetes.***

Self-monitoring tips

Self-monitoring blood sugar levels are vital for effective diabetes management, helping to regulate meal scheduling, physical activity, and when to take medication, including insulin. While self-monitoring blood glucose (SMBG) machines vary, they will generally include a meter and test strip for generating readings and a lancing device to prick the skin for obtaining a small quantity of blood. However, the following precautions and steps will apply to many of the machines on the market:

- Make sure both hands are clean and dry before touching the test strips or meter
- Do not use a test strip more than once and keep them in their original canister to avoid any external moisture changing the result.
- Keep canisters closed after testing.
- Always check the expiration date.
- Older meters might require coding prior to use. Check to see if the machine currently in use needs this.
- Store the meter and strips in a dry, cool area.
- Take the meter and strips into consultations, so that a primary care physician or specialist can check their effectiveness.

A person who is self-monitoring diabetes uses a device called a lancet to prick the skin. While the idea of drawing blood might cause distress for some people, the lancing of the finger to obtain a blood sample should be a gentle, simple procedure.

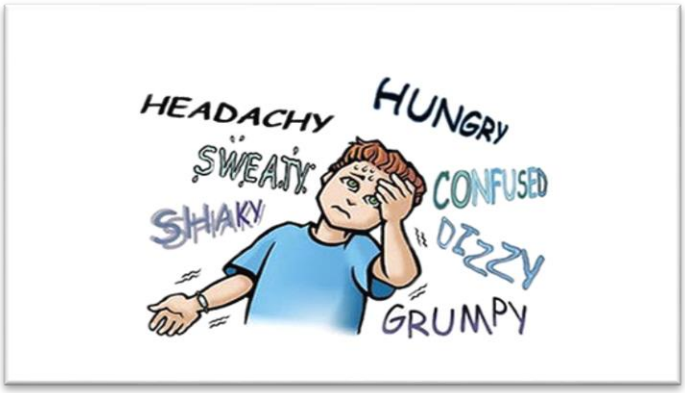
Take the following precautions:

- Clean the area from which the sample will come with soapy, warm water to avoid food residue entering the device and distorting the reading.
- Choose a small, thin lancet for maximum comfort.
- The lancet should have depth settings that control the depth of the prick. Adjust this for comfort.
- Many meters require only a teardrop-sized sample of blood.
- Take blood from the side of the finger, as this causes less pain. Using the middle finger, ring finger, and little finger may be more comfortable
- While some meters allow samples from other test sites, such as the thighs and upper arms, the fingertips or outer palms produce more accurate results.
- Tease blood to the surface in a "milking" motion rather than placing pressure at the lancing site.
- Dispose of lances in line with local regulations for getting rid of sharp objects.

Hypoglycemia

Hypoglycemia is an abnormally low plasma glucose concentration and not a disease entity. Hypoglycemia, the plasma glucose level of 45 mg/dl or less.

Symptoms of hypoglycemia



- Sweating
- Anxiety
- Hunger
- Fatigue
- Headache
- Difficulty speaking
- Abnormal behavior
- Confusion

* Sensation of warmth
* Nausea
* Palpitation and tachycardia
* Dizziness, drowsiness
* Visual disturbances
* Inability to concentrate
* Loss of memory
* Loss of consciousness or seizures

Causes of hypoglycemia in **Diabetics**

1. Insulin dose excessive, ill-timed, wrong type.

2. Decreased food intake.

3. Increased glucose utilization (e.g., exercise)

4. Decreased glucose production (e.g. alcohol).

5. Increased sensitivity to insulin (after exercise, weight loss)

6. Decreased insulin clearance (e.g. renal failure).

Treatment of Hypoglycemia

- If the patient is conscious and able to swallow, glucose-containing foods such as candy, orange juice with added sugar, and cookies should be quickly ingested.

- If intravenous therapy is not practical, subcutaneous or intramuscular glucagon can be used.
  - ❖ When consciousness is restored, oral feedings should be started immediately.
  - ❖ Periodic blood glucose surveillance after a hypoglycemic episode may be needed for 12-24 hours to ensure the maintenance of glycemia.

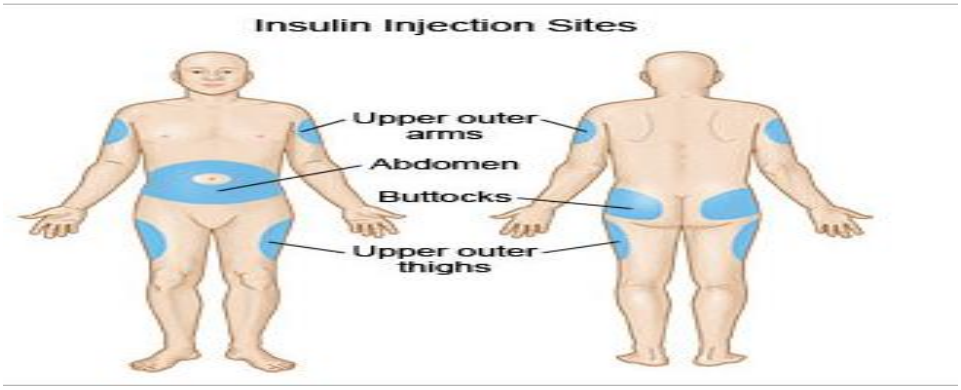
WHAT YOU NEED TO KNOW:

What do I need to know about insulin syringes?

Insulin syringes come in different sizes depending on the dose of insulin you need. Your healthcare provider or pharmacist will help you find the right size syringe. Use the correct size insulin syringe to make sure you get the right dose of insulin.

Where do I inject insulin?

- You can inject insulin into your abdomen, upper arm, buttocks, hip, and the front or side of the thigh. Insulin works fastest when it is injected into the abdomen.



- Do not inject insulin into areas where you have a wound or bruising. Insulin injected into wounds or bruises may not get into your body correctly.
- Use a different area within the site each time you inject insulin. For example, inject insulin into different areas in your abdomen. Insulin injected into the same area can cause lumps, swelling, or thickened skin.

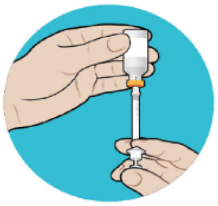
How do I inject the insulin with a syringe?

If You Use Vials and Syringes

Step 1
Clean the top of the vial with an alcohol pad, then remove the cap from the syringe needle.

Step 2
Draw air into your syringe—an amount equal to the units of insulin you'll be injecting. To do so, pull back the syringe's plunger until its black stopper reaches your insulin dose amount on the syringe barrel. So if you will be taking 6 units of insulin, pull back the plunger until the stopper hits the 6 etched onto the barrel.

Step 3
Put the vial on a flat surface and hold it. Insert the syringe into the vial, and press down on the plunger to inject the air from Step 2 back into the vial.



Step 4
With the syringe still in the bottle, turn the vial and syringe upside down. The tip of the needle should be fully covered by insulin.

Step 5
Make air bubbles less likely by slowly pulling down on the plunger. Draw insulin past your dose. Tap the syringe a few times so any bubbles rise to the top.

Step 6
Without removing the syringe from the vial, slowly push the plunger until the edge of its black stopper reaches the number of units in your dose, as marked on the syringe. If you see any bubbles, push all that insulin back into the vial and repeat these steps until no bubbles are present.

Step 7
Identify an injection site. Pinch up a bit of skin (if necessary). Insert the needle at a 90-degree angle. Hold the needle in the skin for 5 seconds to ensure there is no leakage.

Step 8
Dispose of your syringe and needle in a sharps container.

American Diabetes Association. | Together We Can Stop Diabetes®

How can I decrease pain when I inject insulin?

- Inject insulin at room temperature. If the insulin has been stored in the refrigerator, remove it 30 minutes before you inject it.
- Remove all air bubbles from the syringe before the injection.
- If you clean your skin with an alcohol pad, wait until it has dried before you inject insulin.
- Relax the muscles at the injection site.
- Do not change the direction of the needle during insertion or removal.

Can I reuse my syringe?

You may increase your risk for a bacterial infection when you reuse syringes. Ask your healthcare provider if it is safe for you to reuse a syringe. Do not reuse a syringe if you have an open wound, trouble seeing, or have an infection. The following are tips on how to safely reuse a syringe:

- Recap the needle as soon as you are done using it. Place the cap on a table or hard surface and slide the needle into the cap.
- Do not let the needle touch anything but clean skin or the top of the insulin bottle.
- **Never** share syringes with anyone.
- Do not clean your needle with alcohol. This will remove the coating that helps your needle slide easily into your skin.
- Throw out any syringe that bends or touches anything other than clean skin.

When should I contact my healthcare provider?

- You feel or see hard lumps in your skin where you inject your insulin.
- You think you gave yourself too much or not enough insulin.
- Your injections are very painful.
- You see blood or clear fluid on your injection site more than once after you inject insulin.
- You have questions about how to give the injection.
- You cannot afford to buy your diabetes supplies.
- You have questions or concerns about your condition or care.

What Is a Pain Management Nurse?

Pain is described in sensory and emotional terms primarily associated with tissue injury or described in terms of such damage. No exact pain perception center exists in the brain. Physiological manifestations are not reliable indicators of the total pain experience. Objective measures do not adequately quantify pain; subjective descriptors attempt to qualify pain. Thus, pain is defined as whatever the experiencing person says it is, existing whenever the patient says it does. Self-report is the standard for pain assessment.

What Do Pain Management Nurses Do?

1. Pain management nurses assess patients to determine the severity and causes of their pain. In order to do this, they will often physically examine patients and discuss their symptoms. Pain management nurses will also usually examine their patients' medical histories and perform diagnostic tests, such as x-rays.

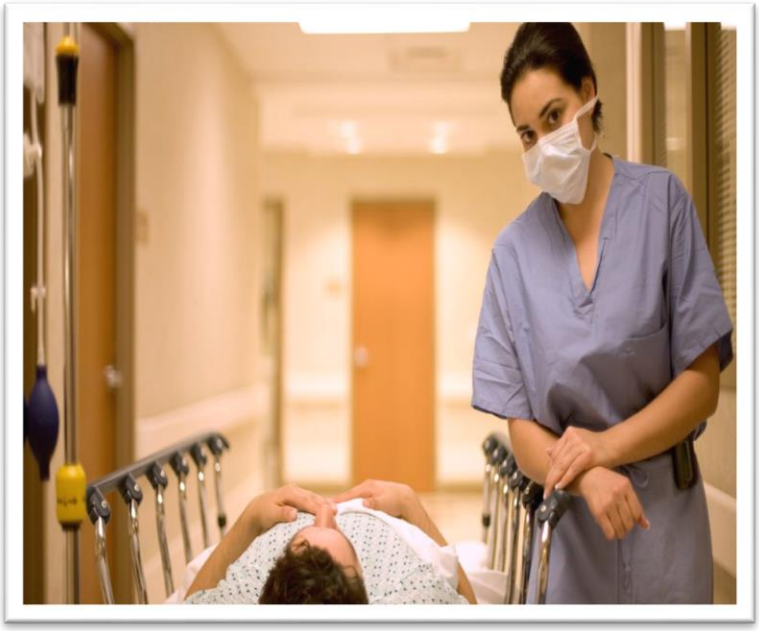
The pain history should include the following:

- Significant previous and/or ongoing instances of pain and its effect on the patient
- Previously used methods for pain control that the patient has found either helpful or unhelpful
- The patient's attitude toward and use of opioids, anxiolytics, or other medications, including any history of substance abuse
- The patient's typical coping response for stress or pain, including the presence or absence of psychiatric disorders such as depression, anxiety, or psychosis
- Family expectations and beliefs concerning pain, and stress course
- Ways the patient describes or shows pain
- The patient's knowledge of, expectations about, and preferences for pain management methods and for receiving information about pain management.

2. Pain management nurses also try to help patients by introducing them to alternative pain management techniques. Some of these techniques may include:

- Music therapy,
- Massage,
- Quran therapy,
- Therapeutic exercises,
- Heat/cold therapy,
- Listening to patient concerns,
- Communicating the desire to help the patient become more comfortable,
- Determining strategies that might achieve more comfort.

What Does Ensuring for Patient Safety?



Following are some patient safety issues that relate to pain management:

- When administering sedatives, consider the patient's physical safety (e.g., using bed rails, fall precautions, assistance with ambulation).
- Eliminate errors related to PCA infusions (improper dose/quantity, wrong drug, drug omission) by using systems to double-check drug and dose (e.g., barcoding, nurse-nurse checking).
- Eliminate errors and complications related to diabetic neuropathy administration (initial dose testing, monitoring diabetic neuropathy and response to medication).
- Protect the skin when applying heat or cold.

Diabetes and Wound Healing

Diabetes is a condition where the body is not able to use the insulin or there is not enough insulin in the body to control blood sugar levels. Having an injury or an illness can change your body's insulin needs and make it harder to control your blood sugar. High blood sugar can slow healing and put you at risk for infection.

Wound Problems with Diabetes

If your diabetes is not controlled and you often have high blood sugar, you are at greater risk for:

• Skin breaks or ulcers in the skin.

• Slow healing of wounds from poor blood flow.

• Small scrapes or blisters becoming infected wounds.

• Nerve damage causes loss of feeling in your hands or feet. You may not feel any pain or pressure to make you aware that you have a sore or other injuries to your hand or foot.

What You Can Do?

Protect Your Skin

- Check your skin each day for any cuts, scrapes, boils or blisters. Look for red or bruised spots. Use a mirror to view hard to see areas like the bottom of your feet. Use a moisturizing lotion on your skin that does not have perfumes or alcohol in it.
- Wear gloves and clothing to protect your skin from cuts or scrapes.
- Wear shoes that fit well and cotton socks that absorb moisture.

Treat Any Wounds

• If you have a wound, clean it right away. Rinse the skin for several minutes underwater to remove dirt and germs. Use a mild soap to clean. Do not use hydrogen peroxide or iodine that can injure the skin.

• Apply an antibiotic cream or ointment. You can find antibiotic cream or ointment at grocery or drug stores. Ask the pharmacist to help you find it.

• Cover the wound with a sterile bandage or band-aid to keep it clean and protected until it heals. The bandage should be about an inch larger than the wound to be sure the wound is covered on all sides.

- Change the bandage each day or anytime it is wet or soiled.
- Check daily for signs of infection such as redness, warmth, swelling or a change in drainage from the wound site.

• Keep pressure off the wound as it heals. Protect the area by wearing clothing to keep dirt and germs away. Modify exercise as needed until the skin heals.

• If a wound is not healing or looks worse, call your doctor. You need to have your wound checked for infection.

When to Call Your Doctor?

If you have any of these signs, call your doctor right away:

• Redness, warmth or swelling at the site or streaking away from the wound
• A temperature over 100.5 degrees F or 38 degrees C.
• An increase or change in draining from the wound or any pus drainage.
• The wound gets bigger or is not showing signs of healing.

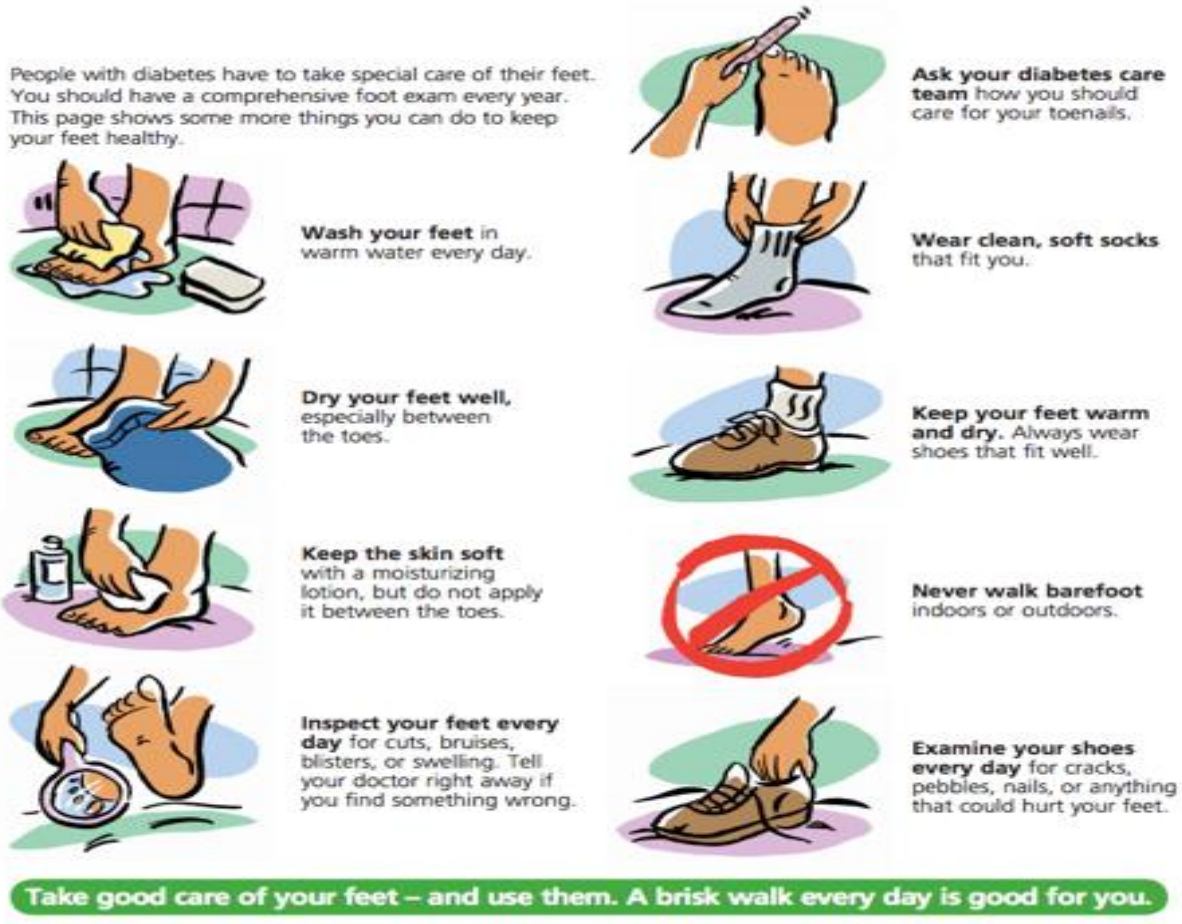
Talk to your doctor, nurse or diabetes educator if you have any questions or concerns.

Diabetic Foot Care

Your feet are very important. They take you wherever you need to walk to. You need them for your lifetime, so it is very important for you to take good care of your feet. This becomes even more important if you are living with diabetes mellitus. This is because diabetes mellitus is a leading cause of non-traumatic lower-limb amputations worldwide. Prevention is better than cure; so it is important for you to

take extra care of your feet if you are living with diabetes, to prevent diabetes-related foot problems

To avoid serious foot problems that could result in losing a toe, foot, or leg, be sure to follow these guidelines. (Tips to Keep Your Feet Healthy).



American Diabetes Association. | Together We Can Stop Diabetes®

CHARACTERISTICS OF A GOOD FOOTWEAR

- The shoes should be adjustable: An adjustable closure, such as shoelaces or no-tie straps, can allow for different foot needs, day to day and hour to hour.
- ***Wide Toe Box:*** Squeezing feet into too-small and too-narrow shoes can lead to pain, bruises, and deformities. So when buying shoes make sure you can move your toes inside them. This will prevent your toes from rubbing against each other and developing foot problems.

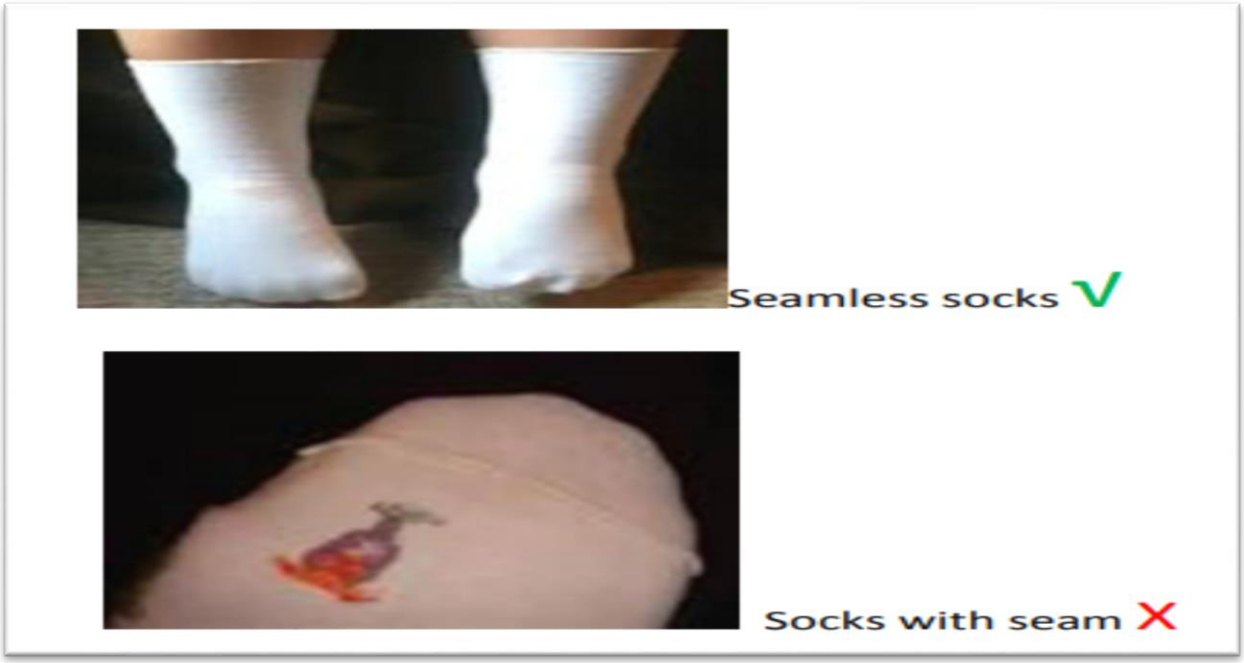
- ***Suitable Shoe Material*:** Choose shoes made of leather or microfiber. These materials expand, preventing irritation and friction if your foot swells. A shoe that is rigid and unable to expand is a shoe that will cause a blister.

- ***Special Foot Bed****:* Inspect the inside of the shoes. Make sure it has a footbed that is wide and made with shock-absorbing materials. Your Podiatrist or foot care specialist may also recommend a custom insert, which can relieve heel or arch pain and can take the pressure off areas that might be prone to calluses.

CHOOSING SOCKS

The layer between the shoe and your foot is important. When you are fitted for your shoes, make sure you wear the same kind of socks you'll wear with the shoes. Socks that fit appropriately are very important: Don't wear socks that are too tight. They will cut into your leg or ankle. Avoid over-sized socks that fall down your ankle and bunch up in your shoes. These too can cause injury to your feet.

Avoid socks that have seams as they can cause rubbing or irritation that can lead to a blister or callus.



- A breathable material, such as cotton, or wicking material, such as microfiber, can reduce your chances of getting feet infection.
- DO talk to your doctor: If you have circulation problems you may need a compression sock or stocking.

THERAPEUTIC FOOTWEAR

- These are special shoes fitted By a Professional: Your feet would be measured and the shoes fitted by the professional, such as a podiatrist or orthoptist.
- They are extra deep: An extra-deep shoe cradles your foot. Support around your ankle gives you more stability. The extra depth gives foot deformities such as bunions and hammertoes the space they need. A deeper shoe also gives you room for an insert or orthotic.

- They may not look fashionable or attractive but do protect your feet from further injury and amputation.
- Who Needs a Special Shoe? In people with existing foot problems like bunions and hammertoes; therapeutic shoes can help them prevent more complications. Also, people with a previous amputation, past ulcers, calluses that could lead to foot ulcers, nerve damage (Neuropathy), poor circulation, or a foot deformity will also require therapeutic shoes.

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Is there a Healthy Diet

Your body needs more calories, protein, vitamins A and C, and the mineral zinc to help with the healing process. Talk to your doctor, dietitian or diabetes educator about your diet.

Can I do sports?

- Advise people with diabetes to perform at least 150 min/week of moderate-intensity aerobic physical activity (50–70% of maximum heart rate), spread over at least 3 days per week with no more than 2 consecutive days without exercise
- In the absence of contraindications, adults with type 2 diabetes should be encouraged to perform resistance training at least twice per week.

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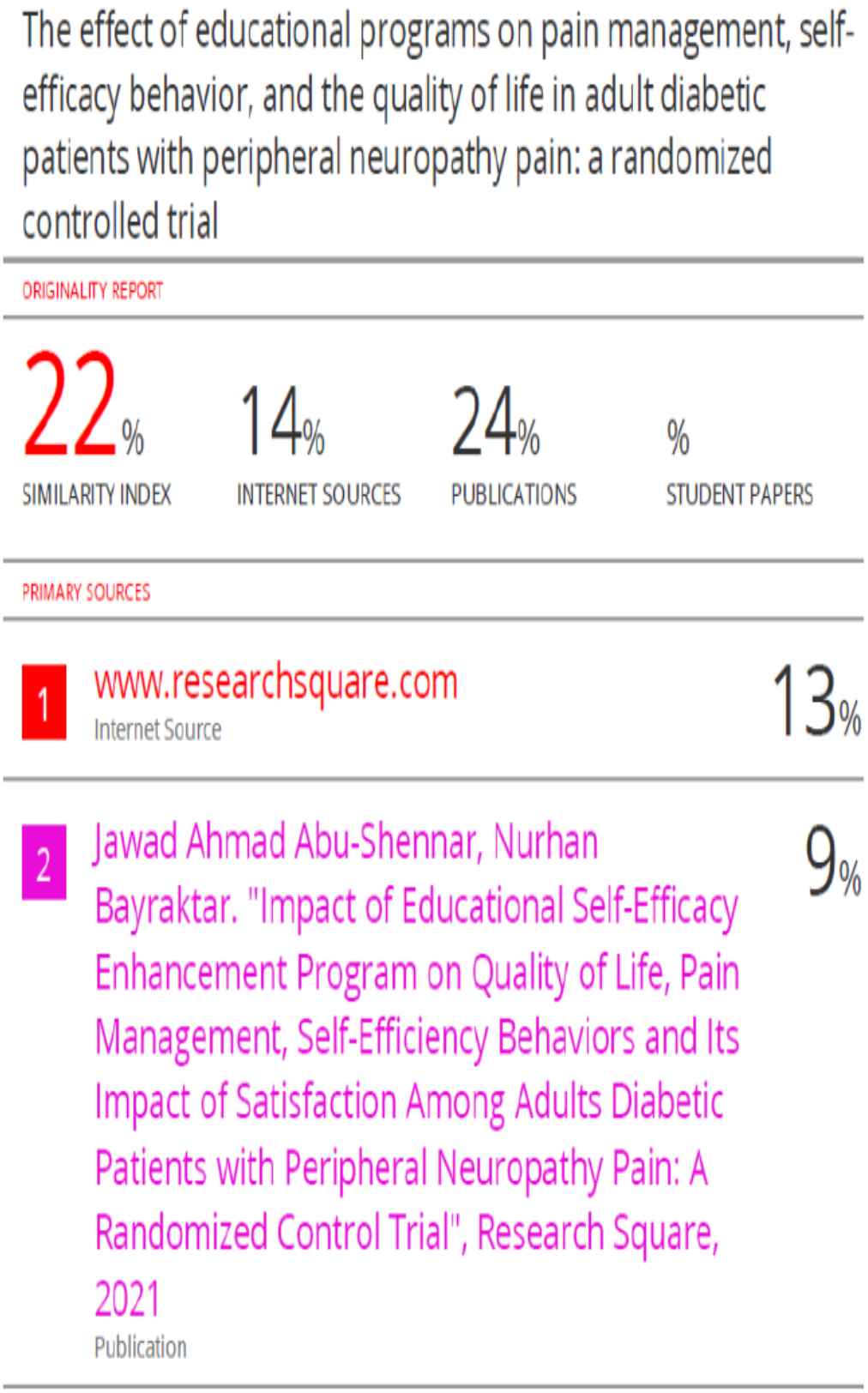
Thank you

TURNITIN REPORT



The effect of educational programs on pain management, self-efficacy behavior, and the quality of life in adult diabetic patients with peripheral neuropathy pain: a randomized controlled trial

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Masters	Master Degree in Clinical Nursing of Diabetes Specification at The University of Jordan, Jordan, Amman. Average 93 rating excellent	2015
Higher Diploma	Higher Diploma Degree in Clinical Nursing of Diabetes Specification at The University of Jordan, Jordan, Amman. Average 88.9 rating excellent	2014
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