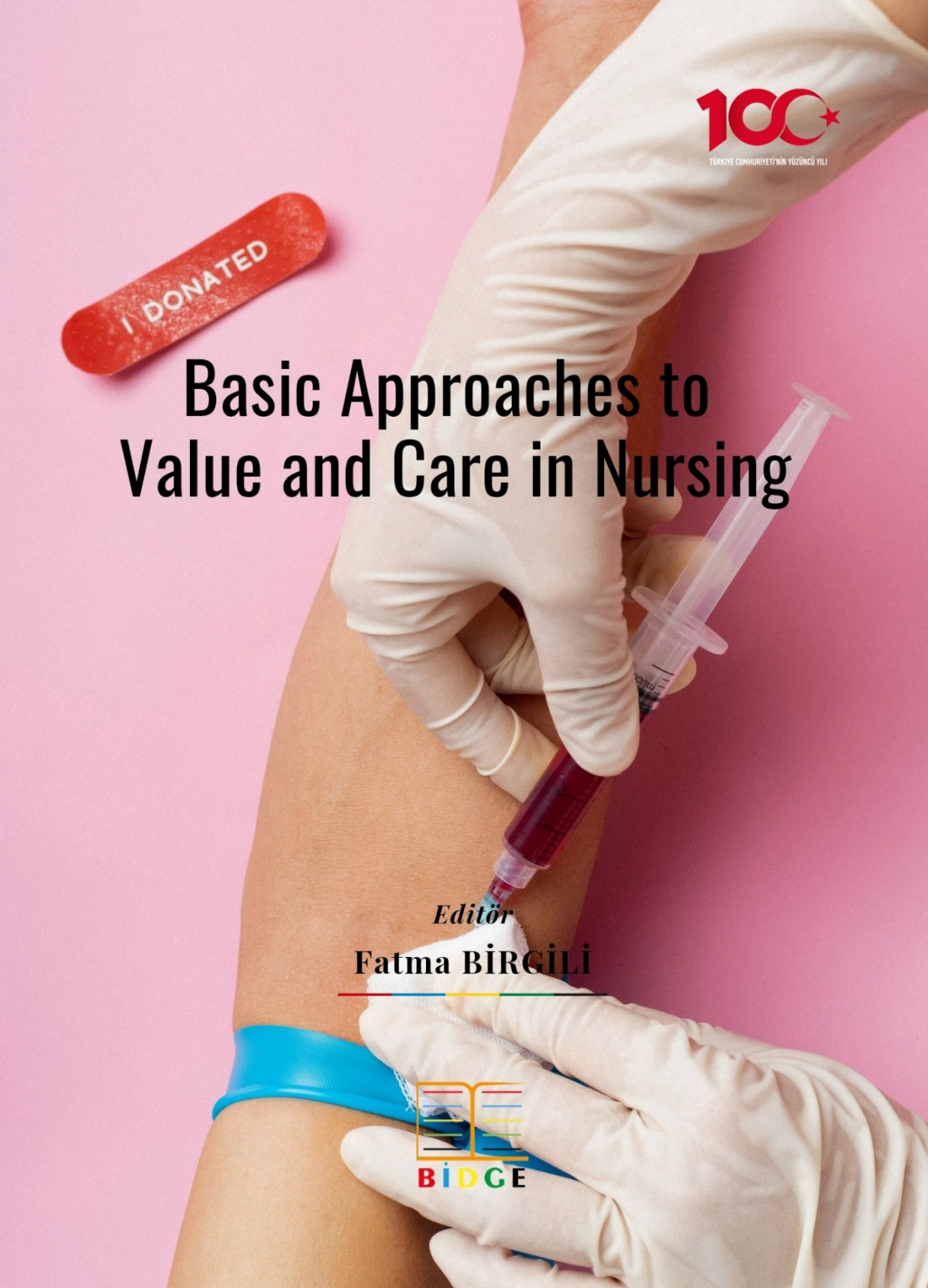

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Fatma BİRGİLİ

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CHAPTER I

Importance of Diabetic Foot Examination

Berna DİNCER[1]
Nefise BAHÇECİK[2]

Introduction

Definition of Diabetes

DM is a lifelong chronic metabolic disease. The Turkish Society of Endocrinology and Metabolism (TEMD) defines diabetes as "a chronic metabolic disease in which the organism cannot make adequate use of carbohydrates, fats and proteins due to insulin deficiency or defects in insulin action, requiring continuous medical care". Diabetes is a chronic disease that is lifelong, has acute and chronic complications, imposes financial and moral responsibilities and burdens on the individual, his/her environment, family and

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society, has negative effects on life span and requires a multidisciplinary approach (TEMD, 2021).

Prevalence of Diabetes

With the rapid change in lifestyle, the prevalence of diabetes, especially type 2 diabetes, is increasing rapidly in all developed and developing societies. In 2017, it was reported that approximately 425 million people between the ages of 20-79 had diabetes in the world, while 629 million people are expected to have diabetes in 2045 (IDF, 2017). The number of people with diabetes is 58 million in Europe, and Turkey accounts for the majority (12.1%) of this number (IDF, 2017). The prevalence of type 2 diabetes was found to be 13.7% in the Turkish Diabetes Epidemiology (TURDEP-II) study (Satman, 2013). According to the National Burden of Disease Study 2013 data, with a 60% increase in the burden of disease between 2000 and 2013, diabetes ranked 10th in 2000 and 4th in 2013 (http://www.hips.hacettepe.edu.tr/UHYCSunumu_06122016.pdf, Access date: October 22, 2017).

With the rapid change in lifestyle, the prevalence of diabetes, especially type 2 diabetes, is increasing rapidly in all developed and developing societies. Diabetes is the 8th leading cause of death worldwide after ischemic heart disease, stroke, lower respiratory tract infections, chronic obstructive pulmonary disease (COPD), diarrhea-related diseases, HIV/AIDS (human immune deficiency virus/acquired immune deficiency syndrome) and respiratory cancers (World Health Organization, 2017). It has been reported that approximately 5 million people worldwide have died due to diabetes and its complications. Approximately half of these deaths occur in

patients aged 60 years and younger, which is up to 75% in less developed regions (IDF, 2015).

Uncontrolled diabetes leads to hyperglycemia, affecting all systems of the body and causing many complications. In addition, the risk of developing infections is higher in individuals with diabetes than in those without diabetes. The prevalence, incidence and mortality of cardiovascular diseases are 2-8 times higher in individuals with diabetes compared to those without diabetes (Marks and Raskin, 2000; THSK, 2014a; THSK, 2014b). Diabetes is the leading cause of renal failure and non-traumatic amputation worldwide. The risk of lower extremity amputation is 25 times higher in individuals with diabetes compared to those without diabetes. Especially in developed countries, diabetes is the most common cause of vision loss (THSK, 2014a; THSK, 2014b).

In addition to being a chronic disease that threatens human health, diabetes has a high cost to both the individual and the health system of countries. Globally, the cost of diabetes and related diseases is estimated at 727 billion US dollars (IDF, 2017). In order to reduce the burden of diabetes on the individual and society, the disease and the complications that may develop should be recognized as early as possible and care and treatment should be provided appropriately.

Classification of Diabetes

The American Diabetes Association (ADA) classifies diabetes into four main groups.

Type 1 Diabetes Mellitus; Type 1 Diabetes Mellitus, also called 'juvenile diabetes' and 'childhood-onset diabetes' in the past,

is a chronic disease characterized by absolute insulin deficiency due to autoimmune damage to pancreatic beta cells.

Type 2 diabetes mellitus accounts for more than 90% of all diabetics and is the most common form of diabetes. The basis of the disease is insulin resistance triggered by lifestyle in genetically predisposed individuals and gradually increasing insulin resistance and decreasing insulin release over time.

Gestational diabetes mellitus (GDM) is glucose intolerance that first occurs during pregnancy. In the long term, women with gestational diabetes have a high risk of developing type 2 diabetes, with a 30-40% risk of developing impaired glucose tolerance or type 2 diabetes within 10-20 years.

Other Specific Types; Some conditions other than Type 1, Type 2, Getational Diabetes Mellitus may also cause diabetes or some rare diseases may be accompanied by diabetes.

Genetic defects in beta cell function, genetic defects in insulin action, exocrine pancreatic diseases, endocrinopathies, infections due to drugs and chemicals, rare forms of immune-induced diabetes, and other genetic syndromes sometimes associated with diabetes (Alkan and Enç, 2014; Hogan et al., 2015).

Complications of Diabetes

Acute complications

Hypoglycemia

Hypoglycemia is an acute complication seen in people with diabetes. It is more common in insulin users. Symptoms include shivering, cold sweating, anxiety, nausea, palpitations and hunger. In hypoglycemia, 15-20 g glucose is given orally. Parenteral

treatment should be applied to unconscious individuals with impaired chewing and swallowing function. Glucagon injection is applied. Administering more insulin than needed, excessive exercise or not taking enough carbohydrates may lead to hypoglycemia (Özcan, 2001; THSK, 2014b).

Hyperglycemia

It is an increase in blood glucose levels above normal levels. It is an acute complication. If the blood glucose level is often above 140 mg/dl in fasting and 180mg/dl in postprandial, sugar (+) in urine and HbA1c is 8% or higher, blood glucose is high and should be treated. If left untreated, hyperglycemia can lead to diabetic ketoacidosis (DKA) or hyperosmolar nonketotic coma syndrome (HNKS). When not kept under control, it leads to microvascular complications in the long term (Özcan, 2001; Görpe & Özyazar, 2012).

Ketoacidosis

Ketoacidosis, also called diabetic coma, is a severe condition due to insulin deficiency. Since sugar in the blood cannot enter the cell due to insulin deficiency, the cell uses fats as an energy source and ketone bodies are formed. It is common in people with type 1 diabetes (Özcan, 2001; Görpe & Özyazar, 2012).

Lactic acidosis

Lactic acidosis is the accumulation of lactic acid in the body. Cells make lactic acid when they use non-glucose fuel for energy. If too much lactic acid remains in the body, the balance is disturbed and the person starts to feel unwell. This less common condition

usually affects people with type 2 diabetes (Özcan, 2001; Görpe & Özyazar, 2012).

Bacterial / fungal (fungal) infections

Individuals with diabetes become more prone to bacterial and fungal infections in all organs, especially in the skin and nails. Especially high blood glucose levels facilitate the reproduction of bacteria and fungi (Özcan, 2001; Görpe and Özyazar, 2012).

Chronic complications

Complications of diabetes can be analyzed under three headings.

Microvascular complications: retinopathy, nephropathy, neuropathy (peripheral and autonomic).

Macrovascular complications: Atherosclerotic heart disease, peripheral arterial disease, cerebrovascular disease

Other complications: Skin, diabetic foot, joint, bone, brain problems (dementia, Alzheimer's), psychological problems, sexual problems, etc.(Özcan, 2001; Görpe and Özyazar, 2012; THSK, 2014a; THSK, 2014b).

Neuropathy

It is caused by prolonged diabetes causing damage to peripheral and autonomic nerves. It affects the feet, legs, arms, hands, eyes, heart, gastrointestinal system, especially the stomach and intestines. Diabetic neuropathy develops in 50-70% of diabetics. The longer the duration of the disease, the more likely it is to develop. Involvement of the peripheral nervous system can be divided into focal, multifocal or diffuse. Examples of focal

involvement are polyneuropathy (diffuse and symmetrical involvement of peripheral nerves) and multifocal involvement is mononeuropathy multiplex (involvement of more than one peripheral nerve together). DM can affect nerves in all three ways. Although the exact cause is not known, it has been reported that high blood sugar or insulin deficiency are the most important factors. In addition, insufficient oxygen supply to the organs as a result of changes in the blood vessels may also cause neuropathy to progress. In general, it has been reported in the literature that high HbA1c levels and sorbitol accumulation in the nerves may contribute to the development of neuropathy (Görpe and Özyazar, 2012; THSK, 2014b).

If nerves in the hands and feet are affected by neuropathy, numbness, burning, tingling, pain and weakness may occur. Neuropathy involves the muscles in the foot, leading to muscle weakness and impaired weight distribution on the sole of the foot. A significant part of the body weight starts to be carried by the front part of the foot and a thick callus (callus) forms in this area. During walking, ulcers develop in the soft tissue squeezed between the callus and the bone. Neuropathy also affects the sensory nerves, causing symptoms such as numbness, pain and heat perception. As a result, the person may not be able to recognize physical and chemical trauma. The perception of vibration and the sense of touch are reduced. Loss of sweating as a result of autonomic neuropathy can also lead to dry and cracked skin and ulcer development. Charcot joint is a painless deformity of the foot. Hyperglycemia should be controlled in the treatment of neuropathy. If pain is present, appropriate analgesic use should be provided and conditions that

increase pain should be controlled (Olgun, 2012; Biçer & Çelik, 2016; Adam et al., 2017).

Passive movements and, if necessary, physical therapy should be applied in muscle atrophies due to neuropathies. Neuropathy is also an important risk factor for the development of diabetic foot. Patients are exposed to foot trauma due to loss of sensation in the lower extremities. Therefore, patients with peripheral neuropathy should be protected from trauma, appropriate foot care should be provided, feet should be examined routinely, and patients should be given comprehensive education (Olgun, 2012; Biçer and Çelik, 2016; Adam et al., 2017).

Diabetic Foot

Diabetic foot (DF) is one of the most serious and common complications resulting from diabetic neuropathy and/or vascular insufficiency. Every diabetic patient has a 12-15% lifetime risk of developing diabetic foot. It has been determined that 50%-70% of non-traumatic foot amputations are due to diabetic foot. Studies have shown that the relative risk of death increases approximately 2.5 times in diabetics with new ulcers on their feet (TEMD, 2017). Diabetic foot problems are the reason for hospitalization more than other complications of diabetes and account for 50% of hospitalizations due to diabetes. Diabetic foot ulcers are a serious complication with a risk of affecting 4-10% of diabetic patients throughout their lives. Despite appropriate treatment, this rate still results in amputation in around 15%. Apart from the risk of amputation, it is an important socioeconomic problem that leads to increased morbidity, deterioration of patients' quality of life and high treatment costs. The financial resources allocated to the treatment of

diabetic patients are extremely high, and the treatment of foot wounds accounts for 24-31% of these expenditures, and the financial burden increases further depending on the depth of the wound, accompanying infections and circulatory problems (Yetkin, 2016; Adam et al., 2017).

The main goal in the approach to diabetic foot is to provide primary prevention. For this purpose, it is necessary to identify risk groups, teach the patient how to take care of his/her feet from the time of diagnosis, contribute to the development of preventive health behaviors, and perform foot examination and regular follow-up at each control. In many studies, it has been shown that trainings on diabetic foot care provide significant reductions in wound formation and amputations (Çetin et al., 2004; Clayton and Elasy, 2009; Çelik and Öztürk, 2009; Demirel, 2011).

Effective factors in diabetic foot formation

Diabetic foot is a clinical picture characterized by impaired skin function due to peripheral neuropathy, peripheral vascular disease or a combination of both, which may lead to ulcerations in the advanced stage. Feet are organs that are vulnerable to injury, trauma and infection in all individuals with or without diabetes. Feet are at risk due to decreased protective sensation in the feet and fingers, slowing of blood circulation in the feet, dryness and cracks as a result of loss of sweating, peripheral vascular disease and visual impairment (Yüksel, 2002). Diabetic foot infections are the most important cause of non-traumatic foot amputations (Özcan, 2001; Boike and Hall, 2002; Görpe and Özyazar, 2012; Hogan et al., 2015).

Neuropathy due to impaired blood glucose regulation, vascular insufficiency and infection due to impaired neutrophil

function are the prominent factors in the pathogenesis of diabetic foot. Pathologic events are caused by a combination of different mechanisms such as neuropathic degeneration (autonomic, motor, sensory), vasculopathy (micro- and macroangiopathy), uncontrolled infection, and prolonged wound healing due to impaired collagen production. These factors affect the innervation, nutrition and maintenance of foot integrity (Sorensen et al., 2012).

Diabetic foot classification

Various classifications for diabetic foot ulcers have been defined so far. However, no classification has been made to reveal the characteristics of the diabetic foot. The PEDIS (Perfusion, extent/size, depth/tissue loss, infection, sensation) classification is infection-oriented and classifies the wound according to five clinical conditions: perfusion, surface, depth, infection and sensation. The University of Texas classification is based on the depth of the wound and the presence of infection and ischemia. The recently published Kobe classification directs treatment according to physiopathology. However, its effectiveness has not yet been fully proven and is open to debate (Tetiker, 2016).

The most widely used classification is the Wagner Classification, which also guides treatment. In this system, ulcers are evaluated between Stage 0 and Stage 5.

Wagner Classification

Stage 0 No skin lesions.

Stage 1 Superficial ulcer present and clinically uninfected.

Stage 2 Deep ulcer, often infected but no osteomyelitis.

Stage 3 Deep ulcer, abscess and osteomyelitis also present

Stage 4 Localized gangrene of the toes and soles.

Stage 5 Gangrene involving the whole foot.

The basic approach in the treatment of diabetic foot is to identify the patient at risk and take precautions before the foot wound develops, and if the wound has developed, to prevent it from progressing to the point that it requires limb amputation. If amputation is inevitable, it should be decided on time and intervention should be performed at the most appropriate functional level (Schaper, 2004).

Diabetic Foot Examination

According to the diabetic foot international consensus report, examination of the at-risk foot and regular inspection are the cornerstones of diabetic foot management. In the evaluation of the diabetic foot, the patient's age, how many years he/she has had diabetes, the state of glycemia regulation, whether he/she uses insulin, the presence of previous diabetic foot wounds, and whether amputation has been performed are questioned in the anamnesis. Subsequent physical examination, radiology, vascular and neurologic examination are important. Pain, tingling, burning sensitivity, loss of sensation, ulcer formation in the foot are asked. The skin of the foot is evaluated for temperature control, discoloration, edema, atrophy, dryness due to loss of sweating, cracks, calluses and foot ulcers. A sensory test is performed on the foot (Van Baal, 2004).

A comprehensive foot examination is important for individuals with diabetes. First of all, the patient's **history** should be taken by questioning whether the patient has had previous wounds,

amputation, whether he/she has received foot care training, the people he/she lives with, those who support the care, foot care regimen, how often he/she has control examinations, smoking/alcohol use, lifestyle, social status, complaints related to vascular causes, neuropathic complaints (such as pain, tingling, burning, tenderness), ulcer causes if there is an ulcer, insulin use. A comprehensive **dermatologic evaluation** should be performed at the next stage. At this stage, inspection should be performed including between the fingers to detect ulcerated, erythematous or infective areas.

Hardening, thickening, nail deformities, paronychia (nail inflammation) should be evaluated and recorded. **Temperature control** should be done in the continuation of the examination. Both ankles of the patient should be evaluated in terms of hot/cold with the back of the hand up to the ankle level. A decrease in temperature is an indication of insufficient blood circulation. An increase is a condition that may occur in the presence of infection. In Charcot deformity, the increase in temperature may be higher than in the other foot (Boike, 2002; Boulton et al., 2008).

In the evaluation of **color control**; pale, cyanotic, reddened skin should be checked starting from the ankle to the fingertips. In circulatory failure, the skin is usually pale or cyanotic. Redness is also a sign of infection. Pale and cyanized skin is a sign of ischemia. Nails should be examined for thickening, ingrowth, length and nail cut. Ingrown nails are among the most important factors causing wound formation. On the other hand, one of the most common problems is fungal infections of the nail. **Volume** should also be evaluated in terms of atrophy and edema. Edema examination should

be performed starting from below the knee. The presence of edema is a risk factor for wounds (Kravitz et al., 2003). **In textural evaluation**, the skin may be dry due to loss of sweating.

It is a sign of autonomic involvement of peripheral nerves. Exfoliation of the skin may be a sign of hydration deficiency or fungal infection (Frykberg et al., 2006). **Foot ulcers** should be evaluated in terms of pressure ulcer, traumatic ulcer and vascular pathology. The most important factor in the development of pressure ulcers is the change in pressure areas due to deformities. In the area where the pressure increases, first callus, then subcutaneous bleeding, cracked skin and deep infection (osteomyelitis) occur. If the patient has an ulcer on the foot, the reason for its formation and how long it has been present should be investigated; the location and size of the ulcer should be recorded on the examination form. Measuring its diameter facilitates the evaluation of wound healing (Oyibo et. al., 2001; Yüksel, 2002; Biçer and Çelik, 2016).

Musculoskeletal evaluation of the foot and diagnosis of deformities should be performed during the foot examination. Muscle atrophy due to motor muscle involvement leads to foot deformities and the presence of neuropathy leads to traumatization of bones and joints. Therefore, the presence of deformities such as hammer toe, hallux valgus, hallux limitus, equnus, forefoot amputation, below-knee amputation, charcot deformity, low foot, etc. due to diabetes should be evaluated. Hallux valgus is an adduction deformity of the thumb at the metatarsophalangeal joint. Charcot deformity is a foot deformity defined as neuro-osteo-arthropathy in which the medial arch of the foot collapses or large ulcers may form underneath, which is hot, red, swollen, mostly

painless. Calluses formed as a result of diabetic neuropathy are formed in areas subjected to pressure and are generally specific to the diabetic foot (Yüksel, 2002; Yılmaz, 2005; Boulton et al., 2008; Edmonds et al., 2008).

In **neurologic evaluation,** neuropathic findings (burning pain that increases at night, hypersensitivity in the form of socks, numbness, etc.) should be questioned. Needle, reflex hammer, diaposon, monoflamnet test are applied to detect the presence of central nerve damage. **In Semmes-Weinstein Monoflamnet test**; peripheral nerve damage is evaluated. If there is a loss of sensation with this filament that gives 10 grams of pressure to the foot, the patient has lost protective sensation. The nylon monoflament used is manufactured to bend when 10 grams of force is applied. The patient is asked to close his/her eyes during the application. The monofilament is touched to the determined areas of the foot with 10 grams of pressure (until it looks like the letter C). The patient is expected to answer yes or no to the monofilament pressure. If sensory loss is present, it is marked as negative (-). Avoid applying the monoflament to areas with callus, as this will lead to inaccurate assessment. The same monofilament should not be applied to more than 10 patients within 24 hours because it will bend. **In the diapozone test, the** perception of vibration in the big toe is evaluated as present, decreased or absent with a 128 Hz diapozone. It is both a cheap and easy method for clinical application.

In the pinprick test, pressure is applied with a needle on the dorsal surface of the hallux just proximal to the nail, and if the pinprick is not felt, it is recorded as an abnormal test finding (Boulton et al., 2008; Edmonds et al., 2008; Biçer and Çelik, 2016).

In **vascular evaluation;** color, temperature and edema of the foot are evaluated for both feet. Symmetrically, dorsalis pedis pulses on the dorsum of the foot and tibialis poterior pulses under the medial malleolus should be taken and evaluated as normal, weak or absent. Ankle-brachial index (ABI) is calculated by dividing the tibialis posterior pressure by the brachial artery pressure. Its normal value is close to 1. The index decreases in ischemia. High values can be obtained in calcifications (Watkins, 2003; Edmonds et al., 2008; Biçer and Çelik, 2016) (Table 1).

Table-1 Ankle Arm Index (ABI) Measurement Values

ABI Değeri	Yorum
0,90-1,30	Normal
0,70-0,89	Hafif Obstrüksiyon
0,40-0,69	Orta Obstrüksiyon
<0,40	Ağır Obstrüksiyon
>1,30	Medikal Kalsinoz/ Hatalı Ölçüm*

*Daha ileri vasküler değerlendirme

Toe Brachial Index (TBI) can be measured when ABI is not sufficient due to arterial calcification. A TBI >0.70 or a transcutaneous oxygen pressure (TcPO2) >40 mmHg measured from the area adjacent to the wound suggest that arterial flow in the foot is sufficient (Türkaslan and Altındaş, 2004; TEMD, 2011).

Evaluation of footwear; when the patient comes to the control, the shoes he/she is wearing must be evaluated. Unsuitable shoes are a risk factor for ulcer and wound formation. Leather or cloth shoes that allow the feet to breathe, do not absorb moisture, are suitable and comfortable for the feet, and do not squeeze the feet should be preferred. The risk of ulcer, infection and amputation is reduced when shoes specially prepared for diabetics are used. Shoe width should be as wide as the width of the foot. Shoes with pointed

front, high heels, open toes, shoes that will squeeze or disturb the foot should never be used. The inside of the shoes should be checked before wearing them.

Sandals or slippers that get between the toes should not be preferred. When new shoes are purchased, they should be worn and changed in short periods of time until the foot gets used to them. The old shoe should be carried with the patient until he/she is sure of the comfort of the new shoe (Efe, 2001; Hogan, 2015; Adarmouch et. al, 2017). With the completion of the foot examination, the patient should be **educated** about diabetic foot care. It is known that diabetic foot amputations are reduced by 49-85% as a result of good patient education, multifaceted foot ulcer treatment and regular follow-up (Yüksel, 2002). Education on this subject is of great importance.

The Importance of Education in Diabetes and Diabetic Foot Care

Since diabetes is a lifelong chronic disease, individuals need to manage the disease and provide self-care skills. Continuous monitoring and education are important in the development of self-care and self-management skills of individuals. The success of individuals with diabetes in drug treatment, physical activity and nutrition program is evaluated through regular health checks and necessary measures are taken at this stage. Thanks to these evaluations, necessary arrangements are made and trainings are planned. Diabetes education generally includes topics such as general diabetes knowledge, acute and chronic complications of diabetes, insulin use and oral anti-diabetes medication use, nutrition, physical activity, self-care and problem-solving skills (ADA, 2017). The importance of patient education is also emphasized in the 2017

guideline of the Turkish Society of Endocrinology and Metabolism. It is stated that individuals diagnosed with diabetes should be directed to diabetes centers and after glycemia control is achieved, the importance of participating in the training program given by the physician, nurse, dietician and physiotherapist and that the training should be repeated at regular intervals. Recommendations with high level of evidence in terms of evidence-based practices in diabetes education are also included in the guideline. Providing diabetes education to individuals with diabetes and their families at the appropriate time to increase their knowledge and skills in diabetes self-management, teaching them to measure peripheral glucose at home, and providing training to make treatment changes in accordance with peripheral glucose results are recommended as evidence-based [Class A, Level 1A Evidence (1)] practices (TEMD, 2017). Information, education and counseling services about diabetes are now available in many health centers via internet and mobile devices. One of the most important topics within the scope of education is diabetic foot care.

The main goal in diabetic foot care is to provide primary prevention. For this purpose, it is necessary to identify risk groups, to teach the patient how to take care of his/her feet from the time of diagnosis, to contribute to the development of preventive health behaviors, to perform foot examination and regular follow-up at each control. In many studies, it has been shown that trainings on foot care focused on preventing complications of diabetes have been shown to provide significant reductions in wound formation and amputations (Çetin et al., 2004; Ragnarson and Apelqvist, 2004; Younes et al., 2004; Clayton and Elasy, 2009).

Diabetic foot care and taking preventive measures is a condition that the patient should maintain for life. The individual should manage this care himself/herself, make it a lifestyle and take responsibility for daily foot care. Nowadays, due to the limited duration of hospitalization of individuals diagnosed with diabetes, diabetic foot care is briefly presented in a diabetes education program that includes topics such as self-monitoring of sugar, insulin applications, diet and exercise in a limited time interval. It is essential for diabetes nurses to make a training plan for diabetic foot care and preventive measures. However, diabetes nurses need to prevent acute complications that may develop, provide care for complications that occur, and continue their educational activities (Batista and Pinzur, 2005; Arsand et al., 2012). In addition to all these efforts, it is difficult to provide education on foot care and emphasize its importance (THSK, 2014a).

Nurses, one of the most important members of the diabetes team, are the most appropriate person to plan and maintain preventive care (Saltoğlu et al., 2015; Orhan and Bahçecik 2017). Diabetes nurses must create an education plan for diabetes, diabetic foot care and preventive measures. In addition to planning, implementing and evaluating the process for diabetes and diabetic foot care of individuals, many responsibilities such as providing patient-oriented education with appropriate techniques, evaluating and maintaining the gains belong to diabetes nurses (Batista and Pinzur, 2005). Nurses have great duties in preventive education practices of patients and their relatives. A planned and structured education that will increase motivation and skill, provide the patient with self-skills, and increase care responsibility is very important.

The patient must be taught to recognize foot problems and be aware of what to do (Sözen, 2009).

A structured and planned education program plays an important role in establishing foot care behavior and preventing complications. The aim of education is to increase the patient's motivation and skills. Adult education principles should be taken into consideration while providing education. The important thing in patient education is to create behavioral change in the desired way. In the education given, it is important to be person-centered and to create physical comfort and a dynamic environment. Adults enjoy different educational techniques and are more motivated (Merriam, 2001; Çelik & Öztürk, 2009). They are more open to learning when they are ready and in line with their needs. Designing different materials in different teaching environments is widely used in adult education, and the use of audio-visual tools to enrich teaching environments also increases the effectiveness of education. Multimedia used in instructional technology appeals to multiple senses and ensures the permanence of learning (Güner, 2005; Demirel, 2011; Avşar, 2012).

Conclusion

Diabetic foot care and taking preventive measures is a lifelong condition for individuals with diabetes. Diabetic foot care is an important issue that should be emphasized in individuals with diabetes. It is known that the majority of diabetic wounds are preventable. Considering all these, a comprehensive foot examination is essential for both healthcare professionals and patients. Following the diabetic foot examination, it is essential to educate patients on how to perform foot examination at home. It has

been reported that good patient education, sensitivity and education of healthcare professionals, multifaceted foot ulcer treatment and regular follow-up will greatly reduce foot amputations. Especially for diabetic foot examination, foot care training is vital in this context. The individual needs to manage his/her own care, change his/her lifestyle and take responsibility for daily foot care. In this context, healthcare professionals should provide effective training programs that will provide knowledge and skills for diabetic foot examination of individuals with diabetes and their relatives. The way to prevent diabetic foot ulcers is through diabetic foot examination and patient education.

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