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Review Article

# Management of Diabetic Foot Ulcer

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**Abstract:**

Diabetes mellitus is a kind of syndrome which represents by hyperglycemia. It is estimated that nearly 7 percent of the world population suffering from diabetes. Diabetic foot ulcer is one of the important side effects of diabetes that impose a lot of problems to patients, their families and health centers. Diabetic foot consists of spectrum of anomalies in foots which can finally led to amputation. Therefore, correct management of diabetic foot ulcer is the main purpose of this article by reviewing some recently published articles in this field.

**Key words:** foot ulcer; diabetes; management of diabetic foot; predisposing factors for recurrence

## Introduction

Diabetes is the leading cause of blindness worldwide and the fourth leading cause of patient death in many countries [1,2,3].

In Iran, the rate of diabetes has doubled over the past three decades [2,3]. The term diabetic foot includes abnormalities such as ulcerated foot, neuropathic foot and peripheral vascular disorder foot, ulcerated foot and Charcot foot [3,4].

Treatments for this condition include: wound debridement and pressure relief. There are also new treatments that include the use of electrical stimulation, light therapy, and the use of low-power lasers, high-pressure oxygen, and negative pressure [3,5]. Diabetic foot ulcers are prone to infection and chronicity and can lead to amputation [3,6]. With the increase in the number of patients with diabetes, the need to provide continuous care increases, and the number of treatment staff will not be able to meet their needs [37]. The probability of developing a diabetic foot ulcer in the life of a diabetic patient is 15-20% [8,9]. The American Diabetes Association estimates that by 2025, 324 million people will be diagnosed with diabetes [9]. The prevalence of diabetes in Iran is estimated between 3 and 17 percent [9]. Studies have shown that 60-70% of diabetic patients develop neuropathy and up to 25% of these patients will experience chronic diabetic foot ulcers [9,10]. Currently, a leg is amputated every 30 seconds due to diabetes [9]. Therefore, the correct management of leg ulcers in susceptible patients is very important, which can be useful for the patient as well as the medical centers.

**Management of diabetic foot ulcers:**

To manage diabetic foot ulcer, the steps are as follows [11]:

1- Preventing leg ulcers in susceptible people

2- Regular examination and examination of feet in susceptible people

3- Proper education to patients, especially susceptible patients

4- Use appropriate shoes

5- Correct treatment of small wounds in such patients

According to the articles, the predisposing factors of diabetic foot ulcers are: having a history of high blood pressure, having a history of high triglycerides or cholesterols, having a history of heart diseases, and being over 65 years old [9].

So, the people of the groups mentioned above are talented people and need serious follow-up.

**Treatment:**

1- Wound debridement

By doing this, dead tissues are removed from the surface of the skin, which helps to heal the wound. Enzymatic debridement can also be done with collagenase, papain, streptokinase and streptodornase and dextran enzymes. Although this debridement method is expensive, it is used for ischemic wounds, because the surgical method in these cases is very painful [11,12].

2- Removing pressure on the wound

Removing pressure is very effective in healing soles of the feet [11,13,14,15]. It has been proven that the entry of insufficient and high pressure on the soles of the feet is one of the factors that delay the healing of wounds [11,16]. One way to reduce the pressure is to use non-removable molds that have full contact with the feet and reduce the incoming pressure on them [11,17].

3- Wound dressing

Dressings are used to prevent infection at the wound site [11,18]. There are many dressings to prevent infection and help heal the wound [11,19,20].

4- Use of growth factors

The use of PDGF-beta has been proposed as a therapeutic method for the treatment of non-infectious leg ulcers. This factor is used in gel form, which is used once a day along with debridement at the wound site on a weekly basis [11,21].

Platelet-rich plasma (PRP) is a product taken from the patient's plasma and contains a high concentration of platelets in a fibrin clot that can be used in the wound area. The fibrin clot is absorbed during the wound healing process and its effect lasts for several days to several weeks [11,22].

5- Use of skin substitutes

Available evidence has shown that skin substitutes are useful as adjunctive therapies for wound healing in non-infected leg ulcers [11].

6- Use of extracellular matrix proteins

This method can be used as a safe and useful method in patients with leg ulcers, although there is little evidence in this field [11, 23].

7- The use of matrix metalloproteinase (MMP) modulators

Matrix metalloproteinase regulates extracellular matrix components. During the wound healing process, there is naturally a balance between the construction and degradation of the extracellular matrix. In chronic wounds, high expression of MMP-2 in fibroblasts and endothelium has been identified, which favors the degradation of the extracellular matrix. Therefore, reducing MMP-2 gene expression can be effective in wound healing [11,24].

8- Using negative pressure on the wound

This method involves the use of an intermittent or continuous vacuum pump under subatmospheric pressure, which is connected to a container into which the exudate and materials from the wound drain into, and is a new method for treating diabetic foot ulcers [11,25].

9- Use of hyperbaric oxygen

This method involves intermittent use of 100% oxygen at a pressure higher than sea level pressure [11, 26]. The use of hyperbaric oxygen can be used as an adjuvant method for patients with severe soft tissue leg ulcers and for patients with osteomyelitis who have not responded to conventional treatments [11,27].

## Conclusion:

Since diabetes is a chronic disease and the patient has to use drugs for the rest of his life, amputation of the leg in these patients is an important thing that should be taken into account. Diabetic foot ulcer complications cause long-term hospitalization of patients in hospitals. The reason is that the healing process takes time and eventually this process can even lead to amputation. The risk of amputation in diabetic people is 41 times more than of non-diabetic people. Currently, the most common cause of limb amputation is diabetes. Chronic diabetic foot ulcer is one of the most important complications of diabetic patients, whose consequences can be avoided if prevented and treated on time.

## References


1. Cassimatis M, Kavanagh D, Hills A, Smith A, Scuffham P, et al. (2015) The OnTrack Diabetes Web-Based Program for Type 2 Diabetes and Dysphoria Self-Management: A Randomized Controlled Trial Protocol. JMIR research protocols. 4: e97.
2. Yeaw J, Lee WC, Aagren M, Christensen T. () 2012Cost of self-monitoring of blood glucose in the United States among patients on an insulin regimen for diabetes. *Journal of managed care pharmacy*: JMCP. 18(1):21-32.
3. Ghazi Saeedi M, Esmaeili Javid GR, Mohammadzadeh N, Asadallah Khan vali h. (2021) Determining the Minimum Data Set of Diabetic Foot Ulcer Patients' Electronic Medical Records. payavard. 14(5):443-453.
4. Ragnarson Tennvall G, Apelqvist J. (2000) Health-related quality of life in patients with diabetes mellitus and foot ulcers. *Journal of diabetes and its complications*.14(5):235-241.
5. Boulton AJ, Vileikyte L, Ragnarson-Tennvall G, Apelqvist J. (2005) The global burden of diabetic foot disease. Lancet (London, England).366(9498):1719-1724.
6. Ziegler-Graham K, MacKenzie EJ, Ephraim PL, Travison TG, Brookmeyer R. (2008) Estimating the prevalence of limb loss in the United States: 2005 to 2050. *Archives of physical medicine and rehabilitation*.89(3):422-429.
7. Peeters JM, Wiegers TA, Friele RD. (2013) How technology in care at home affects patient self-care and self-management: a scoping review. *International journal of environmental research and public health*. 10(11):5541-5564.
8. Amogne W, Reja A, Amare A. (2011) Diabetic foot disease in Ethiopian patients: A hospital-based study. Ethiopian *Journal of Health Development*. 25:17-21.
9. Hajilou F, Darvishi M, Shiehmorteza M. (2021) Evaluation of Predisposing Factors for Recurrence of Diabetic Foot Ulcer in Patients Admitted to the Hospital. Annals of the Romanian Society for Cell Biology.8288-8294.
10. Shahrad Bejestani H, Motabar AR. (2004) Assessment of Diabetic Foot Ulcer's Predisposing Factors and its Outcomes in Patients with Diabetic Foot Syndrome Hospitalized in Hazrat Rasoul-e-Akram Hospital in Tehran During 1996-2001. RJMS.11(39):77-83.
11. Alexiadou K, Doupis J. (2012) Management of diabetic foot ulcers. Diabetes therapy: research, treatment and education of diabetes and related disorders.3(1):4.
12. Smith RG. (2008) Enzymatic debriding agents: an evaluation of the medical literature. Ostomy/wound management.54(8):16-34.
13. Veves A, Sheehan P, Pham HT. A randomized, 2002 () controlled trial of Promogran (a collagen/oxidized regenerated cellulose dressing) vs standard treatment in the management of diabetic foot ulcers. *Archives of surgery* (Chicago, Ill: 1960).137(7):822-827.
14. Pham H, Armstrong DG, Harvey C, Harkless LB, Giurini JM, Veves A. (2000) Screening techniques to identify people at high risk for diabetic foot ulceration: a prospective multicenter trial. *Diabetes care*. 23(5):606-611.

15. Frykberg RG, Lavery LA, Pham H, Harvey C, Harkless L, (1998) Role of neuropathy and high foot pressures in diabetic foot ulceration. *Diabetes care*. 21(10):1714-1719.
16. Lebrun E, Tomic-Canic M, Kirsner RS. (2010) The role of surgical debridement in healing of diabetic foot ulcers. Wound repair and regeneration: official publication of the Wound Healing Society [and] the European Tissue Repair Society. 18(5):433-438.
17. Burns J, Begg L. (2011) Optimizing the offloading properties of the total contact cast for plantar foot ulceration. Diabetic medicine: a *journal of the British Diabetic Association*. 28(2):179-185.
18. Harding KG, Jones V, Price P. (2000) Topical treatment: which dressing to choose. Diabetes/metabolism research and reviews. 16 Suppl 1: S47-50.
19. Olson ME, Wright JB, Lam K, Burrell RE. (2000) Healing of porcine donor sites covered with silver-coated dressings. The European journal of surgery = Acta chirurgica. 166(6):486-789.
20. Tredget EE, Shankowsky HA, Groeneveld A, Burrell R. (1998) A matched-pair, randomized study evaluating the efficacy and safety of Acticoat silver-coated dressing for the treatment of burn wounds. *The Journal of burn care & rehabilitation*. 19(6):531-537.
21. Papanas N, Maltezos E. (2010) Benefit-risk assessment of becaplermin in the treatment of diabetic foot ulcers. *Drug safety*. 33(6):455-461.
22. Yang HS, Shin J, Bhang SH, Shin JY, Park J, et al. (2011) Enhanced skin wound healing by a sustained release of growth factors contained in platelet-rich plasma. *Experimental & molecular medicine*. 43(11):622-629.
23. Veves A, Murray HJ, Young MJ, Boulton AJ. (1992) The risk of foot ulceration in diabetic patients with high foot pressure: a prospective study. *Diabetologia*. 35(7):660-663.
24. Karim RB, Brito BL, Dutrieux RP, Lassance FP, Hage JJ. MMP-2 assessment as an indicator of wound healing: A feasibility study. *Advances in skin & wound care*. 2006;19(6):324-327.
25. Xie X, McGregor M, Dendukuri N. (2010) The clinical effectiveness of negative pressure wound therapy: a systematic review. *Journal of wound care*. 19(11):490-495.
26. Kessler L, Bilbault P, Ortéga F, Grasso C, Passemard R, et al. (2003) Hyperbaric oxygenation accelerates the healing rate of nonischemic chronic diabetic foot ulcers: a prospective randomized study. *Diabetes care*. 26(8):2378-2382.
27. Tiaka EK, Papanas N, Manolakis AC, Maltezos E. (2012) The role of hyperbaric oxygen in the treatment of diabetic foot ulcers. *Angiology*.63(4):302-314.