The Relationship between Socket Blood Sugar and Post-Extraction Complications in Type II Diabetic and Non-Diabetic Patients

Mohammad Hassan Akhavan Karbassi[1], Raha Salehi[2], Khatere Kheirollahi[3*], Mehrdad Ghaffari Targhi[4], Maryam Jalili Sadrabad[3], Bahare Yousefipour[2]

1. Assistant Professor, Department of Oral Medicine, School of Dentistry, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
2. Postgraduate Student of Operative Dentistry, Department of Operative Dentistry, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran
3. Postgraduate Student of Oral Medicine, Department of Oral Medicine, School of Dentistry, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
4. Undergraduate Student of Dentistry, Student Research Committee, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

[*]**Correspondence:**
Khatere Kheirollahi, Postgraduate Student of Oral Medicine, Department of Oral Medicine, School of Dentistry, Shahid Sadoughi University of Medical sciences, Yazd, Iran.
Email: khaterekheirollahi@yahoo.com
Tel: (98) 913 521 7174

Received: 25 July 2015

Accepted: 25 October 2015

Published in December 2015

Abstract

Objective: Prevalence of tooth loss is higher among diabetic patients in comparison with non-diabetic patients. The aim of this study was to evaluate and compare the relationship between socket blood sugar and post-extraction complications in type II diabetic and non-diabetic patients.

Materials and Methods: This cross-sectional study was carried out on 80 diabetic and 80 non-diabetic patients in Yazd Dental School. All patients had posterior tooth extraction. Prolonged bleeding, pain, fever and swelling were studied at the end of 4th day and dry socket and lack of healing at the end of the 7th day after extraction. Data was analyzed with SPSS 13 software using chi squared, Mann-Whitney and Fisher's exact tests.

Results: The frequency of prolonged bleeding and incidence of dry socket between two groups at socket blood sugar levels under 126 mg/dL and comparison of the frequency of prolonged pain, fever and infection between two groups at socket blood sugar levels ≥126 mg/dL showed statistically significant differences ($P<0.05$). Swelling and lack of healing were not associated with diabetes mellitus in none of the socket blood sugar levels ($P>0.1$).

Conclusion: It is suggested that dentists use glucometers to determine socket blood sugar levels in diabetic patients to predict and prevent complications after tooth extraction in diabetic patients.

Keywords: Diabetes mellitus, Post-extraction complications, Socket blood sugar level.

Introduction

Presently, diabetes mellitus has become a serious health problem worldwide, affecting 246 million people all over the world (1). Based on World Health Organization (WHO) estimates, approximately 333 million people will suffer from diabetes mellitus by 2025 (2). The number of patients with diabetes mellitus in Iran will increase to more than 6 million people by 2030 (3).

Diabetes mellitus is characterized by abnormal metabolism of carbohydrates, lipids and proteins. The resultant hyperglycemia causes

[Downloaded from ijdo.ssu.ac.ir on 2026-11-20]

micro vascular complications and a number of clinical neuropathies. Diabetes is classified into Type I and II with prevalence rates of 5% and 95%, respectively (4). The prevalence of diabetes mellitus in Yazd is 16.3%, which is higher than other parts of Iran (5). Uncontrolled diabetes will increase the complications in future and severely affecting the patients' quality of life. In recent years, widespread national programs have been designed to prevent the incidence, complications and disabilities of diabetes which increase the rate of mortality (6). The oral healthcare professions, as a component of the healthcare team have an important role in screening and monitoring patients with diabetes mellitus (6).

Half of the diabetic patients require surgery at a period of their lives (7-8) and two-thirds of these patients will experience some complications in relation to infections (8). Diabetic patients have experienced complications associated with tooth extraction, periodontal surgeries and ill-fitting dentures (9). Poor regeneration of soft tissues and a delay in osseous tissue healing are well known complications of oral surgeries in diabetic patients. Therefore, management and treatment of diabetic patients undergoing oral surgeries are more difficult. Delayed angiogenesis, decrease in blood flow, compromised innate immunity, decrease in the production of growth factor and psychological stress have been reported as factors cause delay in the healing of oral ulcers (10).

In most cases, diabetes makes the patient susceptible to oral and dental problems and complications, including various oral soft tissue injuries and inflammatory conditions (11). Some of the possible complications after tooth extraction in diabetic patientsare edema, discomfort, prolonged hemorrhage, trismus, infection and alveolar osteitis (12). Hyperglycemia makes thepatients susceptible to infections and further complications by decreasing the function of leukocytes and affecting the endothelium (13). It should be pointed out that a large number of studies have evaluated the relationship between tooth loss and tooth extraction and diabetes. The results of these studies have shown that tooth loss and tooth extraction are significantly more common in diabetic patients compared with healthy subjects (14).

Since complications after tooth extraction will decrease the patients' quality of life, the present study was designed to evaluate the relationship between the glucose level in tooth socket blood and complications after tooth extraction in patients with Type II diabetes and healthy controls.

Materials and Methods

The present Case-Control study was carried out on 160 patients referring to the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Yazd University of Medical Sciences, in 2010. Patients with a history of Type II diabetes mellitus served as the case group and those without such a history served as the control group. Extraction of a posterior tooth indicated in both groups.

Sampling was carried out using the convenient sampling technique and the two groups were matched. The sample size was determined at a confidence interval of 95%, study power of 80%and type one error level of 5%. The inclusion criteria contained age range of 30-50 years, duration of Type II diabetes mellitus in the diabetic group at least 5 years, Fasting Blood Sugar (FBS) ≤200 mg/dL in the diabetic group with proper control of diabetes under the supervision of a physician and absence of overt clinical periodontitis and other oral diseases.

The subjects' demographic data were recorded. The diabetic patients underwent FBS test so that they would have the test results available on the day extraction was carried out. In each case, after taking medical and dental histories and making sure of the absence of cardiovascular diseases and hypertension and also after making sure of eating a meal 1 hour before tooth extraction, local anesthesia were administered and questioned teeth was extracted with forceps by

[Downloaded from ijdo.ssu.ac.ir on 2026-11-20]

closed technic. If there were any complications during tooth extraction, including use of excessive force, root fracture or a need for open surgery the patient was excluded from the study. During the first 24hours after tooth extraction, Ibuprofen analgesics were administered at a dose of 400 mg/dL and the patients were asked to report back if they need analgesics after 24 hours so they were excluded from the study. In addition, patients taking antibiotics 2 weeks before tooth extraction and 1 week after it were excluded from the study.

After extraction of the tooth one drop of blood from the blood collected in the socket on theglucometer tape placed in advance in the device. The glucometer used (ACCU CHECK ACTIVE, Roche, Germany) determines the blood glucose level in 5 seconds in mg/dL and displays it on the monitor. The patients were instructed in correct standard post-extraction care in all the cases.

Hemorrhage, pain, fever, infection and swelling at the end of 2th day, dry socket at the end of4thday and absence of healing at the end of 7thday after tooth extraction were evaluated.

Due to the wide variations in the blood glucose level and prediction of it's returning to the baseline 1-2 hours after a meal and also based on a pilot study. The socket glucose level of

126 mg/dL was considered a base for comparisons and the frequencies of complications at blood glucose levels of <126 mg/dL and ≥126 mg/dL were evaluated in the diabetic and non-diabetic groups. Data were analyzed with SPSS 13, using chi-squared, Man-Whitney and Fisher's exact tests.

Results

In the present study, 80 patients were in each groups, with 37 males and 43 females in the diabetic group and 45 males and 35 females in the non-diabetic group. The mean ages of diabetic and non-diabetic subjects were 44±5.5 and 43±6.1, respectively, with an age range of 30-50 in each group.

The mean socket blood sugar levels in the diabetic patients and non-diabetic controls were 196.99±88.75 and 125.45±29.55 mg/dL, respectively, with statistically significant differences.

Comparison of the frequencies of abnormal and prolonged hemorrhage in the diabetic and non-diabetic patients with socket blood sugar levels<126 mg/dL showed statistically significant differences between the two groups

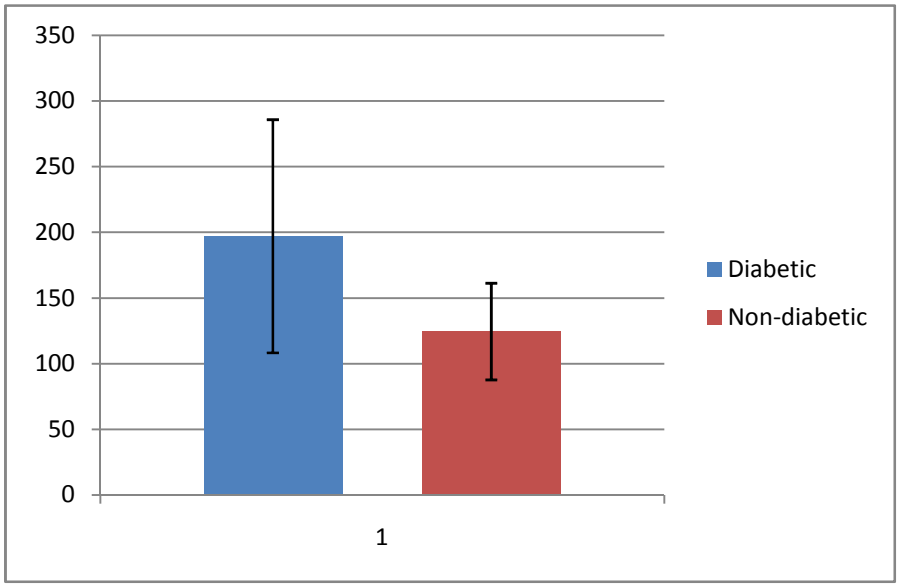


Figure1. The means and standard deviations of socket blood sugar levels In the diabetic and non-diabetic groups

[Downloaded from ijdo.ssu.ac.ir on 2026-11-20]

(*P*=0.011); however, such a comparison in patients with socket blood sugar levels ≥126 mg/dL was not statistically significant (*P*=0.095).The frequencies of abnormal and long-term pain in the two diabetic and non-diabetic patient groups with socket blood sugar levels<126 mg/dL were not statistically significant (*P*=0.742); however, at socket blood sugar levels ≥126 mg/dL there were significant differences between the diabetic and non-diabetic subjects (*P*<0.001).

The frequencies of fever and infection between the diabetic and non-diabetic patients at socket blood sugar levels <126 mg/dL were not statistically significant (*P*=0.102); however, at blood sugar levels ≥126 mg/dL there were significant differences between diabetic and non-diabetic subjects (*P*=0.002).

Comparison of swelling between the diabetic and non-diabetic subjects at socket bloods sugar levels<126 mg/dL (*P*=0.104) and at blood sugar levels ≥126 mg/dL did not reveal any statistically significant differences (*P*=0.24).The comparison of the incidence of dry socket between the diabetic ad non-diabetic subjects at socket blood sugar level <126 mg/dL revealed statistically significant differences (*P*=0.037);however, at blood sugar levels ≥126 mg/dL there were no significant differences between the two groups (*P*=0.086). At socket blood sugar levels <126 mg/dL all the diabetic and non-diabetic subjects exhibited some evidence of healing on the 7thday. The comparison of the frequencies of "no healing" between the diabetic and non-diabetic subjects at socket blood sugar levels of ≥126 mg/dL revealed no statistically significant differences (*P*=0.292).

At socket blood sugar levels of ≥126 mg/dL all the diabetic and non-diabetic subjects exhibited some evidence of healing on the 7thday.

Discussion

Hyperglycemia due to diabetes leads to various complications, including a decrease in the function of leukocytes and detrimental effects on the vascular epithelium and tissue healing potential. Since there is a prominently greater need for tooth extraction in diabetic patients compared with non-diabetics, the present study was undertaken to evaluate and compare the relationship between the tooth socket blood sugar levels and complications after tooth extraction in patients with Type II diabetes and non-diabetic subjects, based on

Table1. The frequency distributions of the complications in the diabetic and non-diabetic subjects at socket blood sugar levels<126 mg/dL

Variable	Complication	Diabetes status		*P*
		Diabetic	Non-diabetic	
Hemorrhage	No abnormal hemorrhage	N=16 69.6%	N=44 93.6%	0.011
	Abnormal hemorrhage	N=7 30.4%	N=3 6.4%	
Pain	No abnormal pain	N=17 73.9%	N=37 78.7%	0.742
	Abnormal pain	N=6 26.1%	N=10 21.3%	
Fever and infection	No fever and infection	N=18 78.3%	N=4 93.6%	0.102
	Fever and infection	N=5 21.7%	N=3 6.4%	
Swelling	No swelling	N=18 78.3%	N=44 93.6%	0.104
	Swelling	N=5 21.7%	N=3 6.4%	
Dry socket	No dry sockets	N=19 82.6%	N=46 97.9%	0.037
	Dry sockets	N=4 17.4%	N=1 1.2%	

[Downloaded from ijdo.ssu.ac.ir on 2026-11-20]

the assumption that the results of the study might be useful in the adoption of protocols to prevent complications after tooth extraction in patients with diabetes(14).

The present study was carried out on two groups of diabetic and non-diabetic patients. In similar studies (15-20) the same technique has been used to compare the various complications of diabetes in diabetic and non-diabetic case control groups. In addition, some other studies have used descriptive retrospective design (21-25) and cohort design (13,26).

One of strong points of this study is proper match of case and control group in clinical indications of posterior tooth extraction. In the preset study, the control group was selected in a manner to match the confounding factors, as much as possible, with the case group.

The mean ages of the subjects in the diabetic and non-diabetic groups in the present study were44 and 43 years, respectively. In a study by Folk et al (39), the mean age of the subjects was 35, which was less than our study. At this young age, the prevalence of micro vascular and macro vascular complications of diabetes is very low. In a study by Bagic et al (14), the meanages of the subjects in the diabetic and non-diabetic subjects were 55 and 53 years, respectively.

In addition, in a study by Huang et al (15), the mean ages of the subjects in the diabetic and nondiabetic groups were 46.8 and 63.9 years, respectively, which our patients were in middle age so the effect of high age not changes the ability of regeneration of connective tissue. Furthermore, in a study by Morikubo et al (15), the mean ages of the subjects in the diabetic and non-diabetic groups were 68.8±8.9 and 68.6±8.8 years, respectively. At this high mean age, the prevalence of atherosclerotic, hypertensive and cardiovascular conditions are higher and therefore the results of the disease cannot be attributed solely to the effect of diabetes and its complications.

Liao et al (24) evaluated 337 subjects, including 39 diabetic patients and reported a significant difference between blood sugar levels before the procedure between the two groups (P<0.001).

Comparison of the mean blood sugar levels of

Table2. The frequency distributions of the complications in the diabetic and non-diabetic subjects at socket blood sugar levels of ≤126 mg/dL.

Variable	Complication	Diabetes status		*P*
		Diabetic	Non-diabetic	
Hemorrhage	No abnormal hemorrhage	N=43 75.4%	N=30 90.9%	0.095
	Abnormal hemorrhage	N=14 24.6%	N=3 9.1%	
Pain	No abnormal pain	N=28 49.1%	N=30 90.9%	<0.001
	Abnormal pain	N=29 50.9%	N=3 9.1%	
Fever and infection	No fever and infection	N=44 77.2%	N=33 100%	0.002
	Fever and infection	N=13 8.22%	N=0 0%	
Swelling	No swelling	N=45 78.9%	N=30 90.9%	0.24
	Swelling	N=12 21.1%	N=3 9.1%	
Dry socket	No dry sockets	N=48 84.2%	N=32 97.0%	0.086
	Dry sockets	N=9 15.8%	N=1 3.0%	
Tissue healing	Healing	53 93.0%	33 100%	0.292
	No healing	N=4 7.0%	N=0 0%	

[Downloaded from ijdo.ssu.ac.ir on 2026-11-20]

patients is important because in such cases the final results can be attributed to differences in blood sugar levels with more confidence.

In the present study, comparison of the frequencies of abnormal hemorrhage between the diabetic and non-diabetic groups at socket blood sugar levels <126 mg/dL revealed statistically significant differences (30.4%. vs. 6.4%, *P*=0.001); however, such a comparison between the two groups at socket blood sugar levels ≥126 mg/dL did not reveal any significant differences (24.6%. vs. 9.1%, *P*=0.095).

Comparison of the frequencies of abnormal pain between the diabetic and non-diabetic groups at socket blood sugar levels <126 mg/dL did not show any significant differences between two groups (26.1% vs. 21.3%, *P*=0.742); however, at socket blood sugar levels of ≥126 mg/dL significant differences were observed between two groups (50.9% vs. 9.1%, *P*<0.01). The significant differences between the two groups might be attributed to the neuropathy due to diabetes. Nonetheless, no similar study was found to confirm this.

Latham et al (26) reported a significant relationship between postoperative infection and postoperative blood sugar levels in their subjects (*P*=0.007).

Stratton et al (27) reported each 1% decrease in HbA1C causes37% decrease in micro vascular complications (*P*<0.001). In addition, the results of studies by Carson et al (28), Huang et al (*P*=0.0136) (22), Liao et al (*P*=0.003) (24), Del Toro et al (*P*=0.003) (23), Hirsch et al (*P*<0.05)(16) and Bower et al (P<0.042) (29) were consistent with the present study in relation to the significant differences in the incidence of infection between diabetic and non-diabetic groups.

Because of micro vascular and macro vascular changes and immune deficiency in diabetes, risk of infection will increase (30). A study by Latham et al (26) showed history of diabetes increases the infection at surgery site 2.7 folds compared to non-diabetic subjects. In this study, no relationship was found between the blood sugar control (HbA1C) and the incidence of infection (*P*=0.09). In relation to swelling no similar study was found.

Dry socket occurs due to disturbance in the blood flow and in patients with diabetes the incidence of dry socket is higher due to micro angiopathy (7). In addition, absence of significant differences between the diabetic and non-diabetic subjects at socket blood sugar levels ≥126mg/dL might be attributed to the fact that despite no history of diabetes in the non-diabeticgroup, an increase in the socket blood sugar levels might be considered as a risk factor of dry socket; therefore, no significant differences were observed between the two groups.

Huang et al reported similar socket healing processes after tooth extraction in diabetic and nondiabetic subjects (9). Joshipura (31) evaluated epithelialization of the socket in patients with different levels of bloodglucose and reported no significant differences in epithelialization between them. Aronovich etal (20) reported that the control level of blood glucose had no effect on socket healing after tooth extraction.

Fernandes et al (32) evaluated the healing process after tooth extraction in patients with Type II diabetes and reported that 60 days after tooth extraction the socket epithelialization was complete in all the subjects despite poor control of blood glucose levels and neutrophils dysfunction.

Graves et al (19) evaluated oral ulcers created in diabetic and non-diabetic mice and concluded that the epithelial coverage of ulcers, the connective tissue structure and the density of fibroblasts were significantly poor in the diabetic subjects compared to the non-diabetic subjects (*P*<0.05).

They reported a decrease in fibroblast proliferation secondary to increased apoptosis on one hand and an increase inpolymorphonuclear leukocytes (PMN) counts secondary to the inability of the diabetic tissue to eliminate the inflammation and return to the normal state on the other hand as reasons for a delay in healing.

[Downloaded from ijdo.ssu.ac.ir on 2026-11-20]

In addition, Hirsch et al (16) compared diabetic and non-diabetic animals in relation to tissue healing and reported that on the 12th day after ulceration there was a significant difference between the two groups (P<0.001).
In the present study, gross wound healing was evaluated on the 7th day after tooth extraction based on the patients' symptoms and signs in relation to the presence and absence of pain or an unpleasant feeling during tooth extraction. Since the samples were human beings, it was not possible to carry out more accurate microscopic evaluations.

Conclusion

The incidence of abnormal bleeding and dry socket at socket blood sugar levels <126 mg/dL was associated with a history of diabetes; however, at socket blood sugar levels ≥126 mg/dL such a relationship was not detected. In addition, abnormal pain, fever and infection at socket blood sugar levels <126 mg/dL were not associated with diabetes, while at socket blood sugar levels≥126 mg/dL, the incidence of these complications were associated with diabetes. Swelling and absence of healing were not associated with a history of diabetes at none of the socket blood sugar levels. Based on our findings, dentists can predict of risks of complications after tooth extraction and prevent them with the use of a glucometer and determining the socket blood sugar level in diabetic patients.

Acknowledgment

This study was supported by a grant of Research Vice Chancellor of Shahid Sadoughi University of Medical Sciences (Grant No:400). There was no conflict of interest in this research.
Funding: This research was funded by Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

References

1. AL-Maweri SAA, Ismail NM, Ismail ARI, AL-Ghashm A. Prevalence of Oral Mucosal Lesions in Patients with Type 2 Diabetes Attending Hospital Universiti Sains Malaysia. The Malaysian Journal of Medical Sciences: MJMS. 2013;20(4):39-46.
2. Norouzi A, Ghofranipour F, Heydarnia A, Tahmasebi R. Determinants of physical activity based onHealth Promotion Model (HPM) in diabetic women of Karaj diabetic institute. ISMJ 2010;13:41-51.
3. World Health Organization. Prevalence of Diabetes in the Who Eastern Mediterranean Region: Diabetes Programmer. Available From: http://www.who.int/diabetes/facts/ world_figures/en/index2.html. Accessed Nov 19, 2012.
4. Vernillo AT. Dental Consideration for the Treatment of Patients with Diabetes mellitus. J Am Dnet Assoc 2003;134:24-33.
5. Larejani B, Zahedi F. Epidemiology of Diabetes Mellitus in Iran. Ijdld.2001;1(1):1-8.
6. Greenberg Ms, Glick M, Ship JA. Burket's Oral Medicine.11th ed. Hamilton: BC Decker, 2008;21:509-17.
7. Parabha A, Abraham A. Risk factors for post-operative Complication in sixty Diabetic Patients. International Journal of Diabetes in Developing Countries2004;24(4):115-9.
8. Babineau TJ, Bothe AJr. General Surgery Considerations in the Diabetic Patient. Infect Dis Clin North Am 1995;9(1):183-93.
9. Huang S, Dang H, Huynh W, Sambrook PJ, Goss AN. The healing of dental extraction sockets in patients with Type 2 diabetes on oral hypoglycaemics: a prospective cohort. Australian Dental Journal 2013;58(1):89-93.
10. Al-Maskari AY, Al-Maskari MY, Al-SudairyS.Oral Manifestations and Complications of Diabetes Mellitus: A review. Sultan Qaboos Univ Med J. 2011 May;11(2):179-86.
11. Mohsin SF, Ahmed SA, Fawwad A, Basit A. Prevalence of oral mucosal alterations in type 2 diabetes mellitus patients attending a diabetic center. Pakistan Journal of Medical Sciences. 2014;30(4):716-9.
12. Mc Ardle BF. Preventing the Negative Sequelae of tooth Extraction. J Am Dent Assoc 2002;133(6):742-3.
13. Woods SE, Smith JM, Sohail S, Sarah A, Engle A. The influence of type 2 diabetes mellitus in patients undergoing coronary artery bypass graft surgery: an8-year prospective cohort study. Chest 2004 126(6):1789-95.
14. Bagic IC, Verzak Z, Car N, Car A. Tooth Loss among Diabetic Patients. Diabetologia Croatiea2004;33(1):23.

[Downloaded from ijdo.ssu.ac.ir on 2026-11-20]

15. Morikubo S, Takamura Y, Kubo E, Tsuzuki Sh, Akagi Y. Corneal Changes after Small Incision Cataract Surgery in Patients with Diabetes Mellitus. Arch Ophthalmol 2004;122:966-9.
16. Hirsch T, Spielmann M, Zuhaili B, Koehler T, Fossum M, Steinau HU, et al. Enhanced susceptibility to infections in a diabetic wound healing model. BMC Surg 2008;8:5.
17. Graber SE, Shabahang Sh, Escher AP, Torabinejad M. The effect of hyperglycemia on pulpal healing in rats. Journal of Endodontics 2009;35(1):60-2.
18. Siqueria MF, Li J, Chehab L, Desta T, Chino T, Krothpali N, et al. Impaired wound healing in mouse models of diabetes is mediated by TNF-α dysregulation and associated with enhanced activation of forkhead box O1 (FOXO1). Diabetologia 2010;53:378.
19. Desta T, Li J, Chino T, Graves DT. Altered fibroblast proliferation and Apoptosis in Diabetic Gingival Wounds. J Dent Res 2010;89(6):609-14.
20. Aronovich S, Skope LW, Kelly JP, Kyriakides TC. The relationship of glycemic control to the outcomes of dental extractions. J Oral Maxillofac Surg. 2010 Dec;68(12):2955-61.
21. Folk JW, Starr AJ, Early JS. Early wound Complications of Operative Treatment of calcaneus Fractures: Analysis of 190 fractures. Journal of Orthopaedic Trauma 1999;13(5):369-72.
22. Huang TT, Tseng FY, Liu TC, Hsu CJ, Chen YS. Deep neck infection in diabetic patients: Comparison of Clinical picture and outcomes with nondiabetic patients. Otolaryngol Head Neck Surg 2005;132(6):943-7.
23. Del Toro R, Aldrete MG, Mendoza T, Gonzalez C, Bracamontes C, Balcazar N. Epidemiologicalstudy: Oral manifestation in diabetes mellitus patients. Presented at the ADEA/ AADR/ CADR Meeting and Exhibition: March 8- 11, 2006; Orlando Florada; abstract 1012.
24. Liao JC, Chen WJ, Niu CC. Postoperative wound infection Rates after Posterior instrumented Spinal Surgery in Diabetic Patients. Chang Gung Med J 2006;29:480-5.
25. Liu SA, Wong YK, Poon C.K, Wang CC, W CP, Tung KC. Risk factors for wound infection after surgery in primary oral cavity Cancer Patients. The Laryngoscope 2007;117(1):166-71.
26. Latham R, Lancaster AD, Covington JF, Pirolo JS, Thomas CS. The Association of Diabetes and Glucose control with surgical site infection among cardiothoracic surgery patients. Infection control and Hospital Epidemiology 2001;22(10):607-12.
27. Startton IM, Adler AI, Neil H AW, Matthews DR, Manely SE, Cull CA et al. Association of Glycemia with macrovascular and microvascular complications of type 2 Diabetes (UKPDS35): Prospective Observational Study. BMJ 2000;321:405-12.
28. Carson JL. Scholz PM, Chen AY, Peterson ED, Gold J, Schneider SH. Diabetes Mellitus increases short-term mortality and morbidity in patients undergoing Coronary Artery Bypass Graft Surgery. J Am Coll Cardiol 2002;40(3):418-23.
29. Bower WF, Cheung CS, Lai RWM, Underwood MJ, Hasselt CAV. An audit of risk factors for wound infection in Patients undergoing coronary artery bypass grafting or valve replacement. Hong Kong Med J 2008;14:371-8.
30. Alba-Loureiro TC, Munhoz CD, Martins JO, Cerchiaro GA, Scavone C, Curi R, et al. Neutrophil function and metabolism in individuals with diabetes mellitus. BrazJ Medical Biol Res 2007;40(8):1037-44.
31. Joshipura K1.Glycemic control is not related to postextraction healing in patients with diabetes. J Evid Based Dent Pract. 2011 Dec;11(4):187-8.
32. Fernandes KS, Kokron CM, Glick M, Gallottini M. Post Extraction wound healing in patients with type 2 diabetes. Oral Surgery Oral Medicine Oral Pathology and Oral Radiology Journal 2013;116(3):197-8.

[Downloaded from ijdo.ssu.ac.ir on 2026-11-20]