

Comparison of Extraction Socket Healing in Non-diabetic and Diabetic Patients: A Prospective Study

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Abstract

Aims and Objectives: The purpose of this study is to evaluate the effect of diabetes on healing of extraction socket.

Patients and Methods: Total of 100 patients were included in the study who required tooth extraction. Study participants were divided into two groups Diabetic and non-diabetic, 50 participants in each group. Parameters such as extraction socket size, post-operative pain, post-operative swelling, infection, and dry socket were assessed.

Results: Statistical difference was noted between the two groups in terms of post-operative swelling, size of extraction socket which was more in diabetic group than non-diabetic group. Pain score was also more in diabetic group than non-diabetic group. Infection of extraction socket was noted in diabetic group in nine cases whereas no infection was noted in non-diabetic group. Dry socket was absent in both groups.

Conclusion: The study concluded that the socket dimension, pain, infection, and post-operative facial swelling were more on post-operative day 7 in patients with diabetes when compared to non-diabetic patients which suggest delayed healing.

Key words: Diabetes, Extraction, Delayed healing

INTRODUCTION

Diabetes mellitus is a metabolic disorder having multiple etiology which is characterized by chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism resulting from defects in insulin secretion, insulin action, or both. Diabetes mellitus is rapidly spreading as epidemic in India with more than 62 million people affected. By 2030, it would rise to 79.4 million.^[1] The disease is classified as Type 1 (also referred to as insulin- dependent diabetes) or Type 2 (also referred to as non-insulin dependent diabetes).

Type 1 diabetes is characterized by deficiency of insulin production or defective production of insulin within

the pancreas. Type 2 diabetes is characterized by both insulin deficiency and tissue resistance to insulin. Both Type 1 and Type 2 diabetes leads to long-term complications, which is divided into macrovascular, microvascular, and neuropathic complications.^[2] Macrovascular complications include diabetic patients to suffer atherosclerosis, peripheral vascular disease, and myocardial infarction. Microvascular complications are associated with a thickening of the basement membrane that leads to reduced capillary permeability. Overall the microvascular circulation is disturbed that leads to reduce inflammatory response. As a result of which, there is decrease leukocyte migration, tissue perfusion, and impaired hyperemia. Delivery of nutrients and removal of metabolic by products are affected, due to which diabetic patients are at increased risk of post-operative infection and delayed wound healing. Perioperative and post-operative hyperglycemia is associated with higher infection rate in general surgery patients.^[3] *In vitro* studies have shown that high glucose concentration leads to reduce collagen fibril formation and, therefore, less cross-

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linking of collagen fibers.^[4] Less amount of cross linking makes the collagen susceptible to digestion by collagenase. Therefore, high glucose concentration leads to delayed wound healing.

Aims and Objectives

The purpose of the study was to evaluate the effect of diabetes on healing of extraction socket. Various parameters such as extraction socket size, post-operative pain, swelling, infection, and dry socket were assessed.

MATERIALS AND METHODS

This prospective study was conducted in the Department of Oral and Maxillofacial Surgery, Indira Gandhi Government Dental College, Jammu. A sample size of 100 patients was taken in the study.

Patients were divided into two groups (Group A and Group B). Glycated hemoglobin (HbA1c) and random blood glucose were recorded for all the participants before the procedure in patients suffering from diabetes mellitus. Based on the HbA1c values, participants were categorized into two groups as non-diabetic and diabetic. Patients were recalled on post-operative day 7. Sutures were not placed to approximate the mucoperiosteal flaps. Informed consent was obtained from all the patients.

Inclusion Criteria

Patients who are 18 years and above and those who required tooth extraction were included in the study.

Exclusion Criteria

1. Patients who required a transalveolar tooth extraction were excluded from the study
2. Conditions that may impair wound healing (HIV/AIDS), chemotherapy, systemic steroids, radiotherapy, bisphosphonates, benign, or malignant pathology within jaws were excluded from the study
3. Smokers and alcoholics were also excluded from the study.

Parameters

1. Measurement of extraction socket was done using periodontal probe from buccal to lingual gingival margin
2. Pain was measured using visual analog scale (VAS) (Score-0–10) [Figure 1]
3. The facial swelling was recorded by a thread, which was transferred to a standardized scale. The horizontal facial measurement was taken as distance from the corner of the mouth to the tragus of the ear. The vertical measurement was taken as the distance from

the outer canthus of the eye to the angle of the mandible by palpating the inferior border.^[5]

Facial measurement =

$$\frac{\text{Horizontal measurement} + \text{Vertical measurement}}{2}$$

4. For infection, there were three criteria out of which two must be met.^[6]
 - An obvious area of palpable fluctuance adjacent to an extraction socket
 - Serosanguineous or purulent drainage from or around the extraction site
 - Worsening induration, tenderness, erythema, and swelling around the extraction site.
5. For Dry socket, there were three criteria out of which two must be met.^[6]
 - Increase throbbing pain that was not relieved by analgesics
 - Dark fragments from a resorbed blood clot on irrigation of painful extraction socket
 - Substantial relief of pain with reduction on the VAS of greater than 4 points within 10 min of dry socket dressing application.

Radiographic bone imaging using conventional plain dental or panorex radiographs requires at least 30–50% loss of bone mineral density before disease detection, therefore, may appear normal for up to 3 weeks after onset of symptoms. Then, radiographic finding shows bony destruction and increased radiolucency with a moth eaten appearance.

Statistical Analysis

Statistical analysis was performed using Software Package of Statistical Analysis (SPSS for Windows, version 20, Armonk, NY: IBM Corp). Socket dimensions were compared using the “t” test. Categorical variables were compared using the Chi-square test. The level of significance for the present study was set at $P < 0.05$.

RESULTS

A significant decrease in the mean socket size was observed after day 7 among non-diabetic and diabetic groups when compared to the socket size on day 0 [Table 1]. On day 0, no significant difference in the mean socket size was seen among the two study groups ($P = 0.121$). However, a significant difference was seen in the mean socket size on day 7 among the non-diabetic and diabetic group ($P = 0.00001$).

The pain score among the study subjects was measured on the basis of VAS (visual analogue score) scale. It was observed that in the non-diabetic group, only 1(2%) patient has reported no pain, 48 (96%) patients reported mild pain and only 1 (2%) patient reported moderate pain. Whereas, in the diabetic group 6 (12%), patients reported mild pain, 43 (86%) patients reported moderate pain, and only 1 (2%) reported severe pain [Table 2 and Figure 2].

No significant difference was seen in the pre-operative face swelling among the study groups ($P = 0.135$) whereas significant difference was seen in the post-operative face swelling on day 7 ($P = 0.005$) [Table 3].

In the non-diabetic group, the infection was not present in any of the study subject whereas in case of diabetic group, there was infection in nine study subjects and no infection was reported among 41 study subjects. Further, dry socket was absent in both the groups among all the study subjects [Table 4 and Figure 3].

DISCUSSION

A total of 100 participants were included in this study. Out of 100 study subjects, there were 61 males and 39 females. The mean age of the total participants was 45.6 ± 15.32 years. The total study participants were divided into two groups, that is, diabetic and non-diabetic, there were 50 study participants in each group. In the non-diabetic group, there were 25 males and 25 females and the mean age among this group was 35.56 ± 13.84 . Whereas, in the diabetic group, there were 36 males and 14 females, the mean age among the diabetic group was 55.64 ± 8.79 . A significant difference was seen with respect to age among the two groups ($P = 0.024$) [Table 5]. Males were significantly more (72%) in the diabetic group than the females (28%) whereas in non-diabetic group, male: female ratio was equivalent [Figure 4].

In the present study, no significant difference was seen in mean socket size among the diabetic and non-diabetic study groups on day 0. However, a significant difference was seen in the mean socket size on day 7 among diabetic and non-diabetic study group ($P = 0.00001$).

Finding of the study supported the fact that higher the glycemic level could delay the healing.^[2]

However, some studies suggest that patients with diabetes or glycemic control are not a risk factor for experiencing post-operative complications in people undergoing dental extractions.^[7]

Similarly in the non-diabetic group, 96% patients reported mild pain whereas in diabetic group 86% patients reported moderate pain.

Table 1: Comparisons of extraction socket size on post-operative day 0 and 7

Group	Mean±SD	
	Day 0	Day 7
Non-diabetic (52)	7.97±1.499	2.8±0.808
Diabetic (34)	7.52±1.865	5.3±1.644
P	0.121	0.00001

SD: Standard deviation

Table 2: Distribution of post-operative pain scores among the two study groups

Group	No pain, n (%)	Mild, n (%)	Moderate, n (%)	Severe, n (%)
Non-diabetic	1 (2)	48 (96)	1 (2)	0
Diabetic	0	6 (12)	43 (86)	1 (2)

Table 3: Comparisons of facial swelling pre- and post-operative (day 7)

Group	Mean±SD	
	Pre-operative	Post-operative (day 7)
Non-diabetic (50)	10.548±1.731	11.088±1.751
Diabetic (50)	10.118±1.040	11.894±0.983
P	0.135	0.005

SD: Standard deviation

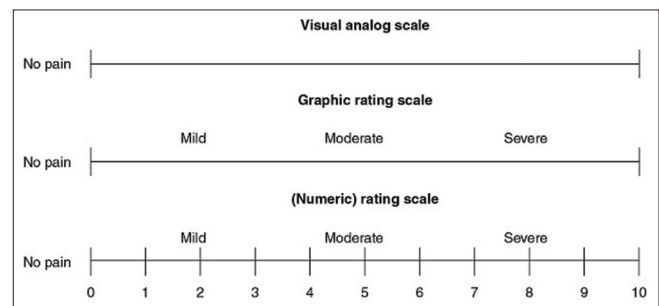


Figure 1: Visual analog scale

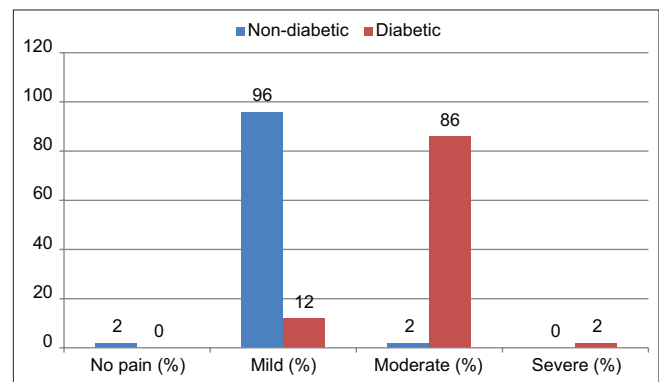


Figure 2: Post operative pain score

The introduction of NSAIDs has significantly reduce the intensity or severity of pain.^[8] Difficulty and duration of the operation increased the intensity of pain.

Table 4: Status of infection (present/absent) among the study groups

Group	Infection present, n (%)	Infection absent, n (%)
Non-diabetic	0	50 (100)
Diabetic	9 (18)	41 (82)
Total	41	60

Table 5: Distribution of age and gender among the study groups

Group	Age, mean±SD	Male, n (%)	Female, n (%)
Non-diabetic	35.56±13.84	25 (50)	25 (50)
Diabetic	55.64±8.79	36 (72)	14 (28)
Total	45.6±15.32	61 (61)	39 (39)

SD: Standard deviation

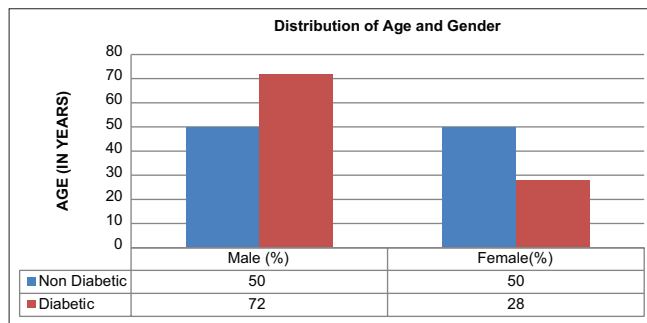


Figure 4: Distribution of age and gender

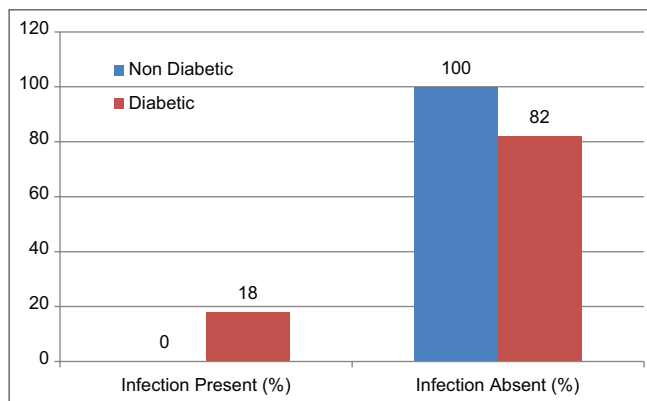


Figure 3: Status of infection

In our study, a significant difference was seen in the post-operative facial swelling between the two study groups on day 7 ($P = 0.005$).

In the non-diabetic group, the post-operative infection was not present in any study subject whereas in case of diabetic group, there was post-operative infection in nine study subjects.

Further, dry socket was absent in both the study subjects.

The present study assessed that factors such as swelling, infection, and pain were more likely to be seen in people with diabetes than non-diabetics.

CONCLUSION

The study concluded that the socket dimension, pain, infection, and swelling were more on post-operative day 7 in people with diabetes when compared to non-diabetics which suggest delayed healing.

Statement of Ethics

This research complies with the guidelines for human studies and was conducted after clearance from Ethical Committee of the Institution.

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