ORIGINAL RESEARCH

The Healing of Dental Extraction Sockets In Patients with Type 2 Diabetes on Oral Hypoglycaemics: A Prospective Study

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ABSTRACT

Introduction: Diabetics are usually thought to have a delayed wound healing in comparison to non diabetics. The aim of this study was to determine whether there is a difference in postextraction healing following dental extractions for Type 2 diabetics on oral hypoglycaemics and non-diabetic patients.

Material and Methods: Patients referred for dental extractions were recruited into two groups: known diabetics and non- diabetics with no conditions associated with poor healing. All had a random blood glucose level (BGL). Extractions were performed using local anaesthesia. Delayed healing cases were identified and statistical evaluation performed to identify risk factors.

Results: There were 100 Type 2 diabetics on oral hypoglycaemics (BGL 7.5) and 100 non-diabetics. The diabetic group were older, more males and less smokers than the control group. 18patients, 8 (.08%) dia- betic and 10 (.1%%) control group, had socket healing delayed for more than one week but all healed in four weeks. There were no statistical differences between delayed healing and diabetic state. The younger control group had more healing problems.

Conclusions: The traditional view that diabetics have increased delayed healing was not supported. Type 2 diabetics on oral hypoglycaemics should be treated the same as non-diabetic patients for extractions.

Keywords: Diabetes, Type 2, blood glucose levels, extractions, delayed healing

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INTRODUCTION

Diabetics are usually thought to have increased healing problems related to dental extractions, periodontal surgery and wearing ill-fitting dentures. They are also considered more likely to have infections. Although this may be true for poorly controlled Type 1 diabetics, there is only little support for this view for Type 2 diabetics on oral hypoglycaemics. There are no evidence based studies for dental surgery in Type 2 diabetes which support this consideration. This is an important evidence based deficiency as Type 2 diabetics constitute 90% of all diabetic patients.Type 1 diabetes (previously known as insulin-dependent, juvenile or childhood-onset) is characterized by deficient insulin production whereas Type 2 diabetes (formerly called non-insulin-dependent or adult-onset) results from relative insulin deficiency and tissue insulin resistance causing abnormal blood glucose levels despite secondary hyperinsulinaemia.[1,2] Patients with prediabetes do not meet the criteria for being diagnosed with diabetes but have glucose levels higher than those considered normal.[3] For IFG, it is a fasting BGL of 6.1–7 mmol/L and for IGT, it is a non-fasting BGL of 7.8–11.0 mmol/L. Each year, 3–10% of people with prediabetes will go on to develop diabetes. The clinically relevant BGLs are 7.8 mmol/L for prediabetes and 11.0 mmol/L for diabetes.[4] HbA1c is also used to asses long term diabetic control. Apart from patient history it is important to measure HbA1c and blood sugar levels before comencing any dental procedure. Poor diabetic control predisposes to a range of complications that have been broadly categorized as macrovascular, microvascular and neuropathic.[5] Delayed wound healing mainly comes under the microvascular complications of diabetes. For tissue nutrition, removal of waste products, inflammatory responses and temperature regulation we need an intact microcirculation.[6] Thickening of the basement membrane result in altered permeability, impeded migration of leucocytes and impaired hyperaemia, causing underperfusion during tissue stress and tissue hypoxia[7] are caused due to poor glycemic control which can adversely affect the outcome of surgery, resulting in poor wound healing and wound infection.[8,9] Oral environment with the forces of mastication, high bone turnover, high vascularity, saliva and the constant reservoir of microorganisms is distinct from other parts of the body, thereby making generalizations from other surgical sites limited.[10] In some studies animals with an uncontrolled dibetes had delayed wound healing of dental extraction sockets with alveolar de-

struction.[14] The aim of this study is to compare the difference in healing between Type 2 diabetics and non-diabetics.

MATERIAL AND METHODS

This prospective study was performed in the exodontia clinic of the oral and maxillofacial department at Govt Dental College Srinagar. Patients 18 years and over who were referred for extractions under local anaesthesia were approached to give written consent to be involved in the study. Exclusion criteria related to known conditions which may impair healing of extraction namely: Type 1 diabetes and insulin dependent Type 2 diabetes; HIV/AIDS; chemotherapy; systemic steroids; irradiation to the head and neck; dental infections with systemic involvement; bisphosphonates; anticoagulant and antiplatelet treatment; and major benign or malignant pathology within the jaws. Patients unable to give consent through physical or mental disability were also excluded. All patients had a random BGL taken after administration of the local anaesthetic (2% lignocaine with 1 in 80 000 adrenaline) using a glucometer Patients were initially assigned to two groups: known Type 2 non-insulin dependent diabetics on oral hypoglycaemics and the control group without conditions known to impair healing. The intra-alveolar extraction of erupted teeth was then performed with forceps and elevators. Antibiotics were only prescribed if there was clear evidence of localized acute odontogenic infection with pus present. Patients with spreading infection were excluded. Patients were offered follow-up review at one week. The random BGLs of the control group were checked. Those with a BGL above 7.8 mmol/L were counselled by OMFS staff and referred in writing to their general medical clinic. The results of completed questionnaires were entered on a case sheet each day. The patient records were reviewed at four weeks by one researcher to determine who had returned or reported delayed healing. This included dry socket, bony sequestra or excess granulation tissue after one week. Patients who demonstrated to be diabetic were reassigned to the diabetic group.

STATISTICAL ANALYSIS

Statistical analysis was done using SPSS software. The odds of delayed healing were compared between the diabetics and non-diabetic groups using logistic regression, with results expressed as odds ratios with 95% confidence intervals. Logistic regression was also used to test the association between perioperative blood glucose level and the odds of delayed healing. Throughout all analyses a two-tailed student t test and p-value of 0.05 was used to indicate statistical significance.

RESULTS

Out of 200 patients 100 were known Type 2 diabetics on oral hypoglycaemics and not taking insulin, with an average BGL of 7.5 mmol/L.100 patients were in the control group. Eighteen patients had healing delayed beyond one week; 8 (.08%) in the diabetic group and 10 (.01%) in the non-diabetic control group. All had fully healed within four weeks. There were no cases of osteomyelitis or osteonecrosis of the jaws. The age, gender, BGL, and adverse outcomes are presented in table 1 and the relation between delayed healing and blood glucose level is presented in table 2. Diabetic group had less delayed healing events. Evaluation of the association between diabetic status and adverse outcomes showed that while the odds ratio were higher in the non-diabetic group, 10 (.01%) vs 8 (.08%), the difference between groups was not statistically significant ($p = 0.49$) two-tailed student t test.

DISCUSSION

This study shows that there was no statistically significant difference in post-extraction outcome between Type 2 diabetics on oral hypoglycaemics and the control group.The results of our study were similar to those found by S Huang *et al* on 456 patients.[12] The original plan of their study was that the diabetic and non-diabetic groups would be of similar age and gender, but this did not eventuate. The diabetic group was older on average by 17 years and there were more males. Increased age and male gender are risk factors for delayed healing. Conversely, more of the control group were smokers, also an important factor in delayed healing. Although there were no statistical differences, the clinical impression was that the diabetic group had less delayed healing than the younger, more female control group. The AusDiab study in 2002 found an incidence of 3.7% unknown diabetics and 16.4% with prediabetes, or 20%, in an adult Australian population.[13] The AusDiab study was very large and is thus difficult to directly compare to this relatively small sample. However, the numbers are of similar order All the patients of our study were referred to the exodontia clinic of a specialist OMS unit. Only 2 of the 200 patients, 1 from each group, required transalveolar extraction. In the non-diabetic control group, 2 had acute oro-antral fistulae created from maxillary extractions and all were immediately closed without any adverse sequelae. Although there were no statistical differences, the clinical impression was that the diabetic group had less delayed healing than the control group. Recently, a broadly similar study has been published which compared the relationship of glycaemic control between well and poorly controlled diabetics They found no statistically significant difference between the two groups. This is a similar outcome to the present study. However, on detailed analysis there are some methodological issues with the study by Aronovich et al.[11] They combined both Type 1 and Type 2 diabetics and did not have a non-diabetic control group. Thus, the present study looks at a homogenous group of Type 2 diabetics on oral hypoglycaemics and compares them to a non-diabetic

Group	Number	Mean Age (Years)	Gender		Mean Blood Sugar Level (Mmol/L)	Delayed Healing (N)
			M	F		
Non diabetics	100	42.6	63	37	5.2	10
Diabetics	100	48.9	48	52	7.5	8

Table-1: Mean age; gender; BGL; delayed healing

Blood Glucose Level	Diabetic	Non Diabetic
Below 7.8mmol/l	7 (0.07%)	10 (0.1%)
Between 7.8-11mmol/l	1 (0.01%)	0 (0%)
Above 11mmol/l	0 (0%)	0 (0%)

Table-2: Relationship Between Delayed Healing and BGL

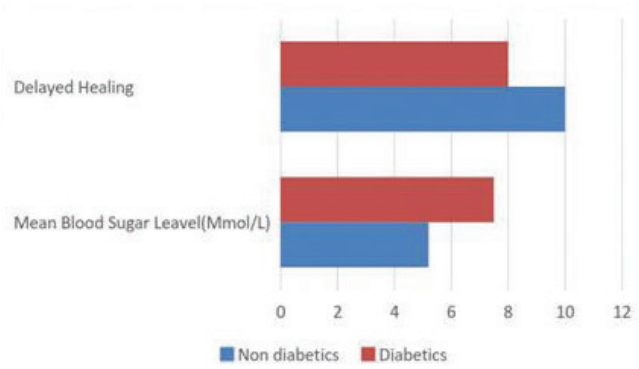

Figure-1: Mean BGL; Delayed healing

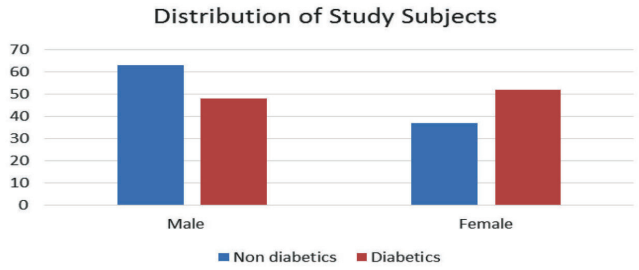

Figure-2: Distribution of study subjects

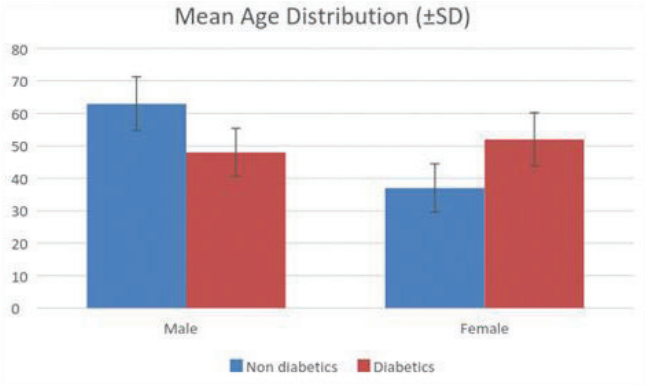

Figure-3: Mean Age Distribution

population treated by the same staff, in the same clinic over the same time period. This strengthens the specific value of the study to dental practice. Devlin H et al conducted a study in rats.Insulin-dependent diabetes mellitus was induced in a group of mature Sprague-Dawley rats by injecting streptozotocin. Control animals were injected with citrate buffer only. A third group of rats were also injected with streptozotocin, but the diabetes was controlled by daily injections of insulin. After 2 weeks, all of the rats underwent extraction of the right maxillary molar teeth under general anesthesia. The rats were killed at varying intervals and the maxilla and calvaria recovered in continuity. Tissue sections were stained with hematoxylin-eosin and periodic acid-Schiff (PAS), the latter to identify diabetic microangiopathy. they concluded that in insulin-dependent diabetes, the formation of the collagenous framework in the tooth extraction socket is inhibited, resulting in delayed healing and increased alveolar destruction.[14]

CONCLUSION

It is concluded that there is similar healing between Type 2 diabetics on oral hypoglycaemics and non- diabetic patients. Special precautions including warnings about adverse healing and prophylactic antibiotics for routine extractions are not required in such patients.

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