

Original Research Article

To Determine the Efficacy of Adrenaline in Local Anaesthetic amongst Diabetic subjects undergoing Dental Extraction

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ABSTRACT:

Background: Diabetes is of two types- Juvenile diabetes mellitus, which is genetic in type and there is autoimmune demolition of beta cells of pancreas and adult type diabetes mellitus in which there is body's conflict to insulin. Therefore, the aim of the present study is to evaluate the action of epinephrine in diabetic patient undergoing dental extraction. **Materials and methods:** The observational prospective study was conducted in the Oral and maxillofacial surgery Department in institute. The study enrolled a total of 200 subjects that reported to the hospital for the rationale of dental extraction. The study was conducted for a period of 8 months. Levels of glucose in blood were measured before administering local anaesthesia, after giving local anaesthesia and after extraction of teeth. The glucose levels were estimated using electronic glucometer. All the data was arranged in a tabulated form and analysed using SPSS software. The results were compared using student t test. **Result:** The patients were aged between 26-52 years. The mean age of the patients was 38.24 +/- 8.84 years. The mean levels of glucose before LA administration was 197.34 +/- 30.09 and after LA administration was 199.58 +/- 30.43. There was no significant difference in the glucose levels. **Conclusion:** Epinephrine exerts no significant action on healthy and diabetic patients.

Keywords: Adrenaline, diabetes, extraction, glucose.

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INTRODUCTION

Diabetes is one of the most commonly seen endocrine condition around the globe.¹ As per the WHO, in the year 2000, the prevalence of diabetes was 2.8% and it is approximate to increase to 4.4% by the end of year 2030.² Diabetes is of two types- Juvenile diabetes mellitus, which is genetic in type and there is autoimmune demolition of beta cells of pancreas and adult type diabetes mellitus in which there is body's conflict to insulin. The main aim while performing dental management is pain relief. It is provided by the use of local anaesthesia. Lignocaine is the frequently used anaesthetic solution as it has high efficacy, minimal allergy and toxicity.³ To increase the time of action of local anaesthetic agent, vasoconstrictors are generally added. There are various advantages of adding a vasoconstrictor.⁴ Addition of catecholamines give us with prolong anaesthesia⁵, decreases the absorption of the drug and hence decreases its toxic effects⁶. It also aids to provide a bloodless field of surgery.⁷ However there have been reports in the literature indicating that it leads to alteration in the plasma glucose levels.⁴ There have been various studies regarding

this but none of the studies provide us with a clear evidence. This is a topic of controversy. Therefore, the aim of the present study is to evaluate the action of epinephrine in diabetic patient undergoing dental extraction.

MATERIALS AND METHODS

The observational prospective study was conducted in the Oral and maxillofacial surgery Department. The study enrolled a total of 200 subjects that reported to the hospital for the rationale of dental extraction. The study was conducted for a period of 8 months. All the subjects were informed about the study and a written consent was obtained from all the subjects. Group I enrolled subjects with no medical history of diabetes. Group II enrolled diabetic subjects who were on anti diabetic drugs. Group III enrolled diabetic patients who didn't use any anti diabetic drugs. Each group consisted of equal number of subjects. Complete history like the demographic details was taken from all the patients. Past dental history and medical history were given special emphasis. Subjects were instructed to have usual meals before extraction and take their usual course of

medications. Levels of glucose in blood were measured before administering local anaesthesia, after giving local anaesthesia and after extraction of teeth. The glucose levels were estimated using electronic glucometer. Suturing was done in all subjects postoperatively. All the data was arranged in a tabulated form and analysed using SPSS software. The results were compared using student t test. Probability value of less than 0.05 was considered as significant.

RESULTS

The study was conducted involving 200 patients. The patients were aged between 26-52 years. The mean age of the patients was 38.24 +/- 8.84 years. Table 1 shows the mean glucose levels in healthy controls before and after administering LA. The mean levels of glucose before LA administration was 108.56 +/- 19.21 and after LA administration was 109.66 +/- 20.25. There was no significant difference in the glucose levels. Table 2 shows the mean glucose levels in amongst diabetic patients (on medications) before and after LA. The mean levels of glucose before LA administration was 197.34 +/- 30.09 and after LA administration was 199.58 +/- 30.43. There was no significant difference in the glucose levels. Table 3 shows the mean glucose levels in amongst diabetic patients (without medications) before and after administering LA. The mean levels of glucose before LA administration was 170.43 +/- 22.23 and after LA administration was 168.47 +/- 23.64. There was no significant difference in the glucose levels. Table 4 shows the mean glucose levels amongst healthy controls before and after extraction of third molar. The mean levels of glucose before extraction was 107.54 +/- 20.22 and after extraction was 106.49 +/- 20.25. There was no significant difference in the glucose levels. Table 5 shows the mean glucose levels amongst diabetic patients (on medications) before and after extraction of third molar. The mean levels of glucose before extraction was 196.34 +/- 29.20 and after extraction was 199.78 +/- 32.13. There was no significant difference in the glucose levels.

Table 1: Comparison of blood glucose levels amongst healthy controls before and after LA

Variable	MEAN +/- SD	Difference	P Value
Blood sugar level before LA administration	108.56 +/- 19.21	1.1	>0.05
Blood sugar levels after administration of LA	109.66 +/- 20.25		

Table 2: Comparison of blood glucose levels amongst diabetic patients (on medications) before and after LA

Variable	MEAN +/- SD	Difference	P Value
Blood sugar level before LA administration	197.34 +/- 30.09	2.24	>0.05
Blood sugar levels after administration of LA	199.58 +/- 30.43		

Table 6 shows the mean glucose levels amongst diabetic patients (without medications) before and after extraction of third molar. The mean level of glucose before extraction was 172.45 +/- 22.20 and after extraction was 225.66 +/- 43.35. There was significant difference in the glucose levels with p value greater than 0.05.

Table 3: Comparison of blood glucose levels amongst diabetic patients (without medications) before and after LA

Variable	MEAN +/- SD	Difference	P Value
Blood sugar level before LA administration	170.43 +/- 22.23	1.96	>0.05
Blood sugar levels after administration of LA	168.47 +/- 23.64		

Table 4: Comparison of blood glucose levels amongst healthy controls before and after extraction of third molar

Variable	MEAN +/- SD	Difference	P Value
Blood sugar level before extraction	107.54 +/- 20.22	1.05	>0.05
Blood sugar levels after extraction	106.49 +/- 20.25		

Table 5: Comparison of blood glucose levels amongst diabetic patients (on medications) before and after extraction of third molar

Variable	MEAN +/- SD	Difference	P Value
Blood sugar level before extraction	196.34 +/- 29.20	3.44	>0.05
Blood sugar levels after extraction	199.78 +/- 32.13		

Table 6: Comparison of blood glucose levels amongst diabetic patients (without medications) before and after extraction of third molar

Variable	MEAN +/- SD	Difference	P Value
Blood sugar level before extraction	172.45 +/- 22.20	53.2	<0.05
Blood sugar levels after extraction	225.66 +/- 43.35		

DISCUSSION

There is fewer information on the action of local anaesthesia on hemodynamic response of the human body.^{8,9} The present study evaluates the effect of local anaesthesia on the level of glucose amongst diabetic and healthy subjects. In this study we can clearly observe that there is no significant difference in the level of glucose before and after administration of local anaesthesia amongst all the two groups but significant difference was observed in glucose levels in Group III (without medications) before and after dental extraction. As per the study by Tily and Thomas in the year 2007¹⁰, they found that local anaesthesia with adrenaline should be used both amongst healthy and diabetic patients without any significant alteration in glucose levels. Significant alteration was observed amongst diabetic patients who were not on any medications after extraction in their study. As per a study by Khawaja et al¹¹, local anaesthesia can be safely and routinely given in diabetic patients taking medications and healthy patients. They also observed similar finding amongst

diabetic subjects who were not on any medications. As per the present study, The mean level of glucose before extraction was 172.45+/-22.20 and after extraction was 225.66+/- 43.35 amongst diabetic patients who did not take medications. There was significant difference in the glucose levels with p value greater than 0.05. According to a study by John and Meechan et al¹², epinephrine injection given at 10 and 20 minutes and compared with the baseline values of glucose amongst the subjects. They showed that there was significant increase in glucose levels amongst diabetic patients who were not taking any medicines. Thus indicating that the use of diabetic medications mask the effect of adrenaline on glucose levels. Sherwin et al¹³ theoretically proved that rise in blood glucose levels has been accompanied with administration of local anaesthesia with adrenaline amongst diabetic patients. Cryer et al¹⁴ and Ra et al¹⁵ have found out that both endogenous and exogenous catecholamine release has affected the insulin secretion amongst humans. As per the study by Mahima goel et al¹⁶, (2016) similar findings were observed. There was significant rise in glucose levels amongst diabetic patients who were not taking any drugs. According to a study by Ad et al¹⁷, addition of adrenaline to LA produces a prolonged anaesthetic effect, thus reducing the patient's stress and hence reducing the release of endogenous epinephrine.

CONCLUSION

Epinephrine exerts no significant action on healthy and diabetic patients. But in subjects with undiagnosed diabetes, the glucose levels increases significantly if LA with epinephrine is given to them for the purpose dental extraction.

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