

# To Assess the Changes in the Blood Glycemic Level among Diabetic Patients before and after Administration of Local Anesthesia Containing Adrenaline 1:80,000 for Dental Extraction in OMFS Department MGSDC Sri Ganganagar

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## ABSTRACT

In present scenario diabetes have appeared as common disease with prolonged dependence on state of body and inter related risks that make its management more difficult and requires more interdisciplinary approach. Glucose levels in diabetic patients have shown considerable variation with adrenaline used in local anesthesia. The aim of this research was to assess the varying levels of glycemic levels in patients with diabetic disorder before and after injecting them with local anesthesia containing adrenaline prior and after extraction of tooth.

**Key words:** Diabetic, Glycemic level, Oral surgery

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of glycemic level was measured after tooth extraction to assess the difference in glycemic levels pre and post extraction in patients under study.

## INTRODUCTION

Use of lidocaine in minor oral surgical procedures has been of immense help and its effectiveness has been varying depending upon number of factors. Addition of adrenaline shows an increase in its efficacy in controlling bleeding hence provide blood less field of surgery, also increase its anaesthetic action and absorption level [1-3].

Henceforth, addition of adrenaline allows greater time of action and more flexibility to perform minor oral surgical procedures. However addition of adrenaline to Lidocaine has shown the alteration in glycemic levels in diabetic patients.

The study by Christensen, while assessing effect of adrenaline on diabetic patients concluded that hypoglycemic medication taken by patients have shown effect of adrenaline on glycemic levels in those patients [4].

The aim of this research paper is to assess the changes in the blood glycemic level among diabetic patients before and after administration of local anesthesia containing adrenaline 1:80,000 for dental extraction. Also assessment

## MATERIALS AND METHODS

In this study 50 diabetic patients were selected randomly from OPD of OMFS (Oral and Maxillofacial Surgery) department MGSDC (Maharaja Ganga Singh Dental College and Research Centre) Sri Ganganagar. After an informed consent, procedure was duly explained to the patient and demographic details including age, gender and patient past medical history whether non-diabetic or diabetic was also recorded (Table 1).

The inclusion criteria followed in study was if patient had known history of diabetes and whether he/she was on medications for diabetes, and if diabetic, whether medication is taken or not on the day of extraction. This inclusion criterion was strictly followed for all the patients in our study.

Exclusion criteria taken were to rule out any other medical problem except diabetes in all patients under study.

Further the procedure that was followed to measure glycemic level in our patients was by using Acucheck glucometer as per the instructions laid down by manufacturer. During procedure a gentle prick was given on tip of patients finger and sample of blood under sterile

conditions was taken and placed it over the strip, and accordingly the blood glycemic level before the administration of local anesthesia containing adrenaline (1:80,000) was recorded as marked in Table 1, then next

reading was taken after 3 min–5 min of administration of local anesthesia. Last reading was measured after 5 min of the complete procedure to assess the glycemic levels after extraction of the tooth.

**Table 1: Demographic profile of diabetic patients**

Total No. of patients	Age of patients (years)	Gender	Pre-operative glycemic levels before local anaesthesia <sup>1</sup>	Post-operative glycemic levels after local anaesthesia <sup>2</sup>	Post extraction glycemic levels <sup>3</sup>	Past medical history
1	27	M	123	120	128	-
2	29	M	134	134	130	No medication
3	56	M	140	148	1	-
4	19	M	150	168	140	-
5	24	M	188	198	230	No medication
6	32	M	127	120	122	-
7	44	M	124	130	138	-
8	44	M	140	138	138	-
9	55	M	166	168	176	-
10	30	M	173	193	210	No medication
11	30	M	180	190	197	-
12	38	M	198	196	194	-
13	36	M	210	214	220	-
14	42	M	122	120	128	-
15	39	M	140	144	154	-
16	49	M	185	193	250	No medication
17	35	M	144	186	245	No medication
18	46	F	147	196	207	No medication
19	22	M	198	217	224	No medication
20	26	M	128	128	130	-
21	34	M	160	166	140	-
22	44	M	177	179	198	No medication
23	56	M	187	196	224	No medication
24	43	M	220	214	218	-
25	35	M	190	173	155	No medication
26	51	F	198	198	210	-
27	40	F	211	214	210	No medication
28	40	F	180	190	212	-
29	49	M	142	144	189	-
30	56	M	142	155	150	No medication
31	26	M	174	173	176	-
32	42	M	128	147	174	-
33	46	F	147	146	180	-
34	27	M	190	198	188	-
35	69	M	126	149	190	-
36	40	M	140	141	142	-

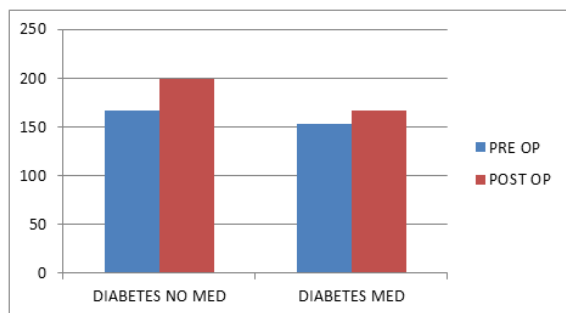
37	33	M	129	123	120	-
38	35	M	119	116	128	-
39	39	M	130	133	134	-
40	43	M	126	127	135	-
41	27	M	123	158	207	No medication
42	39	M	163	175	212	-
43	26	M	180	188	216	-
44	39	M	118	120	128	-
45	22	M	140	175	209	No medication
46	32	M	137	140	180	No medication
47	44	M	179	189	198	No medication
48	42	M	187	198	208	No medication
49	34	F	182	196	222	No medication
50	44	F	182	192	194	-

<sup>1</sup>Denoted for pre-anesthesia, <sup>2</sup>For post-anesthesia, <sup>3</sup>For post-extraction; M: Male, F: Female

Armamentarium used: a) Acucheck Glucometer; b) local anesthesia (1.8 ml Capsule); 2% lidocaine with adrenaline in 1:80,000 concentrations; c) Sterile gauze & Alcohol swab

**RESULTS**

The results of our study showed that mean sugar level was 152.72 (SD 29.32) before and 167.21 (SD 34.22) after tooth extraction in 33 (66%) diabetic patients with hypoglycemic medications and 167.21 (SD 34.22) before and 198.94 (SD 29.94) after tooth extraction in 17 (34%) diabetic patients without hypoglycemic medications (Table 2 and Figure 1).



**Figure 1: Difference of varying blood glycaemic level in diabetic patients as seen before and after the procedure**

Also it was concluded that mean sugar level was 152.72 (SD 29.32) before and 157.54 (SD 30.43) after injecting lidocaine with adrenaline (1:80,000) in 33 (66%) diabetic patients who were on hypoglycemic medications and 166.88 (SD 26.60) before and 181.82 (SD 23.60) after Lidocaine with adrenaline in 17 (34%) diabetic patients without hypoglycemic medications (Table 3 and Figure 2).

**Table 2: Mean sugar level in diabetic patients with and without hypoglycemic medications**

Type of patient	Diabetics (with medication) (N=33)		Diabetics (without medication) (N=17)	
	Mean	S.D	Mean	S.D
Pre-operative glycaemic levels before LA	152.72	29.32	166.88	26.6
Post extraction glycaemic levels	167.21	34.22	198.94	29.94
Difference	9.49	4.9	32.06	3.34
p-values (paired t-test)	p>0.05		p>0.05	
Interpretation	Not significant		Not significant	

**Table 3: Mean sugar level before and after injecting lidocaine with adrenaline (LA) in diabetic patients with and without hypoglycemic medications**

Type of patient	Diabetics (with medication) (N=33)		Diabetics (without medication) (N=17)	
	Mean	S.D	Mean	S.D
Pre-operative glycaemic levels before LA	152.72	29.32	166.88	26.6
Post-operative glycaemic levels after LA	157.54	30.43	181.82	23.6
Difference	4.82	1.11	14.94	3
p-values (paired t-test)	p>0.05		p>0.05	
Interpretation	Not significant		Not significant	

From this study it was concluded that no significant changes in glycaemic levels of diabetic patients on medication were noticed before or following tooth extraction. However noticeable and significant change in glycaemic levels after injecting lidocaine with adrenaline was seen in diabetics who had not taken medication.

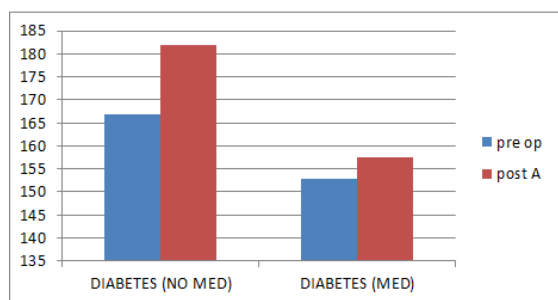


Figure 2: Difference of varying blood glycaemic level in diabetic patients as seen before and after the local anaesthesia

## DISCUSSION

Very few studies are available on effect on local anesthesia on metabolic and cellular functioning of the human body [5,6]. According to a recent research, acute short-term hyperglycemia has shown to change immunity and alter host response to infection [7].

Further it's seen that lowering of nitric oxide formation in endothelium further decrease the tissue reaction to dilating agents like Bradykinin and in this way it hampers function of component system even though complement factors have shown increase in levels [7,8].

Acute hyperglycemia pricks up hyperinsulinemia (which increases the circulating cytokine concentrations) and these effects are more pronounced in sepsis with impaired glucose tolerance. This suggests a potential modulation of immunoinflammatory responses in human sepsis by hyperglycemia [9]. On the other hand, in the healthy patients, literature suggests that there is a rise in blood glucose levels, but this increase in glucose is slight compared to the increase in diabetes [10-13].

The results of this study concluded that patients suffering from diabetic disorder who had their hypoglycemic medication taken regularly, no significant ( $p > 0.05$ ), change in glycaemic levels was seen after administration of LA as well as after extraction of their tooth. However, the only significant ( $p < 0.05$ ) change in glycaemic level was seen in diabetic patients who had not taken their hypoglycemic medication prior to tooth extractions.

A study done by Meechan [1] on whether addition of adrenaline in local anesthesia cause any variation in blood glucose levels in group which was not undergoing any stress compared with a group which was undergoing third molar surgery (supposedly stressed) showed that the results observed in both were similar: A significant increase in blood glucose levels. Thus, although endogenous adrenaline would inevitably be released due to stress (and may be playing a role in varying the glycaemic levels), the effect of the exogenous epinephrine is undoubtedly, very significant.

Even though Meechan observed significant alterations in glycaemic levels after 20 min of adrenaline administration, they did not mention anything about the anti-diabetic therapy status of the patients included in their study [14].

Some studies suggest that even general anesthesia increase the blood glucose levels significantly [15]. Clarke et al. [16] assessed blood glucose levels in females undergoing minor gynecological procedures under general anesthesia and concluded that the rise of levels is more likely due to stress generated because of surgery [16-18].

## CONCLUSION

It could be concluded from the study that adrenaline in local anesthesia doesn't have any considerable effect on glycaemic levels of diabetics on medication; however it causes significant increase in glycaemic levels in diabetics who didn't take medication. Thus it is imperative to take detailed history and seek consult of physicians in diabetic patients before undergoing dental surgical procedures.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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