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Adrenaline and Nor Adrenaline Effect on Blood Glucose Level in Diabetic Patients

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ABSTRACT

Aims: This study was conducted to find the effect of adrenaline and nor adrenaline containing local anesthesia on the blood glucose level on non insulin dependent diabetic patients. **Materials and Methods:** Thirty patients were given 1.8ml of 2% lignocaine containing 1:100000 adrenaline as infiltration local anesthesia intraorally, and other thirty patients received 1.8ml of 2%lignocaine containing 0.072mg of nor–adrenaline in the same manner. Fasting blood sugar was measured before the administration of local anesthesia and 30 minutes after the administration of local anesthesia. **Results:** There were no significant differences in blood glucose level measured before and after the injection of adrenaline containing local anesthesia. However, there were significant differences between the results obtained with nor–adrenaline containing local anesthesia, where there is a significant increase in blood glucose level 30 minutes after the injection of local anesthesia. **Conclusions:** The administration of anesthesia containing adrenaline has no effect on blood glucose level of diabetic patients. While administration of anesthesia containing nor adrenaline cause a significant effect (hyperglycemic effect) in those patients.

Key Words: Adrenaline, nor adrenaline, diabetic patients.

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INTRODUCTION

The administration of local anesthesia during dental treatment such as simple tooth extraction to help in pain controlling during dental operation and to control postoperative pain, and the use of vasoconstrictor containing solution also aids heamostaises [1,2].

The systemic effect attributed to the injection of local anesthesia solutions have been the subject of discussion for many years[3–6]. Most of the debate, have been concerned with the hemodynamic effect of vasoconstrictor component in both healthy and medically compromised patients, evidence suggest that a quantities of adrenaline injected routinely during oral surgery procedure can produce biochemical changes in healthy volunteers [7, 8] and in patients having third molar surgery under local aneasthesia[9].

It was a purpose of the present study to investigate biochemical effect of adrenaline and nor–adrenaline containing lignocain local anesthesia solution when used in clinical doses on fasting blood glucose level in non insulin dependence diabetes mellitus patients.

MATERIALS AND METHODS

The study sample consisted of 60 volunteers of non insulin dependence diabetes mellitus patients (NIDDM). All patients selected were collected from Al–Waffa diabetic clinical center in Mosul city. Patients were on oral hypoglycemic agents and their blood glucose level was controlled .

A double blind study was conducted in which 1.8ml of lignocaine containing adrenaline 1:100,000 was given to 30 patients as infiltration intraorally anesthesia opposite the apex of upper first premolar, those patients were recorded as group I.

The other 30 patients were received 1.8ml of lignocaine containing 0.072mg of nor adrenaline as infiltration intraorally at the same site as group I, those patient were considered as group II. Fasting blood glucose level was recorded before the administration of local anesthesia and 30 minutes after the injection of local anesthesia. Determination of blood glucose level was achieved by digital computerized device, drop of blood sample was obtained from the ventral surface of thumb.
Statistical analysis was performed using Student's t–test to measure significant difference of changing within and between group of <0.05.

RESULTS

The total numbers of volunteers upon which the study is designed were 60. These are selected randomly in age and sex, after the coded carpools are advocated it have been shown that the carpool coded A represent vasoconstrictor in local anesthesia with Nor adrenaline, code B represent vasoconstrictor with adrenaline.

The number of patients operated on in group I 30 (14 males and 16 females) the age range 26–65 years the mean age 50.5±8.16 (Table 1). The number of patients operated on in group II 30 (18 males and 12 females) the age range 30–65 years the mean age 52.63±9.03(Table 2).

Table (1): Sex distribution and mean age of patient in group I.

Sex	**Male**	**Female**	**Total**
No. of patients	14	16	30
Age (26–65) years	**Mean ± SD**		
	50.4± 8.16		

SD: Standard deviation

Table (2): Sex distribution and mean age of patient in group II.

Sex	**Male**	**Female**	**Total**
No. of patients	18	12	30
Age (30–65) years	**Mean ± SD**		
	52.63± 9.03		

SD: Standard deviation

Student's t–test showed that there were significant difference in patients group I before and after intra oral injection of local anesthesia *P*–0.001 (Table 3).

Student's t–test showed that there were no significant difference in patients group II before and after intra oral injection of local anesthesia p>0.05 (Table 3).

Table (3): Comparison between blood glucose level in Group I, and Group II pre and postoperatively.

Group tested	**Mean ± SD**	
	Preoperatively	Postoperatively
Group I	7.75± 2.78	10.59± 3.69*****
Group II	11.43± 4.85	12.68±4.61

SD: Standard deviation

DISCUSSION

The investigation was designed to identify systemic effect of adrenaline and nor adrenaline containing local anesthesia on blood sugar level in non insulin depended diabetic patient.

There was no statistical significant increases of blood sugar level in patients received adrenaline containing local anesthesia these results were in agreement with Meechan *et al*.,[10]. However there was a significant rise in
blood glucose level 30 minutes after the injection of "nor adrenaline containing lignocaine this finding was in agreement with Rodrige *et al*.,[11] they found an increase in blood glucose as early as 5 minutes after nor adrenaline injection locally into the medial preopetic area (MPOA) a plasma glucose rose 2–3% of the basal value reading a peak at 15 minutes 20.6% of a basal value. In this study, the blood sample was obtained 30 minutes after the injection of local anesthesia to obtain the maximal level of changing in blood glucose level.

The explanation of these results where the injection of adrenaline cause no significant changes in blood glucose in that adrenaline had greater affinity in increases glucogenolysis and lipolysis through activation of β_1 receptor and decrease glucose utilization, increase insulin secretion and increase glucagon secretion through β_2 receptor[12].

Nor adrenaline increase the sympathatic out flow expressesd by a neurally mediated hyperglyceamia and insulin inhibition related to presynaptic α_2 receptor activation[11].

Nor adrenaline possesses a higher affinity than adrenaline in increasing gluconeaogenesis through α_1 agonist and greater affinity in decreasing insulin secretion by stimulation of α_2 receptor[13,14].

CONCLUSIONS

Nor adrenaline containing lignocain found to increase Significantly fasting blood glucose level in non insulin depended diabetic mellitus patients while adrenaline containing lignocain produced no significant changes.It's highly recommended that the percussion of the use of nor adrenaline contains local anesthesia solution in non insulin depended diabetic mellitus patients in order to avoid hyperglycemia.

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