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To Compare the effects of different drugs on blood glucose during general anesthesia.

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Abstract

The level of glucose that is present in the blood is known as blood glucose level. Normal random sugar values are ≤ 140 mg/dl (7.8 mmol/L). The normal fasting blood glucose level is < 100 mg/dl. When glucose levels in the blood are elevated, it is referred to as hyper glycemia (level higher than 11.1mmol/L or 200mg/dl, while a low concentration of glucose is known as hypo glycemia.

Aim: To compare the effect of various drugs used for general anaesthesia on blood glucose levels.

Material and method: A prospective cohort study, comparative clinical work was done in the department of anaesthesiology at SGT College, Budhera, Gurugram, Haryana during the year 2020-2021.

In this study a total number of 60 non-diabetic patients were enrolled and divided into two groups of 30 patient in each group. Group A patients were given GA with oxygen+ nitrous oxide+ propofol+ fentanyl + atracurium + isoflurane. Group B patients were given GA with oxygen+ nitrous oxide + propofol + nalbuphine + vecuronium + isoflurane. RBS was monitored before induction, after 30 minutes of induction, at the end of the procedure and after half an hour shifting the patient in PACU.

Results: In the study on demographic comparison of age, sex, there is no significant p value. On com parison of group, A HR, BP and SPO2 were compared and p value was highly significant for systolic and diastolic BP (p value 0.001) and heart rate was also significant (p value 0.007) as compared to group A and group B before intubation, after operation there was no significant difference (p value was non-significant).

Conclusion: It conclude that both the groups observed increase in RBS levels post operatively and near extubation. We conclude that in this study inhalation drugs, induction agents used for giving general ana esthesia and increases RBS levels depending on duration of surgery.

Keywords: Glucose, Hyper glycaemia, Propofol.

Introduction

The normal level of glucose that is present in the blood are ≤ 140 mg/dl (7.8 mmol/L). The normal fasting value is < 100 mg/dl. When glucose levels in the blood are elevated, it is referred to as hyperglycemia (level higher than 11.1mmol/L or 200mg/dl, while a low con centration of glucose is known as hypo glycemia.

In the skeletal muscles and liver cells the glucose is stored as glycogen. Insulin decreases movement of glucose from liver to blood and also promotes its removal from blood into liver, muscle and fat. There are 4 gram of glucose circulating in the blood of a person weighing 70 kg[1].

Patients induced under general anaesthesia had shown higher blood glucose levels than local and epidural anaesthesia. General anaesthesia is most widely used technique during surgery. Opioids/ Analgesics during surgery are used to prevent a metabolic and hormonal response to surgery[2].

Insulin and cortical secretion are decreased with benzodiazepines. It has been suggested that glucose tolerance is impaired and insulin secretion is inhibited with volatile anaesthetics, resulting in peri-operative hyper glycemia and blood glucose levels decreases with high dose of propofol infusion. It is beneficial to reduce post operative mortality, hospital stay & post-op com plications if blood glucose levels are controlled effectively[3].

Blood glucose is one the parameter for safety of the patients. After induction and during surgery there was a rise in blood sugar level in patients operated under ether anaesthesia. Any change in blood glucose level may be due to anxiety, hyper ventilation or hypo ventilation and light anaesthesia[4].

Post-operative high levels of blood glucose are associated with bad prognosis, including wound infection, pneu monitis, and CVS events. Hyper glycemia causes glucose toxicity that leads to beta cell disability and leading to Diabetes mellitus (DM)[5].

Surgical stress is characterized by increased cortisol levels in plasma and also raises blood glucose levels. Studies shows that various anaesthesia methods have diverse effects on glucose levels of blood. To overcome com plications due to hyper glycemia or hypoglycemia during surgeries, it is likely required to reduce the effects of ana esthetics and various other types of muscle relax ants on glucose level. One study shows that there is no direct effect of muscle relaxants on blood glucose levels[6].

Hence to conclude the same study was done to differentiate the effects of sedation along with relaxant methods that is (propofol + fentanyl + atracurium + and propofol + nalbuphine + vecuronium) on blood glucose levels.

Material and methods

A planned, comparative clinical work was conducted in Anaesthesiology department at SGT Medical College, and Research Institute Budhera, Gurugram, Haryana, during 2020- 2021.The study was done after the approval from the ethical committee.

In this study total number of sixty non-diabetic candidates were enrolled. Informed consent was taken from each patient before including in the trial. Victims were divided into two groups. 30 patients in each group.

Group A patients were given GA with oxygen+ nitrous oxide+ propofol+ fentanyl + atracurium + isoflurane.

Group B patients were given GA with oxygen+ nitrous oxide + propofol + nalbuphine + vecuronium + iso flurane.

RBS was monitored before induction, after 30 minutes of induction, at the end of the procedure and after half an hour shifting the patient in PACU.

Inclusion criteria

Patients aged between 18-60 years. Patients undergoing general anaesthesia, Patients with American Society of Anaesthesio logists (ASA) grade I and II. Non-diabetic patients. Duration of surgery more than 1 hour

Exclusion criteria

Emergency cases were excluded to maintain standard conditions. Patients aged above 60 and below 18 years, Pregnant and Diabetic.

Methodology

A thorough pre anaesthetic evaluation was done prior to the surgery. An informed consent was taken every patient. Preoperative check-up was done, included investigations. Preoperative fasting for 6 hours was ensured. All patients were given alprazolam 0.5 mg at night-time along with 0.25mg in the morning of the surgery.

Intra-operative

Following arrival in the OR following parameters were monitored: ECG, Non-invasive blood pressure (NIBP), Pulse oximetry.

After securing the I.V. line, first blood sample was taken just before the premedication (Sample 1). Glucose values estimation was done using glucometer. Ringer lactate was the choice of fluid connected to the IV line. Dextrose and normal saline infusion were not used during the study duration.

Recording of pulse, SpO2 and NIBP will be done. All the patients were pre-medicated before surgery with IV inj. Midazolam 0.02mg/kg, injection.

Glycopyrrolate 0.2 mg & Inj. fentanyl 1.5 mcg/kg in Group A and instead of fentanyl Inj. Nalbuphine 0.25 mg/kg in Group B.

All the patients were extubated and shifted to post anaesthesia care unit & last blood sample was obtained half hour after shifting to post anaesthesia care unit (Sample 4). Data was tabulated and analysed.

Statistical analysis

All the parameters were recorded in the proforma and statistically analysed at the end of study using SPSS Software, Graph pad prisms software and p-value was calculated.

The results gained from both the groups were equated by utilising repeated measures ANOVA.

The f-test, student t-test was used to compare between the two groups and p value was obtained from the logarithm of probability**.**

Result

In our study percentage of participants as per gender (Table 1), age and duration of surgery (Table 2) was calculated and p value was in-significant (0.524 and 0.995 respectively).

In our study in group A HR, BP and SPO2 (Table 3) were compared and p value was highly significant for systolic and diastolic BP (p value 0.001) and heart rate was also significant (p value 0.007).

In our study in group B HR, BP (Table 4) they are highly significant (p value 0.001) as compared to group A. In the present study in group A, RBS reading is comparable and were highly significant (Table 5). In group B also reading was comparable and was highly significant.

Table 1: Distribution of study partici pants according to the gender.

Gender	Frequency (%) Group A	Frequency (%) Group B
Male	12(40%)	7(23%)
Female	18(60%)	23(77%)

Table 2: Distribution according to age and duration of surgery.

	Mean ± SD	**Mean ± SD**	**t-value**	**p-value**
Age	40.23 ± 11.20	38.33 ± 11.77	0.64	0.524ns
Duration of surgery	89.47 ± 21.25	89.43 ± 18.59	0.006	0.995ns

Table 3: Heart rate, BP, Spo2 comparison ingroup A.

	Before	After	At the end of Surgery	Post OP	F-value	P-value
Group A	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
Heart Rate	82.53 ± 8.06	81.10 ± 8.24	79.37 ± 7.98	76.37 ± 5.56	4.26	0.007*
BP Diastolic	76.27 ± 11.11	59.10 ± 8.26	78.73 ± 8.56	72.77 ± 6.92	33.3	0.001**
BP Systolic	109.20 ± 9.22	85.97 ± 10.30	110.27 ± 9.99	120.73 ± 6.73	116.24	0.001**
SPo2	99	99	99	99	-	-

Table 4: Heart rate, BP, spo2 comparison in group B.

	Before	After	At the end of Surgery	Post OP	F value	P-value
Group B	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
Heart Rate	79.87 ± 5.58	84.27 ± 5.11	83.77 ± 4.76	78.27 ± 4.15	17.07	0.001**
BP Diastolic	78.60 ± 7.65	64.63 ± 8.01	80.90 ± 5.74	75.40 ± 5.77	43.59	0.001**
BP Systolic	103.07 ± 9.41	79.87 ± 7.86	110.73 ± 11.72	122.83 ± 7.14	113.29	0.001**
SPo2	99	99	99	99	-	-

Table 5: RBS reading before intubation, after intubation, before surgery and after surgery.

	Before	After	At the end of Surgery	Post OP	F-value	P-value
Group A	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
RBS	104.70 ± 4.39	74.57 ± 6.97	126.93 ± 10.39	135.33 ± 9.13	410.43	0.001**
Group B	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
RBS	104.13 ± 4.79	74.50 ± 10.58	125.87 ± 10.56	137.87 ± 8.11	343.14	0.001**

Table 6: RBS reading compared between group A and group B during surgery there was no significant difference (p value was non-significant).

RBS (before Intubation)	Mean ± SD	t-value	p-value
Group A	104.70 ± 4.39	0.477	0.635ns
Group B	104.13 ± 4.79		

RBS (after Intubation)	Mean ± SD	t-value	p-value
Group A	74.57 ± 6.97	0.029	0.977ns
Group B	74.50 ± 10.58		
RBS (at the end of surgery)	Mean ± SD	t-value	p-value
Group A	126.93 ± 10.38	0.395	0.695ns
Group B	125.87 ± 10.56		
RBS (post op)	Mean ± SD	t-value	p-value
Group A	135.33 ± 9.13	1.137	0.260ns
Group B	137.87 ± 8.11		

Discussion

The work aimed to assess the outcome on RBS levels post during various stages of general anaesthesia. Significant difference was observed in both the groups. We assume that anaesthesia has a role in altered blood sugar levels.

Xiong-XH et al[3] did a mixed, double blinded study using intravenous along with inhalational anesthesia effect on blood sugar levels and its problem in type two diabetes mellitus and they concluded that inhalation anesthetics produce impaired sugar toleration along with insulin production. They also concluded that excessive dose of propofol infusion can decrease blood glucose levels as the same we observed in our study also immediately post giving propofol. RBS levels were reduced progressively with increasing duration of surgery and with use of inhalation drugs RBS levels increased. Akavipat p et al[7]conduct a study to compare blood glucose levels between isoflurane and desflurane and concluded that inhalational agents cause increase in blood glucoses level and their study was comparable with our study.

Nishiyama T et al[8] conducted a study and concluded that blood glucose levels are increased with increasing the stress exposure time during surgery under GA and this study was comparable with our study, as with increased in duration of surgery there was increases in RBS levels also. As per Akavita p et al[7] there was no significant changes in hemodynamic response will found and was comparable with our study as there were no such significant changes in hemodynamic variables. In the present report, the conclusion of increase in BP and HR during the time of induction is in agreement in the two groups with Baris et al[9]Marana E et al[10]concluded through their study that they didn't calculate the values of hormonal levels, catecholamines plasma value, it was supposed that the systemic metabolism before surgery was the same. Hence, the sugar values in the blood are inspired by neuro hormonal stress response after under going anaesthesia and surgery principally.

Tanaka T et al.[11]conducted a study and concluded that isoflurane anaesthesia impairs glucose tolerance to 1.5 MAC and as per our study it was compared as there was significant increase in blood sugar levels after giving inhalation anaesthesia i.e isoflurane and after giving fluids which was comparable with our study. J. Lund et al[12] also conducted a study and stated that the blood sugar concentration in the GA group increased significantly during surgery in contrast to a moderate and short-lived increases in patients receiving extradural analgesia which was also comparable with our study.

Conclusion

From the present study, we can conclude that both the groups observed increase in RBS levels post operatively and near extubation.

Hence, we conclude that in our study inhalation drugs and induction agents used for giving general anaesthesia and increases RBS levels depending on duration of surgery.

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