Original Paper

INFLUENCE OF PREOPERATIVE FASTING TIME ON MATERNAL AND NEONATAL BLOOD GLUCOSE LEVEL IN ELECTIVE CAESAREAN SECTION UNDER SUBARACHNOID BLOCK

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Abstract

Introduction: **Pre-operative fasting period is poorly monitored in developing countries though it may lead to critical consequences especially in the parturient women and their neonates.**

Objective: **In this prospective randomized study, conducted over a period of six months, influences of pre-operative fasting time on maternal and neonatal blood glucose level in elective caesarean section under sub-arachnoid block was observed.**

Methods: **Three equally sized (n=20) groups with different pre-operative fasting period (Group A: 4 hours, Group B: 6 hours and Group C: 7.9±1.15 hours) were taken into consideration. Maternal blood glucose level was measured on day before operation (as baseline), on day of surgery before starting infusion and just after baby delivery. Neonatal umbilical cord blood glucose just after delivery was also measured by strip method.**

Results: **Baseline blood glucose level of group C mother was 5.41±0.43 mmol/L, whereas glucose level before starting infusion and just after deliver was 4.46±0.45 mmol/L and 4.60±0.39 mmol/L respectively. In group A and group B, these changes were not significant ($p>0.05$). There was marked reduction in maternal blood glucose level in group C ($p<0.001$). Neonatal blood glucose level was reduced in all three groups as compared to placental circulation concept (70-80% of placental flow). No mother or neonate showed critical hypoglycaemia (in mother <4.0 mmol/L and in neonate <2.5 mmol/L). Highly significant inverse correlation was observed between maternal fasting time and blood glucose before starting infusion ($r= 0.706$, $p <0.001$), and maternal blood glucose and neonatal cord blood glucose level ($r= -0.937$, $p <0.001$).**

Conclusion: **Though, no significant correlation could be detected between maternal fasting time and neonatal blood glucose level ($r= -0.196$, $p >0.05$) neonatal blood glucose level was reduced in group C.**

Key words: **Pre-operative fasting time, caesarean section, sub-arachnoid block, neonatal cord blood glucose**

Introduction

The ritual of nil per os (NPO) for clear fluids and solids from midnight on the night prior to anaesthesia has been practiced since long. Most practitioners usually follow American Society of Anaesthesiologists (ASA) guidelines in giving NPO order for elective operations. It is usual to deny all oral intakes for up to four and preferably six hours before an operation[1,2]. Although there are recommendation of allowance of clear fluid intake 3 hours prior to surgery, patient with full term pregnancy seem to be in improper condition as they have increased intra-abdominal pressure with more chance of regurgitation.

During adopting fasting order, there are some potential problems that may prolong the fasting time. One of the most common problems is the failure to comply fasting order by nursing or care-giving staffs in ward. Another difficult situation is arrangement in operation list. Those who are scheduled for afternoon surgery may be feared of prolonged fasting due to unpredictability in listing[3-5]. So most of these patients are starving and have the prolonged fasting time before anaesthesia for caesarean section is conducted in the next morning.

Hypoglycaemia is the most feared complication of prolonged fasting and may occur in pregnancy. Foetal blood glucose is directly proportional to maternal blood glucose level. Their blood glucose level is about 70-80% of those in maternal venous plasma. This ultimately depends upon uterine blood flow. Prolonged fasting may cause hypotension that reduces perfusion pressure, thus causing foetal hypoglycaemia if a critical level is reached[6,7].

The present study was intended to identify the influence of maternal fasting time on maternal and neonatal blood glucose level in elective caesarean section under sub-arachnoid block.

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Materials and Methods

This prospective study was carried out in the Department of Anaesthesiology and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from July to December 2004. Formal approval was obtained from the ethical committee of BSMMU. Informed consent was also taken from each of the study subject.

Sixty full term pregnant women scheduled for elective caesarean section under sub-arachnoid block (SAB), were allocated randomly by card sampling method into three groups viz. Group-A, Group-B and Group-C. Group-A mothers fasted for four hours, Group-B for six hours and Group-C for more than six hours but not exceeding nine hours. There were twenty patients in each group. Fasting blood glucose level of all subject mothers were estimated on the day before surgery as baseline value. After proper pre-anaesthetic check-up, on the day before surgery, all patients were advised to take fruit juice (250 ml of mango juice) and light meal (two pieces of sliced bread and one cup of milk) before starting fasting order. There was no intravenous fluid infusion throughout the fasting period. All patients were kept in close observation by trained staffs.

On the day of operation, before starting intravenous fluid infusion, the duration of preoperative fasting time were recorded and blood sample from mother were taken for glucose measurement by strip method. Middle finger of mother was punctured aseptically and after swabbing first drop of blood with cotton, next drop of blood were taken on the strip of glucometer ('OMNITEST OZ' made in Malaysia). Then infusion was started with non-glucose containing fluid (normal saline). After preloading with 15 ml/kg of normal saline over 30 minutes, all mothers were anaesthetized by SAB with heavy Inj Bupivacaine 0.5% (drug volume was calculated as per body weight and height of the patient). Cord blood sample was taken just after baby delivery to measure neonatal blood glucose with the same strip method. After delivery of baby, another blood sample from mothers was taken for glucose measurement. All the values were recorded on a preformed data sheet. Throughout the operative procedures standard techniques for anaesthetic management were applied to all study subjects.

Data were processed and analyzed by SPSS version 11. Analysis of Variance (ANOVA) was done to compare the mean measurements in different groups. Pearson's correlation coefficient was calculated to see the correlation of selected measurements.

Results

There are no significant differences in age, body weight, height and ASA grading (I- II) of the patients (Table-I). Maternal blood glucose level on the day of operation before starting infusion (4.46±0.45 mmol/L) was markedly reduced ($p<0.001$) from the baseline value (5.41±0.43 mmol/L) in group C mother (Table II)

Table-I: Patients' characteristics.

Characteristics	Group A (n=20)	Group B (n = 20)	Group C (n = 20)	P value
Age (in years)	27.20±3.14	25.95±3.80	26.85±4.34	>0.05
Body weight (in kg)	63.80±4.37	61.50±3.46	64.45±3.91	>0.05
Height (in cm)	156.25±3.49	152.65±4.04	155.35±4.0	>0.05
ASA grade I : II	18:2	16:4	16:4	

Table -II: Maternal blood glucose level at different timing.

Maternal blood glucose (mmol/L)	Group A (n= 20)	Group B (n = 20)	Group C (n = 20)	p value
Day before operation	5.45±0.41	5.41±0.49	5.41±0.43	>0.05
Day of operation before starting infusion	5.50±0.89	5.41±0.47	4.46±0.45	<0.001
After delivery	5.66±0.76	5.68±0.43	4.60±0.39	<0.001

Table -III: Neonatal blood glucose level (just after delivery).

	Group A (n= 20)	Group B (n = 20)	Group C (n = 20)	p value
Neonatal blood glucose (just after delivery); mmol/L	4.10±0.32	4.14±0.37	3.23±0.44	<0.001

But in other groups, these changes were relatively less ($p>0.05$). Neonatal blood glucose just after delivery (Table-III) of group C (3.23±0.44 mmol/L) was reduced more ($p< 0.001$) than that of other two groups (group A 4.10±0.32 and group B 4.14±0.37 mmol/L). Maternal preoperative fasting time was highly ($p<0.001$) variable in group C (Table-IV). But in other groups it was fixed. There was highly significant correlation ($p<0.001$) between maternal fasting time and fasting blood glucose just before starting infusion (Table-V) and between maternal blood glucose before starting infusion and neonatal blood glucose (Table-VI) in the same group.

Table -IV: Maternal preoperative fasting time.

	Group A (n= 20)	Group B (n = 20)	Group C (n = 20)	p value
Maternal preoperative fasting time in hours	4	6	7.9±1.15	<0.001

No significant correlation ($p>0.05$) between maternal preoperative fasting time and neonatal blood glucose was observed (Table-VII) in all three groups.

Table-V: Correlation coefficient between maternal preoperative fasting time and blood glucose level.

		Maternal fasting time	Maternal blood glucose
Maternal fasting time	Pearson's Correlation	1	-0.706*
	Significance (2-tailed)		0.000
	n	60	60
Maternal blood glucose before starting infusion	Pearson's Correlation	-0.706*	1
	Significance (2-tailed)	0.000	
	n	60	60
Correlation Coefficient * r= -0.706 and p < 0.001			

Table-VI: Correlation coefficient between maternal blood glucose before starting infusion and neonatal blood glucose level.

		Maternal blood glucose	Neonatal blood glucose
Maternal blood glucose, before starting infusion	Pearson's Correlation	1	0.937*
	Significance (2-tailed)		0.000
	n	60	60
Neonatal blood glucose	Pearson's Correlation	0.937*	1
	Significance (2-tailed)	0.000	
	n	60	60
Correlation Coefficient *r=-0.937 and p <0.001			

Table-VII: Correlation coefficient between maternal preoperative fasting time and neonatal blood glucose level.

		Maternal fasting time	Neonatal blood glucose
Maternal fasting time	Pearson's Correlation	1	-0.196*
	Significance (2-tailed)		0.407
	n	60	60
Neonatal blood glucose	Pearson's Correlation	-0.196*	1
	Significance (2-tailed)	0.407	
	n	60	60
Correlation Coefficient *r= - 0.196 and p >0.05.			

Discussion

Labour, mode of delivery and pretreatment of the mother are important factors affecting the level of blood glucose in both mother and neonates[8]. Hypoglycaemia is common in obstetric practice, especially when the fasting period is prolonged beyond 8 hours[9]. In our study, prolonged preoperative fasting (group C, more than six hours) showed reduced blood glucose in mother, but normal blood glucose level was maintained as fasting time was within prescribed guidelines. Neonatal blood glucose level was also reduced in group C. But in group-A and group B, there were no such significant reduction in blood glucose level on the operative day before starting infusion and after delivery. Studies by Meis et al found that a daytime fast of 8 hours resulted in significantly lower glucose levels than did a night time fast of 8 hours[9]. In this study, patients were allowed to fast during nighttime. They did not show any evidences of critical hypoglycaemic episodes during study, probably for nighttime fasting.

In group C, preoperative fasting time was inversely correlated with the maternal blood glucose and maternal blood glucose level directly affects neonatal blood glucose level. But no significant correlation between the maternal fasting time and the neonatal blood glucose was observed in this study. Jirasiritham et al concluded that prolonged fasting time had an inversely significant correlation with the maternal blood glucose during general anaesthesia[10]. They found no significant correlation between the duration of fasting time and neonatal blood glucose.

Hypoglycaemia might be a factor involved in the genesis of hypotension during spinal anaesthesia[4]. Thus hypotension might impair uterine blood flow, causing neonatal hypoglycaemia. In this study, there was no significant reduction in blood pressure because of controlled preloading with fluid. Jouppila et al[11] found that spinal anaesthesia uncomplicated by hypotension was not associated with any changes in intervillous blood flow.

Conclusion

Preoperative fasting is advantageous in obstetric anaesthesia. On the other side, prolonged preoperative fasting is responsible for some adverse outcomes in pregnant mother and as well as in neonates after delivery. It may complicate the situation by producing severe to moderate dehydration and hypoglycaemic episodes, discomfort and provocation of anxiety, irritability and malaise. Hypoglycaemic events should be suspected in every mother who has long preoperative fasting time. It may be important for pregnant women to establish appropriate meal patterns during day time hours to maintain euglycaemia and to avoid fasting during day time or night time hours. In this study it was observed that neonatal blood glucose was reduced as a result of reduction of maternal blood sugar. Though, there is no

significant correlation between maternal fasting time and the level of blood glucose in the neonates, it is a devastation complication if only one neonate is born from a starving mother and has critical hypoglycaemic event with neurological deficit.

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