Research Article

INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

EFFICACY OF ANTENATAL BETAMETHASONE THERAPY ON MATERNAL BLOOD GLUCOSE LEVELS

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How to cite: Shireesha G. Efficacy of antenatal betamethasone therapy on maternal blood glucose levels. International Research Journal of Pharmacy, 2021,12:11:31-34.

DOI: 10.7897/2230-8407.1211176

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ABSTRACT

Background: It has been noted that giving pregnant women betamethasone reduces the frequency and severity of newborn respiratory distress syndrome. Blood glucose levels temporarily rise as a result of the placenta's insulin resistance and diabetogenic potential.

Aim: Assessing the impact of prenatal betamethasone therapy on maternal blood glucose levels during preterm pregnancy was the goal of the current investigation.

Methods: 280 pregnant women without diabetes who showed signs of giving birth before 34+6 weeks gestation and had one or two betamethasone doses were evaluated for this research. Every day, a POC (point of care) device was used to measure capillary blood glucose levels in order to evaluate the glycemic profile in pregnant women. During their evaluation, a healthy food was provided to all girls.

Results: 77.14% (n=216) of the patients had a substantial change in their glycemic index, with mean preprandial and postprandial blood glucose levels of 95.26±7.13 and 144.54±7.91 mg/dl, respectively. Although the glycemic profile was proportional to the betamethasone dosage, it was unrelated to maternal age, parity, gestational weeks, or other factors.

Conclusion: there is a great need to raise awareness, manage pregnant women's hyperglycemia, and provide them with individualized blood sugar monitoring following betamethasone treatment.

Keywords: Betamethasone, glycemic profile, neonatal respiratory distress syndrome, postprandial blood glucose

INTRODUCTION

Africa and India account for 60% of premature births worldwide. All births have a 6–15% preterm delivery rate, of which 40–50% are spontaneous, 25% are iatrogenic (caused by obstetric intervention to avert fetal or maternal complications), and 25% are caused by PROM (premature rupture of membrane). In patients at preterm birth risk, it is a primary cause of severe morbidities in the neonates, such as long-term neurological problems, intraventricular hemorrhage (IVH), necrotizing enterocolitis (NEC), and respiratory distress syndrome (RDS).1

In its 1994 agreement, the National Institutes of Health (NIH) recommended that all fetuses between 24 and 34 weeks of gestation who are at risk of preterm birth be taken into account as a possible population for prenatal corticosteroid therapy.

Two intramuscular 12 mg betamethasone doses spaced 24 hours apart or four intramuscular betamethasone doses spaced 12 hours apart make up standard corticosteroid treatment. This data took into account the RCOG's guidelines for the administration of prenatal corticosteroids to females who were at risk of preterm delivery and were between the ages of 24 and 36+4 gestation weeks.2

Despite its benefits, corticosteroids are linked to a few negative maternal outcomes, such as decreased adrenal gland suppression and poor glucose tolerance. In addition to causing placental insulin resistance during pregnancy,

betamethasone has been shown to have a considerable potential to cause diabetes and to cause pregnant women's blood glucose levels to temporarily rise. There is little information in the literature currently available about how betamethasone affects pregnant women's glucose homeostasis, and the sample size is limited.[3]

Hyperglycaemia can occur in individuals with diabetes mellitus or gestational diabetes mellitus who have regulated blood sugar levels, necessitating the introduction of temporary insulin treatment. When a baby is born prematurely, hyperglycaemia in the mother might cause severe hypoglycaemia. There is a lack of information in the literature about the degree and timing of blood sugar increases as well as the impact of steroid activity on glucose homeostasis in pregnant women without diabetes. 4. The current study sought to evaluate the impact of prenatal betamethasone therapy on maternal blood glucose levels during preterm pregnancy while taking these parameters into account.

MATERIALS AND METHODS

Assessing the impact of prenatal betamethasone therapy on maternal blood glucose levels during preterm pregnancy was the goal of the current cross-sectional investigation.

The research participants were from the Institute's Obstetrics and Gynaecology Department. Prior to their involvement in the study, all individuals gave their written and verbal informed consent. 280 pregnant women between the ages of 18 and 35 who were admitted to the Institute throughout the research period and had completed 24+0 to 34+6 weeks of gestation and had signs of pregnancy termination were evaluated. Depending on the treating obstetrician's discretion, the individuals received either one or two betamethasone doses.

After completing the oral glucose tolerance test (OGTT) with 75 grams of glucose between weeks 24 and 28, the girls were eventually admitted to the study when their glucose metabolism was shown to be normal. Subjects who refused to participate in the study, those who received betamethasone at other clinics or institutions, those who received intravenous fluid, such as 10% dextrose, those with renal diseases, systemic infections, maternal illness, those receiving steroid therapy, those with multiple gestations, those with gestational diabetes mellitus, and those with overt diabetes were all excluded from the study.

Demographic information, such as OGTT, blood pressure, and BMI (body mass index), was collected at baseline for all subjects. The glycaemic profile was tracked for females with singleton pregnancies that lasted 24+0 to 34+6 weeks and who were hospitalized for high-risk pregnancies, such as antepartum haemorrhage, preeclampsia, oligohydramnios, and prelabour rupture of membranes. Two doses of 12 mg betamethasone were administered via the intramuscular (IM) method at 24-hour intervals as part of the betamethasone treatment.[5]

Females' glycaemic profiles were based on five to six daily POC (point of care device) measurements of their capillary blood glycaemic levels. Hyperglycaemia was defined as blood glucose levels of 90 mg/dl or above before meals and while fasting, and as high as 140 mg/dl an hour after meals. 6. At a certain time, two readings were taken in the morning and at night (Table 1). Hyperglycaemia was defined as any of these readings that rose. Every participant received a consistent, well-balanced diet when they were admitted to the Institute. The chi-square test, Fisher's exact test, Mann Whitney U test, and SPSS were used to statistically evaluate the information obtained from the pregnant women using ANOVA, chi-square test, and student's t-test. The significance level was considered at a p-value of <0.05

RESULTS

Assessing the impact of prenatal betamethasone therapy on maternal blood glucose levels during preterm pregnancy was the goal of the current cross-sectional investigation. The current study evaluated 280 pregnant women without diabetes who were given one or two betamethasone doses and showed signs of delivery before 34+6 weeks of gestation. All individuals were closely observed in order to evaluate the glycaemic profile in pregnant women based on daily capillary blood glucose assessments using a POC device. During their evaluation, a healthy food was provided to all girls.

Pre-meal blood glucose levels in the morning were 94.09±5.14 mg/dl, which was substantially lower than the mean blood glucose levels at night, which were 96.18±7.23 mg/dl with a p-value of 0.005, for mean blood sugar levels after the first betamethasone dosage.

The mean blood sugar levels at night were 143.86±8.66 mg/dl with a p-value of <0.001, whereas the postprandial blood glucose levels in the morning were 140.03±8.41 mg/dl, which was considerably lower (Table 2).

According to research data, pre-meal blood glucose levels in the morning were 95.49±7.79 mg/dl after the second betamethasone dosage, and they substantially rose to 98.62±7.63 mg/dl at night with a p-value of 0.005. With a p-value of 0.001, the postprandial blood sugar levels were considerably higher at night than in the morning (151.66±9.19 mg/dl and 147.00±8.47 mg/dl, respectively) (Table 3).

The mean blood sugar levels after the first and second betamethasone doses were compared. The pre-meal blood sugar level after the first dosage was 95.22±5.49 mg/dl, which was considerably lower than the pre-meal blood sugar level after the second dose, which was 96.96±7.54 mg/dl with p=0.04. Following the first dosage, the postprandial blood sugar level was 142.11±7.96 mg/dl, and following the second dose, it was 149.04±8.39 mg/dl, which was considerably higher with p<0.001 (Table 4).

DISCUSSION

The current study evaluated 280 pregnant women without diabetes who were given one or two betamethasone doses and showed signs of delivery before 34+6 weeks of gestation. In order to evaluate the glycaemic profile in pregnant women, all individuals were closely observed. A POC device was used daily to measure capillary blood glucose. During their evaluation, a healthy food was provided to all girls. These findings were similar to those of earlier research by Chaurasia A et al.7 and Jian Yun X et al.8, whose authors evaluated participants using analogous criteria to the current study.

According to the study's findings, pre-meal blood glucose levels in the morning were 94.09±5.14 mg/dl, which was substantially lower than the mean blood glucose levels at night, which were 96.18±7.23 mg/dl with a p-value of 0.005, for mean blood sugar levels after the first betamethasone dosage. The mean blood sugar levels at night were 143.86±8.66 mg/dl with a p-value of <0.001, but the postprandial blood glucose levels in the morning were 140.03±8.41 mg/dl, which was considerably lower. These findings were in line with those of Refuerzo JS et al. (2012) and Tamez-Pérez HE et al. (2015), whose authors likewise found mean blood sugar levels following betamethasone that were comparable to those of the current research.

Pre-meal blood glucose levels in the morning were 95.49±7.79 mg/dl, and at night they substantially climbed to 98.62±7.63 mg/dl with a p-value of 0.005, according to the mean blood sugar levels observed after the second betamethasone dosage. With a p-value of 0.001, the postprandial blood sugar levels were substantially higher at night than in the morning, measuring 151.66±9.19 mg/dl and 147.00±8.47 mg/dl, respectively. These results were consistent with those of Star J et al. (2011) and Amiya RM et al. (2012), whose mean blood sugar levels following betamethasone were similar to those of the current research.

When comparing the mean blood sugar levels after the first and second betamethasone doses, the pre-meal level after the first dosage was 95.22±5.49 mg/dl, which was noticeably lower compared to pre-meal blood sugar after second dose which was 96.96±7.54 mg/dl with p=0.04. After the first dosage, the postprandial blood sugar was 142.11±7.96 mg/dl, and after the second dose, it was 149.04±8.39 mg/dl, which was substantially higher after the second dose (p<0.001). These results were consistent with those of Itoh A et al.13 and Stock SJ et al.14, whose investigations similarly found comparable results for comparing mean blood sugar levels after the first and second betamethasone doses.

CONCLUSION

The current study's conclusion, taking into account its limitations, is that there is a great need to raise awareness, manage pregnant women's hyperglycaemia, and provide individualized blood sugar monitoring for pregnant women following betamethasone treatment. To draw a firm conclusion, further longitudinal prospective studies with a bigger sample size and longer monitoring are required.

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Time	Description
Day 1	Baseline blood glucose at 9 am (before betamethasone administration)
	1st dose betamethasone administration at 9 am
	Pre-meal blood glucose (mg/dL) at 10 am
	Postprandial blood glucose (mg/dL) at11am
	Pre-meal blood glucose (mg/dL) at 8pm
	Postprandial blood glucose (mg/dL) at 9pm
Day 2	Fasting mean blood glucose (mg/dL) at 6am
	2nd dose betamethasone administration at 9am
	Pre-meal blood glucose (mg/dL) at10am
	Postprandial blood glucose (mg/dL) at11am
	Pre-meal blood glucose (mg/dL) at 8pm
	Postprandial blood glucose (mg/dL) at 9pm

Table 1: Day 1 and Day 2 glucose monitoring in study subjects

Blood glucose (mg/dl)	Morning (mean)	Night (mean)	p-value
Pre-meal	94.09±5.14	96.18±7.23	0.005
Post-prandial	140.03±8.41	143.86±8.66	<0.001

Table 2: mean blood sugar levels following 1st betamethasone dose

Blood glucose (mg/dl)	Morning (mean)	Night (mean)	p-value
Pre-meal	95.49±7.79	98.62±7.63	0.005
Post-prandial	147.00±8.47	151.66±9.19	0.001

Table 3: mean blood sugar levels following 2nd betamethasone dose

Blood glucose (mg/dl)	1st dose	2nd dose	p-value
Pre-meal	95.22±5.49	96.96±7.54	0.04
Post-prandial	142.11±7.96	149.04±8.39	<0.001

Table 4: Comparison of mean blood sugar levels following 1st and 2nd betamethasone dose.