

**TO EVALUATE CHANGES IN BLOOD GLUCOSE FOLLOWING ANTENATAL CORTICOSTEROID THERAPY IN PRETERM ANTENATAL WOMEN OF GESTATIONAL AGE 28-34 WEEKS**Renuka S<sup>1</sup>, Anoop Sreevalsan<sup>2</sup>, Sathiya S<sup>3</sup>, Vasantha N. Subbiah<sup>4</sup>**HOW TO CITE THIS ARTICLE:**

Renuka S, Anoop Sreevalsan, Sathiya S, Vasantha N. Subbiah. "To Evaluate Changes in Blood Glucose following Antenatal Corticosteroid Therapy in Preterm Antenatal Women of Gestational Age 28-34 Weeks". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 21, May 26; Page: 5727-5733, DOI: 10.14260/jemds/2014/2656

**ABSTRACT:** Premature birth is the largest unsolved problem in obstetrics today and the single most significant cause of neonatal morbidity and mortality. Routine use of corticosteroids can cause metabolic alterations in the mother, short term and long term effect in the fetus. The present study was undertaken to evaluate the blood sugar changes for a period of six days following antenatal corticosteroid administration and to study the immediate changes in the mother and the fetus. We found out that there was a statistically significant change ( $P < 0.001$ ) in blood sugar values when compared with the prebetamethasone values.

**KEYWORDS:** Corticosteroids, betamethasone, fasting blood glucose, post prandial blood glucose.

**INTRODUCTION:** Premature birth is the largest unsolved problem; it complicates 5-10% of pregnancy and is a leading cause of neonatal morbidity and mortality worldwide. Overall incidence of preterm labor is reported to be 6-15%. Introduction of maternal antenatal glucocorticoid treatment to accelerate fetal lung maturity has allowed us to significantly reduce associated morbidity and mortality. Corticosteroids can cause metabolic alteration in the mother. Glucocorticoids have a well-known effect on glucose metabolism. Glucocorticoids increases hepatic glycogen and glucose production and decrease glucose uptake and utilization in peripheral tissues. Pregnancy is also characterized by a relative insulin resistance that results in glucose intolerance. It follows, then that the combination of pregnancy and corticosteroids could cause significant disruption of glucose homeostasis. In fasting state, cortisol stimulates several processes that collectively serve to increase and maintain normal concentration of glucose in blood.

**MATERIALS AND METHODOLOGY:** After obtaining institutional permission. All antenatal cases between 28 to 34 weeks judged to be at risk of preterm delivery attending the hospital were included. Inclusions and exclusion criteria were as follows. Inclusion Criteria: All women between 28 and 34 weeks of gestation at risk or preterm delivery with singleton pregnancy.

**Exclusion Criteria:** Preterm prelabor rupture of membrane, patients in active labor, multiple gestation, uncontrolled diabetes.

After patient selection, fasting blood sugar and 2 hours post prandial blood sugar. Normal values to be taken according to (fasting blood sugar  $< 95$  mg /dl, post prandial blood sugar  $< 120$  mg / dl). Two doses of injection Betamethasone, 12 mg IM were given 24 hours apart; sample fasting blood sugar and 2 hour post prandial blood sugar were taken and assessed on day 2, 4, and 6.

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**RESULT:** The results were analyzed according to the following parameters such as

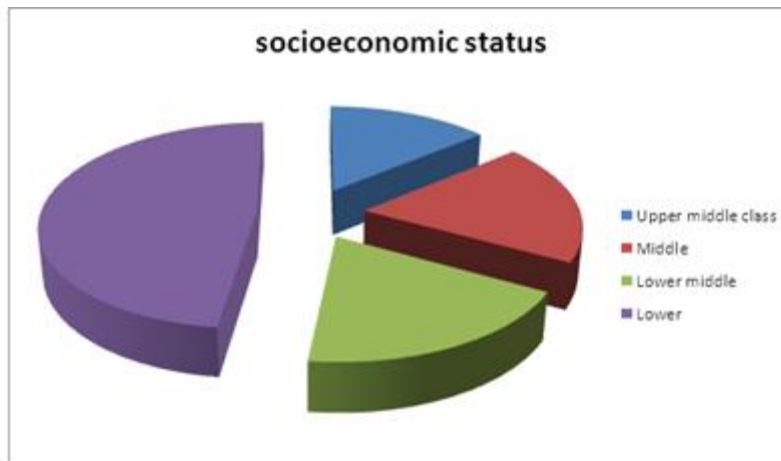
1. No of patients in relation to age, gravidity, socioeconomic status, gestational age at admission and diagnosis.
2. Changes in blood glucose: FBS, PPBS before and after drug on days 2, 4, 6.

Mean	22.96
Median	22.00
Mode	20
Standard deviation	3.58
Minimum	19
Maximum	36

**TABLE 1: AGE DISTRIBUTION**

Socio economic status	Frequency	Percentage
Upper middle	31	14%
Middle	42	19%
Lower middle	41	19%
Lower class	106	48%
<b>Total</b>	<b>220</b>	<b>100%</b>

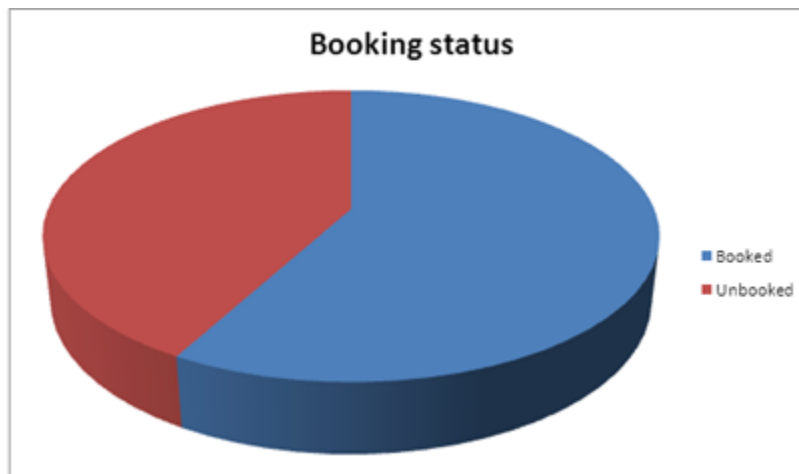
**TABLE 2: SOCIO ECONOMIC STATUS**



Booked / unbooked	Frequency	Percentage
Booked	128	58%
Unbooked	92	42%
<b>Total</b>	<b>220</b>	<b>100%</b>

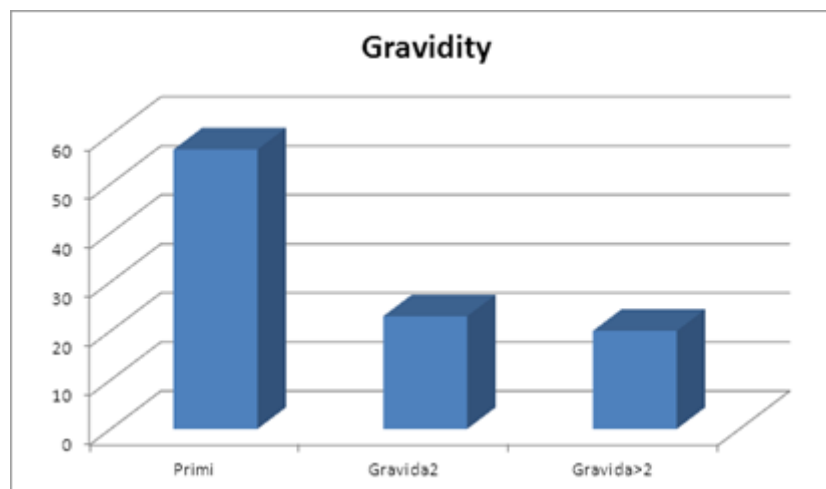
**TABLE 3: BOOKED / UNBOOKED**

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Parity	Frequency	Percentage
Primigravida	125	57%
Gravida 2	50	23%
Gravida>2	45	20%
<b>Total</b>	<b>220</b>	<b>100%</b>

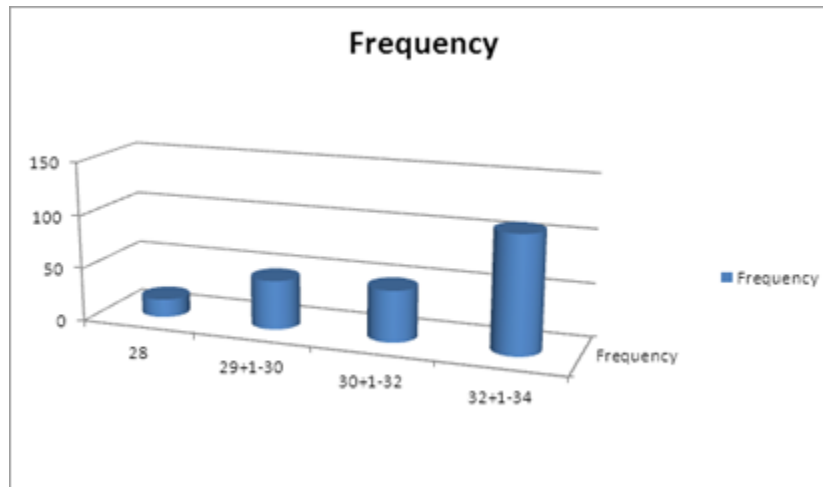
**TABLE 4: PARITY AT REPORTING**



Gestational age while reporting	Frequency	Percentage
28 weeks	17	7%
29+1 - 30 weeks	46	21%
30+1 - 32 weeks	48	22%
32+1 - 34 weeks	109	50%

**TABLE 5: GESTATIONAL AGE AT REPORTING**

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S. NO	Diagnosis	Frequency	Percentage
1.	Threatened preterm labor	82	37%
2.	Severe pre Eclampsia	23	10%
3.	GDM pregestational DM	29	13%
4.	IUGR	17	8%
5.	BOH	10	5%
6.	Placenta previa	16	7%
7.	Cervical incompetence	15	7%
8.	Others	28	13%

**TABLE 6: INDICATIONS FOR CORTICOSTEROIDS**

Days	High > 95mg%	Normal < 95 mg %	Mean	Std. deviation	t` value	P value
2	185 (84%)	35 (16%)	126.37	28.759	-21.963	.000
4	96 (44%)	124 (56%)	105.8	23.689	-13.125	.000
6	58 (26%)	162 (74%)	92.86	14.73	-8.348	0.000
P<0.001 (0.000)						

**TABLE 7: CHANGES IN BLOOD GLUCOSE CHANGES IN FASTING BLOOD SUGAR**

Days	High > 95mg%	Normal < 95 mg %	Mean	Std. deviation	t` value	P value
2	192 (87.3%)	28 (12.7%)	143.5	22.560	-25.087	.000
4	119 (54%)	101 (46%)	124.3	24.742	-14.304	.000
6	44 (20%)	176 (80%)	108.1	21.893	-4.850	.000
P<0.001 (0.000)						.000

**TABLE 8: CHANGES IN POST PRANDIAL BLOOD SUGAR**

**Results found that:** The age of the patients ranged between 19 and 36 yrs., the mean reproductive age group of patients in study group was 22yrs +/- 3.58 SD. The incidence was more in the patients of lower socio economic status and frequency of booked cases were more than unbooked cases out of which 57 % comprised of primigravida patients between gestational age of 32 and 34 weeks (50%). The preterm labor was the commonest indications accounting for 37%.

FBS levels started rising from day 2 after betamethasone administration with 84% having increased blood sugars, FBS started reaching normal range on day 3 and on day 4 around 56 % had normal levels and on day 6 around 74 % had normal limits. 26% had increased FBS levels even on day 6 out of which 14 patient belong to the group of gestational and pregestational diabetes mellitus group but about 44 normal patients also continued to have increased FBS level even on day 6. Thus there was a significant change in FBS levels following ante- natal steroids therapy and it persisted upto 6<sup>th</sup> day.

**Changes in PPBS:** PPBS levels started rising from day 2 after betamethasone administration. With 87.3 % having increased blood sugar, PPBS started reaching normal range on day 3 and on day 4 around 46% had normal levels and on day 6 around 80 % had normal levels. 20% had increased PPBS levels even on day 6 out of which 14 patients belong to the group of gestational and pregestational diabetes mellitus group. Around 30 normal patients also continued to have persistently high blood sugar levels even on day 6.

**Analysis:** There was a significant change in the postprandial blood glucose levels following antenatal corticosteroids therapy ( $p < 0.001$ ). The percentage of cases who had increased FBS levels on day 6 was more than PPBS levels.

1. Shelton SD, Boggess KA et al <sup>1</sup> conducted a prospective cohort study in women receiving betamethasone at 24- 34 weeks gestation. Fasting and 1-h postprandial capillary glucose values were obtained daily following betamethasone therapy for hospitalized patients. A control group comprised, out patients who underwent weekly fasting and postprandial assessments for 3 weeks. Fasting and 1-h postprandial capillary glucose values were compared between control and betamethasone patients using an unpaired test of women receiving betamethasone, 59% of fasting glucose values were greater than 90 mg/dl as compared to 16% of control fasting values ( $p < 0.001$ , x2 test). Mean 1-h postprandial values for control women ranged from 107.7 +/- 15.1 to 112.3 +/- 20.0 mg/dl for weeks 1-3. Mean 1-h postprandial glucose values were >140mg/dl following one, two, three courses of betamethasone therapy. They concluded that betamethasone resulted in an acute increase in fasting glucose following a single course of betamethasone. 1-h postprandial values were not clinically abnormal.
2. V Mariotti, AM Marconi et al. <sup>2</sup> Antenatal corticosteroids administration for enhancing fetal lung maturity a single dose of corticosteroids includes an increase in fasting glucose levels in maternal plasma.
3. Jami Star, Joseph Hogan et al <sup>3</sup>. 45 patients receiving betamethasone 12 mg i.m. at 7 am on two consecutive days were randomized to no insulin (n=20). Low dose insulin (n=18), and high dose insulin (n=7) protocols. Each treatment group received s.c. insulin at 7 am on the 2 days of betamethasone therapy (20 units nph/10 units regular, and 40 units Nph/ 20 units regular

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respectively). Capillary plasma glucose measurements were obtained at fasting and 2 h after meals for 3 days. They found that 85 % of patients who did not receive insulin exhibited hyperglycemia. Significant differences in mean postprandial plasma glucose levels were found between the no treatment and insulin groups on day 1 and day 2. No significant differences were noted among groups on day 3. They concluded that transient maternal hyperglycemia occurs in a consistent pattern in nondiabetic patients receiving betamethasone, which can be limited by the concurrent use of insulin.

4. Beck JC, Jhonson JW, et al<sup>5</sup>. The purpose of this study was to explore the interrelationships of betamethasone, hyperinsulinemia, and hyperglycemia to fetal lung maturation. In this rhesus preparation, maternal betamethasone administration produced an alarming increase in maternal and fetal plasma insulin values.
5. Foglia, Lisa m. md et al<sup>6</sup>. Patients with singleton or twin pregnancies admitted between 24 and 34 weeks gestation with diagnosis requiring steroids administration were approached.

In comparing the above mentioned studies, the present study had a similar outcome of increase in FBS values following antenatal steroid therapy in studies done by Shelton et al,<sup>1</sup> Mariotti et al,<sup>2</sup> Jami star et al,<sup>3</sup> Elisabeth. R et al.<sup>4</sup> Increase in PPBS values was evident with the study done by Jami star et al<sup>3</sup> similar to the present study.

**CONCLUSION:** There was a significant change in the maternal blood glucose levels following antenatal corticosteroids on day 2 ( $p < 0.001$ ) returning to the baseline values in majority of the patients on day 6. Both FBS and PPBS values were persistently high in 14 diabetic patients and in 44 and 30 normal patients respectively. Realizing this can help us to monitor both normal and GDM patients to avoid severe metabolic dysregulation by starting or increasing the insulin doses.

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