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ORIGINAL ARTICLE

Transient Hyperglycemia and Gestational Diabetes Mellitus in Preterm Pregnant Women after Receiving Antenatal Steroids

Saniya Naheed[1], Sajida Asghar[2], Dureshahwar[3], Seema Gul[4], Mahwash Jamil[5], Ayesha Akram[6]

[1,2]Assistant Professor, Department of Obstetrics and Gynecology, HBS Medical & Dental College/General Hospital Islamabad

[3,4]Assistant Professor, Department of Obstetrics and Gynecology, Watim Medical & Dental College/General Hospital Rawalpindi

[5,6]Assistant Professor, Department of Obstetrics and gynecology, HITECH-Institute of Medical Sciences, Rawalpindi.

ABSTRACT

Background: Preterm births account for increased mortality and morbidity in both developed and developing countries. The objective of this study was to determine frequency of transient hyperglycemia and gestational diabetes mellitus in preterm pregnant women receiving antenatal steroids.

Methodology: This descriptive cross-sectional study was carried out in Maternal and Child Health Center Unit 1 at Pakistan Institute of Medical Sciences, Islamabad from January 2018 till August 2018. 370 pregnant women presenting to hospital who received dexamethasone therapy due to preterm labor, preterm premature rupture of membranes or any other conditions which require early delivery e.g., oligohydramnios etc. were included. Multiple pregnancies, advanced preterm labor, gestational or chronic diabetes mellitus, and those having BSR > 126 mg/dl before first dose of dexamethasone were excluded. After ethical approval and informed consent, proformas were filled. Blood sugar levels before 1st dose of dexamethasone noted and 2nd dose was given after 12 hours. Blood sugar profile (fasting, 2 hours after lunch, 2 hours after dinner) was carried out till euglycemia or 5 days if sugars remain deranged. Patients having deranged levels for greater than 5 days were advised 75 g oral glucose tolerance test and were labeled as having gestational diabetes mellitus.

Results: Mean age of study participants was 28.92±5.54 years with mean gestational age of 31.19±1.92 weeks. Assessment of transient hyperglycemia and gestational diabetes mellitus in preterm pregnant women receiving antenatal steroids revealed 73.78%(n=273) had transient hyperglycemia, 6.21%(n=23) had gestational diabetes and 26.22%(n=97) had no blood glucose abnormality.

Conclusion: Frequency of transient hyperglycemia and gestational diabetes mellitus increased in pregnant women receiving antenatal steroids. Basic sugar profile should be carried out after dexamethasone therapy.

Keywords: Corticosteroid, Gestational diabetes mellitus (GDM), Hyperglycemia, Preterm

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Introduction

The incidence of preterm birth in developed countries is 12.7% and its rate varies with socioeconomic status.[1] Preterm births account for 85% of neonatal mortality and increased morbidity in both developed and developing countries.[2] For better feto-maternal outcome, it is important to identify preventable and treatable causes of preterm births.[3]

Respiratory Distress Syndrome (RDS), a consequence of preterm delivery, due to immatur

lung development, is the major reason of early neonatal mortality and morbidity. The RDS has dramatically reduced because of antenatal steroids and exogenous surfactant replacement. In the developing countries, with the scarce resources, especially NICU care, antenatal steroids play a very significant role. They have reduced, risk of RDS from 25.8% to 9.0 % and neonatal mortality has decreased from 15.0% to 3.2%.[4]

To increase lung maturity, intramuscular injection of Betamethasone or Dexamethasone is given. These are the steroids of choice to improve fetal lung maturity.[5] Glucose intolerance, chorioamnionitis, puerperal sepsis, bruising, hematoma, pain at the site of injection, insomnia, gastrointestinal upset, pre-eclampsia is known side effects of steroids.[6]

A strict control on sugar is very important to reduce the risk of RDS because fetal hyperinsulinemia is key factor in pathogenesis of RDS, administration of antenatal steroids is even more recommended in diabetic women and strict insulin therapy is advised to allow beneficial effects of steroids.[7]

As people of South Asian descent are more prone to diabetes, Antenatal steroids can cause disturbance in glucose metabolic homeostasis which may have significant maternal and possibly fetal effects. This study is aimed at exploring effects of antenatal steroids on maternal glucose metabolism by finding the frequency of transient hyperglycemia and gestational diabetes mellitus after dexamethasone therapy.

Methodology

This descriptive cross-sectional study was carried out in Maternal and Child Health Center unit (MCH-1) at Pakistan Institute of Medical Sciences, Islamabad from January 2018 till August 2018, using consecutive nonprobability sampling technique. A total of 370 pregnant women presenting to emergency and outpatient department who received dexamethasone therapy due to either preterm labor (alive morphologically normal babies), preterm premature rupture of membranes (PPROM) or any other conditions which require early delivery (e.g., preeclampsia, intra uterine growth retardation (IUGR), severe oligohydramnios, antepartum hemorrhage (APH) were included. Women having multiple pregnancies, advanced preterm labor (cervix > 5cm dilated), gestational diabetes mellitus (GDM) or type I/II diabetes mellitus (DM), BSR > 126 mg/dl before first dose of dexamethasone, chorioamnionitis and those taking any medication that affects glucose metabolism were excluded from the study. After ethical approval, informed consent was taken from study participants and proformas were filled. Blood sugar levels before the commencement of 1st dose of dexamethasone were noted and 2nd dose of dexamethasone was given after 12 hours of 1st dose. Blood sugar profile (fasting, 2 hours after lunch, 2 hours after dinner) were carried out till euglycemia (BSF < 100 mg/dl, 2 hours post meal 140mg/dl) or 5 days if sugars remain deranged. Patients were labelled as having transient hyperglycemia if their sugar profile got deranged due to dexamethasone therapy but returned to normal within 5 days. Patients having deranged levels for greater than 5 days were advised 75 g oral glucose tolerance test (OGTT) and were labelled as having gestational diabetes mellitus following the NICE criteria for diabetes in pregnancy (BSF > 100 mg/dl and 2 hours PP > 140 mg/dl). SPSS version 26 was used for data analysis, qualitative variables like: transient hyperglycemia, gestational diabetes mellitus (GDM), sugar profile derangement for greater than 5 days were calculated as frequency & percentages. Quantitative variables like age, gestational age, parity was expressed as mean ± SD.

Results

In our study, mean age of the patients was 28.92$\pm$5.54 years (Table-1) and mean gestational age 31.19$\pm$1.92 weeks. Parity distribution showed that 73.78% (n=273) were between 1-3 paras and 26.22% (n=97) were between 4-5 paras, mean ± SD was calculated as 2.77 ± 1.24 paras. Assessment of

transient hyperglycemia and gestational diabetes mellitus (GDM) in preterm pregnant women receiving antenatal steroids revealed 73.78%(n=273) had transient hyperglycemia, 6.21%(n=23) had gestational diabetes and 26.22%(n=97) had no blood glucose abnormality (Table-2 & 3)

Table 1: Age Distribution (n=370)		
Age (in years)	No. of patients	%
18-30	213	57.57
31-40	157	42.43
Total	370	100
Mean ± SD	28.92 ± 5.54	

Table 2: BSR Derangement. (n=370)		
Blood sugar random derangement	No. of patients	**%**
Yes	273	73.78
No	97	26.22
Total	370	100

Table 3:Frequency of transient hyperglycemia, impaired glucose tolerance and gestational diabetes mellitus (GDM) in preterm pregnant women receiving antenatal steroids. (n=370)		
Qualitative variable	No. of patients	%
Blood Sugar derangement	273	73.78
Transient Hyperglycemia	250	67.56
Gestational Diabetes Mellitus	23	6.21
No serum glucose abnormality	97	26.22
Total	370	100

Discussion

South Asian descents are more prone to diabetes[8] and our population has high prevalence of undiagnosed DM and impaired glucose tolerance. Antenatal steroids can cause disturbance in glucose metabolic homeostasis which may have significant maternal and possibly fetal effects. Locally, no or single blood sugar level done, routinely before dexamethasone therapy may be insufficient to judge the glucose metabolic status of women, so this study was aimed at exploring effects of antenatal steroids on maternal glucose metabolism.

Assessment of transient hyperglycemia and gestational diabetes mellitus (GDM) in preterm pregnant women receiving antenatal steroids revealed 73.78%(n=273) had transient hyperglycemia, 6.21%(n=23) had gestational diabetes and 26.22%(n=97) had no blood glucose abnormality. GDM is becoming global health burden with global prevalence of 16.9%. The highest prevalence was seen in South-Asia region of 25% as compared to 10.4% in the North America and Caribbean Region.[9]

It is established in literature that maternal corticosteroids given for fetal lung maturity increase blood glucose level of the mother.[10,11]

From previous studies, we have identified that the effects of corticosteroids on blood glucose levels in non-diabetic mothers remain for 24 hours. However, changes in oral glucose tolerance test were noticed for three days after giving betamethasone injections. Ghazala et al[12] also found that the steroids have systemic metabolic side effects.

The effects of single and multiple courses of dexamethasone and its effect on maternal fasting and postprandial glucose level were observed in another study. It was found that single course of dexamethasone resulted in acute increase in blood glucose level while multiple courses resulted in continuous increase in blood glucose levels.[13]

In Our study 73.78% of study participants had deranged blood sugar level after dexamethasone therapy out of which 6.21 % developed GDM whereas 67.51% had transient hyperglycemia, similarly a study by Refuerzo et al showed 16% to 33% increase in glucose level at 20,44 and 68 hours after first dose of antenatal corticosteroids in pregnant women without diabetes which may be missed with conventional monitoring.[14] Glucose intolerance is signficantlty higher in twins and triplets compared to singleton.[15]

Conclusion

Frequency of transient hyperglycemia and gestational diabetes mellitus increased in preterm pregnant women receiving antenatal steroids. Basic sugar profile should be carried out after dexamethasone therapy.

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