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COMPARATIVE STUDY OF SERUM ALBUMIN AND URIC ACID IN GESTATIONAL DIABETES MELLITUS WITH HEALTHY PREGNANCY

Biochemistry

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ABSTRACT

Background: A woman can be diagnosed with gestational diabetes when glucose intolerance continues beyond 24 to 28 weeks of gestation. 1 in 3 women with diabetes were of reproductive age. 21.3 million of live births had some form of hyperglycemia in pregnancy.
Methodology: This study was carried out in Department of Biochemistry and conducted on 50 clinically positive diagnosed women with GDM in their 2nd trimester of pregnancy represented as study group and 50 healthy pregnant women clinically negative diagnosed with GDM during the 2nd trimester as control group aged between 20-35 years attending Antenatal clinic part of Department of Gynecology and Obstetrics. Serum Albumin and Uric Acid were estimated.
Result: Mean serum albumin level was decreased to 3.418gm/dl and mean serum concentration of uric acid was increased to 4.30mg/dl as compared to control group(3.5gm/dl & 3.03mg/dl).
Conclusion: In this study, we found that gestational diabetes had significantly increased concentration of uric acid and a significantly decreased concentration of albumin than healthy pregnant women. Hyperuricemia seen in GDM could be caused by the effects of insulin on the kidneys. Decreased albumin level in insulin resistant subjects aggravates cardiovascular complications.

KEYWORDS

Gestational Diabetes Mellitus, Albumin, Uric Acid.

INTRODUCTION:

Gestational diabetes is formally defined as "any degree of glucose intolerance with onset or first recognition during pregnancy"[1]. A woman is diagnosed with gestational diabetes when glucose intolerance continues beyond 24 to 28 weeks of gestation.

According to IDF report in 2017[2]

1. There were an estimated 204 million women (20-79 years) living with diabetes. This number is projected to increase to 308 million by 2045.
2. 1 in 3 women with diabetes were of reproductive age.
3. 21.3 million of live births had some form of hyperglycemia in pregnancy. An estimated 85.1% were due to gestational diabetes.
4. 1 in 7 births was affected by gestational diabetes.

During early pregnancy, glucose tolerance is normal or slightly improved and peripheral muscle sensitivity to insulin and hepatic basal glucose production is normal[3]. In the second and third trimester, the continuous increase in the feto-placental factors will decrease maternal insulin sensitivity, and this will stimulate mother cells to use sources of fuels other than glucose as free fatty acids, and this will increase supply of glucose to the fetus[4]. Although, pregnancy is associated with increase in the beta-cell mass and increase in insulin level throughout pregnancy but certain pregnant women are unable to up-regulate insulin production relative to the degree of insulin resistance, and consequently become hyperglycemic, developing gestational diabetes.

Insulin has many metabolic functions such as enhancing cellular uptake of glucose, fatty acids, amino acids and potassium ions. It also has an anabolic action by increasing cellular formation of glycogen, lipids and protein. These physiological functions will be reversed if insulin action is decreased.

MATERIAL METHOD:

A prospective hospital based, case-control study was carried out in Department of Biochemistry and conducted on 100 pregnant women aged between 20-35 years attending Antenatal clinic part of Department of Gynecology and Obstetrics, affiliated to SPMC and associated groups of PBM, Bikaner, and Rajasthan from May, 2018 to October, 2018. The subjects were divided into following groups: 50 clinically positive diagnosed women with GDM as study group and 50 healthy pregnant women clinically negative diagnosed with GDM as control group both during the 2nd trimester of pregnancy.

Venous blood sample were collected aseptically from both the groups of patients for estimating serum Albumin and Uric Acid. The data on maternal age, gestational age, BMI, socioeconomical status, education, dietary habits, Parity, gravid was collected. Serum Albumin and Uric Acid were estimated by Lmbert beer law with the help of fully auto analysor. Blood samples were quantitatively determined by different methods like albumin by Bromocresol green method[5, 6] and Uric acid by uricase method[7].

TABLE I Distribution of Healthy Pregnant Women (control subjects) and GDM Women (study subject) on the basis of their Fasting Glucose Level

Fasting Glucose Level	Healthy Pregnant Women (Control Subjects) (n=50)		GDM Women (Study Subject) (n=50)	
	No. of Subjects	Percentage (%)	No. of Subjects	Percentage (%)
<90	32	64	14	28
90-110	15	30	12	24
>110	2	4	24	48

TABLE II Mean values of Serum Albumin and Uric Acid in Healthy Pregnant Women and Gestational Diabetic Mellitus Women

Blood parameters	Healthy Pregnant Women (Control Subjects) (n=50)		GDM Women (Study Subject) (n=50)		Significance
	Mean±SD	Range	Mean±SD	Range	P
Serum Albumin (gm%)	3.548±0.306	2.6-4.2	3.418±0.263	2.4-3.7	0.012*
Serum Uric Acid (mg%)	3.037±0.787	0.51- 4.8	4.30±0.462	3.5-5.2	0.0001**

*significant value is defined as p value <0.05
**highly significant value is defined as p value < 0.0001

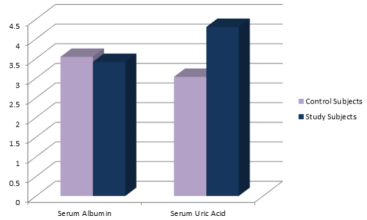

Figure: Mean values of Serum Albumin and Uric Acid in Healthy Pregnant Women and Gestational Diabetic Mellitus Women

RESULT

Most of subjects of both groups were almost in same maternal age groups and gestational age group; they were under comparable conditions. Mean serum albumin level i.e. 3.548 of control subjects were in close association with findings of Donovan McGrowder[8]. Mean serum albumin level was decreased to 3.418mg/dl in study subjects which is in in close collaboration with the results obtained by C S Nagalakshmi[9]. Mean serum concentration of uric acid was found to be 3.037mg/dl in Control Subjects which is in close agreement with findings of C S Nagalakhmi[9], A M Maged[16], B Pundalik[17]. Mean serum concentration of uric acid was increased to 4.30mg/dl in study subjects. These results are in close association with findings of U Singh[18], Piotr Moleda[19].

DISCUSSION

Decreased albumin level was statistically significant as evident by p-value which is less than 0.05(p=0.012). The data of present study supported the hypothesis that decreased albumin levels due to malnutrition were more prone to develop complication in diabetes. Albumin has a cardioprotective[10] effect that may be due to albumin acting as an antioxidant and a protective protein against chronic inflammation[11]. Further this hypothesis is supported by S Bhedu[12], S Bhonsle[13], H M Cho[14], N Ishizaka[10]. Serum albumin in GDM decreases significantly and decrease in albumin concentration may be one of the important factors responsible for complication in GDM.[15,16]

The decrease was statistically significant as evident by p-value which is less than 0.001(p<0.0001). The result of present series of study resembled with findings of S K Laughon[20], M N E Gharib[21]. The data of present study demonstrated the diagnostic importance of serum uric acid levels in a population of pregnant women with very low prevalence of GDM. High serum uric acid level is a hallmark of all the insulin resistance syndromes (W S Waring[22], D J Webb[23]). This study adds to the body of literature about the association of serum uric acid with the development of GDM.[15] Hyperuricemia is also potentially an independent predictor of cardiovascular disease (T W Yoo[33]).

CONCLUSION

A statistically decreased in serum albumin was recorded in the present study. Albumin act as antioxidant, decrease in its level in insulin resistant subjects aggravates cardiovascular complications. There is highly significant increase in uric acid level. It is a hallmark of insulin resistant syndrome. Hyperuricemia seen in GDM could be caused by the effects of insulin on the kidneys. The results may be significant in understanding the possible contribution of serum albumin and uric acid in the pahto physiolgical process in GDM subjects.

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