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Comparative evaluation of two treatment regimens, diet versus insulin, in gestational diabetes mellitus

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ABSTRACT

Placenta is a fetal organ that plays a role in food transfer, other functions such as the synthesis of a variety of hormones and growth factors are performed by placenta. In the present study we have studied the effects treatment type in gestational diabetes mellitus on some parameters of mothers and babies. A total of 30 diabetics pregnant women were evaluated in this study. These pregnant women distributed in two groups, in one group insulin was used for treatment and in the other group diet treatment was used. Immediately after delivery placenta and fetus weights were recorded. Also maternal and babies blood sugar were recorded. All data were compared by Independent t-test, and SPSS (ver. 18) statistical software. The results obtained from this study indicated that the mean baby body weight in the babies were significantly different between groups (p<0.05), and in babies of insulin treated group the levels of babies body weight were higher than diet treated babies. Based on the findings of this study and the previous, it is concluded that except babies body weight, other parameters were not significantly different in insulin and diet treated groups.

Key words: Diabetes Mellitus, Insulin therapy, Diet therapy, Blood sugar, Placenta weight.

INTRODUCTION

Pregnancy is a diabetogenic condition characterized by insulin resistance with a compensatory increase in β -cell response and hyperinsulinemia [24]. The placental secretion of hormones (progesterone, cortisol, placental lactogen, prolactin, and growth hormone) is a major contributor to the insulin resistance, which likely plays a role in ensuring that the fetus has an adequate supply of glucose [1]. Placenta is the most important in intrauterine life of fetus. The Placenta is formed from elements of membrane which surround the developing fetus and the uterine endometrium and provides the means for physiological exchange between the fetal and the maternal circulation and it shows various exchanges in case of diabetic mothers.

Mothers Diabetes causes many changes in a variety of hormones, cytokines and maternal metabolites and also same in fetal blood circulation. The diabetes-related changes also affects placenta, as receptors, enzymes and transporters are often existence at two sides of the maternal and fetal placental. Approximately five percent of all pregnancies are complicated by gestational diabetes mellitus (DM), which increases both maternal and prenatal morbidity [9]. In treating women with this condition, many have advocated minimizing fluctuations in blood glucose concentrations

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to avert maternal hyperglycemia and thus decrease the risk of fetal hyperglycemia and its consequences, fetal hyperinsulinemia and excess fetal growth [7, 10]. In the management of gestational diabetes, various methods of glucose monitoring have been proposed, including the measurement of fasting, preprandial, postprandial, and mean 24-hour blood glucose concentrations [7, 8]. The results of retrospective study which comparing the outcomes of pregnancy among women with gestational diabetes who were followed with preprandial or postprandial glucose measurements, indicated that the women's glycosylated hemoglobin values were lower and that there was less macrosomia (defined as a birth weight greater than 4000 g) among their infants when treatment was based on the results of postprandial measurements [16].

Pregnancy in patients with diabetes is associated with an increased incidence of congenital anomalies for the fetus and spontaneous abortions in women with poor glycemic control. The effect of the increased glucose levels on the rate of spontaneous abortion occurs at the time of conception. Normalizing blood glucose concentrations before and early in pregnancy can reduce these risks to levels of the general population. Treatment with close monitoring of glucose levels, oral agents, medical nutrition therapy, and insulin therapy if glucose levels are above goal may reduce maternal and fetal complications [24].

Some researchers indicated both maternal obesity and excessive weight gain as major risk factors for pre-eclampsia [23, 25], Caesarian section, preterm delivery, fetal macrosomia and fetal death [3, 26]. In a study, tight glucose control was effective at lowering the risk for adverse perinatal events among obese women with gestational DM, but not among those whose BMI were normal [13].

Diabetes mellitus is a common endocrine disorder that can cause significant complications of pregnancy, which including; a) Congenital malformations, b) Premature birth, c) Fetal macrosomia and, d) Intrauterine growth restriction, that were common complications associated with gestational diabetes [14, 17, 24].

The aim of this study is to compare oral agents, and insulin therapy on mothers and infant blood sugar and also infant and placenta weight between two different therapy methods.

MATERIALS AND METHODS

The study was conducted in two groups. Women with DM were distributed in two groups. In group 1 insulin was used for treatment and in group 2, diet treatment method was used. After childbirth in delivery of the placenta, the weight of fetal placental recorded, also maternal and fetal blood sugar were examined and recorded in both groups.

The results of maternal and fetal blood sugar and placental weight were analyzed by using Independent t-test of PASW SPSS software (18th version).

RESULTS

The results obtained from maternal and fetal blood sugar, placental and baby weight in two groups were given in table-1.

	Insulin treated group		Diet treated group		C:a
	Mean±SE	SD	Mean±SE	SD	Sig.
Mothers blood sugar	104.60±3.96	15.37	97.13±1.70	6.62	0.095
baby blood sugar	60.53±2.01	7.79	65.00±1.29	5.00	0.072
Baby weight	3818.33±103.42	400.57	3420.00±99.16	385.12	0.01
Placenta weight	600.00±31.99	123.92	640.00±34.22	132.55	0.401

Table1: Maternal and fetal blood sugar, placental and baby weight in two groups (Mean \pm SE)

Our results showed that mother's blood sugar levels in the studied groups were not significantly different (p>0.05). But the mother's blood sugar levels in insulin treated group were slightly higher (104.60 ± 3.96) than the diet treated group (97.13 ± 1.70). The mean blood sugar of babies were not significantly different between groups (p>0.05), and in babies of insulin treated group (60.53 ± 2.01) the levels of blood sugar were slightly lower than diet treated groups babies (65.00 ± 1.29).



Error Bars: +/- 2 SE





Figure 2: Comparison means baby blood sugar in insulin and diet treated groups

The mean birth weight of babies weights were higher very significantly in insulin treated groups than diet treated groups (p<0.01). The results showed that the average placenta weight in two groups were not statistically different, although in diet treated group it was higher than insulin treated group.



Figure 4: Comparison means baby weight in insulin and diet treated groups

DISCUSSION

Generally, placenta of diabetic mothers in comparison to non-diabetic mothers undergoes some changes. However, due to various factors which play role in gestational diabetes (type of diabetes, severity of diabetes, treatment method and quality of blood sugar control), exact changes in diabetic women placenta still was not known [4, 5, 11, 22].

Some studies indicated that the control of diabetes in pregnancy periods, prevent microscopic and macroscopic changes in placenta [18, 19].

Perssons, et al., (1985) indicated routine insulin therapy of pregnant women with carbohydrate intolerance seems unnecessary in the majority of cases, at least as regards the short-term outcome [20]. A small group of patients (approximately 15%, as has also been found by others) will benefit from insulin therapy [12].

Insulin aspart was tested in one study in women with gestational diabetes. It was compared with regular insulin or diet treatment, in its capacity to lower postprandial glycemia. Regular insulin was given 30 minutes and lispro 5 minutes prior to meal. The AUC (area under the curve) for glucose did not significantly differ between the regular insulin and diet group, whereas with apart it was significantly smaller [21]. Another study results indicated that the frequency of hypoglycemia could be reduced by maintaining a satisfactory metabolic control. The patient had previously been free from retinopathy and it did not occur during pregnancy. Pregnancy was terminated by normal vaginal delivery of a healthy baby, which was not macrosomic, and apart from transient (<48 hour tube feeding) hypoglycemia had no adverse postpartal events [6].

The results of this study showed that the mean placental weight were not significantly different between the two groups (p>0.05). But the mean placenta weight, in diet treated group was higher than the insulin treated group. Moreover, significant increase in placenta weight and volume in diabetic cases were described [15].

Previously it is reported that the type of diet also partly responsible for the increase in size and weight of the placenta, since there is an inverse relationship exists between protein intake and placental weight [2].

CONCLUSION

The aim of diabetes treatment in pregnancy is normoglycemia. Fetal malformations and macrosomia as well as other related complications can be avoided by maintaining glycemia within the normal values. If basic treatment with diet and exercise does not result in the desired level of glycemic control, the treatment of choice is human insulin, applied as intensified treatment.

The results of present study indicated that the baby blood sugar and placenta weight were lower in insulin treated group than diet treated group but there were not significant differences, and also mean baby body weight and mothers blood sugar were higher in insulin treated group. However babies body weight of insulin treated group was significantly different from diet treated group.

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