Original Article

Gestational Diabetes And Breast Feeding – Prospective Analysis For Post-Partum Glucose Intolerance

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Abstract

Introduction: Gestational Diabetes (GD) among women is increasing globally owing to the change in maternal dynamics such as age, elevated Body mass Index (BMI) and lifestyle changes. GD affected women are at a greater risk for post-partum diabetes. Breastfeeding practices may reduce this occurrence. The present study was conducted to assess the post partum glucose intolerance among gestational diabetes women who breast fed.

Methodology: A prospective study was conducted on a cohort of 156 GD women and 304 control population between April 2021 to June 2022. Information on age, BMI and breastfeeding practices were obtained through a questionnaire. Oral Glucose Tolerance Test (OGTT) established confirmatory diagnosis for GD. Chi square and t test was applied to find differences between the groups, at lesser than 0.05 level of significance.

Results: Breast feeding was practiced by 97.7% of the controls as compared to 83.9% of the GD group, which was considerably lower. GD women breast fed for 8.2000 $\pm$ .8366 months as compared to controls for 10.7000 $\pm$.6708 months, which was significant at p =0.001. Glucose levels considerably reduced with prolonged breast feeding; the scores progressively reduced from 2 weeks to 12 months of post partum assessment. Conclusion: Breast feeding may play a significant role in reduction of post partum glucose intolerance in gestational diabetes women. Women must be motivated and supported to breast feed for the positive health outcomes of both the mother and the infant

Keywords: body mass index, diabetes, hypoglycemia, pregnant

INTRODUCTION:

The prevalence of gestational diabetes mellitus (GD), a metabolic disorder during pregnancy, has been projected to be 13% in the world [1]. GD increases the risk of several metabolic and cardio-vascular problems in both the mother and the child [2,3]. Breastfeeding is reported to reduce the risk of type 2 diabetes in mothers. In case of Type 2 diabetes or NIDDM, insulin response to cells is compromised. Insulin is a hormone that regulates blood glucose. the consequences of not controlling the glucose levels can result in a variety of health issues such as heart disease, stroke, kidney disorder, blindness, and even amputation.

Literature evidence shows a 13-fold raise of GD in second pregnancy amongst those women who had GD in their first pregnancy [4]. The risk increased further with subsequent child births. The occurrence of GD is witnessing a global rise ranging from 5 – 36% depending on population base and criteria employed [5]. Programs promoting on the benefits of breast feeding is widely gaining momentum in the recent years. Research has hypothesised that prolonged feeding time can positively influence maternal metabolic and cardiovascular profile [6].

Despite the benefits of breastfeeding on in both maternal and infant health, it is lower in women affected with GD. A prospective study conducted by Hummel S et al reported 75% of GD mothers developing breastfeeding habit as against 86% in control group. The values further dipped in case of obese GD group and those put-on insulin therapy [7]. A similar observation was also noted in the study of Finkelstein S.A et al. Hence the current study was undertaken to answer the research question "What is the breast feeding rate among pregnant women with GD", "Does breast feeding lower the risk of post-partum glucose intolerance" and "Is the length of breast feeding a risk factor in Post-partum diabetes mellitus outcome"

METHODOLOGY:

A prospective, multi centric study, was conducted from April 2021 to June 2022 to evaluate the post-partum outcome of diabetes mellitus in pregnant women. Informed consent of all participants was obtained after explaining the protocol of the study and confidentiality of every participant ensured. The study was conducted in accordance to the ethical standards of WMA declaration of Helsinki and ethical permission obtained from RD Memorial hospital. A convenient sampling technique was employed to recruit both pregnant women with GD and control group. Women between the ages of 18 -40 years, giving birth for the first time at term (> 37 week of gestation) attending maternal antenatal care centres were included for the study. Women who were pre-diagnosed with Type I diabetes or under any form of medication were excluded.

Initially, hospital records and medical case sheets were checked to look in for Gestational Diabetes. Confirmatory diagnosis was done by Oral Glucose Tolerance test. Two stages were taken to evaluate the oral glucose tolerance test in accordance with ADA guidelines. Regardless of the time when the last meal was taken, the pregnant women was administered 50 gm of glucose in the first stage. Postprandial blood glucose level is measured of the taken blood sample. Further testing is carried out if the level is greater than 140 mg/dL. In the second stage, blood glucose levels are determined before ingesting 100 g of glucose, then an hour later, an additional hour later, a second hour later, and ultimately an additional three hours later. The criteria used to diagnose gestational diabetes were - Blood sugar levels are higher than 95 mg/dL during fasting, 180 mg/dL after one hour, 155 mg/dL after two hours, and 140 mg/dL after three hours. A person is diagnosed with gestational diabetes if they meet either of the two requirements.

A pre-designed proforma was used for the study eliciting details such as age, Body Mass Index at pregnancy, duration of feeding, problems associated with feeding practices and Glucose tolerance test at 2 weeks, 6 months and 9 months post-delivery. Breastfeeding habit was dichotomously categorised as “Exclusive” and “Combined with formula feeding”. Duration of feeding was calculated from the delivery to last feed of weaning.

Data was analysed using SPSS 23.0 version (IBM; Chicago). Variables were entered as numbers, mean, percentages and standard deviation. Independent ‘t’ test was applied to find significant differences between age, BMI and length of breast feeding. Chi square test was run to determine differences between feeding rates among GD pregnant women and controls. The level of significance was set at $p<0.05$.

RESULTS:

A total of 162 women with gestational diabetes and 307 pregnant women as controls were recruited for the initial study, of which the final analysis included 156 in the former and 304 in the latter group as they could not be followed up. None of the women in the study group developed Type 2 diabetes at 12 months of follow up.

Pregnant women in both groups had similar age range, with no significant difference. The same observation was noted for BMI as seen in Table 1. 97.7% of controls practiced breast feeding as compared to 83.9% of GD group which was significantly lesser. Only 68.0% could adhere to exclusive breast feeding, while the remaining had to complement it with formula feed. The duration of feeding was higher in the control group (10.7 ± 0.670) than the study group (8.20± 0.836), significant at p=0.001 as seen in Table 2. It was observed that GTT levels reduced with longer feeding practice in the GD group as seen in Table 3 at intervals of 2 weeks, 3 months and 6 months.

Table 1: Demographic details of study population.

Variables	**Control group Mean ± S.D**	**GD group Mean ± S.D**	**T statistic**	**P value**
Age	29.5300 ±6.2173	30.4680 ± 7.3701	-.218	.833 (NS)
BMI	23.9500 ±1.5603	28.0600 ±2.5632	-3.063	.016*

*=Significant; NS=Not Significant

Table 2: Feeding practices between the groups

Variables	**Control group (N=304)**	**GD group (N=156)**	**Chi square statistic**	**P value**
Breast feeding practiced	297 (97.7)	131 (83.9)	29.99	<0.001*
Breast fed immediately or in hospital	289 (97.3)	128 (82.1)	0.059	0.801 (NS)
Exclusive breast feeding	273 (89.8)	106 (68.0)	10.856	0.000*
	Control group Mean ± S.D	**GD group Mean ± S.D**	**t statistic**	**P value**
Duration of breast feeding	10.7000 ±.6708	8.2000 ± .8366	5.213	0.001*

*=Significant; NS=Not Significant

Table 3: Glucose Tolerance Test at various intervals

	Control group Mean ± S.D	**GD group Mean ± S.D**	**t statistic**	**P value**
GTT 2 weeks	95.6240 ±8.8613	106.2540 ± 2.9272	2.547	0.034*
GTT 6 months	87.5360 ± .60937	101.4960 ± .71392	-33.257	0.000*
GTT 12 months	88.7854 ± .58902	92.2280 ± .86877	-7.334	0.000*

*=Significant; NS=Not Significant

DISCUSSION:

Literature exploring the persistence of partum hyperglycemia incidence with duration of breast feeding in GD pregnant women and its comparison to the control group is scarce. To the best of our knowledge, no study is conducted in this part of the country.

There was no difference in age noted between the groups. BMI in the GD group was significantly higher in the GD group than the control. Higher BMI may influence the hormonal response to sucking in the first postpartum week because of impaired prolactin response with resultant delay in the onset of lactation. [8,9]. Certain other neonatal problems in GD pregnant women such as preterm, caesarean birth, infant macrosomia, and hyperglycemia further accentuates the delay as putforth by Taylor et al [10]. Though the present study made no effort to record the type of delivery, literature suggests a lower rate of lactation onset following a caesarean section than the normal delivery [11].

The present study showed that the breast-feeding rate was higher in the control group. Also, a significant number of women could not do it while remaining in the hospital or immediately after delivery. Matias et al[12] hypothesised several risk factors for early breastfeeding failure such as maternal obesity, insulin therapy, and inadequate in-hospital breastfeeding along with delay in onset of lactogenesis.

The follow up time was 12 months in the present study, during which time a significant reduction in the GTT was noted in GD group. Though our study showed that duration of breast feeding was significantly higher in the controls, available studies have a different opinion. The study of Laine M K et al[13] showed an average breastfeeding period of slightly greater than 8 months in their cohort of Finnish primiparous mothers. Also 70% of the mothers breastfed their kids for at least 6 months, and another 20% prolonged it to 12 months, but not difference noted between GD affected women and controls.

The Indian health care system has to promote a strong support system to address the barriers to breast feed by the GD pregnant women. Barriers could be because of the physical exertion and emotional instability of the mother, infant kept in incubators if born with hypoglycaemia or with other condition or just the lack of inadequate support in the health care facility where the mother delivered. Intersectoral collaboration between gynaecologists, paediatricians, endocrinologists, nurses and midwives are fundamentally required to build this much need support. However, Fox et al is of the view that this is slightly difficult due to differing values and perspective of every speciality [14].

The long-term effects on infants exposed to GD mothers are not fully understood in terms of the underlying mechanism. The feeding pattern during infancy demonstrates an influence on the growth and body composition in the later part of life. Early introduction of formula milk or bottle feeding is linked to a rapid weight gain and subsequently increased risk of childhood obesity. Breastfeeding, on the other hand, protects against childhood obesity. Same thing applies for the early introduction of solid food and a higher appetite at 3 months of age. Therefore, it appears that early feeding, growth, and nutritional practises may play a role in modulating the risk of adult obesity and metabolic disorders [15].

The possible limitations of the present study were the antenatal recording of BMI. But the prospective nature added to power of the study, it eliminated any element of recall bias. Additionally, the follow up period of 12 months was also good considering the sample size. But the results of the present study cannot be generalised to the general population as the participants were all recruited from urban maternal care centres.

CONCLUSION:

The study showed a definite improvement in the glucose levels of GD affected pregnant women after breastfeeding the infant for a longer duration of time. Pregnancy visits are to be utilised to educate and reinforce the benefits of breastfeeding practices. Antenatal counselling to maintain a balanced diet and appropriate physical activity to keep a check on weight is recommended.

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