

# Correlation between Excessive Early Gestational Weight Gain and Risk of Gestational Diabetes Mellitus

Vidhya Selvam, Vani K\*, Kousica M, Yuvarani R

Department of Obstetrics and Gynaecology, Sree Balaji Medical College and Hospital, Tamil Nadu, Chennai, India

## ABSTRACT

Pregnant women with immoderate weight gain during their first trimester can be at higher risk for Gestational Diabetes Mellitus (GDM) and related maternal and fetal complications. The results from this study confirm the association between excessive weight gain during pregnancy, especially in the first trimester, and GDM. Changing lifestyle and doing simple exercises may avoid the development of GDM as a complication of pregnancy.

**Key words:** Diabetes mellitus, Pregnancy, Weight gain

**HOW TO CITE THIS ARTICLE:** Vidhya Selvam, Vani K, Kousica M, Yuvarani R, Correlation between Excessive Early Gestational Weight Gain and Risk of Gestational Diabetes Mellitus, J Res Med Dent Sci, 2022, 10 (10): 073-078.

**Corresponding author:** Dr. Vani K

**E-mail:** drvani212@gmail.com

**Received:** 29-Jul-2022, Manuscript No. JRMDs-22-53399;

**Editor assigned:** 01-Aug-2022, PreQC No. JRMDs-22-53399 (PQ);

**Reviewed:** 16-Aug-2022, QC No. JRMDs-22-53399;

**Revised:** 30-Sep-2022, Manuscript No. JRMDs-22-53399 (R);

**Published:** 10-Oct-2022

## INTRODUCTION

Weight gain, one among the hallmarks of pregnancy, has been extensively studied because it relates to the well-being of the fetus and mother. Optimal weight gain in pregnancy has been the topic of considerable discussion, and attitudes regarding what's appropriate have changed with time, even in recent history [1]. GWG is a unique and complex biological phenomenon that supports the functions of growth and development of the foetus. Gestational weight gain is influenced not only by changes in maternal physiology and metabolism, but also by placental metabolism [2]. Approximately 7% of all pregnancies are complicated by GDM, resulting in more than 200,000 cases annually. More recent reports from our country however detected higher frequencies up to 7.7% [3]. The glucose intolerance of GDM is usually mild but perinatal mortality associated with this complication is 4 to 5 times increased compared to the general pregnant population.

## MATERIALS AND METHODS

**Study design:** Prospective observational study.

**Sample size:** Consistent with qualitative analysis ( $n=4pq/l^2$ )=two hundred patients.

**Inclusion criteria**

- Singleton pregnancy
- regular antenatal visits
- No associated co morbidity

## Exclusion Criteria

- Multiple pregnancy
- Anaemia complicating pregnancy
- Chronic hypertension
- Pregestational diabetes mellitus
- Thyroid problems complicating pregnancy
- Molar pregnancy

## Procedure

During the first antenatal visit and 14 weeks, height and weight are measured.

The BMI is calculated based on quetlet index (weight in kg/height in meters squared).

A detailed history, general examination, and obstetric examination were performed.

Blood samples (6-8 ml) to be taken at reserving visit

- Hb
- HbA1C

Blood samples to be tested between 12-14 weeks, 24-28 weeks, and 32-36 weeks

- Oral glucose challenge test

**Statistical tools used:** In an excel spread sheet, data were recorded and analysed using the SPSS statistical program. The usage of this software program, 't' values and 'p' values had been calculated with frequencies, percentages, manner, and well known deviations. A 'p' cost less than 0.05 will denote extensive courting (Table 1).

## RESULT

**Table 1: Proportion of cases with GDM Overall.**

Gestational diabetes mellitus	Frequency	Percentage
Present	70	35
Absent	130	65
Total	200	100

In this study, there were two hundred study participants included and among them 35% and 65% of participants

were found to be with and without Gestational Diabetes Mellitus (GDM), respectively (Table 2).

**Table 2: Association between age and GDM.**

Age group (in years)	Gestational diabetes mellitus				P Value
	Present		Absent		
	N	%	N	%	
≤ 25 years	24	12	15	7.5	0.000*
26-30 years	31	15.5	98	49	
>30 years	15	7.5	17	8.5	
Total	70	35	130	65	
*Significant					

On assessing the association between the age and GDM, there was a statistically significant association reported ( $p=0.000$ ). The age distribution data of the 200 women are summarized in Table 2. The age distribution had a high proportion between 26-30 years. The mean age of

the study participants among GDM and non GDM cases was found to be  $28.0 \pm 2.9$  years and  $28.6 \pm 2.4$  years, respectively and the difference was found to be statistically significant (Tables 3 and 4).

**Table 3: Association between parity and GDM.**

Parity	Gestational diabetes mellitus				P Value
	Present		Absent		
	N	%	N	%	
Primi gravid	29	14.5	64	32	0.291*
Multi gravid	41	20.5	66	33	
Total	70	35	130	65	
*Not significant					

**Table 4: Association between occupation and maternal weight gain.**

Occupational status	Maternal weight gain				P Value
	Abnormal (≥ 1.5 kgs)		Normal (<1.5 kgs)		
	N	%	N	%	
Employed	28	14	39	19.5	0.3192*
Unemployed	46	23	87	43.5	
Total	74	37	126	63	
*Not significant					

In this study 37% of the participants were employed and among them 14% had gained abnormal weight ( $\geq 1.5$

kgs) and 19.5% had gained weight within normal limits. Also among those who were not employed there were

23% and 43.5% of participants who had gained excessive weight and weight within normal limits, respectively. On assessing the association between occupational status

and weight gain, it was found to be statistically insignificant ( $p=0.3192$ ) (Tables 5,6).

**Table 5: Association between family history of DM and GDM.**

Family history of diabetes mellitus	Gestational diabetes mellitus				P Value
	Present (n=118)		Absent (n=82)		
	N	%	N	%	
Present	55	46.61	63	53.58	0.004*
Absent	15	18.29	67	81.7	
*Significant					

**Table 6: Association between weight gain in early pregnancy and GDM Overall.**

Weight gain in early pregnancy	Gestational diabetes mellitus				P Value
	Present (n=70)		Absent (n=130)		
	N	%	N	%	
≥ 1.5 kgs	50	25	24	12	0.000*
<1.5 kgs	20	10	106	53	
Total	70	35	130	65	
*Significant					

Excessive weight gain in early pregnancy (≥ 1.5 kgs) was reported among 74 (37%) of participants. Among them 25% of participants developed GDM. The association

between weight gain in early pregnancy and GDM was found to be statistically significant ( $p=0.000$ ) (Table 7).

**Table 7: Detection of GDM at 24 weeks of gestation among those with abnormal weight gain during first trimester.**

OGCT at 24 weeks	Weight gain				P Value
	≥ 1.5 kgs (n=62)		<1.5 kgs (n=126)		
	N	%	N	%	
≥ 140 mg/dl	30	48.38	20	15.87	0.000*
<140 mg/dl	32	51.61	106	84.12	
Total	62		126		
*Significant					

On assessing the risk of GDM at 24 weeks of gestation among those with abnormal early trimester weight gain, their OGCT values were within normal limits at first trimester 48.38% participants who had abnormal weight

gain (≥ 1.5 kgs) developed GDM. Similarly 15.87%, who had normal weight gain, developed GDM. The association between the weight gain and GDM screening at second trimester was found to be statistically significant ( $p=0.000$ ) (Table 8).

**Table 8: Detection of GDM at 34 weeks of gestation among that abnormal weight gain during first trimester.**

OGCT at 34 weeks of gestation	Weight gain				P Value
	≥ 1.5 kgs (n=32)		<1.5 kgs (n=106)		
	N	%	N	%	
≥ 140 mg/dl	4	12.5	4	3.77	

<140 mg/dl	28	87.5	102	96.22
Total	32		106	0.06*
*Not Significant				

On assessing the risk of GDM at 34 weeks of gestation among those who gained excessive early trimester weight, there were 12.5% of them who gained excessive weight developed GDM. The association between the

weight gain and GDM screening at third trimester was found to be statistically insignificant ( $p=0.06$ ) (Table 9).

**Table 9: Association between induction of labour and GDM.**

Induction of labour	Gestational diabetes mellitus				P Value
	Present (n=70)		Absent (n=130)		
	N	%	N	%	
Yes	38	54.28	4	3.07	0.000*
No	32	45.71	126	96.92	
*Significant					

Out of 42 women in whom induction of labour, was done with prostaglandin E2 gel, 38 (44.28%) had been women with GDM (Table 10).

**Table 10: Association between maternal weight gain at early trimester and mode of delivery.**

Mode of delivery	Maternal weight gain at early trimester				P value
	Abnormal (≥ 1.5 kgs)		Normal (<1.5 kgs)		
	N	%	N	%	
SVD	22	29.7	96	76.1	<0.0001 *
LSCS	42	56.7	24	19.04	
Assisted vaginal delivery	10	13.5	6	4.76	
Total	74		126		
*Significant					

Out of 74 women who had won excessive weight gain ( $\geq 1.5$  kgs), 56.7% had operational delivery which confirmed sizable correlation ' $p<0.0001$ ' (Table 11).

**Table 11: Association between maternal weight gain at early trimester and APGAR score.**

APGAR score	Maternal weight gain				P value
	Abnormal (≥ 1.5 kgs)		Normal (<1.5 kgs)		
	N	%	N	%	
Score 7	24	12	35	17.5	0.1092*
Score 8	22	11	56	28	
Score 9	28	14	35	17.5	
Total	74	37	126	63	
*Not significant					

Our examine showed no large affiliation on the subject of APGAR score (Table 12).

**Table 12: Association between maternal weight gain at early trimester and neonatal complications.**

Neonatal complications	Weight gain				P Value
	Abnormal (n=74)		Normal (n=126)		
	N	%	N	%	
None	19	25.68	27	21.42	0.3055*
LGA	6	8.1	22	17.46	
SGA	16	21.62	23	18.25	
Hypoglycemia	12	16.21	16	12.69	
Birth asphyxia	7	9.46	20	15.87	
Hyperbilirubinemia	14	18.91	18	14.28	
Total	74		126		

\*Not significant

In this study, among the cases with excessive maternal weight gain and normal weight gain, 25.68% and 21.42% of cases had no neonatal complications, respectively. Among the cases who had gained excessive weight, there were 8.1%, 21.6%, 16.21%, 9.46% and 18.91% of cases had LGA, SGA, hypoglycaemia, birth asphyxia and hyperbilirubinemia, respectively.

Similarly among the cases who had gained weight within normal limits, there were 17.46%, 18.25%, 12.69%, 15.87% and 14.28% of cases had LGA, SGA, hypoglycaemia, birth asphyxia and hyperbilirubinemia, respectively.

On assessing the association between the neonatal complications and GDM, there was no statistical significance found (p=0.3055)

### DISCUSSION

In our study, we found that excessive early gestational weight gain in early pregnancy was associated with increased risk of GDM. Similarly, there were 15.5% and 49% belonged to age group of 26-30 years were found to be with and without GDM, respectively and 7.5% and 8.5% of participants in the age group more than 30 years were found to be with and without GDM, respectively. In our study, maternal age and weight gain association was statistically significant. But in Previous studies, they resulted that there is no relationship between maternal age and the pattern of weight gain. On assessing the association between occupational status and maternal weight gain, it was found to be statistically insignificant (p=0.3192). The association between family history and GDM was found to be statistically significant (p=0.004).

In our observe we realised that the correlation of GWG and threat of GDM became strongly attributable to accelerated weight gain in the first trimester. Immoderate weight benefit turned into pronounced amongst seventy four participants from our look at populace, 12 (16.2%) of cases evolved GDM while sixty two (83.8%) of members did not develop GDM with a p value of .0001, displaying sturdy association between excessive early gestational weight benefit and risk of GDM [4]. In previous study, 802 women with diabetes in pregnancy

participated, and Excessive GWG was reported among 59% of women with significant p value of <.001 [5].

During the assessment of GDM at 24 weeks of gestation by OGCT, among those who had gained abnormal weight ( $\geq 1.5$  kgs) 48.38% of participants developed GDM. In the assessment of GDM at 34 weeks of gestation among those who gained excessive early trimester weight, their OGCT values were within normal limits at first and second trimester respectively. There were 12.5% of them who gained excessive weight developed GDM. The association between the weight gain and GDM screening at third trimester was found to be statistically significant. (p=0.06). Induction of labour was done in 42 women, 54.28% and 3.07% were women with GDM and non GDM, respectively. On assessing the association between induction of labour and GDM, statistically significant (p=0.000).

In this study 74 participants had excessive weight gain ( $\geq 1.5$  kgs), 14.5%, 20% and 2.5% of cases delivered through spontaneous vaginal delivery, LSCS and assisted techniques, respectively whereas those who gained weight within normal limits (<1.5 kgs), there were 50%, 7.5% and 5.5% of cases delivered through spontaneous vaginal delivery, LSCS and assisted techniques, respectively. In order to reduce operative deliveries we need to instil the importance of weight gain during pregnancy. The association between the mode of delivery and weight gain was statistically significant (p<.000). Previous studies resulted that, overweight and obese women with GDM, third trimester weight loss is associated with some improved maternal and neonatal outcomes, both total and primary caesarean sections with a significant p value of <.01 [6].

### CONCLUSION

Inappropriate gestational weight gain is considered as a modifiable risk factor of early pregnancy. Lifestyle adjustments like easy exercises (walking) and nutritional adjustments can prevent GDM and its related complications. This cost effective early intervention can result in healthy generations. From our study, we observe that excessive early pregnancy weight gain specifically inside the first trimester correlates with developing the hassle of GDM.

**REFERENCE**

1. King JC. Physiology of pregnancy and nutrient metabolism. *Am J Clin Nutr* 2000; 71:1218-1225.
2. Rasmussen KM, Yaktine AL. Weight Gain During Pregnancy: Re-examining the Guidelines. 2009.
3. Mellitus AG. Position Statement. *Diabetes Care* 2004; 27:88-90.
4. Cho CH, Hur J, Lee KJ. Early Gestational Weight Gain Rate and Adverse Pregnancy Outcomes in Korean Women. *PLoS One* 2015; 10:0140376.
5. Baci Y, Ustuner I, Keskin HL, et al. Effect of maternal obesity and weight gain on gestational diabetes mellitus. *Gynecol Endocrinol* 2013; 29:133-136.
6. Thangaratinam S, Rogozinska E, Jolly K, et al. Effects of interventions in pregnancy on maternal weight and obstetric outcomes: meta-analysis of randomized evidence. *BMJ* 2012; 344:1-15.