To Study The Effect of Gestational Weight Gain on Labour and Fetal Outcome

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ABSTRACT

Introduction: High prevalence of low birth weight, high morbidity and mortality in children and poor maternal nutrition of mother continues to be major concerns in India. Research was planed to study the effect of gestational weight gain on labour and fetal outcome.

Materials and Methods: The research design was non-experimental descriptive design and was conducted from Dec 2014 to Jan 2015 in Maternity Ward of Guru Gobind Singh Medical College and Hospital, Faridkot. 100 pregnant women were selected. The demographic data was collected by interviews. The labour and fetal outcome was assessed by attending the labour.

Results: The result revealed that most of the study subjects had low gestational weight gain. The gestational weight gain is significantly associated with mode of delivery, duration of labour, birth weight of newborn and gestational age, BMI of women at the time of booking. The low weight gain study subjects had higher incidence of prolonged labour and other modes of delivery caesarean section and instrumental delivery as compared to normal gestational weight gain. The lower weight gain as well as normal weight gain subjects had similar gestational age, Apgar score, fetal complications and labour complications.

Conclusion: Gestational weight gain is significantly associated with labour and fetal outcome.

Keywords: Gestational weight gain, labour outcome, fetal outcome, Body Mass Index (BMI)

INTRODUCTION

The period of intrauterine growth and development is one of the most vulnerable period in the human life cycle. The weight of the infant at birth is a powerful predictor of infant growth and survival and is dependent on maternal health and nutrition during pregnancy.[1]

"Good pregnancy outcomes are associated with healthy weight of the mother", said Kathleen Rasmussen, a Professor of nutrition at Cornell University in Ithaca, New York and chair of guidelines committee. A good diet cannot guarantee a good pregnancy outcome, but it certainly makes an important contribution.[2]

There is a need for behavioral intervention to advise pregnant woman on recommended ranges of gestational weight gain and promote healthy diet and regular physical activity to prevent subsequent obesity and associated health problems.[3]

Inadequate prenatal weight gain is a significant risk factor for intrauterine growth restriction, preterm delivery and low birth weight among infants. Obesity and excessive weight gain on the other hand can lead to adverse maternal and fetal outcomes. These have led to suggestions for optimal weight gain to ensure best outcomes.[4]

A prospective cross-sectional study was conducted to show effect of gestational weight gain on the pregnancy outcome in North West Iran. Abnormal weight gain during pregnancy was not related to an increased risk of preterm labour or cesarean delivery but was highly associated with low birth weight ($p < 0.05$).[5]

Inadequate gestational weight gain is a risk factor for low birth, intrauterine growth restriction, preterm birth and perinatal mortality.[6] Low pre-pregnancy BMI and low gestational weight gain can account for upto 25% of cases of fetal growth restriction.[7] The institution of medicine (IOM) recommended weight gain ranges with the primary goal of improving infant birth weight.[8]

REVIEW OF LITERATURE

Haugen M et al showed that a weight gain less than the IOM recommended increased the risk for a low birth weight baby among normal weight nulliparous women. A gestational weight gain more than that recommended by IOM significantly increased the risk of pregnancy induced hypertension, high birth weight baby, pre-eclampsia and emergency cesarean delivery in both multiparous and parouswoman.[9]

Robinson E. Mbul et al studied the effect of gestational weight gain on the outcome of labour at Yaounde Central Hospital Maternity, Cameroon, over a period of four years. Women who gained weight above the recommended range were three times. More likely to develop pre-eclampsia, had a higher incidence for induced labour and almost 4 fold in-

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creased incidence of prolonged labour. They were more likely to be delivered instrumentally, to have episiotomies and to be delivered by cesarean section.[10]

Choi SK, Park IY, Shin JC found that in normal weight women, maternal and neonatal complications were significantly increased with inadequate weight gain during pregnancy.[11]

Simar TA et al conducted a retrospective cohort study to evaluate associations between maternal BMI and risk of small for gestational age and large for gestational age neonates.[12]

Bodnor LM et al conducted the study at Magee Woman's Hospital in Pittsburg, Pennsylvania. The analysis found that the combination of smoking, ethnicity, primi parity or short height with poor gestational weight gain was associated with an increased risk of short for gestational age birth, while high gestational weight gain combined with each of these characteristics diminished the risk of low for gestational age births in comparison with the same gestational weight gain amongst the women's counterparts.[13]

Addo VN conducted a retrospective study to find out the effect of pregnancy weight gain in different BMI groups on maternal and neonatal outcomes in women delivering at term. The over-weight or obese were significantly more likely to have induction of labour and more chances of cesarean compared to normal.[14]

Objectives of Study was to assess the gestational weight gain of antenatal women, to determine the effect of gestational weight gain on labour outcome among antenatal women, to determine the effect of gestational weight gain on fetal outcome among antenatal women and to find out the association between gestational weight gain and selected demographic variables.

Sr. No.	Content	Frequency (n)	%
1	Age of the women (in years)		
	18-23	40	40.0
	24-29	53	53.0
	30-35	5	5.0
	>35	2	2.0
2	Gravida		
	Primigravida	59	59.0
	Multigravida	41	41.0
3	Parity		
	Primipara	59	59.0
	Multipara	41	41.0
4	Educational Status		
	No formal education	3	3.00
	Primary or middle	36	36.0
	Secondary	27	27.0
	Senior Secondary	22	22.0
	Graduation and above	12	12.0
5	Occupation of the women		
	Employed	12	12.0
	Unemployed	88	88.0
6	Family income (Rs./month)		
	≤5000	20	20.0
	5001-10000	43	43.0
	10001-15000	21	21.0
	15001-20000	6	6.0
	>20000	10	10.0
7	Dietary habits		
	Vegetarian	82	82.0
	Non-vegetarian	18	18.0
8	BMI of mother at the time of booking		
	Underweight (<18.5)	51	51.0
	Normal weight (18.5-24.9)	43	43.0
	Over weight (25-29.9)	4	4.0
	Obese (>30)	2	2.0
9	Gestational weight gain of mother according to institute of medicine		
	Low weight gain	64	64.0
	Normal weight gain	36	36.0
	High Weight gain	0	0
10	Gestational age at the time of delivery (in weeks)		
	<37	24	24.0
	37-40	64	64.0
	>40	12	12.0

Table-1: Antenatal Women according to demographic characteristics (N = 100)

MATERIALS AND METHODS

The study was conducted in Department of Obstetrics and Gynecology of Guru Gobind Singh College and Hospital, Faridkot. Total 100 antenatal women admitted for delivery were selected randomly.

Antenatal women who had pregnancy associated complications were excluded from the study. It was an interview schedule designed to collect patients socio-demographic profile and obstetrical history. Labour outcome which included duration of labour, mode of delivery and any other related complications (premature rupture of membranes, postpartum haemorrhage and perineal tear) were studied.

The fetal outcome in the form of birth weight, respiratory efforts of newborn, colour of newborn, muscle tone, reflex, irritability, heart rate, gestational age of the new born, still birth and any other related complications (meconium aspiration, birth trauma and seizure) were studied.

Variable Under Study

Gestational weight gain, labour outcome, fetal outcome, age, gravida, parity, occupation, education, family income, dietary habits, BMI at the time of booking, gestational age at the time of delivery.

Conceptual Framework

The conceptual framework for the present study is taken from Institute of Medicine (IOM) analytic frame work 1990.

S. No.	Gestational weight gain	Frequency (n)	%	Mean gestational weight gain	Standard deviation
A.	Low weight gain	64	64	9.565	2.760
B.	Normal weight gain	36	36		
C.	High weight gain	0	0		

Table-2: Frequency, percentage, mean and standard deviation of gestational weight gain among antenatal women (N = 100)

Mode of delivery	Low weight gain n (%)	Normal weight gain n (%)	Total	Chi-square df p value
Normal vaginal delivery				
I. Spontaneous II. Induced	17 (48.6) 14 (60.9)	18 (51.4) 9 (39.1)	35 23	$\chi 2 = 10.329$ df=3 p value = 0.016*
Instrumental vaginal delivery	0 (0)	1 (100)	1	
Caesarean Delivery	33 (80.5)	8 (19.5)	41	
Total	64	36	100	
*Significant at p<0.05 level				

Table-3: Association of gestational weight gain of antenatal women with mode of delivery (N = 100)

Labour Outcome	Normal weight gain	Low weight gain	Odds ratio, confidence interval p value
1. Mode of delivery			
a) Spontaneous vaginal delivery	18	17	OR = 2.765 CI = 1.173-6.514 p value = 0.020*
b) Other modes (induced vaginal delivery, instrumental delivery, caesarian delivery)	18	47	
2. Duration of labor			
a) <18	29	33	OR = 3.892 CI = 1.490-10.164 p value = 0.006*
b) 18	7	31	
3. Any labor complications			
a) Yes	3	7	OR = 1.351 CI = 0.327-5.582 p value = 0.678*NS
b) No	33	57	
*Significant at p value <0.05 level; NS: Non significant at p value <0.05 level			

Table-4: Odds Ratio of gestational weight gain of antenatal women with labour outcome (N = 100)

Gestational age of the newborn (in weeks)	Low weight gain n (%)	Normal weight gain n (%)	Total	Chi-square df p value
Preterm (<37)	10 (41.7)	14 (58.3)	24	$\chi 2 = 9.465$ df=2 p value = .009**
Term (37-40)	43 (67.2)	21 (32.8)	64	
Post Term (>40)	11 (91.7)	1 (8.3)	12	
Total	64	36	100	
**Significant at p<0.05 level				

Table-5: Association of gestational weight gain of antenatal women with gestational age of the newborn (in weeks)

Birth weight of baby (in kg)	Low weight gain n (%)	Normal weight gain n (%)	Total	Chi-square df p value
<2.5	39 (86.7)	6 (13.3)	45	$\chi 2 = 20.106$ df=2 p value = 0.000***
2.5-3.5	25 (47.2)	28 (52.8)	53	
>3.5	0 (0)	2(100)	2	
Total	64	36	100	
**Significant at p<0.05 level				

Table-6: Association of gestational weight gain of antenatal women with birth weight of newborn (in kg) (N = 100)

RESULTS

The mean gestational weight gain among antenatal women was 9.565 kg. There was statistically significant association of gestational weight gain and mode of delivery, duration of labour, birth weight of newborn gestational age of newborn. There was statistically non significant association of gestational weight gain with complications of labour, Apgar score or fetal complications. The low birth weight gain antenatal women had higher incidence of other modes of delivery (Cesarean delivery, induced and instrumental vaginal delivery), prolonged labour as compared to normal weight gain antenatal women. The low weight gain antenatal woman had lower incidence of normal birth weight babies than normal weight

Fetal Outcome	Normal weight gain	Low weight gain	Odds ratio, confidence interval p value
Gestational age of newborn (in weeks)			
a) Term (37-40)	21	43	OR = 0.684 CI = 0.294-1.589 p value = 0.377[NS]
b) Preterm post-term	15	21	
2. Birth weight (in kg)			
a) 2.5-3.5	28	25	OR = 5.460 CI = 2.149-13.873 p value = 0.001**
b) <2.5, >3.5	8	39	
3. APGAR score			
a) 7-10	35	63	OR = 0.556 CI = 0.034-9.158 p value = 0.681 [NS]
b) 4-6, 0-3	1	1	
4. Any other related fetal complications			
a) No	33	60	OR = 0.733 CI = 0.155-3.476 p value = 0.696 [NS]
b) Yes	3	4	
**Significant at p value <0.05 level; NS: Non significant at p value <0.05 level			

Table-7: Odds ratio of gestational weight gain of antenatal women with fetal outcome

gain antenatal women. The low weight gain as well as normal as normal weight gain. Women had similar incidence of gestational age, Apgar score, fetal complications and labour complications.

Table 1 depicts the frequency and percentage distribution of sample characteristics according to socio demographic profile of ante natal women.

Table 2 shows the frequency, percentage, mean and standard deviation of gestational weight gain among antenatal mothers. The mean gestational weight gain was 9.565 kg and standard deviation 2.760. 64% of antenatal women had low weight gain, at the same time no one had high weight gain.

Table 3 shows the association of gestational weight gain of antenatal women with mode of delivery. Majority of low weight gain antenatal women had cesarean section. In normal weight gain group majority of antenatal women had spontaneous normal vaginal delivery.

The results depicted that the odds ratio of any labour complication was 1.351 (95% CI = 0.327-5.582, p value = 0.678) that was similar among both the groups.

Hence it can be concluded that other modes of delivery and prolonged labour were more among the low weight gain woman and labour complications were similar in both the groups.

From table 5 it can be concluded that the gestational weight gain of antenatal women affects the gestational age of newborn.

From table 6 it can be concluded that with the increase in gestational weight gain of antenatal women the birth weight of newborn also increased.

From table 7 it can be concluded that the low weight gain women are more likely to have low birth weight babies. The Apgar score, other fetal complications were similar among low weight gain as well as normal weight gain women.

DISCUSSION

The present study revealed that high percentage (64%) of the antenatal women had low weight gain and 36% had normal weight gain and 36% had normal weight gain, at the same time no one had high weight gain. These findings were consistent with the study conducted by Sanka A who concluded that 60% belonged to low weight gain category and 40% belonged to normal weight gain category.[15]

In the present study the incidence of prolonged labour was 3.8 times more among low weight gain antenatal women. This was consistent with the study of Robinson E Mbul.[10]

The present study showed that the normal weight gain women were more likely to deliver normal birth weight babies such that women with low weight gain had lower incidence of normal birth weight babies. These findings were consistent with the fining by Henriksson et al.[16] It is also supported by Simar TA et al.[12] Stotand NE et al showed that gestational weight gain below guidelines was associated with small for gestation age status.[17]

The present study showed statistically non-significant association of gestational weight gain with Apgar score. This finding was consistent with Schulz Christine M which did not support the hypothesis that insufficient or excessive weight gain would be related to lower Apgarscore.[18]

CONCLUSION

The findings of the study revealed that the maximum antenatal woman had low weight gain. There was statistically significant association of gestational weight gain with labour and fetal outcome. Gestational weight gain was statistically associated with the mode of delivery. Duration of labour birth weight of new born and gestational age. The timely recognition and management of inadequate gestational weight gain during pregnancy can effectively protect from adverse outcome, so the antenatal women should be motivated for adequate weight gain during pregnancy for optimal fetal outcome. There is a need to identify the cases of inadequate ges-

tational weight gain and provide necessary care throughout pregnancy.

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