

Effect of Maternal weight on Perinatal Outcomes

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How to cite this article:

Linda Varghese, Bency Bhasi, Meenu Pradeep, et. al./Effect of Maternal weight on Perinatal Outcomes/J Nurse Midwifery Matern Health. 2022;8(3):77–83.

ABSTRACT

Maternal overweight and obesity increase risks of pregnancy and delivery complications and neonatal mortality, but the mechanisms are unclear. The purpose of the study was to assess the trends of maternal weight gain among the pregnant women. Quantitative approach with non-experimental descriptive correlative design was used among 200 antenatal mothers in Gynecology wards and OPD of a tertiary care hospital, Kochi, India. Maternal weight gain in this study was assessed based on Institute of Medicine (IOM) weight gain recommendations 2011 for pregnancy. All singleton Pregnancy with cephalic presentation, on or above 35 weeks of gestation and Pre-pregnancy/Early pregnancy BMI ≥ 18.5 kg/m² were included. BMI was calculated and women were categorized into 4 groups.

Results revealed that, 57% of them were below 27 years of age, almost half of the mothers were primi and 75% of them were without previous complications whereas 53% of pregnant mothers have complications currently. In pre pregnancy, Maternal weight gain trends in mothers were 67.5% and 16.5% in Normal BMI and Overweight respectively whereas in third trimester, 51% were overweight and 30% were only remained in normal BMI. The trend in underweight category shown remarkable reduction from 12% in Pre pregnancy to 2% in third trimester whereas pregnant mothers in category Obese were increased from 4% to 17% in third trimester. Out of Normal weight gain (N=65) mothers in Early pregnant state, 67.2% of them gained Less than IOM recommended weight (11.3-15.8 Kg), followed by 23.4% of Normal IOM recommended weight and only 3% gained greater than IOM recommendation. Major complications include Fetal distress, Hypoglycemia and GDM. The study concluded that, IOM weight gain recommendations for antenatal women should be followed to minimize adverse health outcomes for mother and child.

Keywords: Maternal Weight gain; IOM recommendations; Antenatal mothers; Complications.

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Received on: 27.06.2022

Accepted on: 28.08.2022

INTRODUCTION

Obesity has become a wide spread disease and a vital health concern due to heightened risk of far reaching health consequences that encircle metabolic and cardiovascular issues and also an important health concern worldwide, has been reported to be on rise even in India according to Organization for Economic Cooperation and Development (OECD) update 2017. Maternal

overweight and obesity increase risks of pregnancy and delivery complications and neonatal mortality, but the mechanisms are unclear. Excess weight gain during child bearing carries a increased risk (1.32 times) of morbidity and mortality for both mom and the baby. In reverse, underweight is mostly associated with IUGR & anemia. Excessive weight gain throughout pregnancy has a suggested range throughout 40 weeks of pregnancy. If the weight gain is more or less than the proposed, it is associated with an adverse outcome for both the mother and the baby.⁹

Comparing the women with a fine pregnant weight, women with obesity are at higher risk of abortion, GDM, Pre-eclampsia, Venous thrombo embolism, induced labor, LSCS, anesthetic complication and wound infection and they are put in place and maintain breastfeeding also. Baby of pregnant mothers are noted to be having increased risk of still birth, congenital anomalies, prematurity, macrosomia and neonatal death. Intra uterine exposure to obesity is also associated with an increased risk of developing obesity and metabolic disorders in childhood.

Even though we are aware on the consequences of obesity on health and how it affects women health is somewhat different. The evidence of adverse effect of obesity on women's health is overwhelming and indisputable.² Therefore, the mothers are to be knowledgeable and should practice a healthy diet, exercise as well as follow up. So the fetal and maternal complications can be reduced.

BACKGROUND OF THE STUDY

India is a developing country with an increased population rate. Relating Indian growing population and growing prevalence of obesity are thought to be realistic. Even though the health problems are commonly seen along with raised BMI, how much problem it would give to a conceiving mother still remain perhaps unnoticeable. It states that more than one in 2 adults and 1 in 6 children are overweight or obese. According to, National Family Health Survey, one fifth of Indian women or 20.7% to be précised in age group of 15-49 years are overweight. The latest figure has itself indicated that obesity may be the next major health challenge in the countries.

According to a study conducted in 2008 by ACOG, Washington: the increasing rate of maternal obesity provides a major summons to Obstetric practice. Maternal weight gain can result in adverse outcome

for both the women and fetus. The maternal risk includes GDM and Pre-eclampsia had fetal risk include still birth and congenital anomalies. Children also find to be having increased risk for future obesity and heart diseases.¹⁷

The country's most apprehensive health survey shown 31.3% or almost one-third of urban women are obese while 15% of rural are overweight. The OECD report updates 2017 highlighting the urgent need for public awareness and initiatives.¹ Even though we are aware on the consequences of obesity on health and how it affects women health is somewhat different. The evidence of adverse effect of obesity on women's health is overwhelming and indisputable.² Since the prevalence of obesity is rising, the WHO estimates that more than 1 billion people are overweight with 300 million meeting criteria for obesity. 26% of non pregnant women age 20-39 are overweight and 29% are obese, and it will have remarkable impact on pregnant women.³

According to Scejan JonanssoL, and Anna Kariu Bonan UJ, infant mortality increases 2.4/1000 among normal weight women to 5.8/1000 among obese women. In analysis stratified by preterm and term birth, maternal BMI are related to risk of IMR in term birth, their risk of death due to asphyxia and other neonatal morbidities increase with maternal overweight and obesity. In fact, it is now evident that maternal overweight and obesity may be an important preventable risk factor for IMR in many countries.⁶

Many problems in reproductive life are said to be the contribution from excess weight gain. Since the amount of women who gained weight increased from 11% and is higher in Punjab (29.9%), followed by Kerala (28.1%) and Delhi (26.4). It is found to be clearest to let the world know how increased BMI is affecting the pregnancy.⁴ Improving evidence proposes that maternal overweight and obesity is related to defective maternal and perinatal outcomes.¹²

Need for the study

Literature review has been shown; obesity roots pregnancy complication, because of pregnancy complications and practical difficulties in delivery. The curiosity increases to known the impact of obesity on each stages of pregnancy. Pre-pregnancy obesity even contributes to the development of many pregnancy complications including

pregnancy induced hypertension, pre-eclampsia, GDM, cesarean section and neonatal death.³ A study conducted by Fatma. M et al., on pregnancy and its outcome in population of Oman on 2016 January shows that obesity is associated with an increased risk of cesarean section, gestational hypertension, Macrosomia, miscarriage and GDM. The prevalence of obesity has risen over the year and has lead to an increased economic burden because its adverse effect on health and health care system. Even with adequate prenatal care, obesity is associated within increased adverse effect on pregnancy and its outcome.⁵

According to Hindi M Moussa, Meska Acrias, Elizabeth and Baha M Shihai study conducted on 2016 obesity epidemics is on rise throughout world. Not only it affects the general population but also unique threats to women's life in the antepartum, peripartum and postpartum. An increased BMI is associated with worse perinatal outcome including higher rate of pre-eclampsia, macrosomia and other neonatal morbidity and GDM. Isolated maternal obesity and added maternal diabetes to maternal

program.⁷ It is also evident that women who are obese when they become pregnant have increased risk of having babies with certain birth defect than women with normal weight.⁸

Therefore, this study aimed to determine the effect of maternal weight gain on perinatal outcomes in a population of term, singleton, cephalic pregnancies that get obstetrical care in labour room and the delivery in hospital. The primary aim is to see the trends and the question to be answered was to determine the relationships between increased maternal body weight before pregnancy, fetal vitality and wellbeing at delivery defined as Apgar score, NICU admission and length of hospital stay.¹⁰

In this study, perinatal outcome refers to the end result of pregnancy in terms of mode of delivery, feto-maternal complications in third trimester pregnancy as well as during and after delivery in women with increased BMI. And maternal weight gain refers categorizing mothers based on Institute of Medicine (IOM) weight gain recommendation 2011 for pregnancy. (Table I).

Table 1: Institute of Medicine Weight Gain Recommendations for Pregnancy

Pre-pregnancy Weight Category	Body Mass Index*	Recommended Range of Total Weight (lb)	Recommended Rates of Weight Gain† in the Second and Third Trimesters (lb) (Mean Range [lb/wk])
Underweight	Less than 18.5	28-40	1 (1-1.3)
Normal Weight	18.5-24.9	25-35	1 (0.8-1)
Overweight	25-29.9	15-25	0.6 (0.5-0.7)
Obese (includes all classes)	30 and greater	11-20	0.5 (0.4-0.6)

*Body mass index is calculated as weight in kilograms divided by height in meters squared or as weight in pounds multiplied by 703 divided by height in inches.

†Calculations assume a 1.1-4.4 lb weight gain in the first trimester.

Modified from Institute of Medicine (US). Weight gain during pregnancy: re-examining the guidelines. Washington, DC. National Academies Press; 2009. ©2009 National Academy of Sciences.

MATERIALS & METHODS

The research design used for the present study was Non experimental descriptive correlative design with quantitative approach. The study setting was Gynecology wards and OPD of Amrita Institute of Medical Science (AIMS), Kochi. It was selected because of the easy accessibility of the group and familiarity of the researchers with the settings among 197 Antenatal mothers by Non probability Convenience sampling technique. The inclusion Criteria included singleton Pregnancy, Cephalic

presentation, above 35 weeks of gestation and Pre-pregnancy/Early pregnancy BMI ≥ 18.5 kg/m². Multiple pregnancy, Major structural anomaly for fetus and Medical complications such as diabetes and hypertension were excluded from the study.

BMI was calculated and women were categorized into 4 groups:⁹

Group A, Underweight <19.9 kg/m²; Group B, Normal = 20-24.9 kg/m² (exclude); Group C, Overweight = 25-29.9 kg/m² (exclude);, Group D, Obese = 30-34.9 kg/m²

RESULTS

Table 1: Distribution of Demographic Variables among pregnant women

n=197

Variables	Category	Frequency (F)
<i>Socio-demographic variables</i>		
Age	<27	111
	>27	86
Job	Yes	165
	No	32
Income	<10,000	130
	10,000-15,000	62
	<15,000	5
<i>Clinical Variables</i>		
Gravida	Primi	100
	Multi	100
Previous Complications	Yes	53
	No	144
Current Complications	Yes	93
	No	104

Table 1 represented that, 57% of the mothers were greater than 27% and 84% of them were working, regarding income 65% were less than 10,000. In clinical variables, 50% of mothers were from Primi

and Multi each, 73.5% were with no previous complications whereas 53.5% of them with current complications.

Table 2: Distribution of Maternal Weight Gain among pregnant women in different Trimesters

n=197

Category	Pre-Pregnant BMI		Second Trimester BMI		Third Trimester BMI	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Under Weight	24	12	7	3.5	4	2
Normal BMI	132	67.5	92	47.5	57	30
Over Weight	33	16.5	82	41	102	51
Obese	8	4	16	8	34	17

Table 2 revealed that, in pre-pregnancy BMI, majority of the mothers were found to be Normal category (67.5%) followed by over weight (16.5%), Underweight (12%) and obese 4%. In Second trimester, majority of them were Normal BMI

category but almost 20% declined from that of Pre-Pregnant BMI (47.5%). In third trimester, more than half (51%) of the mothers were became Over weight.

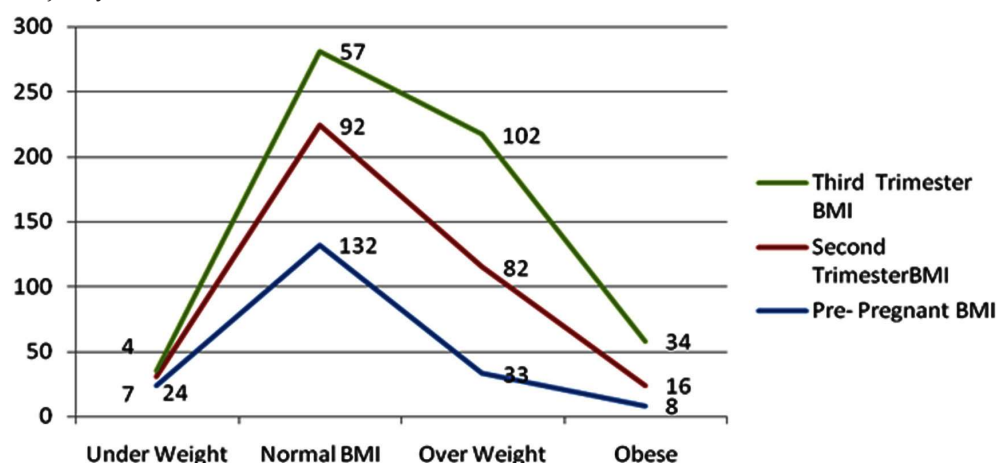


Fig. 1: Distribution of Maternal Weight Gain among pregnant women in different Trimesters

n=197

Table 3: Distribution of Maternal Weight gain of pregnant mothers based on IOM criteria

Early pregnant weight	IOM Criteria of weight gain in Kg	Less than IOM recommended weight		Normal IOM recommended weight		Greater than IOM recommended weight	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Normal Weight N=65	11.3 -15.8	43	67.2	16	23.4	6	3
Over weight N= 99	6.8-11.3	21	10.5	35	17.5	43	21.5
Obese N=33	4.9-6.8	2	1	7	3.5	24	12

Table 3 illustrated the three different categories of weight pattern with respect to IOM guidelines of Weight gain during Pregnancy. Out of Normal weight gain (N=65) mothers in early pregnant state, 67.2% of them gained Less than IOM recommended weight (11.3-15.8Kg), followed by 23.4% of Normal IOM recommended weight and only 3% gained greater than IOM recommendation. Out of Overweight mothers in pre-pregnancy (N=99)

10.5% of them gained Less than IOM recommended weight (6.8-11.3 Kg), followed by 17.5% of mothers gained normal IOM recommendation whereas 21.5% gained greater than IOM recommendation. Out of total Obese mothers in the early pregnancy (N=33), 1% of the mothers gained Less than IOM recommended weight (4.9-6.8 Kg), followed by 3.5% gained Normal IOM recommended weight whereas 21.5% gained greater than IOM recommendation.

Table 4: Comparison between Feto-maternal Complications and Maternal Weight gain among Normal, Overweight and Obese mothers

Complications	Normal Weight n= 65		Over weight n = 99		Obese n = 33	
	F	%	F	%	F	%
Fetal Distress	9	13.8	10	10.1	6	18.1
Hypoglycemia	6	9.2	17	17.1	0	0
GDM	7	10.7	8	8	8	24.2
Others	18	27.6	45	45.4	19	57.5
No Complications	25	38.4	47	47.4	0	0

Major complications include Fetal distress, Hypoglycemia, GDM and in Normal weight gain, others include, Anemia, (2), oligohydramnios (2), Asthma (1), Meconium stained (2), IUGR (1), SGA (2), Hypotension (1), Fibroid complicating pregnancy (2), Cardiac Diseases (4). In Over weight mothers, Hypothyroidism (17) Oligohydramnios (2), Meconium stained (5), Seizures (2), Fibroid (2), Fetal cardiac diseases (5), hypertension (7), PROM

(8), CPD (3) and one hyrdamnios, Cord around the neck, Neural tube defects, Abortion, Low lying placenta, IUGR, Thrombolysis, Twins, Asthma, and Anemia respectively. In Obese mothers, others include, IUGR and hyperthyroidism (3), Fetal cardiac diseases and PROM (2), one each Twins, ITP, Eclampsia, Meconium stained, Preterm and PIH.

Table 5: Association between the clinical variables with Maternal weight in different trimesters

n=197

Factors	Categories	BMI				P Value
		Normal	Obese	Overweight	Underweight	
		n (%)	n (%)	n (%)	n (%)	
Mode of Delivery	Lscs	39(60)	16(53.3)	47(46.5)	2(50.0)	.460
	Normal	25(38)	12(40.0)	45(44.6)	2(50.0)	
	Assisted	1(1.5)	2(6.7)	9(8.9)	0(0.0%)	
Previous Complications	Yes	14(21.5)	7(23.3)	30(29.7)	2(50.0)	.450
	No	51(78.5)	23(76.7)	71(70.3)	2(50.0)	

Current Complication	Yes	28(43.1)	20(66.7)	42(41.6)	3(75)	.58
	No	37(56.9)	10(33.3)	59(58.4)	1(25)	
Job	Yes	8(12.3)	3(10.0)	20(19.8)	1(25)	.42
	No	57(87.7)	27(90)	80(81.2)	3(75)	
Gravida	Primi	33(50.8)	16(53.3)	49(48.5)	2(50)	.97
	Multi	32(49.2)	14(46.7)	52(51.5)	2(50)	
GDM	Yes	8(12.3)	8(26.7)	8(7.9)	—	0.41
	No	57(87.7)	22(73.3)	93(92.1)	4(100)	
Hypoglycemia	Yes	5(7.7)	3(10)	14(13.9)	—	.553
	No	60(92.3)	27(90.0)	87(86.1)	4(100)	
Hypertension	Yes	2(3.1)	3(10.0)	7(6.9)	—	.523
	No	63(96.9)	27(90.0)	94(93.1)	4(100.0)	

Among the 197 samples, 39 (60.0%) normal weight, 16(53.3%) obese, 47 (46.5%) overweight and 20 (50.0%) underweight mothers undergo cesarean section.

From the analysis 51(78.5%) normal weight women, 23(76.7%) obese mothers, 71(70.3%) overweight mothers, and 2(50.0%) underweight mothers had pre-pregnancy complication and 37 (56.9%) normal weight mothers, 10(33.3%) obese mothers, 59(58.4%) overweight and 1(25.0%) underweight had current pregnancy complications.

There are 8 (12.3%) normal weight mothers, 16 (53.3%) obese, 49(48.9%) overweight and 2(50.0%) underweight mothers having gestational diabetes mellitus. Among them 5(7.7%) normal, 3(10.0%) obese, 14(13.9%) overweight, 0(0.0%) underweight mothers had hypoglycemia. Also 29(3.1%) normal, 3(10.0%) obese, 7(6.9%) overweight had hypertension. Results shown that, all factors were not statistically significant.

DISCUSSION

Current study results revealed that, the maternal weight gain trends are rising in nature. The study results are in agreement with the ACOG Clinical committee opinion on Weight gain during pregnancy.¹² The amount of weight gained during pregnancy can affect the immediate and future health of a woman and her infant. According to Siega et al., strong evidence to support associations between excessive maternal weight gain and increased birth weight and fetal growth (LGA) as well as inadequate maternal weight gain and reduced birth weight and fetal growth (SGA).¹³ A study done by Laura et al. found the rising weight gain seems to reduce the risk of LBW but elevates the risks of preeclampsia, caesarean section, and macrosomia; similarly, current study findings shown 53% of the obese, 46.5% of overweight

mothers were undergone LSCS and no LBW cases reported as Other complications.

It has been widely recognized the Institute of Medicine (IOM) recommendations for weight gain during pregnancy, that both pre-pregnancy body mass index (BMI) and gestational weight gain (GWG) are related with the outcome of pregnancy.¹⁵ A huge amount of data connects a high pre-pregnancy BMI with a number of fetal-maternal complications, including fetal death, preeclampsia, GDM, macrosomia, and complicated or assisted deliveries. The present study findings are in agreement with the above statement.

Obese women with low gestational weight gain had a reduced risk for the following outcomes: preeclampsia (0.52; 0.42–0.62), caesarean section (0.81;0.73–0.90), instrumental delivery (0.75; 0.63–0.88), and LGA births (0.66; 0.59–0.75).¹⁶ The study results suggest that weight gain recommendations for overweight and obese women should be followed to minimize adverse health outcomes for mother and child.

CONCLUSION

The rate of weight gained during pregnancy leads to the recent and remote health impact in woman and baby. The population demographics of women is one of the best source which reveals that dramatic increase over the past decade; many women are overweight or obese at conception. Health professionals who care for expectant should decide a woman's BMI at the early prenatal visit and counsel her about the benefits of relevant weight gain, diet and exercise, and, especially, the need to limit excessive weight gain to achieve best pregnancy outcomes. Personalized care and clinical check-up are also necessary in the management of the overweight or obese woman who wishes to gain less weight than recommended but has a suitably growing foetus.

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