Original Article

Relationship of Pre-Pregnancy Body Mass Index and Gestational Weight gain on Mode of Delivery at Term Pregnancies in Primigravida's

Nadeem Shahzad[1], Hifza Waqar[2], Saleh Muhammad[3], Daniyal Nadeem[4]

[1]Associate Professor & Head of Obs & Gyne Sialkot medical college Sialkot.
[2] Postgraduate trainee Unit III, Lady Willingdon Hospital/KEMU, Lahore.
[3]Assistant Professor Medicine, Sialkot Medical College Sialkot.
[4] Fourth year MBBS Student, Aga khan University, Karachi.

Correspondence: *Dr Nadeem Shahzad*
Associate professor & Head of Obs & Gyne Sialkot Medical College, 6 km Daska road Sialkot.
E mail. nadeemgoraya@hotmail.com

Abstract

Objectives: To determine the frequency of low, normal and high weight gain in pregnancy among primigravidas having normal pre-pregnancy BMI and to compare the frequency of cesarean section among these females with low, normal and high gestational weight gain at term.

Study design: Descriptive case study.

Place and duration of study: This study was done at unit III Lady Willingdon Hospital/KEMU Lahore for a duration of six months from 1.1.2015 to 30.06.2015.

Methodology: One hundred and ninety women were selected through Non-Probability, Consecutive sampling technique. Weight and height of all women were recorded and gestational weight gain was calculated. Three groups were formed and women were followed up till delivery. Mode of delivery was noted and cesarean section was labeled. All this information was recorded through study proforma. The Statistical analysis was carried out using SPSS version 20.

Results: Mean age of women included in the study was 26.55±4.93 years. The mean BMI of women was 23.05±1.75. The current mean weight of women at term was 66.14±6.73 kg. Total mean weight gain by the women was 13.87±4.83 kg. The gestational weight gain was low in 53(27.9%) women, 75(39.5%) women gained normal weight and 62(32.6%) women gained high weight. There were 108(56.84%) women who had cesarean section. Among these women 27(25%) had low weight gain, 33(30.6%) had normal weight gain and 48(44.4%) women had high weight gain. A statistically significant association was seen in between gestational weight gain and cesarean section.

Conclusions: With high gestational weight gain, there are more chances of cesarean section and increased BMI during pregnancy is a common indication for cesarean section.

Key words: Obesity, Pregnancy Weight Gain, Caesarean Section.

Cite this article as: Shahzad N, Waqar H, Muhammad S, Nadeem D. Relationship of Pre-Pregnancy Body Mass Index and Gestational Weight gain on Mode of Delivery at Term Pregnancies in Primigravida's. J. Soc. Obstet. Gynaecol. Pak. 2017; 7(3):153-158.

Authorship Contribution: [1,3]Conceived the idea, Literature review, data analysis, [2]Collection, assembly of data and statistical analysis, [3] Writing the article and helped in making results, [4]Literature review, data assembling

Funding Source: none
Conflict of Interest: none

Received: July 03, 2017
Accepted: Sept 21, 2017

Introduction

Prevalence of obesity in pregnancy has been increasing along with the prevalence of obesity in the general population.[1] Over the past two-decade obesity is emerging as a major public health problem around the globe, overall incidence of obesity increases along with the number of women of reproductive age who are overweight or obese. In Canada,21% of the women are obese between the age of 20 to 39 and around one third of women in their reproductive age are obese in the USA.[2] Complications associated during pregnancy, labour and in the Perpeurium along with adverse neonatal outcomes like macrosomia, neural tube defects and stillbirth are more common in obese women.[3]

It has been suggested that increased rates of labour induction and obstetrical interventions are observed in obese women, similarly, the progression of labour is significantly slower in these women along with the duration of labour, oxytocin requirements and cesarean delivery rates are also higher with increasing maternal body mass index (BMI).[4] There appears to be a linear relationship between obstetrical interventions and maternal BMI.[5] Weight for height measurement is expressed as body mass index (BMI) which is traditionally defined as weight in kilograms divided by height in meters' square. Underweight are of BMI of less than 19.8, however, BMI of 19.8-26 &26-29 are categorized normal and overweight respectively. However, obesity is defined as a BMI > 29 and woman is said to be morbidly obese if her BMI is >35.[6] In neonate birth weight is affected by Pre-pregnancy BMI independent of actual weight gain during pregnancy. Gestational weight gain(GWG) is defined as total weight gain during pregnancy at term (>37 weeks) minus the actual weight at the time of booking (<20 weeks of gestation), average GWG is around 12.5 kg[7].Low weight gain is labeled if GWG is <12kg, normal weight gain is if GWG is 12-16kg, whereas, High weight gain if it is >16kg

By keeping in mind, the maternal and neonatal complications it is necessary to identify appropriate interventions for weight management which are safe and effective in pregnancy. Available guidelines and reviews have limitations in their recommendations because of the few number of studies[8].

One study conducted on Iranian women, reported that among females with normal pre-pregnancy BMI, there are 41.4% females gain normal weight (12.5-16kg) while almost 59% females gain abnormal weight, out of which 55% females gained low weight (<12.5Kg) and only 3.6% females gained high weight (>16kg). The rate of cesarean section among females with normal weight gain was 42% while among females with abnormal weight gain was 58%. The difference was high but the rate of cesarean section was also high among females with normal weight gain.[9] Another study reported that among females with normal pre-pregnancy BMI, there are 50.4% females gain normal weight (12-16kg), 21.5% females gained low weight (<12Kg) and 28.1% females gained high weight (>16kg). The rate of cesarean section among females with normal weight gain was 16%, 14% with low weight gain and 23% with high weight gain.[10]

Obesity is a modifiable risk factor. Majority of females attending antenatal clinics are uneducated and become pregnant with suboptimal BMI. Mode of delivery is highly dependent on the weight of female at the time of delivery. Most of the females with more weight have to undergo cesarean section due to complications like CPD, shoulder dystocia or fetal distress. Variable results are present in literature. Moreover, no local study is available through which we can update guidelines for management and control of excessive or below normal weight gain. The rationale of our study was to determine the frequency of females with normal pre-pregnancy BMI which gain low, normal or high gestational weight and outcome in terms of mode of delivery. This study was designed with the aim to create awareness among females regarding obstetrical risk associated with obesity, so they can be properly educated to overcome obesity before conception and adequate weight gain in pregnancy by lifestyle modification and nutritional education.

Methodology

This study was carried out at Department of Obstetrics and Gynaecology unit III Lady Willingdon Hospital Lahore for a duration of six months from 1.1.2015 to 30.06.2015.

Size of the sample was 190 cases, calculated with 95% confidence level and 6% margin of error and taking an expected percentage of low weight gain 21.5% in females with low gestational weight gain in primigravida's at term. Their recruitment was done by Non-probability purposive sampling technique.

Inclusion Criteria

- Primigravida of age 18-35 years with singleton, cephalic presentation before 20 weeks of gestation (as assessed by Ultrasound)
- women with normal pre-pregnancy BMI range from 19.8-26kg/m2.

Exclusion Criteria

- Multiple gestations (as assessed by Ultrasound)
- Congenital anomalies (as assessed by Ultrasound)
- Chronic hypertension (BP>140/90mmHg on medical record), H/o diabetes (BSR>140mg/dl), abnormal liver and renal function tests (AST>40IU, ALT>40IU, creatinine>1.2mg/dl).

Females fulfilling the criteria were recruited in the study from antenatal clinic of Lady Willingdon Hospital, Lahore. After approval from the hospital ethical committee. Informed consent was taken. Demographic information was recorded. Weight and height were recorded and gestational weight gain was calculated. Three groups were formed and females were followed up till delivery. Mode of delivery was noted and cesarean section was labeled. All this information was recorded through study proforma. The Statistical analyses was carried out by SPSS version 20. The quantitative variable like age, gestational age and gestational weight gain were taken as standard deviation and Mean. The qualitative variables like low, normal. high weight gain and cesarean section were calculated as percentage and frequencies. All the groups were compared for a cesarean section by using chi-square test taking $p<0.05$ as significant. Stratification of data was done for age, economic status, employment status. Chi-square was applied post-stratification with $p<0.05$ taken as a significant value.

Results

Mean age of women included in our study was 26.55±4.93 years. Minimum and maximum age of women was 18 and 35 years. As per socioeconomic status 121(63.7%) women were in the socioeconomic class <10,000 and 69(36.3%) women were in the socioeconomic class 10,000-50,000.133(70%) women were house wives and 57(30%) of the women were employed. As long as the educational status of the women 82(43.2%) were primary pass, 41(21.6%) women were middle pass, 46(24.2%) women were matric pass and 21(11.1%) women were graduate.

(Demographic data of the women are shown in table I)

Table I: Demographic Data of the Study Groups

Age Distribution of Women		
No of Cases		190
Mean		26.55
SD		4.93
Minimum		18
Maximum		35
Socioeconomic Status		
Socioeconomic Status	***Frequency***	***Percentage***
<10,000	121	63.7%
10,000-50,000	69	36.3%
>50,000	0	0%
Total	**190**	**100%**
Employment Status of Women		
Employment Status		
House Wife	133	70%
Working Woman	57	30%
Total	**190**	**100%**
Educational Status of Women		
Educational Status		
Primary	82	43.2%
Middle	41	21.6%
Matric	46	24.2%
Graduation	21	11.1%
Total	**190**	**100%**

Obstetrical history of women showed that mean body mass index of women was 23.05±1.75. Minimum and maximum body mass of women was 20 and 26 respectively. The current mean weight of women at term was 66.14±6.73 kg. At this point minimum and a maximum weight of women was 55 and 80 kg. Total mean weight gain by the women was 13.87±4.83 kg. Minimum and maximum weight gain was 5 kg and 20 kg. ***(Table-II).***

Table II: obstetrical history of women			
	Pre-Pregnancy BMI (Booking)	***Current Weight (At Term)***	***Total Weight Gain in kg***
Mean	23.05	66.14	13.87
SD	1.75	6.73	4.83
Minimum	20.0	55	5
Maximum	26.0	80	20

Out of 190women 53(27.9%) gained low weight, 75(39.5%) women gained normal weight and 62(32.6%) women gained high weight. ***(Table-III).***

Table III: Weight gain during pregnancy among primigravidae females		
Weight Gain	***Frequency***	***Percentage***
Low Weight (<12 Kg)	53	27.9%
Normal Weight Gain (12-16 Kg)	75	39.5%
High Weight Gain (>16 Kg)	62	32.6%
Total	**190**	**100.0%**

Regarding the frequency of cesarean section there were 108(56.84%) women who had cesarean section. ***(Figure-1).***

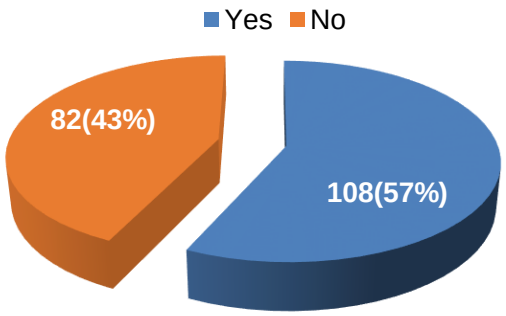

Figure 1. Frequency of cesarean section among females.

108 women had a cesarean section. Among these women 27(25%) had low weight gain, 33(30.6%) had normal weight gain and 48(44.4%) women had high weight gain. A statistically significant association was seen in between gestational weight gain and cesarean section. ***i.e. p-value=0.000 (Table IV).***

Table IV: Comparison of cesarean section among females with different gestational weight gain			
	Cesarean Section		***Total***
	Yes	***No***	
Low Weight	27(25%)	26(31.7%)	53(27.9%)
Normal Weight Gain	33(30.6%)	42(51.2%)	75(39.5%)
High Weight Gain	48(44.4%)	14(17.1%)	62(32.6%)
Total	**108**	**82**	**190**

Discussion

Weight gained during pregnancy can have profound effects on the current and future health of a woman and on her baby. The demographics studies have shown a dramatic change of pregnant women over the past decade; at conception, more women are overweight or obese.[11] In 2010, based upon the recommendations by World Health Organization, the Institute of Medicine published revised pregnancy weight gain guidelines that are based on pregnancy body mass index (BMI) ranges, attaining within the recommended gestational weight gain ranges reduces maternal, fetal and newborn risks.[12]

Increased rates of labour induction and obstetrical interventions are more common in obese women. Similarly, Progression of labour is significantly slower in these women and oxytocin requirements is also increased[13]. Obesity has been identified as a modifiable risk factor for maternal and child health due to its adverse effects still number of gaps remain, however, it is associated with increased rates of cesarean section.[14]

In our study, overall cesarean section rate was57% (108/190). Among these women 48(44.4%) had high weight gain during pregnancy, 33(30.6%) women had normal and 27(25%) women had low weight gain. In another study, Dietzet al. concluded that the rate of cesarean section was 41% among high weight gain women which is almost near to the rate reported in our study among obese women.[15] Few other studies have also reported a linear relationship between BMI and cesarean delivery[16].Caesarean section rate is 6 times more common in obese women due to cephalo-pelvic disproportion or failure to progress than non-obese women.[17]

A recent study conducted at Iraq reported cesarean section rate as 28.1% among primigravida women with BMI >31.[18] Cesarean Section rate among women with high weight gain in our study is quite high as that of reported by Waqar Al-Kubaisy in their study. i.e. (44.4% vs. 28.1%), this difference may be due to their study in a different population having a different pattern of obesity. In an Iranian study the rate of cesarean section increased from 30% in women with normal BMI to 56% in the women with BMI≥35.[19] This rise of cesarean section rate could be due to variety of factors, including, unsuccessful induction of labor, delay in the first stage of labor, fetal macrosomia, fetal distress and the decision of obstetrician.

Kominiarek al. after controlling for parity and prior cesarean section revealed the relative risk of delivery by C-section to be three times higher in multiparas with BMI≥40 than with the comparable group of BMI < 25. [20] Few other studies have shown a proportional increase in the risk of caesarian delivery with the rise of the level of maternal obesity[21 22], proving the findings of our study.

The existence of excess intra-abdominal adipose tissue itself could mechanically obstruct the progression of labor, which in turn compromise fetoplacental circulation leading to fetal distress and necessitating a caesarean section. It is being claimed in several reports that there is an association between obesity and various factors, such as age, parity, occupation, economic & educational status, and lifestyle.[23 24] In our culture these factors play a very vital role for women during pregnancy. limitations of our study were that demographic factors were not addressed in relation to the weight gain and mode of delivery. In future studies, will be designed to assess these factors, their relationship with mode of delivery and pregnancy weight gain.

On the basis of results of our study, it can be said that the pre-pregnancy BMI has an association with the mode of delivery and has an influence on pregnancy outcome as well. Therefore, women with a high BMI need more care during pregnancy and childbirth which requires high expenses. In this regard, training, nutrition, health consultation, and reaching appropriate weight before pregnancy or even at the time of marriage should be highlighted which will enhance the mother and her infant's wellbeing.

Conclusion

Thus, it has been concluded through results of this study that with high weight gain during pregnancy, there are more chances of cesarean section.

Disclosure: This article is based from the thesis submitted to CPSP 2015

References

1. Vahratian A. Prevalence of overweight and obesity among women of childbearing age: results from the 2002 National Survey of Family Growth. Mat Child Health J. 2009;13(2):268-73.
2. Ogden CL, Carroll MD, Curtin LR, et al. Prevalence of overweight and obesity in the United States, 1999-2004. JAMA. 2006;295(13):1549-55.
3. Siega-Riz AM, Viswanathan M, Moos M-K, et al. A systematic review of outcomes of maternal weight gain according to the Institute of Medicine recommendations: birthweight, fetal growth, and postpartum weight retention. Am J Obstet Gynecol. 2009;201(4):339. e1-. e14.
4. Arrowsmith S, Wray S, Quenby S. Maternal obesity and labour complications following induction of labour in prolonged pregnancy. BJOG: An International Journal of Obstetrics & Gynaecology. 2011;118(5):578-88.
5. Crane J, White J, Murphy P, Burrage L, et al. The effect of gestational weight gain by body mass index on maternal and neonatal outcomes. J Obstet Gynaecol Can. 2009;31(1):28-35.
6. Blomberg M. Maternal and neonatal outcomes among obese women with weight gain below the new Institute of Medicine recommendations. Obstetrics & Gynecology. 2011;117(5):1065-70.
7. Ward LC. Segmental bioelectrical impedance analysis: an update. Current Opinion in Clinical Nutrition & Metabolic Care. 2012;15(5):424-9.
8. NICE Guidelines. Dietary interventions and physical activity interventions for weight management before, during and after pregnancy. 2010 [cited 2015]; Available from: http://www.crd.york.ac.uk/crdweb/ShowRecord.asp?LinkFrom=OAI&ID=32011000327.
9. Yekta Z, Ayatollahi H, Porali R, et al. The effect of pre-pregnancy body mass index and gestational weight gain on pregnancy outcomes in urban care settings in Urmia-Iran. BMC Preg Childbirth. 2006;6(1):15.
10. Abrams B, Altman SL, Pickett KE. Pregnancy weight gain: still controversial. Am J Clin Nutr. 2000;71(5):1233s-41s.
11. Obstetricians ACo, Gynecologists. Weight gain during pregnancy: committee opinion no. 548. Obstet Gynecol. 2013; 121:210-2.
12. Modder J, Fitzsimons K. Centre for Maternal and Child Enquiries (CMACE). Royal College of Obstetricians and Gynaecologist

(RCOG) Joint Guideline: Management of Women with Obesity in Pregnancy. 2010.
13. Chu S, Kim S, Schmid C, Dietz P, Callaghan W, et al. Maternal obesity and risk of cesarean delivery: a meta-analysis. Obesity Reviews. 2007;8(5):385-94.
14. Reece EA. Perspectives on obesity, pregnancy and birth outcomes in the United States: The scope of the problem. American journal of obstetrics and gynecology. 2008;198(1):23-7.
15. Dietz PM, Callaghan WM, Morrow B, et al. Population-based assessment of the risk of primary cesarean delivery due to excess Prepregnancy weight among nulliparous women delivering term infants. Maternal and child health journal. 2005;9(3):237-44.
16. Barau G, Robillard PY, Hulsey T, et al. Linear association between maternal pre-pregnancy body mass index and risk of caesarean section in term deliveries. BJOG: An International Journal of Obstetrics & Gynaecology. 2006;113(10):1173-7
17. Young TK, Woodmansee B. Factors that are associated with cesarean delivery in a large private practice: the importance of Prepregnancy body mass index and weight gain. American journal of obstetrics and gynecology. 2002;187(2):312-20
18. Al-Kubaisy W, Al-Rubaey M, Al-Naggar RA, et al. Maternal obesity and its relation with the cesarean section hospital based cross sectional study in Iraq. BMC pregnancy and childbirth. 2014;14(1):235.
19. Rezaie M, Shahoei R, Shahghebi S. The effect of maternal body mass index on the delivery route in nulliparous women. Journal of Public Health. 2013;5(12):493-7.
20. Kominiarek MA, VanVeldhuisen P, Hibbard J, Landy H, et al. The maternal body mass index: a strong association with delivery route. American journal of obstetrics and gynecology. 2010;203(3):264. e1-. e7.
21. Tosson MM, Alhussaini TK. The impact of maternal obesity on pregnancy outcome at Assuit University Hospital. Ass Univ Bull Env Res. 2005;8(2):1-11.
22. Martín AR, Nieto JMM, Ruiz JPN, Jiménez LE. Overweight and obesity: the role of education, employment and income in Spanish adults. Appetite. 2008;51(2):266-72.
23. Park JH, Lee BE, Park HS, et al. Association between pre-pregnancy body mass index and socioeconomic status and impact on pregnancy outcomes in Korea.
24. Zaheri F, Afkhamzada A. The Effect of Pre-Pregnancy Body Mass Index and Gestational Weight Gain on Pregnancy Outcomes. Life Science Journal. 2013;10(6s). journal of Obstetrics and Gynaecology Research. 2011;37(2):138-45.