

Impact of Maternal Body Mass Index (BMI) and Age on Pregnancy Outcomes at a Tertiary Care Hospital

Shazia Iffet, Ayesha Arif, Sadaf Moin, Aisha Raja, Sadia Arif, Nadia Arif

ABSTRACT

Objectives: To analyze the role of maternal BMI and age on pregnancy outcomes.

Study design and Setting: A retrospective cohort study CMH, Abbottabad from 1st August 2022 to 31st January 2023

Methodology: A retrospective cohort study was done over a period of 6 months in 500 post-natal women whose BMI were calculated and recorded at first trimester during their booking visit and eventually delivered at combined military hospital, Abbottabad. Data related to age, BMI, gestational age at the time of delivery, spontaneous or induction of labour and mode of delivery were evaluated.

Results: The study included 500 female patients. The mean age and BMI were 32±11.5 years and 28.8±8 respectively. 140 (28%) females had normal weight, 310(62%) and 50(10%) were overweight and obese respectively. The variable age at the time of booking was divided into three groups = 20 years, 21-35 years, and 36-42 years which included 80(16.4%), 275(55%) and 145(29%) patients respectively. Multigravida were 285(57%) and prim gravida were 215(43%). Induction was given to 275(55%) and those who went into spontaneous labour were 225(45%). Delivery at term that is = 37 weeks was 455(91%) and only 45(9%) were delivered before 37 weeks. Percentage of women having a spontaneous vaginal delivery was 230(46%) and 250(50%) had LSCS and 20(4%) underwent instrumental delivery.

Conclusion: It was evident that raised BMI and maternal age had confounding effects on pregnancy outcomes. The incidence of LSCS was more in patients with higher BMI and age.

Keywords: Body Mass Index (BMI), obesity, gestational age, Lower-Segment Cesarean Section (LSCS).

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INTRODUCTION:

Obesity has become a global phenomenon nowadays and is

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considered the most common metabolic disorder. Its prevalence has affected the women of reproductive age too.¹ The risks of pregnancy complications such as hypertension, gestational diabetes mellitus, pre-eclampsia, preterm deliveries and birth of growth restricted babies are higher for obese and overweight mothers.²

According to the study of Martin et al., pregnancy complications had a statistically direct relationship with overweight, obesity and excessive maternal weight gain during pregnancy which significantly contribute to increased incidence of caesarean section.³ Women with BMI in the normal range that is (20-24.9kg/m²) are less likely to have issues conceiving a baby with low risk of miscarriage and stillbirth than those with BMI greater than 25kg/m². According to Vince et al., the pregnancy complications associated with obesity and excessive gestational weight gain also include labour complications besides those that are threatening to the lives of mothers and babies.⁴

Zongjiang et al., found out the estimated proportions of unfavourable pregnancy outcomes which were associated with obesity and gestational weight gain. The proportion of GDM was 29.3%, pre-eclampsia was 36.2%, caesarean delivery was 15.5%, 21.6% was longer antenatal stay in hospital with 6.5% of NICU admission, the proportion of births large for gestational age was 25.2% and extreme

preterm births was 16.3%.⁵

Xiu et al. compared the pregnancy outcomes in females with normal pre-pregnancy weights to women with higher BMI and inferred that overweight females before pregnancy had higher risk of preterm birth and that obese women had the greatest risk of extremely preterm births. However, the maternal age and gestational weight gain had low impact on preterm births as the estimators were robust in that case.⁶ The effects of age on pregnancy outcomes remain controversial due to several issues such as the effects of maternal weight intervening with the effects of older age. The study done by Malgorzata et al., showed the pregnancy outcomes depending on maternal age substantiating that females related to younger and older age groups had higher adjusted odd ratios of pre-eclampsia, intra uterine growth restriction and preterm births.⁷⁻⁹ Considering the aforementioned outcomes this study was aimed to assess the effects of maternal BMI and age on pregnancy outcomes in our setup.

METHODOLOGY:

This retrospective cohort study consisted of 500 postnatal women and was carried out over a period of six months from 1st August 2022 to 31st January 2023, at a tertiary care hospital, CMH Abbottabad. According to a WHO calculator with 95% confidence interval, 5% margin of error and a population proportion of 50% a sample size estimated must be greater than or equal to 385 to sufficiently represent unknown population.^{8,9} The selection of patients for the data was done through a simple random sampling technique who were booked at first trimester in OPD and were followed up for antenatal care and delivered at CMH Abbottabad. The inclusion criteria composed of the ages of patients that ranged from 19 to 42 years. All primigravida and multigravida were included. The BMI and ages of patients were calculated and recorded at the time of booking visit. The variables also consisted of gestational age, induction (if they were induced or not), spontaneous (if there was a spontaneous onset of labor) and mode of delivery. Exclusion criteria consisted of patients with comorbidities, for example, diabetes mellitus, hypertension and renal parenchymal diseases. Patients aged =42 years or =18 years. It also excludes morbidly obese patients, women with previous 2 scars and with uterine and foetal congenital abnormalities.

The total number of patients with normal BMI were 140 (28%), overweight patients were 310(62%) and obese were 50(10%). Gestational age, induction and spontaneity of labour and mode of delivery were analysed in relation to BMI and age of patients. It was done to assess the importance of maternal weight and age in delivering a baby with less complications during pregnancy and post pregnancy outcomes.

The study was conducted with consent from the patients using consent forms and with permission from the Ethical

Institutional Review Board of Combined Military Hospital Abbottabad vide letter no (ERB no CMH Atd-ETH-82-Gyane-23).

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 26. The variables in study consisted of maternal age, BMI, gestational age, induction, spontaneous and mode of delivery. The maternal age was categorized into 3 groups that is =20 years, 21-35 years and 36-42 years. The BMI was classified into 3 categories normal, overweight and obese. They were assigned '1', '2' and '3' labels respectively. The gestational age =37 weeks was categorized as pre-term while greater than 37 weeks was classified as term. The variable induction was assigned a label 'yes' if the patient was induced and 'no' if she was not. The variable spontaneous was also given label 'yes' if the labor was spontaneous and 'no' if it was not. The mode of delivery was categorized into 3 groups that is, instrumental delivery (Ins-D), spontaneous vaginal delivery (SVD) and lower segment caesarean section (LSCS). The chi-sq test was applied to see if there was any effect of maternal BMI and age on the pregnancy outcomes at 5% level of significance.

RESULTS:

During the study 500 patients were assessed since their first trimester throughout the pregnancy till delivery. The age of patients ranged from 19 years to 42 years. The mean age was 32± 11.5 years. The mean BMI was 28.8±8. The total number of patients with normal BMI were 140(28%), the overweight patients were 310(62%) and patients with obesity were 50(10%). Results showed that 129(92.1%) of the females with normal BMI went through spontaneous vaginal delivery whereas this percentage was much lower in overweight and obese patients that is 100(32.3%) and 1(2%) respectively. On the other hand, the number of deliveries through LSCS was much higher in obese patients as compared to normal weight patients. It was 46(92%) in obese and 1(0.7%) in normal patients. Gestational age was divided into two categories. The one with gestational age =37 weeks was called a term birth whereas the one less than or equal to 37 weeks was called preterm births. The preterm births were higher in obese patients that is 8(16%) as compared to normal patients 0(0%). 49 out of 50 patients with obesity required induction and only 1 patient had spontaneous onset of labor. From the results it was evident that BMI had significant relationship with mode of delivery, gestational age, induced or spontaneous labor.

Figure 1: Delivery at term according to BMI

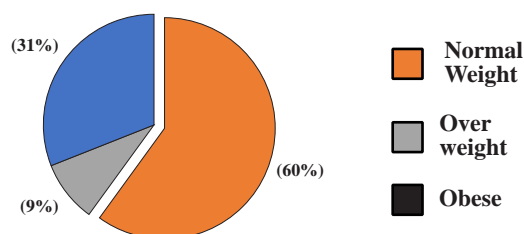


Table 1

Variables	Body Mass Index (BMI)		
	Normal (n=140)	Overweight (n=310)	Obese (n=50)
Mode of Delivery, n(%)			
Ins-D	10 (7.1%)	7 (2.3%)	3 (6.0%)
SVD	129 (92.1%)	100 (32.3%)	1 (2.0%)
LSCS	1 (0.7%)	203 (65.5%)	46 (92.0%)
Gestational Age, n(%)			
Term	140 (100%)	273 (88.1%)	42 (84.0%)
Pre-term	0 (0.0%)	37 (11.9%)	8 (16.0%)
Induction, n(%)			
Yes	35 (25%)	191 (61.6%)	49 (98%)
No	105(75%)	119 (38.4%)	1 (2.0%)
Spontaneous, n(%)			
Yes	105 (75%)	119 (38.4%)	1 (2.0%)
No	35 (25%)	191 (61.6%)	49 (98%)

P-value = 0.000

Figure 2: Mode of Delivery

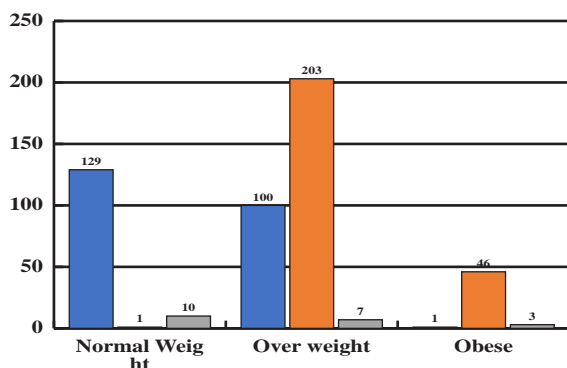


Table 2

Variables	Age Groups		
	≤20 years (n=80)	21-35 years (n=275)	36-42 years (n=145)
Mode of Delivery, n(%)			
Ins-D	1 (1.3%)	15 (5.5%)	4 (2.8%)
SVD	14 (17.5%)	160 (58.2%)	56 (38.6%)
LSCS	65 (81.3%)	100 (36.4%)	85 (58.6%)
Gestational Age, n(%)			
Term	76 (95%)	256(93.1%)	123(84.8%)
Pre-term	4 (5%)	19 (6.9%)	22 (15.2%)
Induction, n(%)			
Yes	56 (70%)	127 (46.2%)	92 (63.4%)
No	24 (30%)	148 (53.8%)	53 (36.6%)
Spontaneous, n(%)			
Yes	24 (30%)	148 (53.8%)	53 (36.6%)
No	56 (70%)	127 (46.2%)	92 (63.4%)

P-value = 0.000

The total number of patients in ≤20 years were 80(16%), in 21-35 years were 275(55%) and in 36-42 years were 145(29%). Most of the patients in younger age group and older age groups went through LSCS. They were 65(81.3%) in ≤20 years group and 85(58.6%) in 36-42 years group. Whereas they are 100(34.6%) in 21-35 years group. The percentage of preterm births increased in older age group that is 8(16%). Induction required in younger patients were 56(70%) whereas the 24(30%) had spontaneous labor. In older patients 92(63.4%) requires induction where as 53(36.6%) had spontaneous labor. In 21-35 years the incidence of preterm births was 6.9%. In our study induction rate was 46.2% and rate of spontaneous labour was 53.8% where as the required rate of induction world wide should be 20%. The results of chi-sq test is shown in table 1 and table 2. As the p value is less than 0.05 there is a significant relationship between maternal [BMI, age] and pregnancy outcomes [mode of delivery, gestational age, induction and spontaneous].

DISCUSSION:

The implications of obesity associated to pregnancy are often unnoticed and ignored due to the absence of specific evidence based treatment options.¹⁰ It is also ascertained that the management of higher BMI does not require short term initiatives rather a long term sustainable approaches that begin before pregnancy and continue through postpartum period.¹¹ Furthermore, the timely management is essential to overcome adverse outcomes during pregnancy. Meng et al., showed obesity as one of the prime reasons for emergency CS.¹² In our study the percentage of LSCS in obese patients was higher as compared to females with normal BMI. In normal BMI patients it was 1(0.7%) whereas 46(92%) of the obese patients delivered babies through LSCS. In overweight females it was 203(65.5%). It is evident that maternal BMI does have impact on the mode of delivery because the risk of LSCS increase with increase in BMI.

Buyun et al., explored the effects of maternal BMI on neonatal outcomes and concluded that overweight and obese mothers are at higher risk of giving birth to large for gestational age (LGA) and pre-term babies.¹³ In our study the incidence of pre-term births was greater in obese patients. It was 8(16%) as compared to overweight patients 37(11.9%).

Rizwana et al., suggested the induction of labour as a preventive measure for late term stillbirths and caesarean births in obese women with pre-existing complications and comorbidities.¹⁴ However in 20% of the cases induction is not successful in terms of vaginal births and this number increases for some groups such as those with obesity.¹⁵ In our research it is clearly shown that overweight and obese patients had higher rate of induction whereas 75% of the patients with normal BMI had spontaneous onset of labour. Jenny et al., added that the obese patients had lower chance of reaching active stage of labour than leaner patients if they

did not have vaginal delivery previously. However, if they had vaginal delivery then their BMI didn't influence uterine activity. Additionally the risk of caesarean section was lower.¹⁶

Kumar et al., assessed the relationship between mode of delivery and maternal age and concluded that age effects the mode of delivery because older women tend to have comorbidities which often end up in LSCS.¹⁷ However, some of the studies showed that the incidence of LSCS was more in teenage mothers that is 30% as compared to adult mothers which was 15% (18). This was confirmed by our study too. The number of LSCS was 65(81.3%) in age groups ≤ 20 years and in age group 36-42 years it was 85(58.6%) as compared to the group 21-35 years which was 100(36.4%). The incidence of preterm births was higher in older patients as compared to young patients. Alexander put forth the preterm birth as one of the many adverse pregnancy outcomes which are associated with females of advanced maternal age (19). In our study it was found out that 22(15.2%) of the women in advanced age group had preterm births. The rate of induction in the younger age group and older age group was higher as compared to spontaneous onset of labour. Joao et al., showed that in the advanced age group it is higher in order to prevent perinatal deaths which often occur at term in older women (20). In the younger females the successful induction is more prevalent than older women.

CONCLUSION:

There was sufficient evidence that females with higher pregnancy BMI as well as inappropriate weight gain during pregnancy had elevated risks of complications for mother and baby. Therefore, there is a need to increase awareness about the negative effects of inappropriate weight gain in pregnant females and improve management techniques for reproductive age group to avoid adverse outcomes.

Authors Contribution:

Shazia Uffer: Data entry, data analysis

Ayesha Arif: Data collection

Sadaf Moin: Literature search

Aisha Raja: Data analysis

Sadia Arif: Data collection

Nadia Arif: Substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data

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