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MATERNAL BODY MASS INDEX (BMI): EFFECT ON PREGNANCY OUTCOME

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ABSTRACT

Objective: To study the effect of maternal body mass index on pregnancy outcome and neo natal birth weight. **Subject and Methods:**This was a cross sectional study conducted from January 22nd 2016 till July 21st 2016 in the department of Obstetrics & Gynaecology Unit 2 Civil Hospital Karachi. 275 pregnant women with increased BMI (>25kg/m^2) at delivery were included in this study. Patients were observed for pregnancy outcome that is mode of delivery with neonatal weight at birth and was measured by experienced staff nurse in labourroom and weight of 4000g or more was considered as marcosomia. **Results**: The average age of the patients was 27.53±3.51 years. Caesarean section and macrosomia were the commonest pregnancy outcomes in women with raised BMI(>25kg/m^2) that was observed in 38.2% & 38.5% cases respectively followed by instrumental delivery in 32% of cases. **Conclusion**: In conclusion, our findings confirm that an increased maternal BMI increases the incidence of macrosomia and rate of caesarean section. All mothers should have their BMI calculated at antenatal booking as a part of the full risk assessment and should be offered advice regardingsensible weight reduction, including diet and exercise and referral to a dietitian where appropriate.

Key Words: Obesity, Body mass index, macrosomia, Caesarean section

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INTRODUCTION

Obesity during pregnancy is associated with numerous maternal and perinatal risks such as pre eclampsia, eclampsia, impaired blood sugar, fetal health like macrosomia and the higher rates of caesarean sections[1]. The risk of adverse neonatal outcome increases with increasing degrees of obesity[2].The rising epidemic of obesity in young womenworldwide

has become a significant public health concern[3]. Increase in urbanization, change in lifestyle and reduced physical activity has given rise to an increasing trend of obesity which is also observed in developing countries. Managing obesity related problems, and potentially reducing their risk, can pose a challenge to the obstetrical care provider [4].

The body mass index (BMI) is the most practical way to evaluate the degree of overweight. It is calculated from the height and weight as follows:

BMI = body weight (in kg) ÷ square of stature (height in meters)

According to the WHO and National Institutes of Health (NIH) guidelines for Asians, overweight is a BMI between 23 and 24.9 kg/m^2 and obesity as BMI >25 kg/m^2 owing that Asian populations[5] have different associations between BMI, percentage of body fat, and health risks than do European populations.

In Pakistani women the obesity prevalence is found to be twice as compared to men(20% versus 7%)[6].In U.K 16% of women aged 25-34 years and 21% aged 35-44 years are obese and in USA 19% of women in the age group 20-34 years and 26% 35-44 years are found to be obese.[7]

It is not clear whether obesity is a direct cause of adverse pregnancy outcome or whether the association between obesity and adverse pregnancy outcome is due to factors that are shared characteristics of both entities.The pathogenesis of some adverse outcomes may be adipose tissue-related deregulation of metabolic, vascular, and inflammatory pathways, which can affect many organ systems.[8] In addition, epigenetic changes in response to increased fetal exposure to glucose, lipids, and inflammatory cytokines may result in permanent or transient changes in metabolic programming, leading to adverse health outcomes in adult life.[9]

This study is designed to observed adverse effects of raised BMI during pregnancy in a tertiary care hospital.

SUBJECTS AND METHODS

This was a cross sectional study conducted from 22 January 2016 to 21 July 2016 in the department of Obstetrics and Gynecology Unit 2 Civil Hospital Karachi. A non probability consecutive sampling was used for selection of sample. Sample size was calculated by open epi version 3.03 online sample size calculated takingprevalence of macrosomia 2.9%[10], 95% level of significance,5% confidence level. The calculated sample size was 275.

The inclusion criteria was singleton pregnancies with cephalic presentation confirmed on ultrasound, at gestational age between 37 - 42 weeks (by LMP or early dating scan of first trimester)with parity0-4 and BMI 25 kg/m^{2}or above at the time of delivery. Women with malpresentations, placenta previa, and comorbid like chronic hypertension, diabetes mellitus, hypo or hyperthyroidism and history of previous caesarian section were excluded from the study.

All women fulfilling inclusion criteria were assigned in study after taking informed consent admitted either through OPD or emergency and data was recorded on a predesigned proforma. Patient was observed for pregnancy outcome that is mode of delivery with neonatal weight at birth which was measured by experienced staff nurse in labour room and weight of 4000g or more was considered as marcosomia.

All collected data was analyzed using SPSS version 17. Mean and standard deviation was calculated for continues variable like height, weight, BMI, gestational age, and weight of the baby. Frequency and percentage for categorical variables like parity, mode of delivery c-section, instrumental delivery and macrosomia.

Chi-square test was applied; p value d" 0.05 was taken as significant to determine the association between raised BMI and mode of delivery and neonatal birth weight.

RESULTS

A total of 275 pregnant women with Raised BMI (>25kg/m^2) wereincluded in the study. There were 88.0% women were less than 30 years of age and 12% were above 30 years of age. The average age of the patients was 27.53±3.51 years. Similarly average body mass index was 29.19+3.96 kg/m^2,gestational age 38.20+ 1.03 weeks and neo natal birth weight was 3.87+ 0.68 kg. Out of 275 women, 82(29.82%) were Primigravida,193 (69.6%) were multigravida. 56.36% of the women were found to be overweight that is BMI between 25-29.9 kg/m^{2}and 43.63% were obese withBMI > 30 kg/m^2 .

Frequency of pregnancy outcome in women with raised BMI is presented in table 1. Caesarean section and macrosomia were the commonest pregnancy outcomes in women with raised BMI that was observed in 38.2%, and 38.5% cases respectively followed by instrumental delivery 32% and 29.8% spontaneous

TABLE -1
Demographic characteristics of the study population

		n (275)	Percentage
Age	< 30 years	162	58.9
	>30 year	113	41.0
BMI	>25<29.9	201	73.0
	>30	74	26.9
Parity	primigravida	83	30.1
	1-4	192	69.8
Caesarean Section		105	38.2
Instrumental Delivery		88	32
Spontaneous Vaginal delivery		82	29.8
Macrosomia		106	38.5
Induction of labour		82	29.8
Pre eclampsia		44	16

TABLE 2
Association of risk factors with mode of delivery and macrosomia

Maternal Characterstics		Mode of Delivery			p-value	Macrosomia		p-value
		SVD	Instrumental Delivery	C-Section		Yes	No	
Gestational age	37-40wks	78(35.6%)	69(31.5%)	72(32.9%)	0.0005	75(34.2%)	144(65.8%)	0.004
	41-42wks	4(7.1%)	19(33.9%)	33(31.4%)		31(70.8%)	25(44.6%)	
Parity	primigravida	48(32.2%)	54(36.2%)	47(31.5%)	0.045	43(28.9%)	106(71.1%)	0.0005
	Multigravida 2-4	34(27%)	34(27%)	58(46%)		63(50%)	63(50%)	
BMI	>25 <29.9kg/m2 overweight	74(40%)	74(40%)	37(20%)	0.0005	46(24.9%)	139(75.1%)	0.0005
	≥30 kg/m2 obese	8(8.9%)	14(15.6%)	68(75.6%)		60(66.7%)	30(33.3%)	

vaginal delivery.

Mode of delivery caesarean section, instrumental delivery and macrosomia was statistically significant among women at gestation between 37-40 weeks and post date pregnancies that is between 41-42 weeks with p-value as 0.0005 and 0.004 respectively asshown in table 2. Similarly rate of caesarean section , instrumental delivery and macrosomia was also statistically significant withregard to parity with p-value 0.045 and 0.0005 for macrosomia as presented in table 2.

75.6% of obese women had caesarean section compared to20% of overweight women with significant p-value 0.0005 and similarly 24.9% of babies were macrosomic in overweight as compared to 66.7% in obese pregnant women with p-value 0.0005 as shown in table 2.

DISCUSSION

Obesity is emerging as an epidemic throughout the world and is a recognized major threat to public health. Hence an increased association of morbidity and mortality with obesity is well established in both pregnant and non-pregnant women[11]Maternal obesity carries significant risks for both mother and fetus leading to high frequency of complications during prenatal period, and increases the risk of several adverse outcomes of pregnancy. Therefore, there is a need to

adopt preventive strategies against obesity[12,13].

In our study caesarean section was observed in 38.18% women, Our findings of an increased risk of caesarean section in women with a BMI > 25kg/m^2 is in accordance with other published work and the excess risk appears to be one to twofold.[14]Study by Jaleel[15]also showed caesarean section rate of 36.4%.One study showed that even in low risk obese women with otherwise normal pregnancies who are managed by nurse midwives, the risk of caesarean section was higher.[16]In the UK National Sentinel Caesarean Section Audit, it was noted that 34% of women who were delivered by caesarean section had a BMI greater than 30.[7] Increase in Caesarean rate as quoted by Sherrord[17] could be due to reduced rate of cervical dilatation and increased depot of soft tissues in maternal pelvis leading to obstructed labor or cephalo-pelvic disproportion.

In our study frequency and fetal outcome in term of macrosomia was 38.5%.Macrosomia has been consistently reported by many researchers (with OR ranging between 1.5 and 2.2).[18]Chu et al,[19] in their meta-analysis suggested that maternal obesity increased the risk of macrosomia, the explanation for the association is uncertain. It may be directly related to obesity, or could be due to associated comorbidities such as GDM or hypertensive disorders. In women who are morbidly obese, fetal monitoring with either ultrasound or cardiotocography is technically more difficult. Whatever the explanation for the increased risk, there should be a low threshold for fetal assessment in women who are obese.

The study is limited because of small number of patients and included only those women attending the outpatient department and labor ward of Obstetrics &GynecologyUnit 2 at Civil Hospital Karachi and the BMI was calculated at the time of delivery. However it adds to the increasing body of evidence suggesting that raised BMI, predisposes women to increased risk of cesarean delivery and macrocosmic babies. These pregnancies are termed high risk as it poses a risk to both mother and the baby. The mother is at risk of developing pre eclampsia, gestational diabetes and increased chances of induction of labour may further increases caesarean section risk .Managing these problems and reducing their occurrence can pose a challenge to obstetrical care providers.

CONCLUSION

In conclusion, the results of our study indicate that obesity caries a significant increased risk for complications during pregnancy and delivery for both mother and fetus. Our findings confirms that an increase in BMI increases the incidence of macrosomia, the need for obstetric interventions and consequent morbidity in mother and baby We clearly demonstrate that women in overweight group need to be regarded as 'high risk' when counseling and risk assessment is done in the antenatal clinic. All mothers should have their BMI calculated at booking as a part of the full risk assessment and should be offered advice about sensible weight reduction, including diet and exercise and referral to a dietician where appropriate.

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Author's Contributions:
***** Designed the project, drafting the work, final approval of the version to be published and agreement to be accountabe for all aspects of work. ** Designed the project, drafting the work, final approval of the version to be published and agreement to be accountabe for all aspects of work. *** Helped designed the project, collecting data and helped in drafting the work and agreement to be accountable for all aspects of work. **** Collecting data and helped in drafting the work and agreement to be accountable for all aspects of work.

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