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The impact of maternal body mass index on maternal and fetal outcome

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Abstract
Background: Prevalence of obesity among women of reproductive age is increasing worldwide. As the prevalence increases among the women of reproductive age group, so it does among pregnant females. This study was conducted with the aim to assess obesity-related adverse maternal, neonatal and perinatal outcomes using new Asian Indian guidelines.
Aims and Objectives: To correlate the body mass index in pregnancy with maternal and fetal outcome.
Methods: The present study was conducted in 150 women admitted in SMGS Hospital, GMC Jammu from January 2020 to December 2020. The above women were placed in standard BMI categories according to WHO and their obstetric and fetal outcome variables were evaluated.
Results: There was increased incidence of antepartum complications in obese women. The difference in the occurrence of hypertensive disorders of pregnancy (p=0.004), hypothyroidism (p=0.002) and GDM (p=0.0001) among the three categories was statistically significant. The risk of induction of labour was highest in obese women and so was the incidence of caesarean and instrumental deliveries and the difference was statistically significant (p=0.01). The difference in the onset of labour as well as mode of delivery among the three categories was statistically significant (p=0.002). In perinatal outcomes, the difference in mean birth weight of the babies among three categories was statistically significant (p<0.008). The difference in the incidence of NICU admissions was statistically not significant (p=0.114).
Conclusion: High BMI is associated with increased incidence of hypothyroidism, GDM, hypertensive disorders, instrumental delivery and caesarean delivery.

Keywords: maternal outcome, fetal outcome, body mass index, overweight, obese, hypothyroidism, hypertensive disorders

Introduction

Obesity is a growing health problem worldwide. According to World Health Organisation (WHO) obesity is defined as abnormal or excessive fat accumulation that may impair health and body mass index (BMI) of 30 kg/m2 or more as obese among adults [1]. The American Medical Association classified obesity as disease in 2013. Obesity among women of reproductive age is increasing worldwide, with prevalence of 20–36% [2]. As it is becoming more prevalent among the women of reproductive age group, so it does among pregnant women.

The prevalence of obesity is icreasing in pregnancy [3], as a result, the American College of Obstetricians and Gynaecologist (ACOG) recommend that the body mass index (BMI) should be recorded in all women at the initial prenatal visit, and that information regarding the maternal and fetal risks of an elevated BMI in pregnancy should be provided [4]. In 2009, WHO announced obesity in pregnancy as one of the important non communicable diseases that endanger maternal and child health [5].

Many studies in India have recapitulated the fact that obesity in pregnancy is responsible for several complications affecting the mother and fetus such as hypertensive disorders of pregnancy (HDP), gestational diabetes mellitus (GDM), dysfunctional labour, preterm labour, caesarean sections, postpartum infections and deep vein thrombosis [6-8]. And the neonatal complications were congenital malformations, large for gestational age macrosomic, prematurity, had high incidences of birth injuries, shoulder dystocia and late foetal deaths and [6-8]. When excess fat deposited in the buttocks and hips, it is called as pelvic obesity and the body shape is described as “pear” and with excess fat deposited in the abdomen called as central or abdominal obesity and body shape is labelled as “apple”. Those with abdominal fat are at increased health risks, though pelvic obesity is more common among female.

Asian Indians have more predisposition for truncal obesity as compared to generalised obesity. Japan has defined obesity as BMI > 25 kg/ m2, while China uses a BMI > 28 kg/m2. Hence, in 2008, experts met in New Delhi to develop Asian Indian specific guidelines and defined Obesity in Indians as BMI ≥ 25 kg/m^2 [9].

Aims and Objectives

To evaluate the maternal and fetal outcome in patients belonging to different BMI categories admitted in our institution.

Material and Methods

This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, SMGS Hospital, Government Medical College, Jammu over a period of one year from January 2020 to December 2020. The study included 150 singleton pregnant women with gestational age >37 weeks with cephalic presentation.

Inclusion criteria

1. Age of 18-35 years.
2. Singleton pregnancy
3. Spontaneous conception

Exclusion criteria

1. Women with multiple pregnancies
2. Women with chronic diseases such as hypertension, diabetes, thyroid disorder and bronchial asthama
3. Women with previous caserean section
4. Women with uterine and fetal congenital anamolies

Women were informed about the study and purpose of study in detail. The selected women were categorized into three groups of 50 each according to their BMI as per WHO classification (Table 1):

Category I included normal women (BMI 18.0-22.9 kg/m2),

Category II included overweight women (BMI 23.0-24.9 kg/m2)

Category III included obese women (BMI >25 kg/m2.

Detailed history and clinical examination including general physical, obstetrical and systemic examinations was done. All the patients included in the study were subjected to all the investigations including Hb, BT, CT, urine routine examination, PT, PTI, platelet count, renal function tests, liver function tests, blood sugar (fasting and postprandial) and urine for albumin were done.

Under maternal outcome, the variables studied included antepartum complications (hypothyroidism, gestational diabetes mellitus, hypertensive disorder of pregnancy and anaemia), onset of labour (spontaneous, induced), mode of delivery (vaginal, cesarean, instrumental) . Perinatal outcome variables included birth weight, APGAR score and NICU admissions.

Ethical clearance: ethical clearance is given by Institutional Ethics Committee (No. IEC/GMC/Cat C/2021/461)

Statistical analysis

Results were expressed in numbers, percentage and mean±standard deviation. All results were analyzed statistically with the help of chi-square test, Fisher's exact test, one-way ANOVA, wherever applicable. The difference was considered significant at p<0.05.

Results

A total of 150 patients, 50 in each category were included in the study. There was no difference in age distribution of three categories. Majority of study population were in the age group between 23-29 years (Table 2). Most of the women 55% (n=83) in study were primigravida (table 2).

Table 1: BMI (WHO Classification)

Groups	BMI (kg/m^2)
Normal	18.0-22.9
Overweight	23.0-24.9
Obese	>25

Table 2: Distribution according to age and parity

Variables	Normal No. (%)	Overweight No.(%)	Obese No.(%)age	Total No.(%)
Age (in years)				
18-22	9(18%)	11(22%)	9(18%)	29(19.33%)
23-29	35(70%)	32(64%)	30(60%)	97(64.66%)
30-35	6(12%)	7(14%)	11(22%)	24(16%)
Total	50	50	50	150(100%)
Parity				
Primi	28(56%)	26(52%)	29(58%)	83(55.33%)
G2-G3	17(34%)	21(42%)	18(36%)	56(37.33%)
≥G4	5(10%)	3(6%)	3(6%)	11(7.33%)
Total	50	50	50	150(100%)

Among 50 women with normal BMI, 2% [1] had hypothyroidism, out of 50 women with overweight 6% [3] had hypothyroidism and 12% [6] among 50 obese women had hypothyroidism (table3). The overall incidence of hypothyroidism in our study was 6.66%. increased rate of hypothyroidism was seen in obese(12%) and overweight(6%) compared to normal (2%). p value of 0.002 signifying that in obese and overweight groups, there was statistically significant increase in incidence of hypothyroidism.

Similarly, among 50 women with normal BMI, 6% [3] had gestational diabetes mellitus (GDM), out of 50 women with overweight 16% had GDM and 28% [14] women among 50 obese women, had GDM (table3). The overall incidence of GDM in present study was 16.66% [25]. Increased rate of GDM was seen in obese 28%, overweight 16% as compared to normal. P value = 0.0001, which was statistically significant.

In case of hypertensive disorder of pregnancy (HDP), 8% [4] women with normal BMI had hypertensive disorder of pregnancy (HDP), 18%(9) women with overweight had HDP and 26% [13] obese women had HDP. Thus, the overall incidence of HTD in our study was 17.33%. Increased rate of HTD was seen in obese and overweight women as compared to normal women with p value of 0.004, which was significant.

Among 50 women with normal BMI, 24% [12] had anaemia, 14% [7] overweight women had anaemia and 10% [5] obese women had anaemia (table 3). The incidence of anaemia in our study was 29.33%. The difference in rate of anaemia in three groups was statistically significant with p value of 0.02.

Table 3: Maternal outcome

Variables	Normal No.(%)	Overweight No.(%)	Obese No.(%)	Statistical inference
Hypothyroid	1(2%)	3(6%)	6(12%)	p = 0.002
GDM	3(6%)	8(16%)	14(28%)	p = 0.0001
HDP	4(8%)	9(18%)	13(26%)	p = 0.004
Anaemia	22(44%)	12(24%)	10(20%)	p = 0.02

In present study, 75.33%(100) of women had vaginal delivery, among them 92%(45) in normal group had vaginal delivery,

76%(38) overweight patients had vaginal delivery while only 62%(31) obese patients had vaginal delivery (table 4). Among 20% of women with LSCS, 32% obese women had lSCS, 20% overweight women had LSCS while only 8% women in normal group had LSCS. The difference regarding mode of delivery is statistically significant (p value= 0.0002).

Table 4: Onset of labour and mode of delivery

Variables	Normal No.(%)	Overweight No.(%)	Obese No.(%)	Statistical inference
Labour onset				p = 0.01
Spontaneous	42(84%)	38(76%)	32(64%)	
Induced	7(14%)	10(20%)	15(30%)	
Elective LSCS	1(2%)	2(4%)	3(6%)	
Mode of delivery				p = 0.002
Vaginal	45(92%)	38(76%)	31(62%)	
Caesarean	4(8%)	10(20%)	16(32%)	
Instrumental	1(2%)	2(4%)	3(6%)	

In present study, majority(40%) of babies birth weight were between 2.6-3 kg (table 5). Study also shows that as BMI increases birth weight increases.

In case of APGAR score, only 7.3% had APGAR score between 5-7 while 92.66% score > 8 (table 5). In our study, the NICU admission was 4% among normal group, 6% among high BMI patients with p value of 0.114. So, the difference was not statistically significant.

Table 5: Neonatal outcome

Variables	Normal No.(%)	Overweight No.(%)	Obese No.(%)	Statistical inference
Birth weight (in kg)				p = 0.008
<2.5	15(30%)	8(16%)	0	
2.6-3.0	26(52%)	20(40%)	14(28%)	
3.1-3.5	8(16%)	18(36%)	20(40%)	
≥3.6	1(2%)	4(8%)	16(32%)	
Apgar score at 5 min				p = 0.02
5-7	2(4%)	3(6%)	6(12%)	
≥8	48(96%)	47(94%)	44(88%)	
NICU admission				
None	48(56%)	48(96%)	49(58%)	p = 0.114
Yes	2(4%)	2(4%)	1(2%)	

Discussion

In modern time, lifestyle-related factors like smoking, alcoholism, sedentary lifestyle and late age marriage and pregnancies are severly affecting the pregnancy outcome. And the common among them is obesity, which complicates pregnancy and child birth. Although with proper antenatal and intranatal care, good outcome can be achieved in obese patients. Our study reported that despite adequate antenatal and prenatal care, obesity during pregnancy can lead to increased medical as well as obstetrical interventions, and do pose increased risk to mother and fetus.

In our study, hypothyroidism was found in 6.6%, which correlates with results of 7% in Ramaya *et al*. [10], and 9% in Sapana *et al*. [11]. Risk of hypothyroidism was 6 times higher among obese women (table 3). Our study shows statistically significant increase incidence of hypothyroidism as BMI increases. Mbah *et al*. [12] also reported higher incidence of hypothyroidism with high BMI.

Risk of GDM was 4.66 times more among obese gravidas (table 3). Kutchi *et al*. [13], showed that the risk of GDM increased with increasing BMI. Similar results were reported by Menon *et al*. [14] and Dasgupta *et al*. [7]. The increased risk of GDM is related to an exaggerated increase in insulin resistance in the obese patients. Women with GDM also has long term risk of developing type 2 diabetes. Seshiah *et al*. [15] has recommended early diagnosis and tight maternal glucose control during pregnancy (fasting blood sugar 80-90 mg/dl, 2 hr postprandial 110-120mg/dl) for better maternal fetal outcome.

In our study, risk of HDP (hypertensive disorder of pregnancy) was 3.25 times higher among obese patients (table 3). Ramaya *et al*. [10] found a significant correlation of high BMI with HTD. Similar results were reported by Kutchi *et al*. [13]. Dasgupta *et al*. [7] and Menon *et al*. [14] also shows same observations. The pathophysiologic changes associated with obesity related cardiovascular risk, such as triglycerides and inflammation, may be responsible for the increased incidence of preeclampsia in obese gravidas [16].

In present study, anaemia was found in 29.33% (table 3). Prevalence of anaemia in developing countries is 33-75% as per WHO. Our study correlates with Ramaya *et al*. [10] and Emmanuel *et al*. [17].

Labour is mostly planned at late preterm or at early term in obese women to improve neonatal outcome. Frequently, in these women bishop score is poor and also uterine muscles are prone to inadequate contraction, which leads to failed induction. In one study, the risk of failed induction increased with increasing BMI and obese women were two times as likely to experience failed induction [18]. In our study, the rate of induction of labour increases with increase BMI, 2.14 times in obese women as compared to normal women. The rate of caesarean was also 4 times higher among obese gravidas (table 4). Similar results were reported by Kutchi *et al*. [13] and Ramaya *et al*. Maternal obesity have modest impact on labour progression that is independent of fetal size but related to maternal size. In our study, obese gravidas experienced prolonged labour more frequently as compared to normal weight women. Instrumental deliveries were more common among obese women in our study (table 4). Ramaya *et al*. [10] also reported that their was significant increase in instrumental delivery as BMI increases. Similar results were observed by Dasgupta *et al*. [7] and Menon *et al*. [14]. But in study by Kutchi *et al*. [13], instrumental deliveries were more common among non-obese subjects.

Obesity is a risk factor for both elective and emergency caesarean delivery, and risk increases with increasing BMI [19]. Obesity related complications like increased preterm and macrosomia are responsible for increased risk of caesarean delivery. In our study, LSCS were 4 times more common among obese subjects similar to Kutchi *et al*. [13] and Menon *et al*. [14]. Jang *et al*. [20] also revealed that increase BMI is an independent risk factor for caesarean sections.

Tayade *et al*. concluded that BMI> 25 kg/m^2 was a good predictor for low birth weight babies [21]. In our study, only 15% babies had birth weight <2.5 kg, 30.66% babies had birth weight > 3kg and 14% babies were born with birth weight >3.6 kg. Our study shows that as BMI increases there was increase in birth weight of baby, correlating with study by Ramaya *et al*. [10]. Obese subjects are more prone for LGA and macrosomia and tend to have overall higher birth weights on average.

The average APGAR score at 5 min was 8.22. No significant correlation was found between BMI and APGAR score in our study. Similar observations were made by Ramaya *et al*. [10] and Papazian *et al*. [22] in their studies that pre-pregnancy weight was not predictor of poor APGAR score.

In our study, no significant difference was found in NICU admission between obese and non-obese women. While Kutchi

et al. [13] and Vijay *et al*. [23] observed that newborns in obese group more likely to be admitted in NICU.

Conclusion

Pregnancy complications related to BMI is a growing problem. High BMI is associated with increased incidence of hypothyroidism, GDM, hypertensive disorders of pregnancy, instrumental and comprehensive strategies need to be developed to improve maternal and perinatal outcomes in obese mothers. Pre-pregnancy counselling, health programs, and appropriate multidisciplinary management should be done to bring awareness among pregnant women.

References

1. Obesity and overweight. World Health Organization. 2018 [cited 2018 February 16]. http://www.who.int/media centr e/facts heets /fs311 /en/#.
2. Ng M, Fleming T, Robinson M, *et al*. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2014;384(9945):766–81.
3. Alexandara P, Vassilios B, Alexandra V, *et al*. Population based trends of pregnancy outcome in obese mothers : what has changed over 15 years. Obesity. 2011;19:1861-5.
4. American College of Obstetricians and Gynaecologist. Obesity in pregnancy. Obstet Gynecol. 2005;106(3):671-5.
5. WHO. Discussion paper: Non communicable diseases, poverty and the development agenda (July 2009) ECOSOC high level segment;2009. http://www.who.int/nmh/publications/discussion_paper_ncd _en.pdf.
6. Jain D, Khuteta R, Chaturvedi V, Khuteta S. Effect of body mass index on pregnancy outcomes in nulliparous women delivering singleton babies: observational study. J Obstet Gynaecol India. 2012;62(4):429-31.
7. Dasgupta A, Harichandrakumar KT, Habeebullah S. Pregnancy outcome among obese Indians-a prospective cohort study in a tertiary care centre in south India. Int. J Sci Study. 2014;2(2):13-8.
8. Quiner T, Perlow JH. The global burden of obesity on pregnancy outcomes in the developed world [17Q]. Obstet Gynecol. 2017;1(129):177S.
9. Misra A, Chowbey P, Makkar BM, *et al*. Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. J Assoc Phys India. 2009;57:163-70.
10. Ramaya S, Ashok K, Shweta S *et al*. A study of body mass index in pregnancy and its correlation with maternal and perinatal outcome. The new Ind. J of OBGYN. 2019;5(2):120-5.
11. Shah SC, Shah CR. Thyroid disorders in pregnancy – a comparative study. International journal of fundamental and applied life sciences. 2015;5(1):7-14.
12. Mbah A, Ejim E, Onodugo O *et al*. Two logistic models for the prediction of hypothyroidism in pregnancy. BMC Res Notes. 2011;4:205.
13. Kutchi I, Chellammal P, Akila A. Maternal obesity and pregnancy outcome: in perspective of new Asian Indian guidelines. The J of Obstet and Gynecol of India. 2020;70:138-144.
14. Menon RM, Isac M. Impact of body mass index on pregnancy outcome: a prospective cohort study. Paripex Indian J Res. 2019;8(2):7-9.
15. Seshiah V, Kapur A, Balaji V, *et al*. Targeting glycemic level in gestational diabetes mellitus to that of normal pregnancy would result in a better maternal-fetal outcome. J Assoc Phys India. 2019;67:66.
16. Bodnar LM, Ness RB, Harger GF, Roberts JM. Inflammation and triglycerides partially mediate the effect of prepregnancy body mass index on the risk of preeclampsia. Am J Epidemiol. 2005;162(12):1198–206.
17. Ugwuja EI, Ogbonnaya LU, Obuna AJ *et al*. Anaemia in relation to Body mass Index and sociodemographic characteristics. Journal of Clinical and Diagnostic research. 2015;9(1):LC04-LC07.
18. Wolfe KB, Rossi RA, Warshak CR. The effect of maternal obesity on the rate of failed induction of labor. Am J Obstet Gynecol. 2011;205(128):e1.
19. Brost BC, Goldenberg RL, Mercer BM, *et al*. The Preterm Prediction Study: association of cesarean delivery with increases in maternal weight and body mass index. Am J Obstet Gynecol. 1997;177:333.
20. Jang DG, Jo YS, Lee GS. Effect of pre-pregnancy body mass index and weight gain during pregnancy on the risk of emergency caesarean section in nullipara. Arch Gynecol Obstet. 2011;284(6):1389-97.
21. Tayade S, Singh R, Kore J, Gangane N. Maternal anthropometric measurements, pre-pregnancy body mass index, and fetal growth parameters-a rural experience. Obstet Gynecol Res. 2018;1(2):51-64.
22. Papazian T, Tayeh GA, Sibai D *et al*. Impact of maternal body mass index and gestational weight gain on neonatal outcomes among healthy Middle- Eastern females. PLoS One. 2017;12(7):e0181255.
23. Vijay A, Maran G, Koothan V. Impact of maternal obesity on obstetric outcome in a rural population in Pondicherry. Int J Reprod Contracept Obstet Gynecol. 2015;4(3):740-4.