How to Cite:
Kumar, R. N., & Fadadu, S. (2022). Association between maternal high body mass index and obstetrical outcome. *International Journal of Health Sciences*, *6*(S6), 5032–5038. https://doi.org/10.53730/ijhs.v6nS6.11584

Association between maternal high body mass index and obstetrical outcome

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Abstract---Background and Aim: Maternal overweight, obesity, and morbid obesity are already known to be associated with adverse obstetric and neonatal outcomes. There is also increased risk of fetal macrosomia, unexplained fetal death, respiratory distress and neonatal intensive care unit admissions. Hence the aim of the present study was to estimate the effect of BMI in overweight, obese, pregnant women in compared with normal (BMI) pregnant women regarding the Obstetric performance. Material and Methods: This is a prospective study which will be done over a period of 24 months on singleton term pregnant women in the Department of Obstetrics and Gynaecology, Hospital and Research Centre. The study included 300 women, of which 100 of them had a BMI of underweight, 100 of them had a normal BMI, 100 of them had BMI of overweight and obese category. The antenatal, intrapartum, postpartum and neonatal assessment was done for each BMI category and statistical analysis is done using Chi square test. Results: Of the 300 study women, 182 were primiparas and 118 were multiparas. Out of the 182 primiparas of them 51were overweight and obese, 65 were underweight and 66 had normal BMI. Out of the 118 multiparas, 40.67% of them were overweight and obese, 30.51% were underweight and 28.81% had normal BMI. underweight is more commonly associated with inadequate weight gain while overweight and obesity is more commonly associated with excessive weight gain during pregnancy. Of the 94 women who had low birth weight babies, 44 of them had inadequate weight gain during pregnancy while 32 of them had excessive weight gain during pregnancy and only 18 of them had normal weight gain. Conclusion: there is a higher prevalence of complications to both the foetus and the motherin the study group with extremes of BMI and abnormal gestational weight gain.

Therefore, we should educate all pregnant and non pregnant women to be aware of the feto-maternal complications arising due to both the extremes of BMI.

Keywords---body mass index, overweight, obesity, postpartum

Introduction

Over the past few decades, overweight and obesity have become a growing health problem in the Western world, so much so that WHO now considers it one of the most relevant health problems. The distribution of this problem is not homogeneous among the population, being women's rates higher than men's, and this makes obesity a problem that greatly affects women of reproductive age.[1, 2]Nutritional factors and weight gain during pregnancy are two amenable factors influencing maternal and perinatal outcomes. Individualised counselling regarding the weight gain and dietary charting would help in optimised pregnancy weight gain. Pre-pregnancy physical activity and improved dietary goals help in regulating pregnancy weight gain whereas breast feeding assists in normalising the mother's weight in addition to optimisation of child's health in the puerperium. India is facing dual burden of nutrition of under nutrition and escalating rise in overweight and obesity problem. India has more than 30 million obese people and the number is increasing alarmingly.[3, 4]

Many experimental and epidemiological studies show that nutritional changes in the prenatal and postnatal stages of life can have a significant impact on the child's health and development. Maternal overweight, obesity, and morbid obesity are already known to be associated with adverse obstetric and neonatal outcomes.[5, 6] The ACOG recommends that obese women lose weight before and not during pregnancy. Among morbidly obese women, bariatric surgery before conception may improve birth outcomes. The committee concluded that low gain or weight loss during pregnancy is not recommended for obese women because of potential of 3 irreversible effects on child's neurological development. The risks for SGA and preterm birth increases with decreasing gestational weight gain in all women.[7, 8] Obese women are more likely to have medically induced preterm delivery, induction of labour, prolonged labour, operative and cesarean deliveries. DVT, wound infection and anaesthetic hazards are high. There is also increased risk of fetal macrosomia, unexplained fetal death, respiratory distress and neonatal intensive care unit admissions. Hence the aim of the present study was to estimate the effect of BMI in overweight, obese, pregnant women in compared with normal (BMI) pregnant women regarding the Obstetric performance.

Materials and Methods

This is a prospective study which will be done over a period of 24 months on singleton term pregnant women in the Department of Obstetrics and Gynaecology, Hospital and Research Centre. ETHICAL CLEARANCE As this was an observational study with no unethical interventions, or danger to the patient due to the study itself, it is an ethically sound study. Ethical clearance was taken by the hospital committee for the same.

Inclusion criteria

- Singleton pregnancy.
- Women between 19-35 years of age.
- Women delivering in Medical Hospital and Research Centre.

Exclusion criteria

Multi-fetal gestation. The study included 300 women, of which 100 of them had a BMI of underweight, 100 of them had a normal BMI, 100 of them had BMI of overweight and obese category. The antenatal, intrapartum, postpartum and neonatal assessment was done for each BMI category and statistical analysis is done using Chi square test. The p value less than 0.05 is considered to be statistically significant. After detailed history and examination, and after fulfilling the criterion for inclusion in the study, patients were divided into 3 groups

- BMI less than 18.5 kg/m^2
- BMI between 18.5 – 24.9 kg/m^2
- BMI greater than 25 kg/m^2.

In all cases detailed history of the patient was taken including - Name, age, education, religion, socio economic status. History of present illness – if any Obstetric History – Gravida, Parity, Number of live issues, period of gestation Past History, medical and surgical History – Any associated medical condition like diabetes mellitus, hypertension, tuberculosis, thyroid disease, asthma, any previous surgery. Informed consent of the patient was taken. General examination-including general condition, hydration, Pulse rate, Blood pressure, temperature, pallor, icterus, cyanosis, edema, lymphadenopathy. Weight was measured in kilograms. Patients were weighed without shoes, wearing light indoor clothes.

Height(in metres) was measured using a stadiometer. The patients are made to stand erect on the floor barefoot with both ankles together and parallel to each other. The 24 head of the patient is held in such a position that the line joining the tragus and outer canthus of eye are in a horizontal plane (Frankfurt's Plane), with the individual standing straight next to the wall with the heels, buttocks, shoulders and occiput touching the wall. The data were used to calculate Quetelet index or the BMI using the formula BMI= weight (kilogram)/height (in square metres). According to WHO 2004, Body mass index (BMI) is used to characterize women as under-weight(BMI < 18.5kg/m2), normal (18.5–24.9kg/m2), overweight(>25kg/m2), pre-obese (25-29.9 kg/m2),obese class 1 [30-34.9kg/m2],obese class 2 [35- 39.9kg/m2],obese class 3[>/40kg/m2]. For those women whose pre-pregnancy weight was not available, first trimester weight was recorded. Weight at term is also recorded and compared with that of the first trimester weight and gestational weight gain is calculated.

Results

The collected data analysis shows that out of the 300 women of study group, 50% of the women belonged to the age group of 21-25 years; 26.6% of them between

26-30 years; 13.3% of them were ≤20 years and 10% of them were >30 years. Out of the 30 women who were >30 years, 18 were overweight and obese. Out of the 40 women who were ≤20 years, 22 were underweight.Thus in our study overweight and obesity is more common in advancing age while underweight is more common in teenage group. Of the 300 study women, 182 were primiparas and 118 were multiparas. Out of the 182 primiparas of them 51were overweight and obese, 65 were underweight and 66 had normal BMI. Out of the 118 multiparas, 40.67% of them were overweight and obese, 30.51% were underweight and 28.81% had normal BMI. Thus in our study overweight and obesity is more prevalent among multiparous women while underweight is more prevalent among primiparas.

Out of the total study women, 94 of them had excessive weight gain, 124 had inadequate weight gain and 84 of them had normal weight gain. Out of the 100 women who were underweight, 42 has normal weight gain, 52 had inadequate weight gain and only 6 had excessive weight gain. Of the 100 women who had normal BMI, 44 had inadequate weight gain, 34 had excessive weight gain and 22 had normal weight gain. Of the 100 overweight and obese women, 88 of the women had excessive weight gain and only 12 women had normal weight gain while none had inadequate weight gain. Thus, underweight is more commonly associated with inadequate weight gain while overweight and obesity is more commonly associated with excessive weight gain during pregnancy. Out of the 38 women who had GDM, 26 women were overweight and obese, 10 women had normal BMI and only 2 were underweight. The p value was 0.0012. Thus, overweight and obesity during pregnancy is associated with increased risk of GDM. Out of the 100 overweight and obese women, 22 of the women underwent vaginal delivery, 66 of them under-went caesarean section, 12 of them underwent instrumental delivery.

Out of the 100 normal BMI women, 46 of the women underwent vaginal delivery, 48 of them underwent caesarean section, 6 underwent instrumental delivery. Out of the 100 underweight women, 48 of the women underwent vaginal delivery, 50 of them had caesarean section, 2 underwent instrumental delivery. The p value was 0.026. Thus overweight and obesity has increased risk of operative delivery. Out of the 142 women who had normal duration, 28 were overweight and obese, 52 of the women had normal BMI, 62 were underweight. Out of the 72 women who had prolonged labour, 28 were overweight and obese, 24 had normal BMI and 20 were underweight. The p value was 0.0821. Hence, BMI did not show any significant effect on duration of labour. Out of the 94 women who delivered low birth weight babies, 20 of the women were overweight and obese, 40 had normal BMI, 34 were underweight/ The p value was 0.08, thus, BMI showed no effect on the birth weight of the baby. Of the 94 women who had low birth weight babies, 44 of them had inadequate weight gain during pregnancy while 32 of them had excessive weight gain during pregnancy and only 18 of them had normal weight gain. The p value was 0.02, thus, abnormal weight gain is associated with the risk of low birth weight babies.

Table 1
Age wise Distribution of study participants

Age in years	Number	Percentage (%)
≤ 20	40	13.3
21-25	150	50
26-30	80	26.6
<30	30	10

Table 2
Para wise Distribution of study participants

Variable	Number	Percentage (%)
Primipara	182	60.66
Multipara	118	39.33
Total	300	100

Table 3
Distribution of Primipara study participants according to BMI

BMI	Number	Percentage (%)
Underweight	65	35.71
Normal	66	36.26
overweight and obese	51	28.02
Total	182	100

Table 4
Distribution of Multipara study participants according to BMI

BMI	Number	Percentage (%)
Underweight	36	30.51
Normal	34	28.81
Overweight and Obese	48	40.67
Total	118	100

Discussion

We found a significant association between pre-pregnancy BMI and GDM (p value – 0.0012). Risk of GDM is higher in overweight and obese women with excessive gestational weight gain. We also found that out of the 38 women with GDM, 20 women had caesarean delivery, 4 women had macrosomia, 10 of them were also associated with hypertensive disorder of pregnancy and 2 had IUD. Patrick M Catalano et al[9] in their HAPO Study, examined the impact of GDM and obesity alone as well as their combined impact on adverse pregnancy outcomes such as caesarean sections, macrosomia and cord blood C-peptide levels. The combination of GDM and obesity shows a greater risk of these adverse pregnancy outcomes than either GDM or obesity alone. Our study showed an increased risk of hypertensive disorder of pregnancy with increased pre-pregnancy BMI (p value – 0.013) and also increased gestational weight gain (p value – 0.03). Prevalence of

hypertensive disorder of pregnancy was increased in overweight and obese women. This is a significant finding, because hypertensive disorders are the third leading cause of maternal death.

Yawen Shao et al[10] also supported that pre-pregnancy overweight and excessive gestational weight gain were independently associated with an increased risk of preeclampsia. In their study, the highest risk for preeclampsia was seen among women who were overweight and obese and had an excessive gestational weight gain, although the interactions between pre-pregnancy BMI and gestational weight gain were not statistically significant in their study.A potential synergistic effect between pre-pregnancy BMI and gestational weight gain warrants further studies. Our study showed an increased rate of elective and emergency LSCS with overweight and obesity and excessive weight gain. 13.33% of these women underwent elective LSCS and 8.66% of them underwent emergency LSCS. Our study did not show significant association between pre-pregnancy BMI and birth weight. (p value – 0.08) In contrast, Zhangbin Yu et al studied the effect of pre-pregnancy BMI on birth weight and found that pre-pregnancy overweight or obesity increased the risk of large for gestational age and macrosomia.

There are several ongoing randomized trials examining the impact of interventions on not only optimal maternal–foetal outcomes, but also offspring obesity. In addition, birth weight and offspring overweight/obesity are affected by maternal age, ethnicity, gestational hypertension and GDM, smoking during pregnancy, educational level, and gestational weight gain. Our study showed that both BMI and gestational weight gain together have an effect on preterm delivery (p value – 0.0001). Similarly, Masho et al[11] studied that weight gain during pregnancy and pre-pregnancy overweight and obesity have different effects on preterm birth. They found that gaining less than 7 kg was a significant risk factor for preterm births in underweight women while gaining more than 9.5kg in overweight and obese women increased the risk of preterm delivery. Thus, this study found that pre-pregnancy BMI more than 25kg/m2 was associated with the risk of many adverse obstetric outcomes such as GDM, preeclampsia, mode of onset of labour, need for operative delivery, preterm delivery.

Conclusion

From our study we conclude that there is a higher prevalence of complications to both the foetus and the motherin the study group with extremes of BMI and abnormal gestational weight gain. Therefore, we should educate all pregnant and non pregnant women to be aware of the feto-maternal complications arising due to both the extremes of BMI. By increasing awareness amongst the women and increasing their accessibility to medical facilities, maternal and perinatal morbidity and mortality can be minimized.

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