MEDICO RESEARCH CHRONICLES
ISSN NO. 2394-3971
DOI No. 10.26838/MEDRECH.2022.9.5.623
Contents available at www.medrech.com

COMPARISON OF THE MATERNAL AND PERINATAL OUTCOME IN PATIENTS WITH BMI ON PREGNANT WOMEN

Layla Khayrun Nahar[1], Nazma Haque[2], Afroza Kutubi[3], Ratu Rumana[4], Shikha Gangoly[5], Sabina Akhter[6], Nowshin Yesmin Tonny[7], Saira Khan[8]

1. Indoor Medical Officer (IMO), Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital, Dhaka, Bangladesh
2. Professor & Head, Department of Obstetrics and Gynaecology, Dhaka Medical College, Dhaka, Bangladesh
3. Professor & Head, Department of Obstetrics and Gynaecology, Sir Salimullah Medical College (SSMC), Dhaka, Bangladesh
4. Professor (Ex), Department of Obstetrics and Gynaecology, Sir Salimullah Medical College (SSMC), Dhaka, Bangladesh
5. Professor, Department of Obstetrics and Gynaecology, Dhaka Medical College, Dhaka, Bangladesh
6. Assistant Registrar, Department of Obstetrics and Gynaecology, Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh
7. Indoor Medical Officer (IMO), Department of Obstetrics and Gynaecology, Mugda Medical College Hospital, Dhaka, Bangladesh
8. Associate Professor, Department of Paediatrics, HM Samorita Medical College, Dhaka, Bangladesh

ARTICLE INFO

Article History
Received: July 2022
Accepted: October 2022
Key Words: Body Mass Index, Macrosomia, Pregnancy Outcome.

ABSTRACT

ORIGINAL RESEARCH ARTICLE

Background: Pregnancy is an important event during a woman's life. It has a great impact on her physical and mental health. All efforts that are carried out during pregnancy aim to ensure full-term pregnancy without complications, safe delivery, and a healthy baby. The prevalence of obesity or overweight in pregnancy is also rising and is of international concern. **Objective:** To evaluate and compare the maternal and perinatal outcome in patients with BMI as an impact on pregnancy women. **Methods:** This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital, Dhaka, Bangladesh from January to December 2021. The study included 120 singleton pregnant women with gestational age >37 weeks with cephalic presentation. The selected women were categorized into three groups of 40 each according to their BMI: Category I included normal women (BMI 20-24.9 kg/m^2), Category II included overweight women (BMI 25- 29.9 kg/m^2) and Category III included obese women (BMI >30 kg/m^2). **Results:** In the present study,

120 singleton pregnant women were equally distributed into three categories according to their BMI. In Category I (BMI 20-24.9 kg/m^2), mean age of normal women was 28.5 ± 4 years in Category II (BMI 25-29.9 kg/m^2), mean age of overweight women was 29.5± 4 years; and in Category III (BMI 25-29.9 kg/m^2), mean age of obese women was 31.5± 6 years. There was increased incidence of antepartum complications in Category III women as compared to Category II and Category I women. The difference in the occurrence of PET among 3 categories was statistically significant ($p<0.05$). Similarly, the differences in the incidence of PT pregnancy, macrosomia as well as that. The mean weight of Category I (56.72 kg), Category II (65.77 kg) and Category III (80.71 kg). As regard the onset of labour as well as mode of delivery among the 3 categories there was a statistically significant difference ($p<0.05$). As regards postpartum complications, only PPH was seen in 7.5% of women in Category III as compared to 5% in Category II and 5% of women in Category I. The incidence of PPH among the 3 groups was statistically not significant ($P >0.05$). As regard perinatal outcomes, 10% babies born to women in Category III needed NICU admission as compared to 5% in Category II and 2.5% in Category I. There was a statistically significant difference in the incidence of NICU admissions ($p<0.05$). As regard still births there were 5% of babies born to women in Category III, whereas 2.5% was seen in Category II and none in Category I. There was statistically not significant difference ($p<0.05$). **Conclusion:** This study concluded that increase in BMI lead to increased Incidence of Pre-eclampsia, GDM, Post term pregnancy, Caesarean section rate with no increase Incidence in post-partum haemorrhage. As perinatal complications increase in BMI lead to increased Incidence of Macrosomia and NICU admission with no increase Incidence of still birth rate.

Corresponding author
L. K. Nahar*

2022, www.medrech.com

INTRODUCTION

Pregnancy is an important event during a woman's life. It has a great impact on her physical and mental health. All efforts that are carried out during pregnancy aim to ensure full-term pregnancy without complications, safe delivery, and a healthy baby. Special care should be given to nutrition as a part of antenatal care. Adequate nutrition is required to avoid problems that result from weight extremes. The prevalence of obesity or overweight in pregnancy is rising and is of international concern [1]. Incidence of obesity has increased to pandemic proportions over the last 20 years [2]. Body mass index (BMI) is considered a measure of body composition/nutritional status [3]. An increase in BMI is a chronic illness which is associated with metabolic disease, nutritional deficiency, musculoskeletal adverse effects. Obesity-related health issues extent to pregnancy where they are responsible for producing a lot of medical and obstetric risks [2]. The increasing incidence of obesity worldwide has prompted the world health organization to designate obesity as one of the most important public health threats world-wide [4]. There is a number of systems have been used to classify body weight. The body mass index (BMI), also known as Quetelet's Index is

currently used [5]. BMI is calculated as weight (wt) in kg divided by the height in meters squared Categories of BMI are as follows: BMI of 20-24.9 kg/m^2- normal, BMI of 25-29.9 kg/m^2- overweight, and BMI of >30 kg/m^2-obese. Obese women when compared with women with a normal BMI have a greater risk of medical complications [6]. The BMI is a simple index of the weight-for-height and it is calculated by dividing a person's weight in kilograms by the square of their height in meters (kg/m^2). That mechanism appears to be related to the endocrine milieu associated with obesity (increased levels of insulin, leptin and androgens). Also nonspecific marker of inflammation, C-reactive protein is increased [7, 8, 9]. Recently, reported that obesity carries significant risks for the mother and foetus with the risk increasing with the degree of obesity and persists after accounting for other confounding demographic items [10]. Gestational obesity has been associated with increased risk of structural anomalies and caesarean delivery (CS) [11]. The obese women are more likely to have induction of labour, prolonged labour (IOL), and shoulder dystocia. Hazards of anaesthesia are high. Increased chance of puerperal urinary tract infection (UTI), post-partum haemorrhage PPH, DVT, poor wound healing and lactation failure in women with high BMI [12]. Special care should be provided to underweight, overweight, and obese mothers since they are more susceptible to pregnancy and delivery complications. According to WHO underweight mothers are at higher risk to develop intrauterine growth restriction. A study conducted at Swansea University showed that "costs to NHS per pregnancy were 23% more for overweight women and 37% more for obese" [13]. Macrosomia is common in pregnant women with high BMI which increase the risk of shoulder dystocia. Immediate neonatal complications such as hypoglycemia, hyperbilirubinemia and RDS are also associated with gestational obesity [14]. Anomalies like neural tube defects, orofacial abnormalities, cardiac defects, limb reduction and intestinal tract anomalies such as anorectal atresia are also common. Also an increased risk of neonatal intensive care unit NICU admission [15]. Information about lifestyle changes, especially that's of eating habits should be provided to ladies during antenatal care, since ladies are more prepared to change their habits to keep their babies healthy. A healthy lifestyle education is vital and effective before conception, a survey of women's attitudes, concerning healthy lifestyle changes prior to pregnancy.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital, Dhaka, Bangladesh from January to December 2021. The study included 120 singleton pregnant women with gestational age >37 weeks with cephalic presentation. Women with chronic hypertension (HTN), pre-GDM, multiple gestation, abnormal presentation and previous CS were excluded from the study. The selected women were categorized into three groups of 40 each according to their BMI: Category I included normal women (BMI 20- 24.9 kg/m^2), Category II included overweight women (BMI 25-29.9 kg/m^2) Category III included obese women (BMI >30 kg/m^2), detailed history and clinical examination including general physical, obstetrical and systemic examinations were 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. The variables of the maternal outcome included antepartum complications (GDM, PET), the onset of labour (spontaneous, induced), mode of delivery (vaginal, CS) and postpartum complications (PPH). Variables of the

perinatal outcome included still births, macrosomia weight >4000 grams, and NICU admissions. Statistical analysis Results were expressed in numbers, percentages and mean ± standard deviation. All results were analyzed statistically with the help of SPSS. The difference was considered significant at $p<0.05$.

RESULTS

In the present study, 120 singleton pregnant women were equally distributed into three categories according to their BMI. In Category I (BMI 20-24.9 kg/m^2), mean age of normal women was 28.5 ± 4 years in Category II (BMI 25-29.9 kg/m^2), mean age of overweight women was 29.5± 4 years; and in Category III (BMI 25-29.9 kg/m^2), mean age of obese women was 31.5± 6 years. There was increased incidence of antepartum complications in Category III women as compared to Category II and Category I women. The difference in the occurrence of PET among 3 categories was statistically significant ($p<0.05$). Similarly, the differences in the incidence of PT pregnancy, macrosomia as well as that. The mean weight of Category I (56.72 kg), Category II (65.77 kg) and Category III (80.71 kg). As regard the onset of labour as well as mode of delivery among the 3 categories there was statistically significant difference ($p<0.05$). Table 4 show that, as regard postpartum complications, only PPH was seen in 7.5% of women in Category III as compared to 5% in Category II and 5% of women in Category I. The incidence of PPH among the 3 groups was statistically not significant ($P >0.05$). As regard perinatal outcomes, 10% babies born to women in Category III needed NICU admission as compared to 5% in Category II and 2.5% in Category I. There were statistically significant difference in the incidence of NICU admissions ($p<0.05$). As regard still births there were 5% of babies born to women in Category III, whereas 2.5% was seen in Category II and none in Category I. There were statistically not significant difference ($p<0.05$).

Table-1: Patients age, BMI and weight (N=120)

Age	**(Mean± SD)**	**p-value**
Category I	28.5 ± 4	0.060
Category II	29.5± 5	
Category III	31.5± 6	
BMI		
Category I	20-24.9 kg/m^2	0.117
Category II	25-29.9 kg/m^2	
Category III	25-29.9 kg/m^2	
Patient weight		
Category I	56.72	0.01
Category II	65.77	
Category III	80.71	

Table-2: Incidence of antepartum complications in Category III women (N=120)

Item	**Pre-eclampsia N%**	**GDM N%**	**PT pregnancy N%**	**Macrosomia N%**	**p-value**
Category I	2 (5)	0 (0)	3 (7.5)	0 (0)	<0.05
Category II	7 (17.5)	3 (7.5)	4 (10)	2 (2)	
Category III	12 (30)	5 (12.5)	9 (22.5)	4 (10)	

Table-3: Onset of labour in 3 categories (N=120)

	Spontaneous	Induced	p-value
Category I	34(85%)	6(15%)	<0.05
Category II	27(67.5%)	13(32.5%)	
Category III	21(52.5%)	19(47.5%)	

Table-4: Mode of delivery in 3 categories (N=120)

Mode of delivery	Vaginal	CS	p-value
Category I	34(85%)	6(15%)	<0.05
Category II	28(70%)	12(30%)	
Category III	24(60%)	16(40%)	

Table-5: Postpartum complications and outcome during pregnancy (N=17)

Complications	Category I	Category II	Category III	p-value
PPH	2(5)	2(5)	3 (7.5)	<0.05
NICU	1(2.5)	2(5)	4(10)	
Still Births	0	1(2.5)	2(5)	

DISCUSSION

The prevalence of obesity or overweight in pregnancy is rising and is of international concern [1]. An increase in BMI is a chronic illness which is associated with metabolic disease, nutritional deficiency, musculoskeletal adverse effects. Obesity-related health issues extent to pregnancy where they are responsible for producing a lot of medical and obstetric risks [2]. In the present study, 120 singleton pregnant women were equally distributed into three categories according to their BMI. In Category I (BMI 20-24.9 kg/m^2), mean age of normal women was 28.5 ± 4 years in Category II (BMI 25-29.9 kg/m^2), mean age of overweight women was 29.5± 4 years; and in Category III (BMI 25-29.9 kg/m^2), mean age of obese women was 31.5± 6 years. There was increased incidence of antepartum complications in Category III women as compared to Category II and Category I women. The difference in the occurrence of PET among 3 categories was statistically significant (p<0.05). This results in comparison to Nishu et al. [6] who was observed that overweight and obese women were slightly older and short in stature when compared with women with normal BMI. In the current study, among the antepartum complications, the risk of GDM increased significantly with the increase in BMI. This results in agree with Nishu et al. [6] Sahu et al. and Hincz et al. [17, 18] they found that obese women had a significant risk for GDM (p=0.02, p=0.0004 and p<0.001 respectively). In the current study the risk of PET increased significantly with the increase in BMI. This results in agree with Sahu et al, Hincz et al and Nishu et al. [6] they also found that obese women had a significant risk for PET (p=0.004, p<0.05, p=0.001 respectively). In the current study, the risk (IOL) increased significantly with the increase in BMI Kiran et al. [19] also found an increased risk of induction of labor in obese women (OR 1.6; CI 1.3-1.9). Sahu et al. [17] and Nishu et al. [6] also found a significantly higher incidence of induction of labor in obese women (p<0.05 and p=0.01 respectively). In the current study, the risk of CS increased significantly with increase in BMI. Sahu et al. and Hincz et al. [17, 18] and Nishu et al. [6] also reported a significantly higher risk for caesarean delivery in obese women (p=0.01). PPH in the present

study did not increase significantly with the increase in BMI. Sahu et al. [17] and Nishu et al. [6] also did not find a statistically significant difference in the occurrence of PPH in obese, overweight and normal BMI women ($p>0.05$ and $p=0.60$ respectively). However, Bhattacharya et al. [20] in their study found that obese women were more likely to have PPH (OR 1.5; CI 1.3-1.7). As regard the onset of labour as well as mode of delivery among the 3 categories there was statistically significant difference ($p<0.05$). As regard postpartum complications, only PPH was seen in 7.5% of women in Category III as compared to 5% in Category II and 5% of women in Category I. The incidence of PPH among the 3 groups was statistically not significant ($P >0.05$). The difference might be attributed to higher number of patients in their study. Macrosomia increased significantly with the increase in BMI. This in agree with Sahu et al, Hincz et al. [17, 18] and Nishu et al. [6] They found that the risk of macrosomia increased with gestational obesity. ($p<0.05$, $p<0.001$and $p=0.04$ respectively). As regard perinatal outcomes, 10% babies born to women in Category III needed NICU admission as compared to 5% in Category II and 2.5% in Category I. There were statistically significant difference in the incidence of NICU admissions ($p<0.05$). In the current study, number of NICU admissions increased significantly with gestational obesity. Nishu et al.[6], Perlow et al. and Sarkar et al. [21, 22] also found that the incidence of NICU admissions increased significantly with gestational obesity ($p=0.02$, $p=0.01$, $p=0.01$ respectively). Current study did not find a significant difference in the rate of still births among the 3 categories). As regard still births there were 5% of babies born to women in Category III, whereas 2.5% was seen in Category II and none in Category I. There were statistically not significant difference ($p<0.05$). Similarly, Sahu et al. [17] and Nishu et al. [6] did not found a significant difference in the rate of still births in obese, overweight and normal BMI groups ($p>0.05$ and $p=0.33$).

CONCLUSION

This study concluded that increase in BMI lead to increase Incidence of Pre-eclampsia, GDM, Post term pregnancy, Caesarean section rate with no increase Incidence in post-partum haemorrhage. As perinatal complications increase in BMI lead to increase Incidence of macrosomia and NICU admission with no increase Incidence of still birth rate.

Conflict of Interest: None.

Authors Contribution: All Authors contributed this Manuscript.

REFERENCES:

1. Abenhaim HA, Kinch RA, Morin L, Benjamin A, Usher R: Effect of prepregnancy body mass index categories on obstetrical and neonatal outcomes. Arch Gynecol Obstet. 2007, 275:39-43. 10.1007/s00404-006-0219-y.
2. Bhattacharya S, et al. The effect of the body mass index on the pregnancy outcomes in nulliparous women who delivered singleton babies. *BMC Public Health.* 2007;7:168. doi; 10. 1186/1471-2458-7-168.
3. Ehrenberg HM, Dierker LRN, Milluzzi C, Mercer BM. Low maternal weight failure to thrive in pregnancy and adverse prenatal outcomes. *Am J Obstet Gynecol.* 2003;189:1726–30.
4. Mamula, et al. The complications during pregnancy, labor and puerperium in women with an increased BMI at the pregnancy term. *Cent. Eur. J. Med.* 2009;4(1):71–75.
5. Heslehurst N, Simpson H, Ells LJ, Rankin J, Wilkinson J, Lang R, et al. The impact of maternal BMI status on pregnancy outcomes with immediate short- term obstetric resource implications: a meta- analysis. Obesity Rev. 2008; 9(6):635-83.

6. Nishu Bhushan, Surinder Kumar, Dinesh Kumar, Reema Khajuria The impact of maternal body mass index on maternal and perinatal outcome Int J Reprod Contracept Obstet Gynecol. 2017; 6(7):2862-2866.
7. Practice Committee of American Society for Reproductive Medicine. Obesity and reproduction: an educational bulletin. Fertil Steril. 2008; 90:321.
8. Harman-Boehm I, Bluher M, Redel H, Sion-Vardy N, Ovadia S, Avinoach E, et al. Macrophage infiltration into omental versus subcutaneous fat across different populations: effect of regional adiposity and the comorbidities of obesity. J Clin Endocrinol Metabol. 2007; 92(6):2240-7.
9. Metzger BE, Lowe LP, Dyer AR, Lowe J, McCance DR, Lappin TR et al. Hyperglycaemia and adverse pregnancy outcomes. N Engl J Med. 2008; 358(19):1991-2002.
10. Sebire NJ, Jolly M, Harris JP, Wadsworth J, Joffe M, Beard RW, Regan L, robinson S. Maternal obesity and pregnancy outcome: a study of 287, 213 pregnancies in London. Int J of obesity 2001; 25:1175-1182.
11. Stothard KJ, Tennant PW, Bell R, Rankin J. Maternal overweight and obesity and the risk of congenital anomalies: a systematic review and meta-analysis. JAMA. 2009; 301(6):636-50.
12. Saravanakumar K, Rao SG, Cooper GM. The challenges of obesity and obstetric anaesthesia. Curr Opin Obstet Gynaecol. 2006; 18(6):631-65.
13. Obese pregnant women 'cost NHS up to 37% more'. (2014). Accessed: January 2018: http://www.bbc.com/news/uk-wales-26526212.
14. Weiss JL, Malone FD, Emig D, Ball RH, Nyberg DA, Comstock CH, et al. Obesity, obstetric complications and cesarean delivery rate- a population-based screening study. Am J Obstet Gynecol. 2004; 190:1091-7.
15. Owens LA, O'Sullivan EP, Kirwan B, Avalos G, Gaffney G, Dunne F, et al. Atlantic-Dip: the impact of obesity on pregnancy outcome in glucose-tolerant women. Diab Care. 2010; 33(3):577-9.
16. Stothard KJ, Tennant PW, Bell R, Rankin J. Maternal overweight and obesity and the risk of congenital anomalies: a systematic review and metaanalysis. Jama. 2009; 301(6):636-50.
17. Sahu MT, Agarwal A, Das V, Pandey A. Impact of maternal body mass index on obstetric outcome. J Obstet Gynaecol Res 2007; 33(5):655-9.
18. Hincz P, Borowski D, Krekora M, Lech P, Wojciech H, Jan W, et al. Maternal obesity as a perinatal risk factor. Ginekol Pol. 2009; 80(5):334-7.
19. Kiran TSU, Hemmadi S, Bethal J, Evans J. Outcome of pregnancy in a woman with an increased body mass index. Br J Obstet Gynaecol. 2005; 112(6):768- 72.
20. Bhattacharya S, Campbell DM, Liston WA. Effect of body mass index on pregnancy outcomes in nulliparous women delivering singleton babies. BMC Public Health. 2007; 7(1):168.
21. Perlow JH, Morgan MA, Montgomery D, Towers CV, Porto M. Perinatal outcome in pregnancy complicated by massive obesity. Am J Obstet Gynecol. 1992; 167:958-62.
22. Sarkar RK, Colley SM, Donelly JC, Walsh T, Collins C, Geary MP. The incidence and impact of increasing BMI on maternal and fetal morbidity in low risk primigravid population. J Matern Fetal Neonat Med. 2007; 20:879-83.