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Maternal body mass index as an impact on pregnancy outcomes at Aswan university hospital

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Abstract
Background: The prevalence of obesity or overweight in pregnancy is also rising and is of international concern. The aim of the study was to evaluate and compare the maternal and perinatal outcome in patients with BMI 20-24.9 kg/m2 (normal), with BMI 25-29.9 kg/m2 (overweight) and with BMI >30 kg/m2 (obese).
Methods: This cross-sectional study was conducted on 150 singleton pregnant women with gestational age>37 weeks with cephalic presentation. The selected women were categorized into three groups of 100 each according to their BMI: Category I included normal women (BMI 20-24.9 kg/m2), Category II included overweight women (BMI 25- 29.9 kg/m2) and Category III included obese women (BMI >30 kg/m2).
Results: In Category I mean age of normal women was 28.5 ± 4 years, in Category II, mean age of overweight women was 29.5± 4 years; and in Category III, mean age of obese women was 31.5± 6 years. The mean weight of Category I (56.72 kg), Category II (65.77 kg) and Category III (80.71 kg). There was increased incidence of antepartum complications in Category III women as compared to Category II and Category I women. Under perinatal complications, 10% babies born to women in Category III needed NICU admission as compared to 5% in Category II and 2% in Category I. The difference in the incidence of NICU admissions was statistically significant.
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.

Keywords: body mass index, macrosomia, pregnancy outcome

Introduction

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].

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 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/m2- normal, BMI of 25-29.9 kg/m2- overweight, and BMI of >30 kg/m2-obese. Obese women when compared with women with a normal BMI have a greater risk of medical complications [6]. 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].

Macrosomia is common in pregnant women with high BMI which increase the risk of shoulder dystocia. Immediate neonatal complications such as hypoglycaemia, hyperbilirubinemia and RDS are also associated with gestational obesity [13, 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, 16]. This study has been designed to evaluate pregnancy outcomes in patients belonging to different BMI categories admitted in our hospital.

Methods

This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Aswan university hospital, over aperiod of one year from January 2018 to December 2018. The study included 150 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 50 each according to their BMI: Category I included normal women (BMI 20- 24.9 kg/m2), Category II included overweight women (BMI 25-29.9 kg/m2) Category III included obese women (BMI >30 kg/m2), 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 maternal outcome included antepartum complications (GDM, PET), onset of labour (spontaneous, induced), mode of delivery (vaginal, CS) and postpartum complications (PPH). Variables of perinatal outcome included still births, macrosomia weight >4000 grams, and NICU admissions. *Statistical analysis* Results were expressed in numbers, percentage 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, 150 singleton pregnant women were equally distributed into three categories according to their BMI. In Category I (BMI 20-24.9 kg/m2), mean age of normal women was 28.5 ± 4 years in Category II (BMI 25-29.9 kg/m2), mean age of overweight women was 29.5± 4 years; and in Category III (BMI >30 kg/m2), mean age of obese women was 31.5± 6 years.

Table 1: Patient age

Item	Category I Mean± SD	Category II Mean± SD	Category III Mean± SD
Patient age	28.5 ± 4	29.5± 5	31.5± 6

The mean weight of Category I (56.72 kg), Category II (65.77 kg) and Category III (80.71 kg).

Table 2: Patient weight

Item	Category I Mean weight	Category II Mean weight	Category III Mean weight
Patient weight	56.72	65.77	80.71

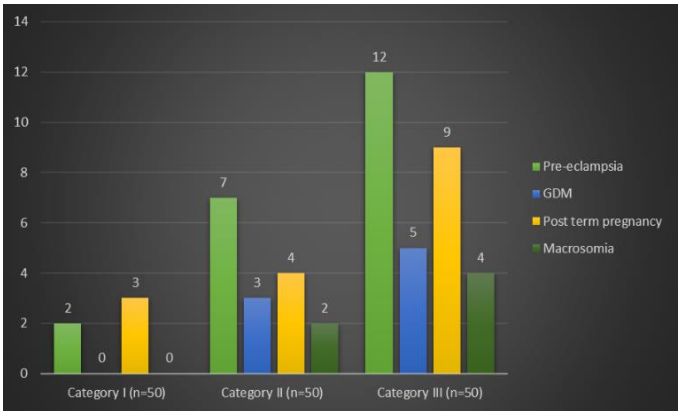

Fig 1

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 of GDM among the 3 categories was statistically significant ($p<0.05$) (Table3)

Table 4: Onset of labour in 3 categories.

Onset of labour	Category I	Category II	Category III
Spontaneous	42(84%)	33(66%)	27(54%)
Induced	8(16%)	17(34%)	23(46%)

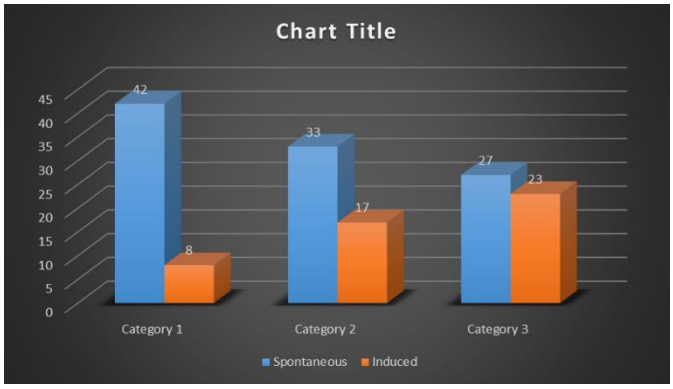

Fig 2

Table 2: Mode of delivery in 3 categories.

Mode of delivery	Category I	Category II	Category III
Vaginal	43(86%)	36(72%)	30(60%)
CS	7 (14%)	14(28%)	10(40%)

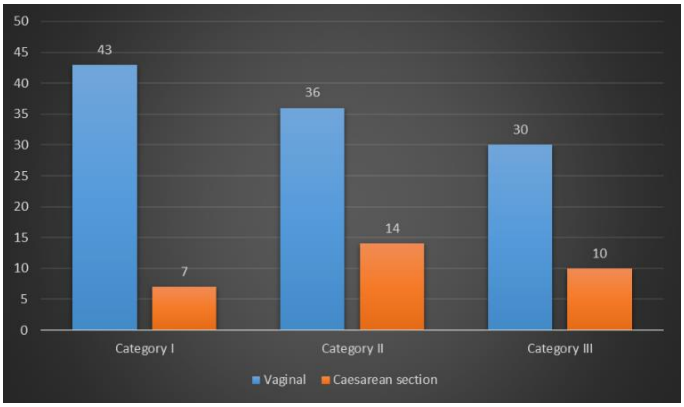

Fig 3

As regard the onset of labour as well as mode of delivery among the 3 categories there was statistically significant diffrance (p<0.05) Table 4 and 5

As regard postpartum complications, only PPH was seen in5% of women in Category III as compared to 4% in Category II and 4% 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% in Category I. There were statistically significant difference in the incidence of NICU admissions (p<0.05).

As regard still births there were 2% of babies born to women in Category III, whereas 1% was seen in Category II and none in Category I There were statistically not significant difference (p<0.05).

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 current study we evaluated the impact of maternal BMI on pregnancy outcomes among 150 women divided in 3 categories according to their BMI.

In Category I, mean age of normal women was 28.5 ± 4 years in Category II, mean age of overweight women was 29.5± 4 years; and in Category III, mean age of obese women was 31.5± 6 years. The mean weight of Category I (56.72 kg), Category II (65.77 kg) and Category III (80.71 kg). 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). 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<0.001and p=0.04 respectively).

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). 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**.**

Recommendations

Obesity is an independent risk factor for adverse

Pregnancy outcomes and hence preventable steps should be taken for reducing the maternal and perinatal morbidity and mortality. A general awareness regarding weight control, food habits and lifestyle modification is required as there are increasing trends of being overweight and obese both in developing as well as developed nations.

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