

Impact of Obesity on Fetomaternal Outcome in Pregnant Saudi Females

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Abstract:

Background: Obesity is rapidly increasing in most populations of the world including Saudi community. Maternal obesity adversely impacts pregnancy outcome through increased rates of hypertensive disease, diabetes, cesarean section and infections.

Objectives: The aim of this study is to determine frequency of obesity and its adverse effects on reproductive outcome in pregnant Saudi females.

Methods: Prospective Cohort study. Eight months (Nov 2008 to June 2009), Maternity and Children Hospital (MCH) Buraida, Saudi Arabia Sample included a group of 1000 randomly recruited pregnant Saudi females. Patients were admitted through Outpatient and Emergency Departments. Height was recorded once and weight twice; at the beginning (prepregnancy weight) and end of pregnancy. The difference between the two weights was taken as net weight gain in pregnancy. Prepregnancy weight was used to calculate Body mass index (BMI) using formula; Weight in Kg/Height in (m). 2

The sample was divided into 5 groups depending upon their BMI ;< 18.5, 18.5-24.9, 25-29.9, 30-39.9 &>40, classified as underweight, normal weight, overweight, obese & morbidly obese respectively. The normal weight group was used as control group. Data were collected regarding complications of obesity in pregnancy and labor and recorded on a Performa.

Results were calculated by using computer programme SPSS Version 13 for windows. A p-value of< 0.05 is used to calculate statistical significance.

Results: The frequency of weight distribution in pregnant Saudi female calculated to be 2% (lean), 31% (normal weight), 33%(overweight), 30%(obese) and 4%(morbidly obese). Compared with normal weight women, both overweight and obese women had a significantly increased risk (p-value-<0.05) for gestational diabetes, preeclampsia, cesarean delivery, and delivery of a macrocosmic infant.

Conclusion: Overweight & obesity is a growing problem in pregnant Saudi females associated with increased risks of fetomaternal complications like preeclampsia, gestational diabetes, cesarean delivery, and delivery of a macrocosmic infant.

Keywords: Obesity, BMI, Reproductive Outcome, Pregnancy, Saudi females

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Introduction

Worldwide obesity is the most prevalent, chronic medical condition⁽¹⁾. It contributes to the development of many chronic diseases² like, hypertension, heart disease, type 2 diabetes, joint problems, gall bladder disease and certain types of cancers e.g. endometrial carcinoma. The prevalence of obesity varies in different populations and further variations depend on age and sex.⁽³⁾

The rate of obesity in pregnant women is rising, increasing the significance of its impact on obesity-related pregnancy complications.⁽⁴⁾ The pregnancy complications associated with maternal obesity can be broadly grouped into those primarily affecting the mother and those primarily affecting the fetus, neonate or older child.⁽⁵⁾ Obesity influences not only the chance of conception but also reduces the response to fertility treatment, and increases the risk of miscarriage, congenital anomalies⁽⁶⁾ as well as pregnancy complications like gestational diabetes, pregnancy induced hypertension, cesarean delivery, macrosomia and infections in addition to potential adverse effects on long term health of both mother and infant⁽⁷⁾.

The World Health Organization⁸ and the National Institutes of Health⁽⁹⁾ define

Underweight as body mass index (BMI) <18.5, normal weight as BMI of 18.5–24.9, overweight as a BMI of 25–29.9, and obesity as a BMI of 30 or greater. Obesity is further characterized by BMI into Class I (30–34.9), Class II (35–39.9), and Class III (greater than 40).

Different methods are used for the measurement of obesity and these include: (a) the estimation of the body mass index (b) measurement of skin fold thickness or waist hip ratio⁽¹⁰⁾ (c) measurement of fat cell size and number⁽¹¹⁾ and (d) measurement of body density.

The body mass index (BMI), or *Quetelet index* is the most frequent internationally used measure of obesity.⁽¹⁰⁻¹¹⁾ It is a statistical measurement which compares a person's weight and height. The *Quetelet index* is: $QI = \text{weight in kilograms} / (\text{height in meters})^2$

The obstetric complications of maternal obesity are related to maternal pregravid⁽¹²⁾ Obesity rather than excessive weight gain during pregnancy. Weight gain in pregnancy is considered to be the difference between a woman's weight at the time of labor and her prepregnancy weight.

Obesity is an ever increasing problem in Saudi population especially in females due to sedentary lifestyle, peculiar eating habits and diet rich in fat and carbohydrates. A few studies have been carried out in Saudi Arabia and the prevalence of obesity and overweight in the general population has been reported to be high both in Saudi males and females.^(15, 16, 17, 18, 19)

The need of the day is to address this issue and strategies must be made to reduce the frequency of this nutritional disease in the Kingdom particularly among the females of reproductive age.

Methods

A sample of 1000 pregnant Saudi females was selected randomly during Nov 2008–June 2009. Patients were admitted through OPD and emergency.

Height and weight were measured by the on duty midwives using standard techniques.⁽²¹⁾ Height was recorded using a measuring tape, with the individual standing straight next to the wall with the heels, buttocks, shoulders and occiput touching the wall. Weight was measured twice at the beginning (antenatal record at 1st visit in 1st trimester) and end of pregnancy using normal weighing machine with the individual wearing light clothes and no shoes. The weight was recorded to the nearest 100G. The data were used to calculate Quetelet index or the BMI using the formula $BMI = \text{weight (kg)} / \text{height (m)}^2$.

Depending upon BMI, the sample was divided into 5 groups; < 18.5, 18.5 to 24.9, 25 to 29.9, 30 to 39.9 and >40 as underweight, normal weight, overweight, obese and morbidly obese respectively. The group with normal BMI was used as control group and those with BMI >25 as study group. The data were collected regarding complications during pregnancy and labor by the attending doctors & recorded on a structured Proforma.

Inclusion Criteria: All the women included in the study delivered live born, singleton infants.

Exclusion Criteria: Women with chronic hypertension, diabetes & multiple pregnancy

Outcome Measures

1. Frequency of weight distribution
2. Maternal complications of obesity
3. Fetal complications of obesity

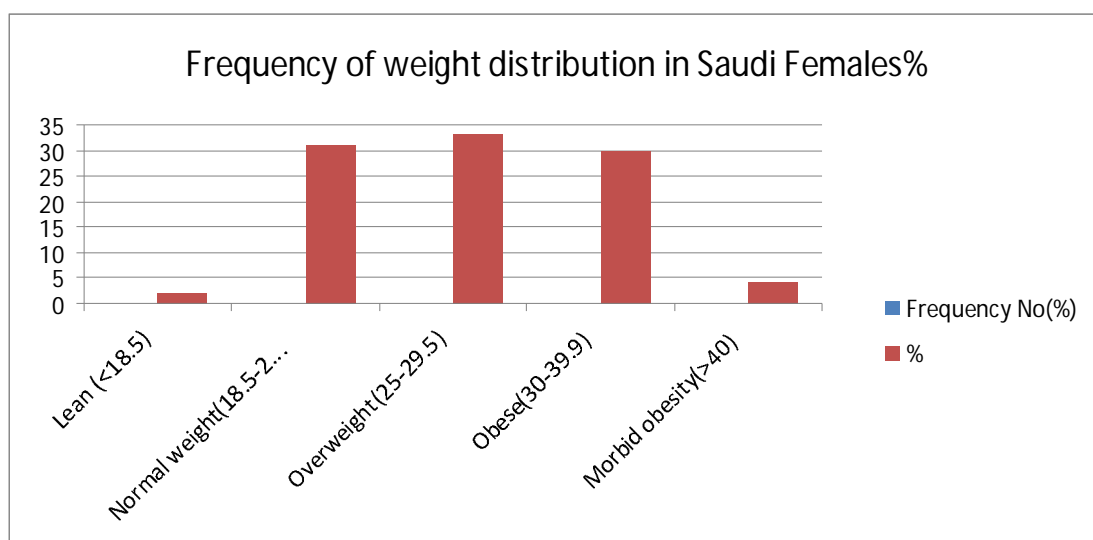
Multiple logistic regression analysis was used with SPSS Version 13 to evaluate the association between prepregnancy BMI and

pregnancy complications. Data were adjusted for confounders to affect pregnancy outcome (maternal age, parity, chronic hypertension, social class).

The results were calculated and compared with results of similar studies conducted at national and international level.

Results

Graph 1 shows frequency of weight distribution among pregnant Saudi females; underweight; 20/1000(2%), normal weight; 310/1000(31%), Overweight; 331/1000(33%), obese; 300/1000(30%) & morbidly obese; 39/1000(4%).

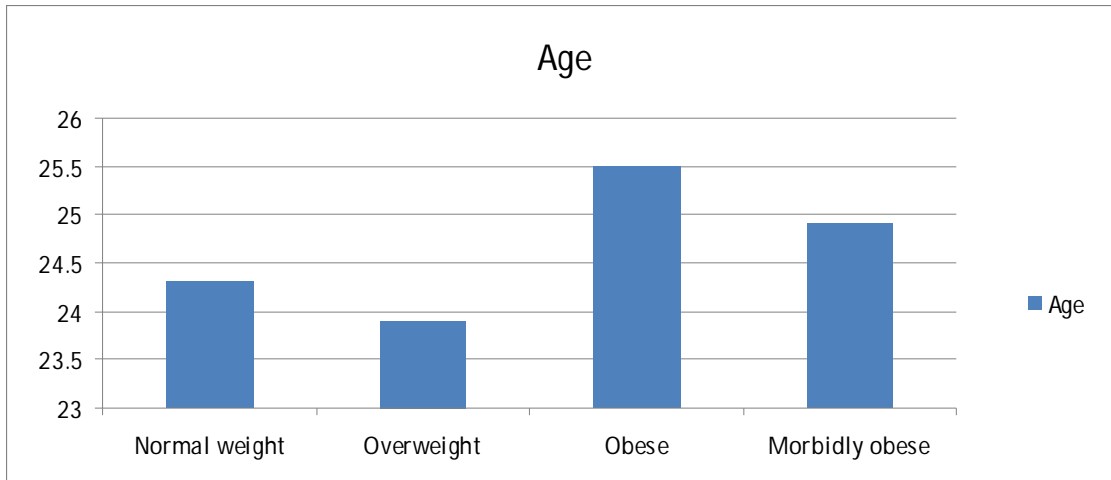


Graph (1). Frequency of weight distribution in pregnant Saudi females.

Table (1) Frequency of weight distribution in different groups.

S.no	Groups According to Body Mass Index (BMI)	Frequency No (%)
1	BMI<18.5 Under weight	20(2)
2	BMI 18.5-24.9 Normal weight	310(31)
3	BMI 25-29.9 Overweight	331(33)
4	BMI 30-39.9 Obese	300(30)
5	BMI.>40(morbidly obese)	39(4)

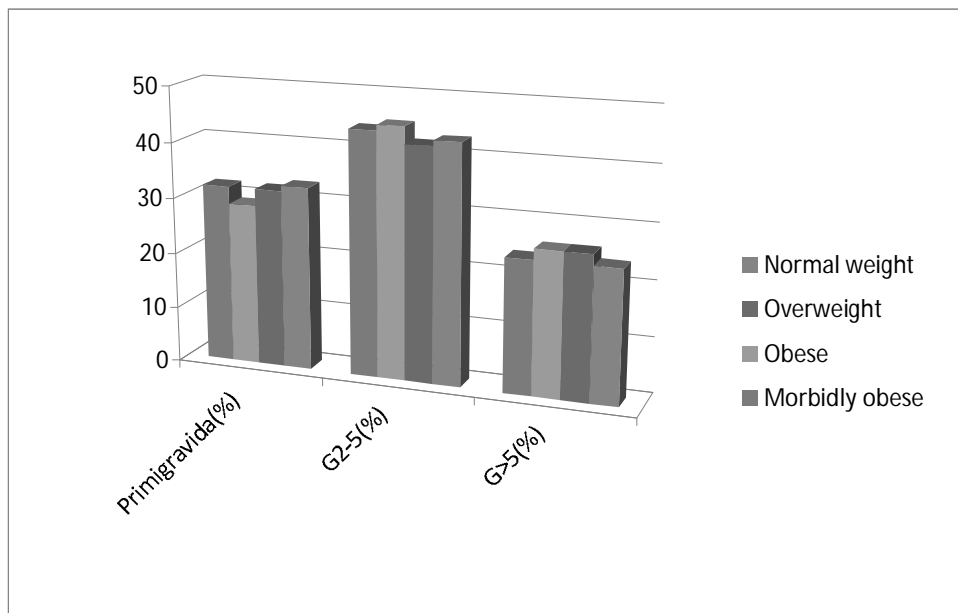
There is no significant difference ($p\text{-value}>0.05$) in age & parity when different groups are compared to control group (normal BMI) as shown in Graph (2).



Graph (2 a). Distribution of age in different groups.

Table (2). Distribution of age & parity among different groups.

Groups	Age(mean in years)	Primigravida No (%)	Gravida2-5 No (%)	Gravida>5 No (%)	p-value
Normal weight	24.3	102(33)	133(43)	75(24)	>0.05(all)
Overweight	23.9	106(32)	140(42)	87(26)	>0.05(all)
Obese	25.5	87(29)	135(45)	78(26)	>0.05(all)
Morbidly obese	24.9	13(32)	17(44)	09(24)	>0.05(all)

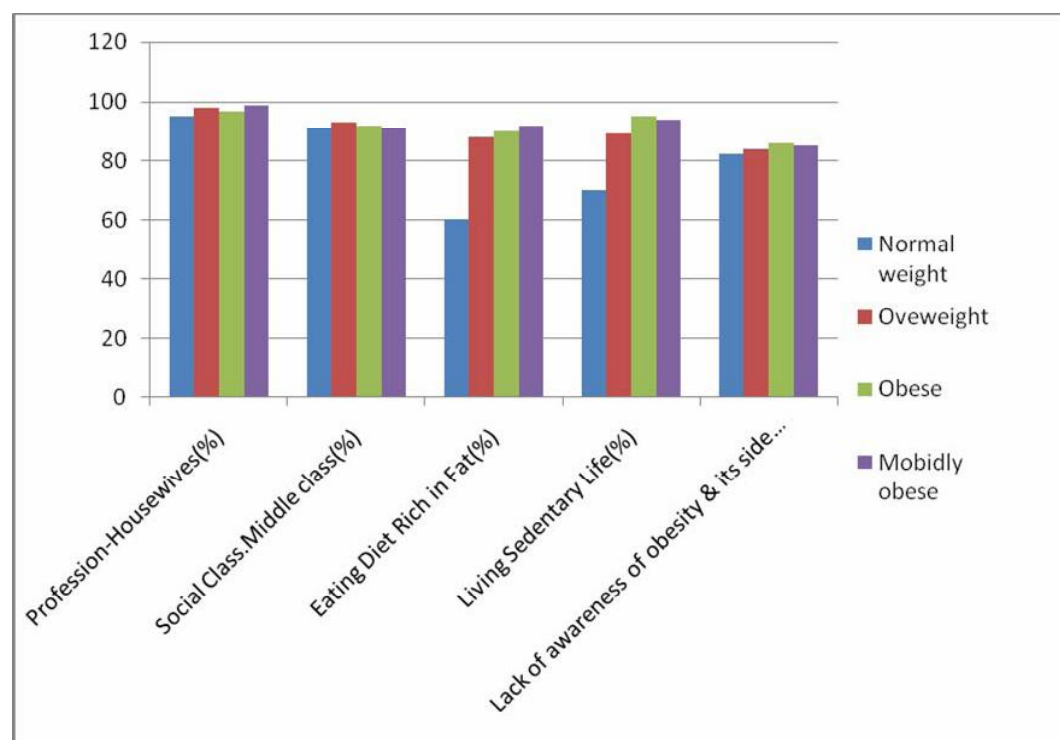


Graph (2 b). Distribution of parity among different groups.

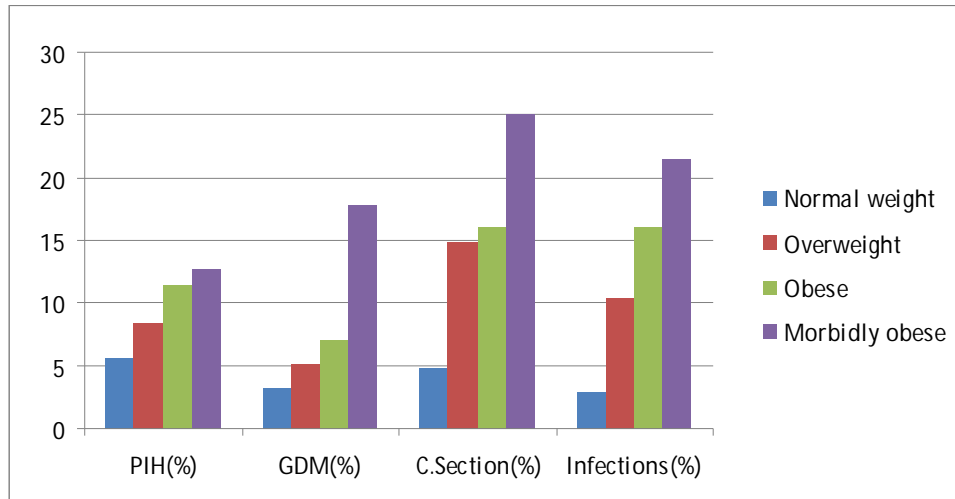
Table (3). Distribution of profession Social class. Diet, Life Style and awareness about Obesity & its Side effects.

Groups	Profession House wives (%)	Social Class (%)	Eating Fat Rich Diet (%)	Living Sedentary Life (%)	Lack of awareness about obesity & its side effects
Normal weight	95	Poor(P)-5 Middle(M)-91 Upper(U)-4	60	71	70
Overweight	98	P-4 M-93 U-3	88	89	84
Obese	97	P-2 M-92 U-6	90	95	86
Morbidly obese	99	P-1 M-91 U-8	92	94	85

More than 90% females were housewives and belonged to middle class in all groups. In the study group, 80-90% of females were living a sedentary life, eating diet rich in fat and had no awareness about obesity and its side effects as compared to control group where these figures are relatively low (60-70%).

**Graph (3). Distribution of profession Social class. Diet, Life Style and awareness about Obesity & its Side effects.**

All maternal complications increased in frequency directly in proportion to the increase in BMI. with significant difference between study & control groups as depicted in Graph (4) below.

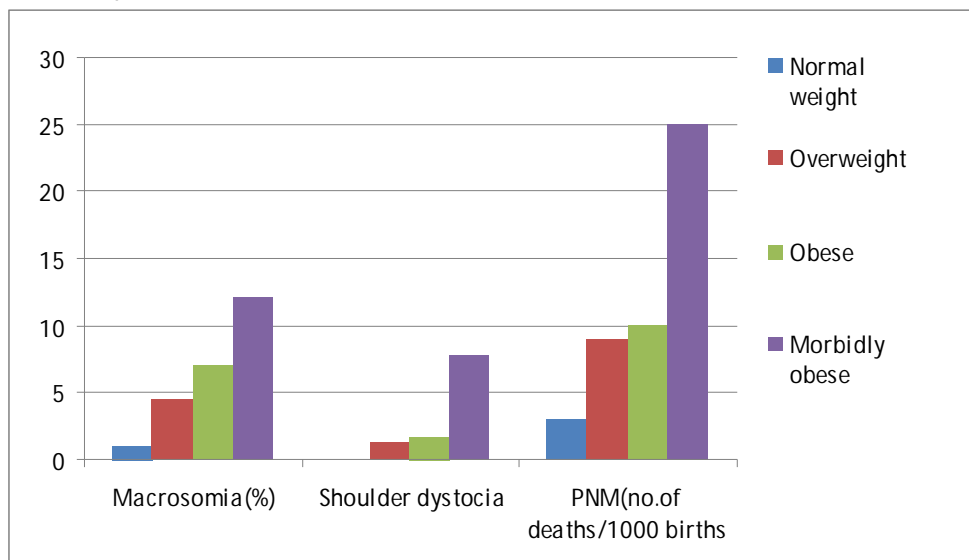


Graph (4). Distribution of Maternal complications of Obesity.

Table(4). Distribution of Maternal complications of Obesity in different groups.

Groups	Pregnancy induced Hypertension (PIH)-No. (%)	Gestational Diabetes (GDM)-No (%)	C-section No (%)	Infections No (%)	p-value
Normal weight	17(5.6)	10(3.2)	15(4.8)	9(2.9)	
Overweight	28(8.4)	17(5.1)	49(14.8)	34(10.3)	<0.05(all)
Obese	34(11.4)	21(7.1)	48(16)	48(16)	<0.05(all)
Morbidly obese	6(15.3)	05(12.8)	9(25)	8(21.4)	<0.05(all)

All fetal complications & PNM also increased in direct proportion to the increase in BMI as is evident from Graph V.



Graph (5). V Fetal complications & PNM among different groups.

Table (5). Fetal complications & PNM among different groups.

Groups	Macrosomia No (%)	Shoulder dystocia No (%)	Perinatal Mortality(PNM) (per 1000 births) No(PNM)	p-value
Normal weight	03(0.96)	None(0)	1/310(3)	
Overweight	15(4.5)	4(1.2)	3/331(9)	<0.05(all)
Obese	21(07)	5(1.7)	3/300(10)	<0.05(all)
Morbidly obese	5(12)	3(7.7)	1/39(25)	<0.05(all)

Perinatal mortality & morbidity was recorded in unbooked case, received in emergency in advanced labor with fetal distress in all groups & in obese & overweight groups complicated by shoulder dystocia associated with macrosomia.

Discussion

Results of our study are comparable to most of the studies conducted on this issue at national and international level. In our study the frequency of overweight and obesity is; overweight (33%), obese (30%) and morbidly obese (4.5%). A study in USA⁽¹³⁾ showed that 28% of US women 25 years or older were overweight and an additional 27% were considered obese and a retrospective case control study carried out by Kumari¹⁴ indicated that nearly 40% of married women are obese in the United Arab Emirates.

Studies conducted in Kingdom of Saudi Arabia also give comparable results e.g. Al Nuaim and coworkers in two separate studies^(15, 16) reported 29.4% and 27% of Saudi females to be overweight, while Rasheed *et al.*¹⁷ in 1994 reported an obesity prevalence of 26.1% and morbid obesity in 4.5% of the Saudi females, Al Shammery and coworkers⁽¹⁸⁾ reported obesity in 41.9% and morbid obesity in 5.18% of Saudi females, while Khashoggi⁽¹⁹⁾ and coworkers reported 64.3% of Saudi females attending Health Centers to be obese. The results of the present study may be slightly different from those reported previously due to the difference in the nature of the study group. Females attending Health Centers in the studies reported by Khashoggi *et al.*⁽¹⁹⁾ and Al Shammery *et al.*⁽¹⁸⁾ were mainly housewives. The females in our study were all pregnant, more than 90% were housewives and 70% were not educated beyond primary class.

In our study more than 90% females belonged to middle class, 2-4% to poor class and the rest 6-8% to upper class. In developed countries such as the United States, obesity and its complications disproportionately affect minority groups and those of lower socioeconomic status, whereas in countries

just emerging from poverty rates of obesity are higher in the wealthier classes.^(20,21)

Regarding maternal complications in pregnancy, results of our study coincide with many studied conducted earlier. The major maternal complications mentioned in literature to be associated with obesity during pregnancy include hypertensive disease (chronic hypertension and preeclampsia), diabetes (pregestational and gestational), respiratory disorders (asthma and sleep apnea), thromboembolic disease, cesarean section and infections.(primarily urinary tract infections, wound infections and endometritis).⁽²²⁾

In our study, the frequency of PIH and gestational diabetes remained significantly high in overweight and obese groups as compared to normal weight group. The frequency of PIH calculated in different groups is; normal weight (5.6%), overweight (8.4%), obese (11.4%) and in morbidly obese (15.3%) while that of gestational diabetes is; 3.2% in normal weight, 5.1% in overweight, 7.1% in obese and 12.8% in morbidly obese females. Results of one study show that obese pregnant women have much higher rates of pregnancy specific disorders such as pre-eclampsia and gestational diabetes⁽²³⁾. In the study by Lu *et al.*,⁽⁴⁾ almost 30% of cases of gestational diabetes seen in their institution between 1995 and 1999 were attributed to maternal obesity. Overall, the literature^(14, 23, 24) suggests that obese pregnant women have a 14±25% incidence of pre-eclampsia and a 6±14% incidence of gestational diabetes.

Results of our study show much higher rates of cesarean section in obese women as compared to those with normal weight (15-25% versus 4.8%).Most studies reported increased cesarean section rates mainly due to macrosomia with rates in obese women greater than 30%.^(23,24,25)

In our study the frequency of urinary tract infection remained high in obese females as compared to normal weight. The infectious complications most consistently associated with obesity are postoperative wound infections, endometritis and urinary tract infections. ^(24, 25) Prophylactic antibiotics are, therefore, indicated to prevent endometritis after cesarean section in obese women.

Results of our study resemble other studies as far as fetal complications of obesity are concerned. In our study frequency of macrosomia remained significantly high in obese (07%) and morbidly obese (12%) as compared to normal weight female infants (0.96%).

Maternal obesity and excessive weight gain during pregnancy are both independently associated with macrosomia and LGA (>90th percentile) neonates. ^(4, 24, 26) Even after controlling for gestational diabetes, maternal obesity is associated with an 18% incidence of LGA neonates, which is a twofold increase over rates found in non-obese controls. ^(23,24,25)

Obese women are at increased risk of shoulder dystocia at delivery if they have an LGA fetus. ⁽²⁸⁾ In our study the frequency of shoulder remained high in overweight, obese and morbidly obese females (1-7%) as compared to normal weight group (0%).

Perinatal mortality rate remained relatively high in the study group (9-25/1000) as compared to the control group (3/1000) in the present study. This was due to hypoxia as a result of prolonged labor and shoulder dystocia related to macrosomia in obese females presenting in emergency as unbooked cases in advanced labor.

Sebire et al. ⁽²⁵⁾ found that maternal obesity was associated with a higher fetal death rate (odds ratio 1.4 with a rate of 7 per 1000). While Studies by Kumari ⁽¹⁴⁾ and Bianco et al ⁽²⁴⁾ showed no significant increase in fetal death rates in obese women, after controlling for diabetes and hypertension.

Weight reduction is not recommended during pregnancy. Our results reinforce current recommendations to avoid excessive weight gain during adolescence and early adulthood, ⁽²²⁾ before a first pregnancy.

It is a matter of great concern that about 70% of pregnant Saudi females have BMI >25 and 80-90% of them are not aware of obesity & its adverse effects. Maternal overweight is one of the few risk factors for poor gestational outcomes

amenable to modification before a pregnancy, and this study further strengthens the arguments for weight control to improve the health status of mothers in the Kingdom. It is impossible to control the epidemic of obesity if broad-based comprehensive interventions are not instituted in near future stressing a need to have healthy diet, active life with exercise and promote awareness about obesity and its adverse effects especially among females of reproductive age.

Limitations of Study

Complications associated with maternal obesity like abortions, congenital malformations, Sleep apnea, deep venous thrombosis, induction of labor & perineal tears were not included due to inconclusive results. Infectious complications like wound infections and endometritis could not be included in the study due to difficulty in following the patients in postpartum period.

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