Journal of Medicine, Physiology and Biophysics
ISSN 2422-8427 An International Peer-reviewed Journal
Vol.42, 2018

FREQUENCY OF PRE-ECLAMPSIA IN OBESE PATIENTS

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ABSTRACT
Objective:- To determine the frequency of pre-eclampsia in obese patients. **Material and methods:-** This descriptive study was carried out in the Department of Obstetrics and Gynecology, Nishtar hospital Multan. Subjects were selected from clinically diagnosed pregnant ladies fulfilling the inclusion criteria in the Department of Obstetrics and Gynaecology, Nishtar Hospital Multan. **Results:-** Age at presentation of the obese women was highest in the age group 20–24 years i.e. 44(36.0%). Mean age of the women was 26.64±4.52 years with age range of 20–38 years. There were 10(8.2%) primigravida, 26(21.3%) nullipara, 79(64.8%) women were para 1–4 and 7(5.7%) para 5 or above. In our study, frequency of pre-eclampsia in obese was 23.8%; (29/122) women developed pre-eclampsia. **Conclusion:-** Frequency of pre-eclampsia in obese was 23.8% in present study which seem to be quite high.
Key Words:- Obesity, pre-eclampsia, body mass index

INTRODUCTION

Obesity is a worldwide individual and public health issue because it contributes to development of several chronic diseases.[1] The rate of obesity in general population is increasing dramatically with up to 40% women in the UK being overweight.[2] In the United States, the prevalence of overweight women of 20–29 years of age increased from 12% in 1971 to 1974, up to 20% in 1988-1991.[3] Similarly in general population its prevalence is 15–20%.[4] Body mass index (BMI) is the most widely accepted measure of obesity in adults[5] which is measured as:

Body mass index = Weight in kilograms Height in meter^2

A normal BMI is 20–24 kg/m^2.

Overweight is defined as a BMI of 25–29.9 kg/m^2.

Obesity is a BMI ≥ 30 kg/m^2.

Class I obesity is a BMI of 30–34.9 kg/m^2.

Class II obesity is a BMI of 35–39.9 kg/m^2.

Class III obesity is BMI of > 40 kg/m^2.[6]

Obesity is considered as independent risk factor for development of pre-eclampsia[7] which is a complex polygenetic trait and is multifactorial.[8] According to WHO, the incidence of pre-eclampsia is seven fold higher in developing countries as compared to developed countries[9] and is one of the cause for high fetomaternal morbidity.[10] It has been reported that obese women have 8.7% incidence of pre-eclampsia[11] while in one local study the frequency of pre-eclampsia has been reported 35% in obese patients.[12]

According to WHO definition, overweight women have two fold increased risk and obese women have 3.2-fold risk of developing pre-eclampsia when compared with women of normal weight.[13] Risk of pre-eclampsia rises by 0.54% for each 1 kg/m^2 increase in BMI and doubles with each 5–7 kg/m^2 increase in body mass index.[7] At BMI of 17 kg/m^2 there is 57% reduction in risk of pre-eclampsia and at BMI of 19 kg/m^2 there is 33% reduction in risk of pre-eclampsia.[14]

Obesity increases the risk of pre-eclampsia through insulin resistance,[15] hyperlipidemia[16] and systemic inflammation.[17] During pregnancy there is three fold increase in triglyceride levels and 50% increase in low density lipoprotein (LDL) and high density lipoprotein (HDL).[18] This increase in triglyceride and very low density lipoprotein (VLDL) is positively correlated with mother's BMI and induces vascular damage by endothelial oxidation. Leptin concentration determined by the degree of adiposity rises three fold during pregnancy and correlated with mother's BMI.[18]

It has been highlighted that obesity is an important public health issue. There is a strong association between

raised maternal BMI and a number of threatening complications during pregnancy including pre-eclampsia. So, pregnancies among obese women must be classified as high risk pregnancies and appropriate antenatal care should be provided.

OBJECTIVE

To determine the frequency of pre-eclampsia in obese patients.

MATERIAL AND METHODS

This descriptive study was carried out in the Department of Obstetrics and Gynecology Unit III, Nishtar hospital Multan. Subjects were selected from clinically diagnosed pregnant ladies fulfilling the inclusion criteria in the Department of Obstetrics and Gynaecology, Nishtar Hospital Multan. Data was entered and analyzed using computer based software SPSS version 20.

RESULTS

This study was conducted on 122 booked obese women (BMI ≥ 30 kg/m^2 in first trimester). Later these women were followed to see how many of them developed pre-eclampsia. There were 106(86.9%) women having gestational amenorrhea of 24–36 week, 16(13.1%) women with gestational age of 37–40 week. In our study, frequency of pre-eclampsia in obese was 23.8%; (29/122) women developed pre-eclampsia. Out of total 106 women having gestational age of 24–36 weeks, 20(18.9) and out of 16 women of gestational age 37–40 week, 9 women (56.3%) developed pre-eclampsia. Gestational age had no significant effect on development of pre-eclampsia (p=0.191).

Age at presentation of the obese women was highest in the age group 20–24 years i.e. 44(36.0%), followed by 41(33.6%) patients who were between 25–29 years of age. There were 34(27.9%) women of age 30–34 years and 3(2.5%) of women between 35–39 years (Table-1).

There were 10(8.2%) primigravida, 26(21.3%) nullipara, 79(64.8%) women were para 1–4 and 7(5.7%) para 5 or above (Table-2).

Mean weight of the women was 73.75±3.09 kg and mean height was 1.52±0.02 m and mean of the BMI was 31.74±1.01 kg/m^2 as shown in Table-3. All the women belonged to class I obesity (i.e. BMI ≥ 30–34.9 kg/m^2).

Out of 44 patients between 20–24 years, there were 11(25.0%) women having pre-eclampsia while 7(17.1%) patients out of total 41 obese between 25–29 years developed pre-eclampsia. Out of total 34 patients between 30–34 years, there were 9(26.5%) women had developed pre-eclampsia and out of total 3 obese women between 35–39 years, 2(66.7%) women developed pre-eclampsia as mentioned in Table-4. Age had no significant effect on development of pre-eclampsia (p=0.326).

Out of total 10 primigravida, 1(10.0%) developed pre-eclampsia. Out of total 26 nullipara, 6(23.1%) developed pre-eclampsia. Out of the total 79 para 1–4, 20(25.3%) developed pre-eclampsia and Out of the total 7 para ≥ 5, 2 women (28.6%) developed pre-eclampsia (Table-5). Parity had no significant effect on development of pre-eclampsia (p=0.739).

Table-1 Age Distribution of Obese Patients (n=122)

Age (years)	No. of Patients	%age
20-24	44	36.0
25-29	41	33.6
30-34	34	27.9
35-39	03	02.5

Table-2 Parity Distribution of Obese Patients (n=122)

Parity	No. of Patients	%age
Primigravida	10	08.2
Nullipara	26	21.3
Para 1-4	79	64.8
Para >5	07	05.7

Table-3 Descriptive Statistics (n=122)

Variable	Mean	SD
Age (years)	26.64	4.52
GA (weeks)	33.09	3.72
Weight (kg)	73.75	3.09
Height (m)	01.52	0.02
BMI (km/m^2)	31.74	1.01

Table-4 Age Distribution of Obese Patients in Relation to Outcome

Age (years)	No. of patients	Women with pre-eclampsia	%age
20-24	44	11	25.0
25-29	41	07	17.1
30-34	34	09	26.5
35-39	03	02	66.7

Table-5 Parity Distribution of Obese Patients in Relation to Outcome

Parity	No. of patients	Women with pre-eclampsia	%age
primigravida	10	01	10.0
Nullipara	26	06	23.1
Para 1-4	79	20	25.3
Para >5	07	02	28.6

DISCUSSION

The prevalence of overweight and obesity have substantially increased in the last decades, especially in women. The rising rate of obesity is a major public health concern in the West, where 28% of pregnant women are overweight and 11% are obese. In industrialised countries, one in five women booking for antenatal care is obese.[19] The World Health Organization characterizes obesity as a pandemic issue, with a higher prevalence in females than males.[20] Thus, many pregnant patients are seen with high body mass index (BMI). Obesity is a chronic condition that predisposes patients to multiple serious health disorders and premature deaths.[21] Obesity during pregnancy is considered a high-risk state because pregnancies in obese women are characterized by a high incidence of maternal complications including hypertensive disorders.[22] Because of those complications, cesarean sections rate is higher in obese women than in lean women. Present study was conducted to find the frequency of pre-eclampsia in obese pregnant women. Mean age of the patients was 26.64±4.52 years. Majority of the patients 79(64.8%) were para 1–4. Frequency of pre-eclampsia in obese patients was 23.8%. Our results are comparable with international literature. Asim et al[23] have reported that frequency of PIH was found to be higher in obese women as compared to nonobese patients. The overall PIH was 67 out of 200 (33.5%). PIH was present in 41% of obese women and in 26% of non-obese women. Yazdani et al[24] determined the effect of maternal body mass index on pregnancy outcome and found that pre-eclampsia developed in 5(3.9%) patients in BMI > 20, in 19 patients (4.6%) in BMI 20–24.9, in 31 patients (8.7%) in BMI 25–29.9, and 12(12.2%) in 30–34.9 and in 2(3.33%) in patients < 35. El-Makhzangi et al[25] have reported the incidence of preeclampsia was 2(4%) in normal, 6(12%) in obese class I, 8(16%) in class II, and 4(8%) in class III, at 28 week. Preeclampsia was diagnosed in 20 cases (8% among cases). Among these 20 cases, 12 cases were classified as mild preeclampsia and 8 cases were classified as severe preeclampsia. Mild preeclampsia developed in 2 pregnant women in group A (4% of normal BMI), in 2 cases in group C (4% of obese class I), 6 cases in group D (12% of obese class II), and 2 cases in group E (4% of obese class III). Severe preeclampsia was diagnosed in 4 cases of group C (8% of obese class I), in 2 cases of group D (4% of obese class II) and in 2 cases of group E (4% of obese class III). Bhattacharya et al[26] have found that in comparison with women of BMI 20–24.9, morbidly obese women faced the highest risk of pre-eclampsia {OR 7.2 (95% CI 4.7, 11.2)} and underweight women the lowest {OR 0.6 (95% CI 0.5, 0.7)}. Pre-eclampsia had adjusted odds ratios (95% CI) as 0.6(0.5–0.7), 1.6(1.2–1.8), 3.1(2.8–3.5) and7.2(4.7–11.2) respectively in underweight (BMI < 20), overweight (BMI= 25–29.9), obese (BMI = 30–34.9) and morbidly obese (BMI > 35) patients. The frequency of pre-eclampsia was 3.3% in underweight, 5.0% in normal, 8.1% in overweight, 14.7% in obese and 28.2% in morbidly obese women. Both pre-eclampsia and gestational hypertension increased linearly with increasing BMI, resulting in an adjusted odds ratio of 7.2 (95% CI 4.7, 11.2) for pre-eclampsia and 3.1 (95% CI 2.0, 4.3) for gestational hypertension in the morbidly obese category when compared to those of normal BMI. Being underweight

seemed to have a protective effect on the development of pregnancy induced hypertension – adjusted OR 0.6 (95% CI 0.5, 0.7) for pre-eclampsia and 0.7 (95% CI 0.6, 0.8) for gestational hypertension.

Robinson et al[27] found in 142,404 singleton pregnancies, 10,134 (7.2%) women were identified as obese (moderate obesity 92.3%, severe obesity 7.7%). The proportion of women in the obese categories increased from 3.2% in 1988 to 10.2% in 2002. Moderately obese women had an increased risk of pregnancy-induced hypertension (PIH) (adjusted OR 2.38, 95% CI 2.24-2.52). Leonie Callaway et al[28] have reported that of the 14 230 women, 6443 (45%) were of normal weight, and 4809 (34%) were overweight, obese or morbidly obese in their study. Overweight, obese and morbidly obese women were at increased risk of adverse outcomes (figures represent adjusted odds ratio [AOR] [95% CI]): hypertensive disorders of pregnancy (including gestational hypertension and pre-eclampsia) as (overweight 1.74 [1.45–2.15], obese 3.00 [2.40–3.74], morbidly obese 4.87 [3.27–7.24]).

Bodnar et al[29] have found in the total-effects model, 4- and 8-unit increases in body mass index were associated with 1.7-fold (95% confidence interval (CI): 1.3, 2.3) and 2.9-fold (95% CI: 1.6, 5.2) increases in preeclampsia risk, whereas in the direct-effects model, these AORs were 1.4 (95% CI: 1.0, 1.9) and 2.0 (95% CI: 1.0, 3.8), respectively.

Study conducted by Weiss et al showed obesity is strongly associated with the development of preeclampsia.[30] The study included 16,102 patients: 3,752 control, 1,473 obese, and 877 morbidly obese patients. Obesity and morbid obesity had a statistically significant association with gestational hypertension (odds ratios [ORs] 2.5 and 3.2) and pre-eclampsia (ORs 1.6 and 3.3). Murakami et al[31] have reported the frequencies of mild and severe preeclampsia were 34/633 (5.4%) and 26/633 (4.1%), respectively. Pre-eclampsia in BMI > 25 having AOR 8.13 (95% CI: 3.78-17.49) In their meta-analysis of 13 cohort studies, O'Brien et al[7] demonstrated that the risk of preeclampsia typically doubled if BMI increased by 5 kg/m^2 to 7 kg/m^2; this increased risk persisted after adjustment for cofounders and exclusion of chronic hypertension and diabetes. Brennand et al[32] revealed in their study, at the beginning of pregnancy, 23.1% of the women had normal weight (BMI 18.5-24.9 kg/m^2), 27.9% were overweight (BMI 25-29.9 kg/m^2), and 49.1% were obese (BMI > or = 30 kg/m^2). Nearly one-half of the women gained excessive weight in pregnancy. Obese women with excessive weight gain had a higher prevalence of pre-eclampsia (14.9%) than obese women with low (3.7%) or acceptable (6.3%) weight gain. The risk of preeclampsia is not only related to the current maternal weight. Indeed, regardless of their pre-pregnancy weight, women whose BMI increased by more than 3 kg/m^2 between pregnancies have a two-fold risk of developing preeclampsia in the subsequent pregnancy.[33]

Mandal Associates[34] in a prospective analysis have showed that in comparison to average weight pregnant women, obese pregnant women were at increased risk of pregnancy induced hypertension (12.32 vs 2.36%; $p<0.001$) and pre-eclampsia (8.76 vs 3.31%; $p<0.001$). Mbah et al[11] found that the rate of pre-eclampsia increased with increasing BMI, with super-obese (BMI $\geq$ 50 kg/m^2) women having the highest incidence (13.4%). Compared with normal weight women, obese women (BMI $\geq$ 30 kg/m^2) had a higher risk for pre-eclampsia (OR = 2.59, 95% CI = 2.87–3.01).

CONCLUSION

Frequency of pre-eclampsia was 23.8% in our study which seems to be high and showing an alarming situation for future. Obesity in pregnancy should be regarded as a high risk state because of its association with adverse obstetric outcome. Our study is a hospital based with a small sample size and no controls and cannot represent the true risk of pre-eclampsia in obese population so, further multicentre studies are needed.

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