Original Article

Association Between Pre-Eclampsia and Obesity in Primigravida

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ABSTRACT

Objective: To determine the association between pre-eclampsia and obesity in primigravida.
Study Design: A Prospective cohort study.
Place and Duration of Study: This study was conducted at the Department of Obstetrics and Gynecology, Bahawal Victoria Hospital, Bahawalpur Pakistan, from August 2022 to February 2023.
Materials and Methods: A total of 64 primigravida (32 obese and 32 non-obese) and 18 to 35 years of age were analyzed. At the time of enrolment, socio-demographic and clinical characteristics of each woman were recorded. Females were divided into two groups (32 primigravida in each group). Obese primigravida contained those primigravida women who had BMI>30 kg/m^2 and gestational age>20 weeks, and non-obese primigravida contained all primigravida with BMI≤30 kg/m^2 and gestational age>20 weeks. All the patients were followed by the researchers until delivery, and the presence or absence of preeclampsia was noted.
Results: In a total of 64 primigravida women, the mean age was 26.86±5.33 years (18 to 35 years) while 33 (51.56%) were between 18 to 25 years. Gestational age of 34 (53.1%) women were between 20-30 weeks. Place of living was rural among 33 (51.6%) women. In obese women, pre-eclampsia was found in 11 (34.4%) women as compared to 3 (9.4%) non-obese women with p-value of 0.031 and relative risk of 3.67 which was statistically significant
Conclusion: The frequency of pre-eclampsia in obese primigravida is significantly higher compared to non-obese primigravida. Our study showed obesity as a risk factor for pre-eclampsia and positive association between body mass index and pre-eclampsia.
Key Words: Body mass index, gestational age, obesity, pre-eclampsia, primigravida.

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INTRODUCTION

Obesity is characterized by an increase in body weight brought on by excessive fat deposition. Among all nutritional disorders, its existence is common, especially in industrially advanced and rich countries.[1] According to the WHO, although obesity is the most evident public health issue that has overwhelming threats for the advanced countries more or less, it is still completely unaddressed. Obesity is common among the general public as an important health problem and is known to be a "killer disease," as the WHO recommends.[2]

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It has been validated by the WHO that overweight and obesity are evident in 1200 million people across the world, and according to epidemiological studies, the adult population has a 22% obesity rate.[3]
With obesity, the risk of developing various diseases, like cardiovascular diseases, diabetes mellitus, certain types of malignancies, and osteoarthritis, is increased.[4] The rising obesity rates among pregnant women are showing their importance in having effect on pregnancy problems caused by obesity. Maternal obesity-related pregnancy issues can be mainly divided into those that can either impact the mothers or the fetus, neonate, or older kid.[5] Maternal obesity increases the likelihood of experiencing adverse pregnancy outcomes, including conditions such as gestational diabetes, pregnancy-induced hypertension, cesarean section, infections, postpartum hemorrhage, delivering babies that are large for gestational age, and stillbirth.[6,7] A serious complication that prevails in 2-8% of all pregnancies is preeclampsia. Every year, pregnancy-related complications cause mortality in 287,000 women around the world, and preeclampsia is estimated to have a contribution of 10-15%.[8-11]
The literature outlines several potential risk factors for preeclampsia, including nulliparity, relatively advanced maternal age, obesity, chronic hypertension, diabetes, a previous history of preeclampsia, a family history of preeclampsia, a significant interval since the last

pregnancy, and the presence of multiple pregnancies.[12,13] Along with obesity, there are several other common mechanisms that adjuvantly potentiate the risk of developing preeclampsia.[14] Lakhanpal S et al[15] have shown that the frequency of preeclampsia in obese women was 38% and in non-obese women, it was 8%. Among different ethnic groups, body mass index (BMI) values that enhance the risk for preeclampsia may be different, so this study was done to determine the association between preeclampsia and obesity in the local population. During the last few years, local data has not been furnished with fresh statistics; therefore, it is needed to collect the latest data to evaluate this issue, as a lot of work has been done in the recent year to raise awareness for maternal care. Hence, it was hypothesized that there is an association between preeclampsia and obesity to plan this study with the objective to determining the association between preeclampsia and obesity in primigravida. The study results will not only add to the existing data to have a precise assessment of preeclampsia among obese primigravida but will also help in raising awareness among the general public and arranging intensive periodic educational programs on a national and regional level so that obesity could be prevented in them by improving their lifestyle and encouraging them to routine exercise.

MATERIALS AND METHODS

This prospective cohort study was conducted at the Department of Obstetrics and Gynecology, Bahawal Victoria Hospital, Bahawalpur, Pakistan, from August 2022 to February 2023. A sample size of 64 was calculated (32 in each group), considering the frequency of preeclampsia in obese primigravida as 38%, in non-obese primigravida as 8%,[15] with a 95% significance level, and the power of the study as 80%.

Inclusion criteria were primigravida women aged between 18 and 35 years. In the obese group, obese primigravida women with gestational age>20 weeks (assessed on LMP) were included, whereas in the non-obese group, non-obese primigravida women with gestational age>20 weeks (assessed on LMP) were included. Exclusion criteria were women with multiple pregnancies (assessed on USG), chronic hypertension (assessed on history), and chronic renal failure. Those patients were also excluded who already had preeclampsia. Primigravida was defined as a woman pregnant for the first time. Patients with BMI ≥30 kg/m^2 were labeled obese. Informed and written consent were acquired from each partcipant. Approval from the "Institutional Ethical Review Committee" was obtained (letter number: 21/39/DME/QAMC Bahawalpur).

Socio-demographic and clinical characteristics of each woman were recorded. Then, all women were divided into two groups (32 primigravida in each group). Obese primigravida group contained primigravida and obese women with gestational age>20 weeks (assessed on LMP), and non-obese primigravida group contained all primigravida with BMI≤30 kg/m^2 and gestational age>20 weeks (assessed on LMP). All the patients were followed by the researchers until delivery, and the presence or absence of preeclampsia was noted. Preeclampsia was labeled when "systolic blood pressure≥140 mmHg, diastolic blood pressure ≥90mmHg (two separate readings taken at least six hours), and proteinuria 1+ on a dipstick or 300mg of protein in a 24-hour urine sample after 20 weeks of gestation" (assessed on LMP) were present.[16] All these cases were managed as per ward protocols. A special proforma was designed to collect the necessary information.

Statistical analysis was performed by "Statistical Package for Social Sciences (SPSS)", version 26.0. Quantitative variables were presented as mean and standard deviation (SD). Qualitative variables were shown as frequency and percentage. Comparison of preeclampsia between obese and non-obese groups was done by chi-square test, and a p-value≤0.05 was considered significant.

RESULTS

In a total of 64 primigravida women, the mean age was 26.86±5.33 years (18 to 35 years) while 33 (51.56%) were between 18 to 25 years. Gestational age of 34 (53.1%) women were between 20-30 weeks. Place of living was rural among 33 (51.6%) women. Table-1 is showing comparison of baseline characteristics.

Table No. 1: Baseline Characteristics of Primigravida Women for Both Groups

Characteristics		Total (n=64)	Number of patients		P-value
			Obese (n=32)	Non-obese (n=32)	
Age (years)	18-25	33 (51.6%)	18 (56.3%)	15 (46.9%)	0.4530
	26-35	31 (48.4%)	14 (43.7%)	17 (53.1%)	
Gestational age (weeks)	20-30	34 (53.1%)	15 (46.9%)	19 (59.4%)	0.3164
	>30	30 (46.9%)	17 (53.1%)	13 (40.6%)	
Booking status	Unbooked	24 (37.5%)	12 (37.5%)	12 (37.5%)	1
	Booked	40 (62.5%)	20 (62.5%)	20 (62.5%)	
Place of living	Rural	33 (51.6%)	18 (56.3%)	15 (46.9%)	0.4530

	Urban	31 (48.4%)	14 (43.7%)	17 (53.1%)	
Monthly income	<20000	20 (31.3%)	10 (31.3%)	10 (31.3%)	0.8939
	20000-40000	25 (39.1%)	12 (37.5%)	13 (40.6%)	
	>40000	19 (29.7%)	10 (31.3%)	9 (28.1%)	
Educational status	Illiterate	10 (15.6%)	5 (15.6%)	5 (15.6%)	0.9983
	Primary	6 (9.4%)	3 (9.4%)	3 (9.4%)	
	Middle	19 (29.7%)	9 (28.1%)	10 (31.3%)	
	Matric	14 (21.9%)	7 (21.9%)	7 (21.9%)	
	Graduate	15 (23.4%)	8 (25.0%)	7 (21.9%)	

In obese women, pre-eclampsia was found in 11 (34.4%) women as compared to 3 (9.4%) non-obese women with p-value of 0.031 and relative risk of 3.67 which was statistically significant. Pre-eclampsia were further analyzed with respect to obese and non-obese group and study variables and it was found that no statistically significant associations were present (p>0.05) as shown in table-2.

Table No. 2: Stratification of Preeclampsia women with respect to obesity and non-obesity and study variables (N=14)

Study Variables		Obese (n=11)	Non-obese (n=3)	P-value
Age (years)	18-25	7 (63.6%)	-	0.0507
	26-35	4 (36.4%)	3 (100%)	
Gestational age (weeks)	20-30	5 (45.5%)	2 (66.7%)	0.5148
	>30	6 (54.5%)	1 (33.3%)	
Booking	Unbooked	6 (54.5%)	1 (33.3%)	0.5148
	Booked	5 (45.5%)	2 (66.7%)	
Place of living	Rural	5 (45.5%)	1 (33.3%)	0.7069
	Urban	6 (54.5%)	2 (66.7%)	
Monthly income (Pakistani Rupees)	<20000	3 (27.3%)	1 (33.3%)	0.9317
	20000-40000	3 (27.3%)	1 (33.3%)	
	>40000	5 (45.5%)	1 (33.3%)	
Education	Illiterate	2 (18.2%)	-	0.3938
	Primary	1 (9.1%)	-	
	Middle	1 (9.1%)	2 (66.7%)	
	Matric	4 (36.4%)	1 (33.3%)	
	Graduate	3 (27.3%)	-	

DISCUSSION

Numerous communities from all over the world have documented a connection between obesity and an increased risk of preeclampsia, proving that this is not just a problem in western society.[17] This research determined the association between preeclampsia and obesity in primigravida. We found that in obese women, preeclampsia was found in 34.4% women, while in the non-obese women, it was seen in 9.4% of women (p=0.031) which showed its significance and a positive association with obesity. Choudhry H et al[18] have found this difference to be 20% vs 35%, respectively (obese vs. non-obese women). A study described that, in obese women, preeclampsia had an occurrence rate of 23.8%.[19] A recent local study revealed that pre-eclampsia was diagnosed in 26.2% obese females.[20]

The occurrence of obesity is acknowledged as a pandemic by the WHO too, with females being more prevalent than males.[21] Obesity-related pregnancy is perceived as having a higher risk of causing significant morbidity and mortality to the fetus and mothers.[22] Mandal et al found that obese pregnant women were at higher risk of all these complications compared to average-weight pregnant women (8.76 vs 3.31%, p-value<0.001).[3] Roman et al[23] investigated 2081 obese women to find a raised incidence of preeclampsia among obese patients and concluded that increased BMI was an independent predictive factor for pre-eclampsia. Voigt et al[24] found preeclampsia in 37.9% of patients with BMI>30 kg/m^2 and in 1.2% with BMI<25 kg/m^2. Similarly, Ehrenthal DB et al[25] also determined preeclampsia as a common incidence in pregnant women with obesity as compared to non-obese women with a p-value <0.0001. Sharara HA et al[26] showed in their study that preeclampsia had a frequency of 15% among obese primigravida and only 4.6% among non-obese primigravida. Sebire NJ et al, in a large prospective study including 287213 pregnant women, noted that among obese pregnant patients, the incidence of preeclampsia and gestational diabetes was relatively higher.[27] It's crucial to keep in mind that adiposity appears to be the problem when analyzing the causes of

some obese women's development of preeclampsia but not all of them, and that BMI is an unreliable indicator of adiposity.

On the whole, it is found that obese primigravida women have a higher frequency of preeclampsia than non-obese primigravida, which shows that obesity is a risk factor for preeclampsia. These findings establish that there is a need for having public awareness for this health problem that affects women of reproductive age, and these will help clinicians have better outcomes in the future by reducing adverse maternal and perinatal outcomes.

CONCLUSION

The frequency of pre-eclampsia in obese primigravida is higher compared to non-obese primigravida which shows obesity as a risk factor for pre-eclampsia and positive association between body mass index and pre-eclampsia.

Author's Contribution:

Concept & Design of Study:	Shamas Un Nisa
Drafting:	Khadija Sundas, Nida Anwar
Data Analysis:	Rukhsana Aziz
Revisiting Critically:	Shamas Un Nisa, Khadija Sundas
Final Approval of version:	Shamas Un Nisa

Conflict of Interest: The study has no conflict of interest to declare by any author.

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