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Original Article

Maternal Obesity as a Risk Factor for Preterm Delivery in Dichorionic Twin Pregnancies

Mubashra Ali[1], Javeria[1*] and Maryya Haram Bibi[2]

[1]Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar, Pakistan
[2]Department of Obstetrics and Gynecology, Mardan Medical Complex, Mardan, Pakistan

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***Corresponding Author:**
Javeria
Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar, Pakistan
javeriakhan.doc@gmail.com

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ABSTRACT

The prevalence of maternal obesity has been steadily rising in recent decades, posing a significant global health concern particularly in the field of obstetrics. **Objective:** To assess the association between maternal obesity and preterm birth in dichorionic twin pregnancies. **Methods:** This descriptive study was carried at Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar during the period 1st January 2020 till 31st December 2021. The study included 122 pregnant women in the age range 18 to 45 years diagnosed as dichorionic twin pregnancy presenting with labor. Gestational age at the time of delivery was calculated to record preterm delivery. Pre-pregnancy BMI was retrieved from medical record taking BMI ≥30.0kg/m2 as cut off for obesity. Data were analyzed using SPSS version 25.0. **Results:** The mean age was 31.2 years with 49.2% (n=60) fell into the age range of 30-39 years. 52.5% (n=64) of the participants were nulliparous. 42.2% patients (n=52) had a bad previous obstetrics history. Maternal obesity was observed in 49.2% patients (n=60). The spearman r value for preterm delivery and BMI was 0.710. **Conclusions:** Significant proportion of women with dichorionic twins and preterm delivery were found obese. The risk of preterm delivery in dichorionic twins increases with maternal obesity.

INTRODUCTION

The prevalence of maternal obesity has been steadily rising in recent decades, posing a significant issue in the field of global health [1]. In 2016, the World Health Organization (WHO) reported that over 40% of adults (aged 18 and older) were classified as overweight, while an additional 13% were categorized as obese. The prevalence of maternal obesity prior to becoming pregnant has been reported in 29.0% women in USA, 26.8% to 54% in Europe, 27.3% in India and 36.7% in Pakistan [2, 3]. Obesity during pregnancy has an impact on both the maternal and fetal well-being [4]. Maternal obesity has implications both in terms of maternal and fetal health such as preterm delivery [5, 6]. Preterm delivery refers to the birth of the baby prior to attaining the normal gestational age of 37 weeks. Preterm delivery is a high risk pregnancy and carries high neonatal morbidity and mortality [7, 8]. The deleterious effects of preterm delivery are not limited to immediate or early complications but also extends to long term effects in case of survival of the baby carrying posing sociofinancial issues [9]. The gravity of preterm delivery increases further while dealing with multiple pregnancies such as dichorionic twins from clinical point of view, dichorionic pregnancy is an altogether separate entity which intricate physiological and clinical challenges as compared to singleton pregnancy [10]. The implications of maternal obesity with preterm delivery in the scenario of dichorionic twins have been seldomly studied. Though previous studies have illustrated association between maternal obesity and preterm delivery in case of singleton pregnancy, the understanding about dichorionic twins is scarce [12]. It is

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vital to obtain insights about the clinical and socio-financial implications of maternal obesity on the outcomes of dichorionic pregnancy, particularly the gestational age at the time of delivery. This study aimed to assess the association between maternal obesity and preterm delivery in dichorionic pregnancies. Results of this study will help in better counselling of such patients. It will enable obstetrician in early identification of high risk pregnancy, which will be make the alert to comprehend and timely application of targeted intervention.

METHODS

This is a prospective descriptive study, carried out at department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar, during the period 1st January 2020 till 31st December 2021. Approval for the conduct of the study was granted vide no: 10/DME/KMC, dated 21-12-2019. The study enrolled 122 pregnant women in the age range 18 to 45 years with dichorionic twin pregnancies presenting in labour. Patients with unavailable pre-pregnancy BMI record, prior history of cesarean section, patients with intrauterine death and patients with fetal anomalies were excluded. Dichorionic twins were confirmed on ultrasound. Labor was confirmed clinically with cervical dilatation more 5 cm or above and uterine contraction effective enough for progressive enhancement and effacement. Preterm delivery was defined by the birth of the baby prior to 37 weeks of gestation. Sample size was calculated using WHO sample size calculator taking anticipated proportion of preterm delivery in twin pregnancy was 10.6% with 5% margin of error and 95% confidence interval [12]. Non probability convenient sampling technique was used to enroll participants. We used documented medical records to gather data on the mother's demographic characteristics, medical and obstetrical background, pre-pregnancy Body Mass Index (BMI) and ante-natal care. BMI was calculated using the formula weight in kilograms divide by height in meter squared. BMI was graded as normal (18.5-24.9kg/m^2), overweight (25.0-29.9kg/m^2) and obese (≥30.0kg/m^2). Gestational age was calculated as per last menstrual period. Preterm delivery was confirmed by the delivery of the baby prior to 37 weeks of gestation. Deliveries were carried out in the labor room of the hospital. All deliveries were managed as per hospital protocol for high risk pregnancy. Cesarean section was performed in case of failure of labor to progress or risk of fetal demise. Pregnancy outcomes were noted. Data entry and analysis was carried out using statistical analysis program IBM SPSS version 25.0. Descriptive statistics were used to summarize the characteristics of the study population. Means and standard deviations were recorded for quantitative variables like age, gestational age, and maternal BMI while frequencies and percentages were computed for qualitative variables like parity, diabetes, hypertension and preterm delivery. BMI was calculated using the formula BMI = weight in kilograms/height in meter2). Preterm delivery was stratified by age, parity, obstetrical history and medical history to control the effect modifiers. Post stratification chi square test was applied at 5% level of significance. The association between maternal obesity and pre-term delivery was measured using chi square test. The strength of association was analyzed using Spearman correlation coefficient r value. P value ≤0.05 was considered statistically significant.

RESULTS

Out of the 122 pregnant women the mean age was 31.2 ± 5.96 years. 49.2% (n=60) fell into the age range of 30-39 years, while 34.4% (n=42) were in the age group of 20-29 years. 52.5% (n=64) of the participants were nulliparous, while 47.5% (n=58) were multiparous as shown in table 1.

Table 1: Maternal Demographics of Study Participants (n = 122)

Demographics And Baseline Variables	Frequency (%)
Maternal Age (Years)	
<20 Years	8 (6.6%)
20-29 Years	42 (34.4%)
30-39 Years	60 (49.2%)
≥40 Years	12 (9.8%)
Parity	
Nulliparous	64 (52.5%)
Multiparous	58 (47.5%)

Of the individuals who shared details about their obstetric history, 57.4% (n=70) reported no complications in a previous pregnancy, whereas 42.6% (n=52) had complications like ante-partum or post-partum hemorrhage, ectopic pregnancy, pre-eclampsia and eclampsia in a previous pregnancy. The most prevalent pre-existing medical issues among participants were hypertension (n=20, 16.4%), diabetes (n=10, 8.2%), and other medical disorders (n=6, 4.9%) as reported in table 2.

Table 2: Maternal Characteristics and Medical History (n = 122)

Variables	Frequency (%)
Obstetric History (PPH, Preeclampsia, Eclampsia, Ectopic Pregnancy)	
No Previous Complications	70 (57.4%)
Previous Complications	52 (42.6%)
Pre-existing Medical Conditions	
None	86 (70.5%)
Hypertension	20 (16.4%)
Diabetes	10 (8.2%)
Other	6 (4.9%)

As illustrated in table 3, the proportion of patients with respect to BMI was; underweight 4.9% (n=6), normal weight was 24.6% (n=30), overweight was 21.3% (n=26) and obesity was 49.2% (n=60).

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Table 3: Pre-pregnancy BMI Distribution (n = 122)

Pre-Pregnancy BMI Category	Frequency (%)
Normal Weight (18.5–24.9 kg/m^2)	36 (29.5%)
Overweight (25.0–29.9 kg/m^2)	26 (21.3%)
Obesity (≥30.0 kg/m^2)	60 (49.2%)

Out of the total babies delivered, 72.1% (n=172) of the neonates were delivered at term, whereas 27.9% (n=68) were born preterm. The mean gestational age was 35.5 weeks. Approximately 71% (n=174) of newborns weighed 2,500 grams or more at birth, whereas 23% (n=56) fell between the weight range of 1,500 to 2,499 grams. After 5 minutes, 92.6% (n=226) of the babies had Apgar scores of 7 or above. For Preterm Delivery (<37 Weeks) n= 122, for Birth Weight (Grams) n= 244 and for Apgar Score at 5 minutes n= 244, as illustrated in table 4.

Table 4: Maternal and Neonatal Outcomes (n = 610)

Neonatal Outcomes	Frequency (%) / mean ± SD
Gestational Age (Weeks)	35.5 ± 1.7
Preterm Delivery (<37 Weeks)	
Yes	34 (27.9%)
No	88 (72.1%)
Birth Weight (Grams)	
<1500 Grams	14 (5.7%)
1500-2499 Grams	56 (23.0%)
≥2500 Grams	174 (71.3%)
Apgar Score at 5 minutes	
<7	18 (7.4%)
≥7	226 (92.6%)

Table 5 reported the correlation between BMI and preterm delivery. The chi square p value for association between BMI and preterm delivery was 0.007 (<0.05), hence statistically significant. The spearman correlation coefficient r value for the strength of association was 0.710 (strong association).

Table 5: Association of Preterm Delivery with BMI (n = 122)

BMI Status	Preterm N (%)		Total	Chi Square	Spearman
	Yes	No			
Healthy (BMI=18.5-25Kg/m^2)	04 (11.1%)	32 (88.9%)	36	p-Value = 0.007	r Value = 0.710
Overweight (BMI=25.1-30Kg/m^2)	06 (23.1%)	20 (76.9%)	26		
Obese (BMI= >30Kg/m^2)	24 (40.0%)	36 (60.0%)	60		
Total	34 (27.9%)	88 (72.1%)	122		

Table 6 reported stratification of preterm delivery with various clinic-demographic parameters. None of the factors were shown to be significantly associated with preterm delivery. (P value > 0.05)

Table 6: Subgroup Analysis of Patients with Preterm Delivery (n = 122)

Variables	Preterm Delivery N (%)		Total	p-Value
	Yes	No		
Age (Years)				
<20	02 (25.0%)	06 (75.0%)	08	
20-29	12 (28.6%)	30 (71.4%)	42	0.966
30-39	16 (26.7%)	44 (73.3%)	60	
≥40	04 (33.3%)	08 (66.7%)	12	
Parity				
Nulliparous	18 (28.1%)	46 (71.9%)	64	0.947
Multiparous	16 (27.6%)	42 (72.4%)	58	
Previous Obstetrical Complications				
No	20 (28.6%)	50 (71.4%)	70	0.840
Yes	14 (26.9%)	38 (73.1%)	52	
Medical Comorbidities				
No	26 (30.2%)	60 (69.8%)	86	0.368
Yes	08 (22.2%)	28 (77.8%)	36	

DISCUSSION

The principal finding of our study shows a statistically significant association was observed between maternal obesity and the risk of preterm delivery in dichorionic twins with chi square p value 0.007 and spearman correlation coefficient r value 0.710 revealing strong correlation. This finding in contrast to the observation reported by Liu LY *et al.*, in their study where maternal raised BMI was not found as risk factor for preterm delivery in twin pregnancy as opposed to singleton pregnancy [13]. The difference in observation may be attributed to the fact that later study was carried out at Western population. The etiology of preterm delivery is multifactorial ranging from genetics to infections, trauma and fetal reasons. In this particular, apparently the genetics may have led to the difference in the results. Logistic regression analysis could have minimized this discrepancy. In a study carried out on Asian population by Li S and colleagues, reported findings in agreement with our observation which further supports assumption related to impact of genetic variability [14]. Maternal obesity was shown independent risk factor preterm delivery in the settings of multiple gestations by Suzuki S *et al.*, However, Sung and colleagues failed to report such association [15, 16]. The mean age of the patients in our study was 31.2 ± 5.96 years with almost half of the participants with dichorionic twins in the age group 30-39 years (n = 60, 49.2%). The pooled mean age of participants with twin pregnancies in a metanalysis by Santos S *et al.*, was 32.1 ± 5.33 years which is similar to our finding [17]. Seetho colleagues showed that majority of the patients with multiple gestation belong to the age group 20 to 34 years which is consistent with our finding [18]. The relatively high prevalence of multiple gestations may be attributed to the higher use of assisted reproductive medications in the fourth or fifth decade of life by women. Mean gestational age at the time of delivery in our study

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was 35.5 ± 1.7 weeks. In a study by Sung and colleagues, the mean gestational age at the time of delivery was 36.2 ± 2.9 weeks. Our findings corresponds to their observation [16]. Not only maternal obesity, several other factors impart their role to the gravity of the situation such as diabetes, hypertension, smoking and endocrine disorders [19]. The overall rate of preterm delivery in our study was 27.9% which is extremely higher than the global average of 10.6% which is another reason for concern [20]. The outcome of this research might perhaps be attributed to the study's setting, which is a low-income community lacking in sufficient resources and healthcare alternatives. The higher prevalence of preterm births observed in this study may be attributed to the association between preterm birth and maternal obesity as well as pre-existing medical conditions, as shown by prior research [19].

CONCLUSIONS

The study findings revealed that almost a third of dichorionic twins were delivered preterm. Majority of the patients were in third or fourth decade of life. Majority of the patients not had prior significant medical or surgical history. Statistically significant association was observed between the presence of maternal obesity and the occurrence of preterm delivery in dichorionic twins.

Authors Contribution

Conceptualization: MA
Methodology: J, MHB
Formal analysis: MA
Writing, review and editing: J

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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