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Research Article

The Association between Body Mass Index and Mode of Delivery in Primigravida and Multigravida at Haj El-Safi Teaching Hospital (2021)

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Abstract

Background: Obesity among pregnant ladies has been associated with increase rates of prolonged labor, cesarean section and instrumental delivery.

Objective: To study the effects of maternal body mass index (BMI) on the mode of delivery for primigravid and multigravid women at Haj El-Safi Teaching Hospital.

Methodology: This is a descriptive cross-sectional hospital-based study was conducted in a period from November 2018 to May 2021 at Haj El-Safi Hospital, Department of Obstetrics and Gynecology. The data was collected from 384 pregnant women in normal, overweight and underweight who attended for delivery.

Results: The results showed that the mean of maternal age among the study population was 29.29 ± 6.48 years. Distribution according to body mass index followed by primigravida were 95 (24.7%), and grand multipara 51 (13.3%).

Delivery by caesarean section was increased as body mass index increase (P. value = 0.000), in normal weight 11.4%, overweight 31.8%, and obese (56.8%).

Conclusion: There was significant association between increasing of body mass index and cesarean section and instrumental delivery. For that I recommend to decrease the BMI preconception so this lead to normalization of it in pregnancy and in labor.

***Keywords**: BMI; Pregnancy; Primigravida; Multigravida*

Introduction

Body mass index is a simple index of weight for height. It defined as weight in kilograms divided by the square of the height in meters (kg/m^2) [1].

Maternal body mass index (BMI) (kg/m^2) was calculated using maternal height and weight measured to the nearest centimeter and kilogram respectively at the first antenatal booking visit.

Women were classified into normal, overweight and obese groups according to conventional World Health Organization (WHO) BMI criteria: normal (18.5 - 24.9 kg/m^2), overweight (25 - 29.9 kg/m^2), and obese (≥ 30 kg/m^2) [2]:

- Obese class I: 30.00 - 34.99.
- Obese class II: 35.00 - 39.99.
- Obese class III: ≥ 40.00.

In most developing economies prevalence of over weight in young women residing in both urban and rural area are higher than in under weight women [3].

The increasing prevalence of obesity in young women is a major public health concern.

Cross sectional study was conducted in Khartoum Teaching Hospital, during February - April 2008, concluded that 5.5% under weight 35.6% were over weight 19.4% obese [4].

Higher maternal body mass index at booking is associated with an increased risk of prolonged pregnancy and increased rate of IOL ending in caesarean section compared with women of normal weight following IOL (38.7% versus 23.8% primiparous; 9.9% versus 7.9% multiparous women, respectively) [5].

Obesity is a risk factor for prolonged labor [6].

Overweight and obese pregnant women constitute a rapidly growing proportion of the total number of caesarean section (C/S) and instrumental deliveries [7].

Obese (BMI ≥ 30) pregnant women were compared to normal weight (BMI 20 to 24.9) pregnant women for risk of cesarean delivery. The results show cesarean delivery is twice as likely as vaginal delivery in women with a BMI ≥ 30 (OR = 2.03, 95% C.I. 1.38 - 2.98) [8].

Obese women are also more likely to undergo elective cesarean sections than normal-weight women. This results, in part, from their excess risk of delivering a large-for-gestational age infant [9].

Cesarean delivery is more difficult in obese than normal-weight women and is associated with excess risk of wound infection in obese women. Cesarean section itself is associated with a longer recovery than vaginal delivery as well as a delay in first putting the baby to the breast to nurse. Such delays may cause a reduction in the duration of breast-feeding, possibly because of a delay in the onset of copious milk secretion, although this association is not consistent [10].

Underweight (a BMI of < 19.9 kg/m^2) has been shown to be associated with an increased risk of preterm deliveries, low birth weight and anaemia [11].

Objectives of the Study

- To measure the body mass index (B.M.I.) and study its effects on the mode of delivery in women whom came to labor at Haj El-Safi Teaching Hospital.
- To determine the association between maternal body mass index (BMI) in singleton term pregnancies and mode of delivery; spontaneous vaginal delivery; instrumental vaginal delivery; and emergency cesarean - section d to evaluate the size of baby in comparison to BMI of the mother.

Problem

Obesity is a problem that carries a great risk to women in labor and affects the outcome of labor. Over the last years in our country very few similar studies have been conducted, but this study will be an addition and helpful to the Obstetricians and gynecologist in counselling and advice women with high body mass index to reduce their weight, and explain to them all the complication associated with it like increase the rate of caesarian section, obstructed labor, shoulder dystocia and wound infection.

Abbreviations

- **Body mass index (BMI):** Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2).
- **Primigravida:** An individual pregnant for the first time.
- **Multigravida:** A woman who has been pregnant more than once.
- **IOL:** Induction of labor, also known as "induction of labour", is the induction of uterine contractions during pregnancy before labor begins on its own to aid a normal delivery.

Materials and Methods

Study design

This was a descriptive cross-sectional hospital-based study.

Study duration

This study was conducted in a period from November 2018 to May 2021.

Study area

The study was conducted in Haj El-Safi Teaching Hospital. It was established in 1434H with a capacity of 240 beds. 1st and largest.

It consist of several buildings such as main building, service building, operating and maintenance building, housing building, administration and training building.

Study population

The population of this study were women in normal, overweight and underweight who attend the labor at Haj El-Safi Teaching Hospital at the time of the study.

Sample size

Sample size was 384 women. This sample calculated with sample size calculation software (power and precision 4) by Biostatic, Inc. with confidence > 95% (Probability < 0.05).

Data collection tools

Data was collected by a pre-designed questionnaire. The weight was measured in kilograms' and was approximated to the nearest one tenth kilogram. The height was measured in centimeters. The BMI was calculated using computer program (matlab). The scale which was used manufactured by Seca Vogel and Halke Germany, which used for medical weighing and measuring and it measures the weight up to point one kilogram and the height in millimeters.

Data analysis

The data were analyzed through software program SPSS, and will be presented in tables and figures, the test of significance will be Chi square, T test, and odds ratio using results of P value of 0.05 as significant.

Results

This is a descriptive cross-sectional hospital-based study, conducted at Haj El-Safi Teaching Hospital. Three hundred and eighty four (384) women were enrolled in this study.

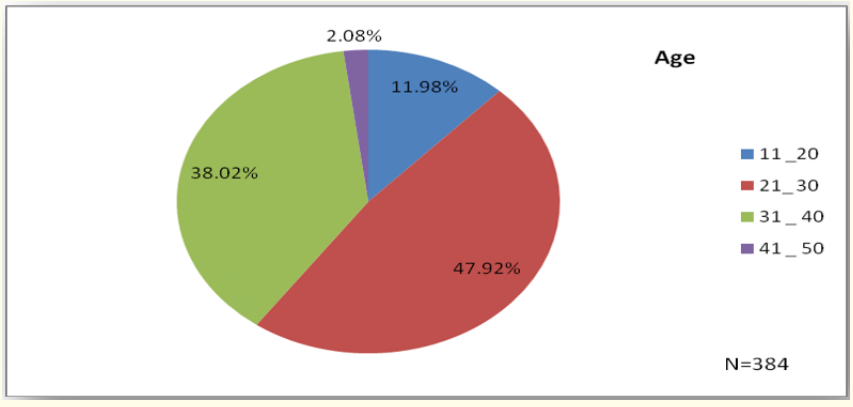

Figure 1: *Distribution of the study population, according to age.*

The distribution of the study population according to the age, < 20 years were 46 (11.98%) women, 21- 30 years were 184 (47.9%) women, 31 - 40 years were 146 (38.02%) women, 41-50 years were 8 (2.08%) women.

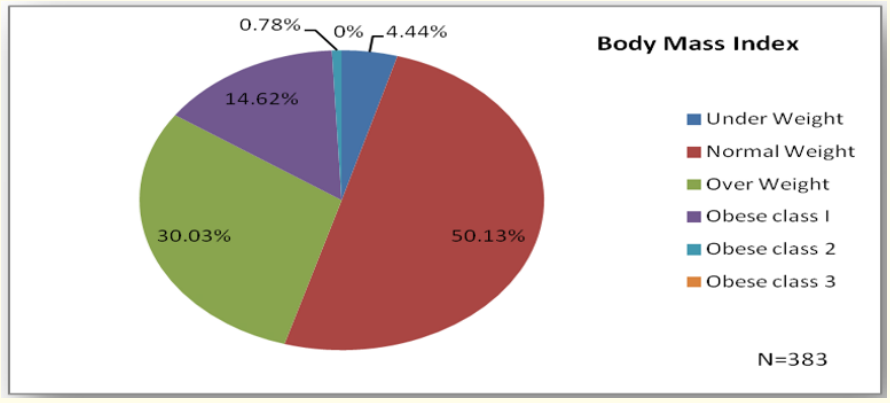

Figure 2: *Distribution of the study population, according to Body mass index.*

The distribution of the study population according to body mass index, 17 (4.4%) women were of underweight, 192 (50.1%) women were of normal weight, 115 (30.0%) women were of overweight, obese class I were 56 (14.6%) women, obese class II were 3 (0.8%) women.

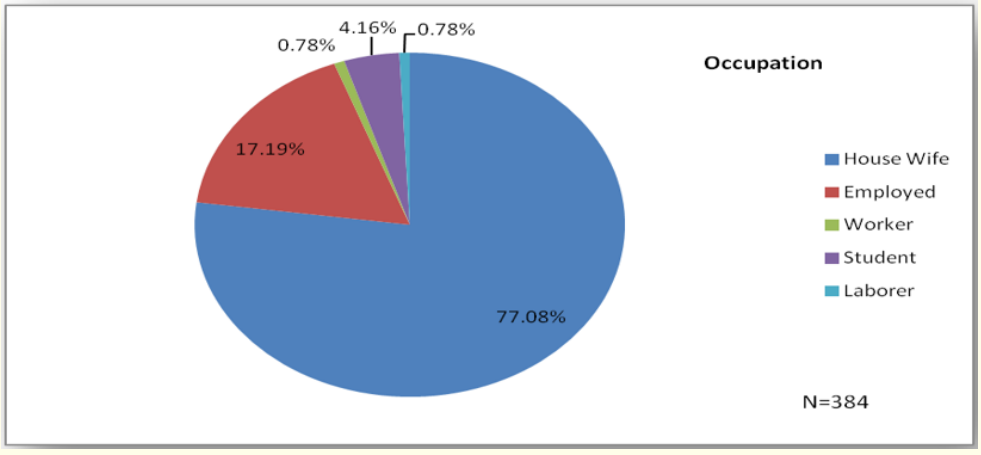

Figure 3: *Distribution of the study population according to occupation.*

The distribution of the study population according to occupation, 296 (77.1%) women were housewives, 66 (17.2%) women were employees, and 16 (4.2%) women were students and 6 (1.6%) were workers.

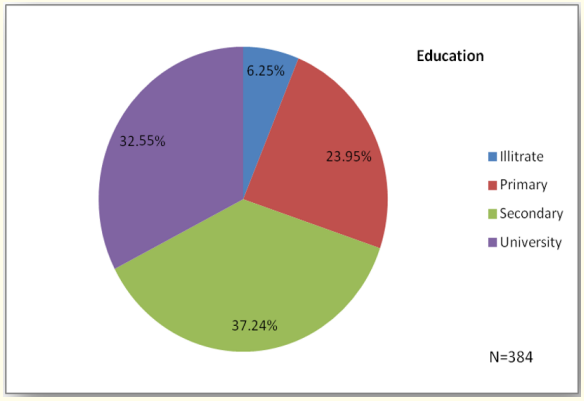

Figure 4: *Distribution of the study population according to educational level.*

The distribution of the study population according to educational level, 24 (6.3%) women were uneducated, 92 (24.0%) women had primary school level, 143 (37.2%) women had secondary school level and 125 (32.6%) women had university level.

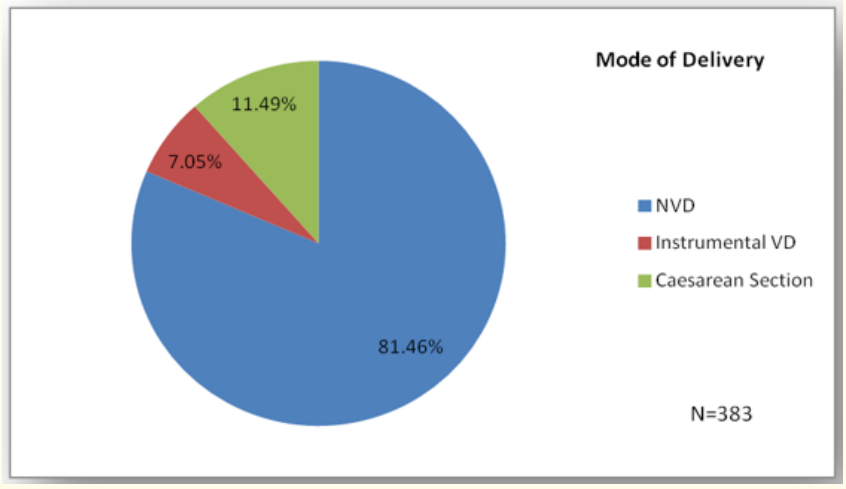

Figure 5: *Distribution of the study population according to mode of delivery.*

The distribution of the study population, according to mode of delivery, 312 (81.3%) women delivered normal vaginally, 27 (7.0%) women had instrumental delivery, while 44 (11.5%) women delivered by caesarean section. Oxytocin was received by 274 (71.4%) of the study population.

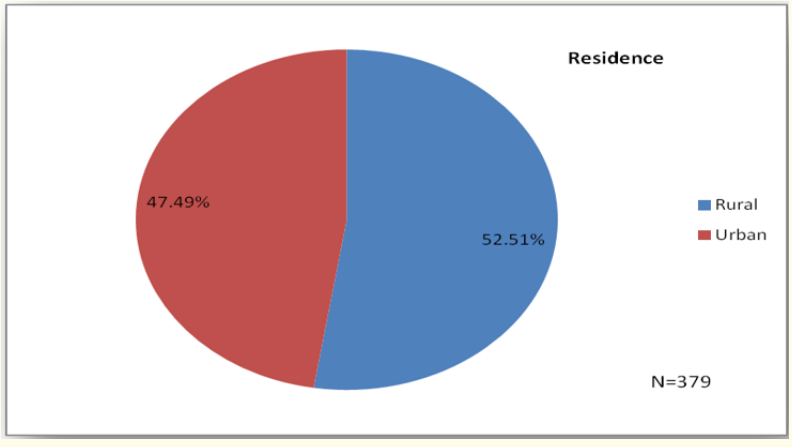

Figure 6: *Distribution of the study population according to residence.*

Regarding residence, most of the study population from rural area 199 (51.8%), while 180 (46.9%) were from urban.

Neonatal weight (kg)	Frequency	Percentage
< 2.5	27	7.03
2.5 - 3.5	267	69.5
> 3.5	90	23.4
Total	384	100.0

Table 1: *Distribution of the study population according to neonatal weight.*

The distribution of the study population according to neonatal weight, the majority 267 (69.5%) women had neonates with weight 2.5 - 3.5 kg, 90 (23.4%) women had neonates with weight > 3.5 kg, while 27 (7.0%) women had neonates with weight < 2.5 kg.

LMP		Body Mass Index				Total	P. value
		Under Weight	Normal Weight	Over Weight	Obese*		
Pre Term (< 37)	Count	9	4	5	2	20	0
	% within LMP	45.0%	20.0%	25.0%	10.0%	100.0%	
Normal Term (38 - 40)	Count	8	164	80	19	271	0
	% within LMP	3.0%	60.5%	29.5%	7.0%	100.0%	
Post date (> 40)	Count	0	24	28	37	89	0
	% within LMP	.0%	27.0%	31.5%	41.5%	100.0%	
Total	Count	17	192	113	58	380*	
	% within LMP	4.5%	50.5%	29.7%	15.3%	100.0%	

Table 2: *Correlation between body mass index and gestational age by LMP among study population*

**Missed data =4.*

**Obese include class 1 and 2. P. value 0.00.*

Correlation between body mass index and gestational age by last menstrual period (LMP) showed that pre term was common among under weigh (45.09%) and hadn't post-term, while post term increased by increasing BMI, 31.5% in overweight, 41.5% obese (P. value = 0.000).

Mode of delivery		Body Mass Index				Total	P. value
		Under Weight	Normal Weight	Over Weight	Obese*		
NVD	Count	17	182	94	18	311	
	% within mode	5.5%	58.5%	30.2%	5.8%	100.0%	0.00
Instrumental VD	Count	0	5	6	16	27	
	% within mode	.0%	18.5%	22.2%	59.3%	100.0%	0.00
Caesarean Section	Count	0	5	14	25	44	
	% within mode	.0%	11.4%	31.8%	56.8%	100.0%	0.00
Total	Count	17	192	114	59	382	
	% within mode	4.5%	50.3%	29.8%	14.7%	100.0%	

Table 3: *Correlation between body mass index and mode of delivery among study population.*

**Missed data.*

**Obese include class 1 and 2. P. value 0.00.*

The correlation between body mass index and mode of delivery among the study population showed that delivery by caesarean section was major (56.8%) among obese, in underweight (100%) and normal weight (94.8%) the NVD was common, and instrumental delivery in obese (59.3%) (P. value = 0.000).

Neonatal weight (kg)		Body Mass Index				Total	P. value
		Under Weight	Normal Weight	Over Weight	Obese*		
< 2.5	Count	13	6	5	3	27	
	% within fetal Wt.	48.1%	22.2%	18.5%	11.1%	100.0%	0
2.5 - 3.5	Count	4	175	77	10	266	
	% within fetal Wt.	1.5%	65.8%	28.9%	3.8%	100.0%	0
> 3.5	Count	0	11	33	46	90	
	% within fetal Wt.	.0%	12.2%	36.7%	51.1%	100.0%	0
Total	Count	17	192	115	59	383	
	% within fetal Wt.	4.4%	50.1%	30.0%	15.4%	100.0%	

Table 4: *Correlation between body mass index and neonatal weight among study population.*

**Obese include class 1 and 2. P. value 0.00.*

The correlation between body mass index and neonatal weight among the study population showed as general, increasing in maternal BMI increasing of baby weight (P. value =0.000).

Neonatal weight (kg)		Mode of delivery			Total	P. value
		NVD	Instrumental VD	Caesarean Section		
< 2.5	Count	21	1	5	27	0.00
	% within fetal Wt.	77.8%	3.7%	18.5%	100.0%	
2.5 - 3.5	Count	253	5	8	266	0.00
	% within fetal Wt.	95.1%	1.9%	3.0%	100.0%	
> 3.5	Count	38	21	31	90	0.00
	% within fetal Wt.	42.2%	23.3%	34.4%	100.0%	
Total	Count	312	27	44	383*	
	% within fetal Wt.	81.5%	7.0%	11.5%	100.0%	

Table 5: *Correlation between mode of delivery and neonatal weight among study population.*

**Missed data = 1.*

**Obese include class 1 and 2. P. value 0.00.*

The correlation between fetal weight and mode of delivery among the study population showed the most of fetuses with normal weight delivered by NVD (95.0%), fetuses with overweight delivered by instrumental or C/S delivery (P. value = 0.000).

Discussion

This is a descriptive cross-sectional hospital-based study was conducted in the period from November 2018 to May 2021 at Haj El-Safi Teaching Hospital, of 384 primigravide women in normal, overweight and underweight who attend for delivery.

In this study, most of the study population 184 (48.17%) women in age group 21- 30 years. This agreed with previous study that reported obesity in women of reproductive age is of particular concern because of its association with complications in late pregnancy such as stillbirth and cesarean delivery [14].

Study population in our study had differ body mass index, 17 (4.4%) women underweight, 192 (50.0%) women of normal weight, 115 (29.9%) women of overweight, obese were 59 (15.4%).

Regarding mode of delivery among the study population, normal vaginally 58.5% in normal weight (P. value = 0.000), 100% in underweight (P. value = 0.000), 30.2% overweight, 5.8% obese, while instrumental delivery 18.5%, none, 22.2% and 59.3% (P. value = 0.000) respectively, and caesarean section, 11.4%, none, 31.8% and 56.8 respectively (P. value = 0.000). These results agreed with previous studies which reported that increasing maternal BMI exerts a progressive adverse effect on vaginal delivery rates for both primigravid and multigravid women also an increased rate of cesarean delivery as BMI increased. Overweight and obese women are known to be at increased risk of serious pregnancy complications including caesarean birth [15-18]. Overweight and obese pregnant women constitute a rapidly growing proportion of the total number of caesarean section (C/S) and instrumental deliveries [7]. Obese women are also more

likely to undergo elective cesarean sections than normal-weight women. This results, in part, from their excess risk of delivering a large-for-gestational age infant [7,9,19].

The BMI of women in the first trimester of pregnancy is associated with the risk of adverse pregnancy outcome. Underweight (a BMI of < 19.9 kg/m^2) has been shown to be associated with an increased risk of preterm deliveries, low birth weight [20].

In correlation between body mass index and neonatal weight among the study population showed as general, increasing of baby weight as increasing in maternal BMI (P. value =0.000). This result agreed with previous study which reported that infants of obese mothers are more likely to be large-for-gestational-age (LGA) [21].

Conclusion

- There is significant association between increasing of body mass index and cesarean section and instrumental delivery.
- Increase body mass index is a significant risk factor for increasing birth weight and its complication.

Recommendations

- Women of childbearing age should be encouraged to maintain a healthy body mass index (18.5 - 24.9 kg/m^2).
- Raise awareness of pregnant women towards the risk of increasing body mass index at antenatal visits.
- Encourage exercise and modifications of lifestyle.

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