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Effect of maternal body mass index on maternal and fetal outcome in Maternity Teaching Hospital in Sulaimani

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Abstract

The current study was undertaken to evaluate the effect of body mass index on birth outcome. This study was carried out for the period of 20th February to 18th April of 2014, sample of (50) pregnant women who have been attended maternity teaching hospital in Sulaimani city, to determine the effect of body mass index on birth outcome, and to explore association between some socio-demographic and obstetrics characteristics with outcome of birth. The result shows that there is no significant association between body mass index and outcome of labor or delivery.

Introduction

Pregnancy body mass index and gestational weight gain are both considered to be the predictors of the maternal nutritional status and have shown to influence the pregnancy outcome. There is evident that suboptimal and excessive weight gain, both are associated with adverse pregnancy outcome [1].

Institute of medicine (IOM) revised the pregnancy weight gain guideline in 2009 by including four body mass index (BMI) in kg/m² categorized as underweight (< 18.5), normal (18.5-24.9), overweight (25-29.5), and obese (>30) kg instead of three categories (low, medium, high). The recommended weight gain for the 4 categories are; underweight (12.5-18), normal (11.5-16), over weight (7-11.5), and obese (5-9) kg. It is observed that in a vast majority of pregnancies the weight gain is not within the range recommended by these guidelines, it is either too little or too much especially in the obese women the low risk gains are smaller [2].

[3].

Adequate weight gain during pregnancy is associated with the better maternal and neonatal outcomes [4]. The increase in (BMI) among pregnant women worldwide has become one of the most significant public health concerns [5], because they add to the disease burden in women and children and increase medical

costs. However, understanding these associations is also complex, because both BMI and GWG are closely linked to lifestyle factors, diseases, and genetic traits that are also correlated with the outcome of pregnancy [6].

Obesity and overweight are becoming an increasingly common problem dramatically in the last few decades creating an important public health issue, both in general population and in women of reproductive age (susceptible to become a pregnant) specially in the West, where 28% of pregnant women are overweight, and 11% are obese, which increase the risk of maternal and perinatal complications [7].

In 2009, World Health Organization (WHO) announced obesity in pregnancy as one of the important non-communicable diseases that threaten maternal and child health. The European Forum of National Nursing and Midwifery Association also recognized this growing problem, and it established the roles of health care personnel in early detection and giving interventions to prevent complications from high pregnancy body mass index and obesity[8].

Material and method

This study was carried out at Maternity Teaching Hospital in Sulaimani. It was a descriptive study conducted on pregnant women; it was carried out during the period of 20th February to 18th April of 2014. A purposeful "non-probability" sample of (50) pregnant women who have been attended maternity teaching hospital in the Sulaimani city.For the purpose of data collection, questionnaire consists of three parts: -

First part (7) questions regarding socio-demographic and obstetric characteristics which includes (maternal age, level of education, economic state, occupation, antenatal care visit, BMI, reproductive history and gestational age).

Second part (9) questions regarding birth outcome which includes (premature uterine contraction, unprogressive delivery, instrumental delivery, small for gestational age, emergency C/S, shoulder dystocia, pre-eclampsia, and gestational diabetes)

Third part (5) questions regarding baby outcome which includes (fetal weight, APGAR score level, fetal hypoxia, intrauterine growth retardation and late fetal death), all questions were taken at the time of delivery, some of the questions were taken from the note of the doctors recorded on file chart, and the others from record of ultrasound.

Nonreassuring fetal heart rate patterns are those associated with fetal hypoxemia, which is deficiency of oxygen in the arterial blood, if uncorrected, hypoxemia can deteriorate to fetal hypoxia, which is an inadequate supply of oxygen at the cellular level (it means any increasing or decreasing in base line rate).

Small for gestational age is defined as a baby weight is below the 10th percentile (or two or more standard deviations below the normal at any week.

APGAR score is defined as numerical expression of the condition of a new born obtained by rapid assessment at first minute.

Body mass index: measuring of weight and height to find out the body mass index according to standard formula of weight (kg)/height square (m^2), the women were categorized in to three categories with respect to their BMI, normal, overweight, and obese.

This study was approved by ethical committee of the School of Nursing in University of Sulaimani. A pilot study was conducted for determination of the reliability and a panel of the experts for the content validity of assessment tool. The data were collected through the interview techniques. Statistical analyses were

performed using SPSS with the significant level set at (0.05). Factors associated with the birth and baby outcome examined by chi-square and Fishers' Exact test.

Results

The population consist of young women, about one fourth are between (31-35 years old), 12 (24%) of them are between (36-40 years old), Majority 35 (70%) were sufficient in their socioeconomic, 17% of them had at least some high school education such as collage and institute certificate which constitute (34%), more than half of them are unemployed, and finally nearly 22(44%) of the overall sample are obese.

As for obstetrics characteristics majority of them have 1-3 previous pregnancy, and previous delivery, 64% of them have previous history of abortion, 70% reported no intrauterine death and finally half 27(54%) of them were more than 39 weeks in their gestational age.

Regarding birth outcome 13(26%) reported prematurity and unprogressive delivery, few of them have babies small for gestational age which represent 6%, while shoulder dystocia, hypertension, and instrumental delivery constitute, 8%, 12%, and 14% respectively. In the other hand, half of the sample 46% had undergone emergency C/S for the delivery of the baby.

Regarding baby outcome 26 of them their babies were in fetal hypoxia during delivery which represent 52%, it means that they are admitted to intensive care unit for critical observation. APGAR score level 26 were less than 6 which constitute 52%, over weight baby represent 23(46%), few of them have intra uterine growth retardation and late fetal death which constitute 6% of the overall samples.

Table (1)Distribution of sample according to socio-demographic data**:-**

Variables	***n. (%)***	***Variables***	***n. (%)***
Maternal age		***Number of pregnancies***	
≤ 20 years	*1(2%)*	*1-3*	*35(70%)*
21-25 years	*9(18 %)*	*4-6*	*13(26%)*
26-30 years	*7(14%)*	*≥6*	*2(4%)*
31-35 years	*16(32%)*	***Number of para***	
36-40 years	*12(24%)*	*None*	*3(6%)*
41-45 years	*5(10%)*	*1-3*	*47(94%)*
Level of education		***Gestational age***	
Illiterate	*8(16%)*	*24-28 weeks*	*2(4%)*
Primary	*12(24%)*	*29-33 weeks*	*7(14%)*
Secondary	*13(26%)*	*34-38 weeks*	*14(28%)*
Collage and more	*17(34%)*	*≥39 weeks*	*27(54%)*
Body mass index		***Economic state***	
Normal weight 19-24.9kg	*4(8%)*	*Sufficient*	*35(70%)*

Overweight 25-29.9kg	*24(48%)*	*Barely sufficient*	*11(22%)*
Obese greater than 30kg	*22(44%)*	*In sufficient*	*4(8%)*
Occupation		***ANC visit***	
Employed	*19(38%)*	*Yes*	*48(96%)*
Unemployed	*31(62%)*	*No*	*2(4%)*
History of abortion		***History of child death***	
Yes	*32(64%)*	*Yes*	*15(30%)*
No	*18(36%)*	*No*	*35(70%)*

Table (2)Distribution of sample according to **birth outcome:-**

Birth outcome	***n (%)***	***Birth outcome***	***n (%)***
Premature uterine contraction		***Diabetes mellitus***	
Yes	*14(28%)*	*Yes*	*11(22%)*
No	*36(72%)*	*No*	*39(78%)*
Instrumental delivery		***Shoulder dystocia***	
Yes	*7(14%)*	*Yes*	*4(8%)*
No	*43(86%)*	*No*	*46(92%)*
Small for gestational age		***Hypertension***	
Yes	*3(6%)*	*Yes*	*6(12%)*
No	*47(94%)*	*No*	*44(88%)*
Unprogressive delivery and prematurity		***Emergency cesarean section***	
Yes	*13(26%)*	*Yes*	*23(46%)*
No	*37(74%)*	*No*	*27(54%)*

Table (3)Distribution of sample according to baby outcome:-

Variables	***n (%)***	***Variables***	***n (%)***
Body weight		***APGAR***	
Under weight	*11(22%)*	*<6*	*26(52%)*
Normal weight	*16(32%)*	*6-8*	*15(30%)*

Overweight	*23(46%)*	*>8*	*9(18%)*
Fetal ypoxia		***IUGR and late fetal death***	
Yes	*26(52%)*	*Yes*	*3(6%)*
No	*24(48%)*	*No*	*47(94%)*

Table (4) Distribution of sample according to level of **BMI** and **gestational age:-**

Gestational age	***BMI Level***			***Total***	***p-value***
	Normal weight	***Over weight***	***Obese***		***Chi-S***
	19-24.9 kg	***25-29.9***	***> 30 kg***		
24-28 weeks	*0(.0%)*	*1(50%)*	*1(50%)*	*2(100.0%)*	
29-33 weeks	*1(14.3%)*	*4(57.1%)*	*2(28.6%)*	*7(100.0%)*	*0.79*
34-38 weeks	*0(0%)*	*6(42.9%)*	*8(57.1%)*	*14(100.0%)*	
<39 weeks	*3(11.1%)*	*13(48.2%)*	*11(40.7%)*	*27(100.0%)*	
Total	*4(100%)*	*24(100%)*	*22(100%)*	*50(100.0%)*	

Table (5) Distribution of sample according to level of **BMI** and **birth outcome**:-

Birth outcome		***Number***	***Mean BMI ± SE****	***P value *****
Premature uterine contraction	*Yes*	*14*	*28.41 ± 0.92*	***0.17***
	No	*36*	*29.95 ± 0.57*	
Prematurity	*Yes*	*13*	*28.68 ± 0.96*	*0.31*
	No	*37*	*29.81 ± 0.57*	
Unprogressive delivery	*Yes*	*13*	*29.28 ± 1.06*	*0.78*
	No	*37*	*29.60 ± 0.56*	
Instrumental delivery	*Yes*	*7*	*28.46 ± 1.77*	*0.39*
	No	*43*	*29.69 ± 0.50*	
Small for gestational age	*Yes*	*3*	*29.57 ± 2.33*	*0.98*
	No	*47*	*29.51 ± 0.51*	

Emergency C / S	*Yes*	*23*	*30.27 ± 0.64*	*0.16*
	No	*27*	*28.87 ± 0.71*	
Shoulder dystonia	*Yes*	*4*	*29.00 ± 1.40*	*0.76*
	No	*46*	*29.56 ± 0.52*	
Hypertension	*Yes*	*6*	*29.23 ± 0.41*	*0.83*
	No	*44*	*29.56 ± 0.55*	
Diabetes Mellitus	*Yes*	*11*	*29.19 ± 1.14*	*0.73*
	No	*39*	*29.61 ± 0.55*	

*****SE= Standard Error of mean.

** The p value obtained through using t-test.

Table (6) Distribution of sample according to level of **BMI** and **baby outcome:-**

Baby outcome		***Number***	***Mean BMI ± SE****	***P value***
Baby Weight	*<2500 gm*	*11*	*28.19 ± 1.07*	*0.32 **
	(2500 - 3500)gm	*16*	*30.04 ± 0.77*	
	>3500 gm	*23*	*29.59 ± 0.76*	
Apgar Score	*< 6*	*26*	*29.67 ± 0.71*	*0.5**
	6 -8	*15*	*29.97 ± 0.76*	
	> 8	*9*	*28.31 ± 1.31*	
Fetal hypoxia	*Yes*	*26*	*29.33 ± 0.65*	*0.7****
	No	*24*	*29.72 ± 0.75*	
IUGR	*Yes*	*3*	*28.23 ± 1.2*	*0.51****
	No	*47*	*29.60 ± 0.51*	
Late fetal death	*Yes*	*3*	*32.70 ± 1.18*	*0.1****
	No	*47*	*29.31 ± 0.50*	

*SE=Standard Error of mean

**the p value obtained through using ANOVA

***the p value obtained through using t-test

Discussion

There is evidence that certain population has reduced weight gain primarily due to poor nutritional status, access to antenatal care, possess limited or no knowledge about the benefit of micronutrient intake during pregnancy, and its sources [9]. Along with poverty, strong culture play vital role in determining women's health during pregnancy [10]. This accentuates an immense need of antenatal education for pregnant women of all socio-economic and demographic class, so that women with different pregnancy BMI can have a healthy pregnancy [11]. Some studies discussed socio-economic and cultural implication on women's nutritional state during pregnancy; they found that low socio-economic states are associated with higher risk ofbaby with low birth weight[11,12,13]

According to the demographic data these characteristic of the study are similar to those found in international study in Denmark, they evaluate associations of pregnancy body mass index with the outcome of pregnancy[4]

Regarding obstetrics demographic data same characteristic are found similar to those found in Taiwan, which evaluate associations of pregnancy body mass index and outcome of labor [14].

Another study evaluates body mass index and birth outcome they found that majority of the studied samples have gestational diabetes mellitus, hypertension, shoulder dystocia, cesarean delivery, preterm labor, and large for gestational age [15].

The prevalence of obesity in pregnancy should alarm health care providers to be more prepared, for this should be a future health problem of the country. There are many complications that come with obese pregnant women; this should alert health care providers to prevent these adverse events either before or during pregnancy. Since obesity is a modifiable risk factor, decreasing body weight before conception, giving correct health education, well planned pregnancy, ante natal lifestyle intervention and even gestational weight gain restriction could help avoiding the uneventful morbidities [16].This result are not in line with the study done in Thailand which have evaluated the relation of outcome of birth with body mass index in pregnancy, they reported that few of the studied sample have babies with fetal hypoxia, intrauterine growth retardation, and late fetal death [17].

This finding is in agreement with the results that reported in other international studieswhich found that BMI have no effect on gestational age of the baby [19].

Low weight gain during pregnancy is associated with birth of a small-for gestational age (SGA) baby, preterm birth, and low birth weight. While high gain is associated with greater risks of adverse maternal pregnancy outcome such as macrosomia [18].

Also no statistically significant association was found between all items of birth outcome and BMI as represented in table (5). Opposite to the result of two international study who found that high BMI have a significant effect on birth outcome such as hypertension, diabetes mellitus, preterm labour, emergency C/S, large for gestational age, and shoulder dystocia[20,21] Another study found that high BMI during pregnancy are not associated with adverse pregnancy such as instrumental delivery, small for gestational age, hypertension, shoulder dystocia, premature uterine contraction, diabetes mellitus and unprogressive delivery [22].

BMI during pregnancy have no effect on babies outcome as table (6) shows that there is no association between these two variable, this result is not in line with the other two studies they found a strong association between BMI during pregnancy and babies outcome such as low birth weight, low Apgar score levels, intra

uterine growth retardation, late fetal death, admission of the baby to Neonatal Intensive Care Unit (NICU) due to fetal hypoxia and fetal distress [23].

Conclusion

Our result suggests that regarding socio-demographic characteristics of the data, nearly half of the samples are overweight, sufficient in their socioeconomic status, and employed. While very few of them are illiterate, and approximately all of the sample visited ANC during pregnancy. According to the past obstetric history, majority of them have previous history of more than two previous pregnancies and previous children, eventually half of the sample they have previoushistory of abortion and they completed her gestational age.

Regarding birth outcome more than half of the samples have no history of premature uterine contraction, prematurity, unprogressive delivery, instrumental delivery, small for gestational age, history of diabetes mellitus, hypertension, shoulder dystocia and emergency caesarean section. While according to baby outcome overweight baby and fetal hypoxia constitute more than half of the data, very few of them have IUGR and late fetal death. Finally there is no association between BMI with gestational age, birth outcome and baby outcome.

Recommendation

Body mass index should become a recorded measure for all patients, just as other vital signs are documented. It is important for women to be counseled about being at a healthy weight before becoming pregnant. As weight loss is not encouraged during pregnancy, it is important that weight issues are addressed preconceptionally, so counseling could be accomplished at routine gynecological, family planning, or family practice visit. Women should be counseled on their weight, if out of the normal range, and should be informed of their increased risks once becoming pregnant if they have unhealthy weight.

Low maternal weight gain may indicate deficiencies in nutrient, lack of expansion of plasma volume, infection, or other unidentified problems. Further understanding of these associations is needed, because it remains unclear whether they are causal and therefore amenable to nutritional interventions

Dissimilarity between our finding and others could have been from the fact that our study was conducted in a population resident in developing country, whereas others are from developed country. Developed countries have better health care, social services and low poverty rates compared with developing countries. As such, there may be lower rates of infections, hunger and malnutrition in populations resident in developed countries. The result of which could be increase prevalence of high maternal BMI that could lead to increased neonatal birth weight outcome

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