

# Awareness of pregnant women about effect of obesity on Mother and Neonates at Maternity and Children's Hospital, Najran, Saudi Arabia

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**Received:** December 24, 2017; **Accepted:** February 03, 2018

## ABSTRACT

**Background:** Overweight and obesity in pregnancy increase the risk of adverse pregnancy outcomes to both mothers and neonates. The effect of obesity on mother and neonates has short- and long-term sequelae. In Saudi Arabia, more than 68% of pregnant women are overweight or obese. **Objectives:** The aim of this study is to evaluate the awareness of pregnant women about the effect of obesity on mothers and neonates during and after pregnancy. **Materials and Methods:** A descriptive, cross-sectional design was used in this study. A sample of 416 pregnant women who attended antenatal care at Maternity and Children's Hospital in Najran completed the questionnaire consisting of demographic, medical, gestational, and variables on awareness of risk of obesity on mothers and neonates. **Results:** Overall 68.5% ( $n = 285$ ) of participants had a poor awareness regarding the effect of obesity during pregnancy. The highest level of awareness (63%) was reported in general awareness regarding obesity, whereas the lowest level of awareness (30.5%) was reported about neonatal complications. More than 60% thought that obesity would increase risk of gestational diabetes mellitus, preeclampsia, and cardiovascular disease. Awareness regarding neonatal complications was poor, and more than 50% did not know that obesity increases neural tube defect, congenital anomaly, stillbirth, preterm labor, and shoulder dystocia. **Conclusion:** This study revealed that the awareness of pregnant women to the adverse effect of obesity in mothers and neonates is unsatisfactory. We found a significant correlation between education level and awareness level of participants. A greater effort is warranted from all health organizations to raise awareness and education for all women of child-bearing age regarding the risk of adverse outcome associated with obesity in pregnancy.

**KEY WORDS:** Obesity in Pregnancy; Maternal Complications; Neonatal Complications; Preconception Counseling; Obesity Awareness

Access this article online	
Website: <a href="http://www.ijmsph.com">http://www.ijmsph.com</a>	Quick Response code
DOI: 10.5455/ijmsph.2018.1234003022018	

## INTRODUCTION

Obesity is abnormal or excessive fat accumulation that presents a risk to health. Obesity is classified according to the World Health Organization based on body mass index (BMI), defined as weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ). It organizes BMI range into six

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categories to define underweight, normal weight, overweight, obesity Class I, obesity Class II, and obesity Class III.<sup>[1]</sup> The prevalence of obesity in the United States shows that one-third of adults are obese.<sup>[2]</sup> In Australian population, 34% were overweight, obese, or morbidly obese.<sup>[3]</sup> In Saudi Arabia, the prevalence of obesity ranged from 33.9% in Ha'il to 11.7% in Jizan.<sup>[4]</sup> In addition, many studies conducted in Saudi Arabia show up to three-quarters of adults to be either overweight or obese.<sup>[4-6]</sup>

The prevalence of maternal obesity in the United States is about 36%.<sup>[6]</sup> Overweight and obesity in pregnancy increase the risk of adverse pregnancy outcomes to both mothers and neonates. Obesity is an ever-increasing problem in Saudi population, especially in females, due to sedentary lifestyle, peculiar eating habits, and diet rich in fat and carbohydrates. A few studies have been carried out in Saudi Arabia, and the prevalence of obesity and overweight in the general population has been reported to be high both in Saudi males and females.<sup>[7]</sup> The rate of obesity in pregnant women is rising, increasing the significance of its impact on obesity-related pregnancy complications. Obesity influences not only the chance of conception but also reduces the response to fertility treatment and increases the risk of miscarriage, congenital anomalies as well as pregnancy complications. In Saudi Arabia, there is scarce information about the prevalence of obesity in pregnancy, and more than 68% of pregnant women were overweight or obese in Saudi Arabia.<sup>[8,9]</sup> The effect of obesity on mothers and neonates has short- and long-term sequelae. The short-term effect of obesity on mothers is gestational diabetes mellitus (GDM), preeclampsia, pregnancy loss, failed induction, instrumental delivery, cesarean section, infection, and postpartum hemorrhage.<sup>[10-12]</sup> The long-term effect on mother will be DM, hypertension (HTN), and cardiovascular diseases (CVD). The short- and long-term effects of obesity on neonates will be macrosomia, congenital anomaly, childhood obesity, and stillbirth.<sup>[7,9,13]</sup>

In a previous study in the USA, Okeh *et al.*<sup>[11]</sup> assessed the knowledge and perception of risks and complications of maternal obesity during pregnancy and found the need for healthcare providers to educate pregnant women about the increased risks associated with overweight and obesity. In another study conducted in Australia, Nitert *et al.*<sup>[14]</sup> evaluated overweight and obesity knowledge before pregnancy and they found that around 19.7% did not know about the effect of obesity on neonatal complications. In Saudi Arabia, Sulaimani *et al.*<sup>[15]</sup> studied the awareness of obesity in pregnancy in married women at King Abdulaziz University, Jeddah, and they found that 82% and 57.7% of them knew about complications of obesity on the mothers and neonates, respectively.

Increasing women's knowledge of the short- and long-term risks of obesity to both their own and their offspring's health is likely to be an important first step in preventing

obesity in pregnancy. Indeed, recommendations to improve preconception care emphasize the need to ensure that women of childbearing age understand factors that increase the risks of childbearing, including obesity. Our study was designed to ascertain whether or not women in the general pregnant population were aware of the increased risks associated with obesity in pregnancy and to identify the relevant factors that might affect the awareness of pregnant women about the adverse effect of obesity on mothers and neonates.

An essential step in overcoming the health hazards of obesity in pregnant women is to evaluate their awareness to the adverse effect of obesity in mothers and neonates. This leads to understand the current situation regarding this issue and helps to establish appropriate interventions in the management of obesity and weight gain during pregnancy. The need of the day is to address this issue, and strategies must be made to reduce the frequency of this nutritional disease in the kingdom particularly among the females of reproductive age.

### Study Objectives

The objectives of this study are as follows:

1. To evaluate the awareness of pregnant women about the effect of obesity on mothers.
2. To evaluate the awareness of pregnant women about the effect of obesity on neonates.
3. To identify the relevant factors that might affect the awareness of pregnant women about the effect of obesity on mothers and neonates.

## MATERIALS AND METHODS

### Study Design

This was a cross-sectional study.

### Study Area

The study was conducted at Najran, a city in Southwestern Saudi Arabia.

### Study Conducted

The study duration was from June 1 to August 31, 2017.

### Study Population

Pregnant women attending antenatal clinic (ANC) at Najran Maternity and Children's Hospital were selected.

### Inclusion Criteria

All pregnant women attending ANC at Najran Maternity and Children's Hospital who agree to participate during the study period were included in the study.

### Exclusion Criteria

There were no exclusion criteria.

### Sample Size

A total of 416 participants taking into considering a 5% allowable error margin were selected.

### Confidence Level

The confidence level was attained at 95%.<sup>[7-9]</sup>

### Sampling Technique

A simple random sampling technique was adopted to include all pregnant women attending the ANC at Najran Maternity and Children's Hospital who agreed to participate during the study period.

### Data Collection Tool and Technique

The researcher used a self-administered questionnaire, consisting of two parts:

- Part 1: Containing sociodemographic data: Educational level, nationality, and medical and gestational variables.
- Part 2: Included items related to awareness (general awareness, maternal complications, and fetal complications) of the adverse effects of obesity during pregnancy on mothers and neonates.

### Pilot Study

The questionnaire was pre-tested with 24 pregnant women to test wording of questionnaire and feasibility of the study and to estimate the average time taken to finish the questionnaire. These 24 cases were not included in the main study.

The independent variables include all the demographic, medical, and gestational characteristics (age, nationality, educational status, occupation, medical and medication history, parity, cesarean section, miscarriage, gestational age, risk categories, antenatal care, number of visit, health care provider, place of antenatal care, and weight in pre-pregnancy/3 months).

The internal consistency was tested using Kurder Richardson 20 (KR-20) due to the dichotomous nature of the answers scores (yes/no or don't know). KR-20 for all domains was ranged from 0.58 for general awareness regarding complications (as it formed of only 2 statements) to 0.86 for maternal complications awareness. The tool stability was tested using test-retest reliability as measured by intraclass correlation coefficients which ranged from 0.61 for general awareness to 0.91 for maternal complications awareness. Content validity was evaluated on reviewing all scale items by three different experts. Any conflicts were treated using

discussion or voting, and any suggested modifications were done.

### Definition of Knowledge about the Risks of Maternal Obesity

Regarding scoring system, the correct answer was given a score of one point. Otherwise, zero score was given. The items discrete scores of dimension and total score were calculated by summing the scores given for its responses. All scores were transformed into score percentage (%) as score % = (the observed score/the maximum score) × 100.

Then, score percentage was categorized into poor awareness if the participant had score percentage <60% and good awareness if score percentage ≥60%. Women who score below 60% were categorized as having a poor awareness of the risks of maternal obesity, while those who got ≥60% correct answers were categorized as having good awareness of maternal obesity complications.

### Statistical Analysis

After data collection, it was filtered from any errors, coded and fed to statistical software IBM SPSS version 21. All statistical analysis was done using two-tailed tests and an alpha error of 0.05.  $P \leq 0.05$  was considered to be statistically significant.

Descriptive statistics was used as frequencies and percent were used to describe the frequency of each category for categorical data. Mean score % was used to describe different domains averages. Multiple logistic regression analysis was used to identify which of the studied factors (sample characteristics) can determine the participant level of awareness and on adjusting all other factors.

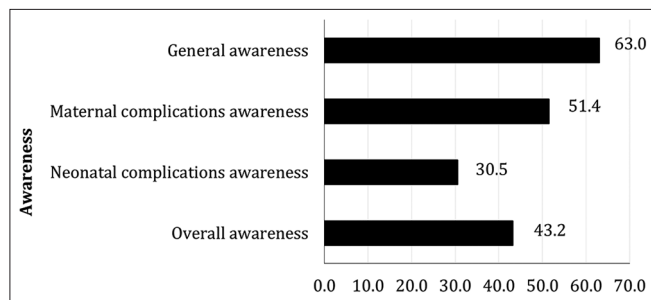
### Ethical Considerations

An ethical approval letter was obtained from the research committee at College of Medicine, Najran University before this study. Written consent was obtained from each participant. Confidentiality of the information will be assured.

### RESULTS

Overall 68.5% ( $n = 285$ ) of participants had a poor awareness about adverse effects of obesity during pregnancy [Table 1]. In particular, 61.5% had poor awareness with respect to maternal complication, while 85% had poor awareness with respect to neonatal complications.

Figure 1 depicts that highest level of awareness (63%) was seen in general awareness, while the lowest level of awareness (30.5%) was observed in neonatal complications.



**Figure 1:** Average awareness level about the adverse effect of obesity during pregnancy on mothers and neonates

For all included pregnant women ( $n = 416$ ), high response rate (100%) was observed. The demographic and medical characteristics of participants are shown in Table 2. The majority of participants were 20–35 years old and 78.8% were housewives. More than one-third of participants had a high level of education either university or postgraduate. Moreover, approximately 75% did not have a previous history of any medical disease.

The majority of participants (78%) had regular antenatal care [Table 3], more than half had multiple care provider, around 70% had normal preconception weight, approximately 23.6% ( $n = 98$ ) were primigravida, and around 86% categorized themselves as low risk.

Description of awareness of pregnant women about the effect of obesity on mothers and neonates is shown in Table 4. More than half of the total cohort were categorized as knowing about the risks of being obese on pregnancy, birth, and neonatal outcomes. In respect to maternal complication, more than 60% thought that obesity would increase the risk of GDM, preeclampsia, and CVD, while more than half did not know that obesity in pregnancy increases the risks of neonatal complications such as neural tube defect (NTD), congenital anomaly, stillbirth, preterm labor (PTL), and shoulder dystocia.

Significant predictors for awareness of pregnant women about the effect of obesity on mothers and neonates are shown in Table 5. Multiparity showed highest (adjusted odds ratio [OR] = 2.14,  $P = 0.001$ ) followed by education level (adjusted OR = 1.39,  $P = 0.006$ ), non-Saudi national (adjusted OR = 2.45,  $P = 0.011$ ), high-risk pregnancy (adjusted OR = 2.3,  $P = 0.015$ ), and finally, regular antenatal care (adjusted OR = 1.7,  $P = 0.048$ ).

**DISCUSSION**

Obesity is one of the biggest factors associated with abnormal reproductive outcomes.<sup>[16]</sup> Obesity in pregnancy has long- and short-term effects on mothers as well as neonates. Awareness of pregnant women to these complications must be increased so as to reduce the prevalence of obesity particularly during

**Table 1:** Awareness level about the effect of obesity on mothers and neonates for pregnant women attending Maternity and Children Hospital in Najran city, Saudi Arabia

Awareness domains	n (%)	
	Poor	Good
General awareness	232 (55.8)	184 (44.2)
Maternal complications awareness	256 (61.5)	160 (38.5)
Neonatal complications awareness	353 (84.9)	63 (15.1)
Overall awareness	285 (68.5)	131 (31.5)

Poor: score % <60%, Good: Score % ≥60%

**Table 2:** Sociodemographic and medical characteristics of pregnant women attending Maternity and Children Hospital in Najran city, Saudi Arabia

Sociodemographic and medical data	n (%)
Age (years)	
<20	24 (5.8)
20–35	287 (69.0)
>35	105 (25.2)
Nationality	
Saudi	367 (88.2)
Non-Saudi	49 (11.8)
Education level	
Illiterate	44 (10.6)
Primary	87 (20.9)
Pre-university	128 (30.8)
University	123 (29.6)
Postgraduate	34 (8.2)
Occupation	
Working	88 (21.2)
Housewife	328 (78.8)
Medical disease history	
No disease	311 (74.8)
DM	12 (2.9)
HTN	13 (3.1)
DVT	7 (1.7)
Hypothyroidism	19 (4.6)
Anemia	29 (7.0)
Other	25 (6.0)
Medications history	
No	406 (97.6)
Yes	10 (2.4)

DM: Diabetes mellitus, HTN: Hypertension, DVT: Deep venous thrombosis

pregnancy.<sup>[17-19]</sup> The results of this study show that despite majority of women in this population had adequate health literacy and at least some college education, there was little knowledge of the effects of obesity on reproductive outcomes. About 43.2% pregnant women had the overall awareness to



**Table 3:** Obstetric and antenatal data of pregnant women attending Maternity and Children Hospital in Najran city, Saudi Arabia

Obstetric and antenatal data	n (%)
Parity	
Nullipara	98 (23.6)
Multipara (1–4)	226 (54.3)
Multipara (5+)	92 (22.1)
Cesarean section	
No	276 (66.3)
Once	82 (19.7)
2+	58 (13.9)
Miscarriage	
No	251 (60.3)
1–2	143 (34.4)
3+	22 (5.3)
Gestational age	
1 <sup>st</sup> trimester	37 (8.9)
2 <sup>nd</sup> trimester	136 (32.7)
3 <sup>rd</sup> trimester	243 (58.4)
Risk categories	
Low risk	360 (86.5)
High risk	56 (13.5)
Antenatal care	
Regular	324 (77.9)
Irregular	92 (22.1)
Number of ANC visits	
1–4 times	161 (38.7)
5–11 times	255 (61.3)
Obstetric care provider	
One	177 (42.5)
Multiple	239 (57.5)
Place of antenatal care	
PHC	25 (6.0)
Maternity hospital	151 (36.3)
Private sector	2 (0.5)
Others	238 (57.2)
Weight in (pre-pregnancy/3 moths)	
Normal	295 (70.9)
Abnormal	75 (18.0)
Do not know	46 (11.1)

PHC: Primary Health Care

obesity complications. In respect to the awareness of pregnant women to maternal complication in our study, 51.4%, 74%, and 55.8% of pregnant women were aware that obesity will increase the risk of cesarean section, GDM, and long-term DM, respectively. Similarly, 69.5%, 52.2%, and 63.7% knew that obesity will increase the risk of preeclampsia, long-term HTN, and risk of CVD, respectively. Whereas, 25.5%, 36.8%, and 34.1% were aware about postpartum hemorrhage,

anesthesia complications, and pregnancy loss, respectively. These results can be compared with another study by Joseph *et al.*<sup>[20]</sup> which found that 75%, 72.1%, 62.4%, 31.7%, and 15.9% of pregnant women were aware that obesity will increase the risk of HTN, miscarriage, DM, cesarean section, and postpartum hemorrhage, respectively. In addition, other survey research carried out among women in Chicago<sup>[21]</sup> and Australia<sup>[14]</sup> showed that 30.8% women in Chicago and more than 60% women in Australia knew that obesity will increase the risk of cesarean section. In this study, we found that majority of pregnant women (76.9%) were knowledgeable about the association of maternal obesity and increased risks of both maternal and neonatal complications, and this concern should be exploited to encourage women to lose weight before pregnancy and to maintain healthy lifestyles during pregnancy which will end by good health for mother and child. The average awareness level to maternal and neonatal complications was 51.4% and 30.5%, respectively, which is consistent with previous studies, done in Australia by Nitert *et al.*<sup>[14]</sup> in that 19.7% did not know about the effect of obesity on neonatal complications. Another study done by Sulaimani *et al.*<sup>[15]</sup> found that 82% and 57.7% had knowledge about maternal complications and neonatal complications, respectively.

In evaluating the awareness of pregnant women to neonatal complication, our study found that a sizable proportion of study population was aware that obesity will increase risk of obstructed labor (55%), macrosomia baby (44.7%), long-term obesity for baby (42.8%), shoulder dystocia (30%), post-term (25.7%), PTL (25%), congenital anomaly (18.8%), NTD (16.6%), and stillbirth (15.9%). These results were consistent with other studies by Joseph *et al.*<sup>[20]</sup> which noted that 32.2%, 26.9%, 26.4%, and 14.9% women knew that obesity will increase risk of premature delivery, macrosomia, fetal malformation, and stillbirth, respectively.

Among the dependent variables, five predictors were statistically significant in determining the awareness levels of women. The pregnant women with high parity had good awareness (double folds) about ill effects of obesity (adjusted OR = 2.14,  $P = 0.001$ ). High education level was associated with knowledge about the risks of overweight and obesity (adjusted OR = 1.39,  $P = 0.006$ ). One of the important predictors of birth outcomes is educational status. A better knowledge of other preconception health issues such as periconceptual folate supplementation is associated with educational status of women.<sup>[14]</sup> Our findings suggest that to enhance knowledge regarding the obesity risks, public health messages targeting those with lower levels of education would be important. The pregnant women who are categorized as high risk were more aware about the risks of overweight and obesity (adjusted OR = 2.3,  $P = 0.015$ ). Furthermore, pregnant women who showed up for regular follow-up in ANC were more aware about the risks of obesity (adjusted OR = 1.7,  $P = 0.048$ ). Moreover, non-Saudi women

**Table 4:** Description of awareness of pregnant women about the effect of obesity on mother and neonates attending Maternity and Children Hospital in Najran city, Saudi Arabia

Awareness domain	Item	n (%)		
		Yes	No	Do not know
General	Do you hear about obesity in pregnancy?	204 (49.0)	200 (48.1)	12 (2.9)
	Do you think obesity in pregnancy is increasing risks for health of mother and neonate?	320 (76.9)	34 (8.2)	62 (14.9)
Maternal complication	Do you think obesity increases risk of pregnancy loss	142 (34.1)	87 (20.9)	187 (45.0)
	Do you think obesity increases risk of GDM	308 (74.0)	16 (3.8)	92 (22.1)
	Do you think obesity increases risk of long-term DM	232 (55.8)	35 (8.4)	149 (35.8)
	Do you think obesity increases risk of PET	289 (69.5)	19 (4.6)	108 (26.0)
	Do you think obesity increases risk of long-term HTN	217 (52.2)	39 (9.4)	160 (38.5)
	Do you think obesity increases risk of CVD	265 (63.7)	24 (5.8)	127 (30.5)
	Do you think obesity increases risk of cesarean section	214 (51.4)	54 (13.0)	148 (35.6)
	Do you think obesity increases risk of PPH	106 (25.5)	64 (15.4)	246 (59.1)
Fetal complication	Do you think obesity increases risk of anesthesia	153 (36.8)	38 (9.1)	225 (54.1)
	Do you think obesity increases risk of macrosomia	186 (44.7)	101 (24.3)	129 (31.0)
	Do you think obesity increases risk congenital anomaly	78 (18.8)	84 (20.2)	254 (61.1)
	Do you think obesity increases risk of NTD	69 (16.6)	60 (14.4)	287 (69.0)
	Do you think obesity increases risk of stillbirth	66 (15.9)	107 (25.7)	243 (58.4)
	Do you think obesity increases risk of long-term obesity for baby	178 (42.8)	75 (18.0)	163 (39.2)
	Do you think obesity increases risk of PTL	104 (25.0)	82 (19.7)	230 (55.3)
	Do you think obesity increases risk of post term	107 (25.7)	85 (20.4)	224 (53.8)
	Do you think obesity increases risk of obstructed labor	229 (55.0)	30 (7.2)	157 (37.7)
	Do you think obesity increases risk of shoulder dystocia	125 (30.0)	34 (8.2)	257 (61.8)

GDM: Gestational diabetes mellitus, DM: Diabetes mellitus, PET: Positron emission tomography, HTN: Hypertension, CVD: Cardiovascular diseases, PPH: Postpartum hemorrhage, NTD: Neural tube defect, PTL: Preterm labor

**Table 5:** Results of multiple stepwise logistic regression for predictors of awareness about the effect of obesity on mother and neonates for pregnant women attending Maternity and Children Hospital in Najran city, Saudi Arabia

Factor	B	SE	P	Adjusted OR	95% CI for OR	
					Lower	Upper
Age	0.056	0.260	0.830	1.06	0.64	1.76
Non-Saudi	0.894	0.350	0.011*	2.45	1.23	4.86
Educational level	0.330	0.120	0.006*	1.39	1.10	1.76
Working	0.056	0.306	0.856	1.10	0.58	1.92
Chronic health problem	0.052	0.065	0.425	1.10	0.92	1.10
Parity	0.760	0.212	0.001*	2.14	1.41	3.24
Gestational age	-0.072	0.173	0.676	0.93	0.66	1.31
High risk	0.831	0.341	0.015*	2.30	1.18	4.47
Regular ANC	0.527	0.207	0.048*	1.70	1.12	3.08
Multiple care provider	-0.474	0.677	0.484	0.62	0.17	2.35
Pre-pregnancy weight	0.128	0.173	0.458	1.10	0.81	1.59
Constant	-3.920	1.395	0.005	0.020		

SE: Standard error, B: Regression coefficient, OR: Odds ratio, CI: Confidence interval, ANC: Antenatal clinic \* $P < 0.05$

were more aware about the risks of obesity to mother and neonates than Saudi women (adjusted OR = 2.45,  $P = 0.011$ ).

Our results suggest that pre-pregnancy health check can be used as an excellent opportunity for educating women regarding

the risks of obesity before pregnancy. A little more than half of all women attended a ANC for a pre-pregnancy health check. At their pre-pregnancy health check, it is important that women have their BMI determined, are advised about the risks associated with pre-pregnancy overweight and obesity.<sup>[14]</sup>

A limitation of this study is the fact that the demographics do not parallel those of the general population of Saudi Arabia and therefore may not be generalizable to the population as a whole. The singular geographic location in which this study was conducted is another limitation, as public education and therefore, public knowledge of these risks may differ. Additional studies are necessary to assess the impact of region of the nation on the prevalence of this knowledge.

## CONCLUSION

We found that there is a less awareness among Saudi women of Najran area that overweight and obesity increase the overall risk of complications of pregnancy and childbirth. Women with less education are less likely to know about the risks of overweight and obesity in pregnancy and so awareness and education are essential for all women of child-bearing age regarding the risk of adverse outcome associated with obesity in pregnancy. This highlights an opportunity for educational intervention through public health initiatives and direct education by physicians, especially at antenatal care services.

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**How to cite this article:** Alshahrani MS, Alqahtani NS, Alqahtani AM, Almaqbul WN, Alwadei AM, Alzamanan SS, *et al.* Awareness of pregnant women about effect of obesity on Mother and Neonates at Maternity and Children's Hospital, Najran, Saudi Arabia. *Int J Med Sci Public Health* 2018;7(4):322-328.

**Source of Support:** Nil, **Conflict of Interest:** None declared.