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# Assessment of Obesity Complications during Antenatal Period at Qena University Hospital, Egypt

Shwikar Mahmoud Etman Othman [1], prof. Dr. Ahmad Hashem Abdellah [2], Dr. Nadia Abdallah Mohamed[3] and Dr. Ghadah Abdelrahman Mahmoud [4]

*1,Assistant lecturer of Obstetrics & Gynecological Nursing, Faculty of Nursing, South Valley University.*
*2,Professor and chairman of Obstetrics & Gynecology, Faculty of Medicine. South Valley University.*
*3, Assistant Professor of obstetrics & Gynecological Nursing, and Dean of the Faculty of Nursing, South Valley University.*
*4,Assistant Professor of obstetrics & Gynecological Nursing. Faculty of Nursing. Assiut University.*

***Abstract***

***Objective:*** *This study aimed to assess the hospital based rate of high-risk obese pregnant women at Qena University Hospital, Assess the antenatal Obstetric and Medical complications associated with Obesity among these women and Provide health education for those obese pregnant women about the dietary requirements.*

***Setting:*** *the inpatient antenatal word OF Obstetrics and Gynecology Departments at Qena University Hospital*

***Duration:*** *from 1st October 2012 to 20th April 2013.*

***Patients&Methds:*** *Cross Sectional, study of 350 cases of high-risk pregnant women admitted at the inpatient antenatal word at Qena University Hospital was used. Completing semi- structured interviewing sheet from All high risk pregnant obese women with single fetus who have the BMI ≥ 29. After completing the sheet, giving them brochures about nutrition according to their diagnosis and explaining how to follow.*

***Results****. More than half (57.4%) of the sample were classified as obesity class one among high risk pregnant women. Complications of obesity increased among high risk pregnant women such as previous caesarean section rate (38.3%), PROM were (13.4%), pregnancy induced hypertension (11.7 %), other risk factors about (16.3 %).*

***Conclusions:*** *hospital based rate of obesity was one third of the total flow of pregnant women at this hospital was obese with high risk pregnancy more than half of high risk pregnant were classified as obesity class one and the most common obstetrics' complications associated with obesity were previous caesarean section and premature rupture of membrane respectively.*

***Recommendations:*** *Nutrition and exercise counseling should begins from pre-puberty, during pregnancy, continues postpartum and before attempting another pregnancy.*

***Key Word:*** *obesity, antenatal complications*

## I. Introduction

The rapid upswing in obesity prevalence across nations, ages, and ethnic groups has reached alarming a nd pandemic proportions. The World Health Organization (WHO) reported in 2005 that 1.6 billion adults were o verweight (BMI>25 kg/m2) and 400 million obese (BMI>30 kg/m2). The prevalence of morbid obesity (BMI>4 0 kg/m2) has increased by 50% between 2000 and 2005, with 8% of women in the reproductive age group being morbidly obese. The percentage of women with a body mass index (BMI) of 50 Kg/m2 or more has increased fi ve-fold in 20 years**.( WHO,2011 and Lovina ,2012 ).** The rank order in Arabic-speaking countries for obesity i n females is Kuwait (55.2%), Egypt (48%), and UAE (42%), which is higher than all the European countries an d about the same as USA (48.3%) and Mexico (41%). Countries such as Bahrain (37.9%), Jordan (37.9%), Saud i Arabia (36.4%) and Lebanon (27.4%) have higher obesity rates in females than UK (26.3%), Greece (26.4%), and Israel (25.9%). **(Badran, and Laher, 2011).** In Egypt, the prevalence of obesity is increasing according to E gyptian Demographic and Health Survey "EDHS" 2008. According to this statistics, overweight and obesity was higher in women with no education (73%) when compared with women with completed secondary or higher ed ucation (67.5%). The prevalence of overweight was 28.3% but the prevalence of obesity was about 39.5% accor ding to statistics from DHS, **(DHS, 2008)**. Overweight and obese women are at increased risk of several pregna ncy complications, including gestational diabetes mellitus, hypertension, preeclampsia, cesarean delivery, and p ostpartum weight retention. Similarly, fetuses of pregnant women who are overweight or obese are at increased risk of prematurity, stillbirth, congenital anomalies, macrosomia with possible birth injury, and childhood obesit y**(ACOG, 2013)**

## II. Aim Of The Work

To assess the hospital-based rate of obesity among high-risk pregnant women at Qena University Hospital, Assess the antenatal Obstetric and Medical complications associated with obesity among these women and Provide health education for these obese pregnant women about the dietary requirements during pregnancy.

## III. Patients And Methods

This study has been recruited on a convenient sample of high-risk pregnant women (350) seeking care at Qena University Hospital was used. Screening of the total flow of pregnant women admitted, and from the tot al flow taking the obese pregnant women, the sample was calculated using Epi-Info statistical package, version 3.3 with power 80%, a value of 2.5 is chosen as the acceptable limit of precision (D) at 95% level of confidence ( CI ), with expected prevalence 30%, and worst acceptable 55%. Accordingly, sample size was estimated to be 350 +10% individuals to guard against non- respondense rate.**Inclusion Criteria**: all high-risk pregnant women with single fetus who have the BMI ≥ 29.**Exclusion Criteria:** All high-risk pregnant women who have BMI <2 9.

**Methods:**

**Tools : Semi- structured interviewing sheet:** This tool was designed by the researcher based on review of literature and consulting expertise in this area, it was structured to include several parts:

**I. The assessment stage:**

1. **Screening** for all pregnant women for **anthropometric measurement**: such as height and weight to determine body mass index (BMI). BMI was calculated as weight in kilograms divided by height in meters squared, to assess the prevalence of obesity among high risk pregnant women.
2. **For obese women: a structured interviewing sheet which** includes **socio-demographic data** as: name, age, educational levels, occupation and residence.
3. **Obstetric history which includes:** Gravidity, parity, abortions, stillbirth, Number of neonatal deaths and Number of living children.
4. **Outcomes of last delivery:** Spontaneous Vaginal Delivery (**SVD**), SVD + Episiotomy, instrumental delivery and Caesarean section.
5. **Mother's Medical history: as** Obesity, Hypertension, Diabetes, Cardiovascular disease, Liver diseases, kidney disease, respiratory diseases and others.
6. **Family history: as** Obesity, Hypertension, Diabetes, cardiovascular disease and others.
7. **Current antenatal risk factors associated with Obesity:**

   **Weeks of gestations and current antenatal risk factors as,** Pregnancy induced hypertension, Diabetes mellitus, Pre mature Rupture Of Membrane (PROM) , Polyhydrominus, Intra Uterine Fetal Death ( IUFD ), Intra Uterine Growth Restriction (IUGR), Previous cesarean section ,Cardiovascular disorders, Oligohydrominus, Hepatic disorders, Renal disorders, Preterm labor, Fetal macrosomia , Respiratory disorders with pregnancy, Gastrointestinal problems with pregnancy ,Others and More than one risk factor.
8. Current Medical diagnosis.
9. Investigations:

a) Laboratory investigations as CBC, Urine analysis and others.
b) Abdominal Ultrasound.
c) Trans Vaginal Ultrasound.

10. Health Education booklet was given for those women about nutritional requirements according to their current medical diagnosis.

**Data Registration and Statistical Analysis:**

Data were analyzed using the Statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS) version 16 and (Windows Microsoft).Continuous data were expressed as frequency, percentage; mean and standard deviation (SD) .Discrete data were expressed as frequency and percentage. Comparison between variables was done using chi-square (x2) test and One-Way ANOVA test was used for qualitative data. Probability (p-value) less than or equal to 0.05 was considered significant and less than 0.001 was considered highly significant.

## IV. Results

**Table (1): Relation between Socio-demographic data and obesity class:**

| | BMI | | | | | | P. value | P. value |
|---|---|---|---|---|---|---|---|---|
| | Obesity class I N =201 | | Obesity class II N =95 | | Obesity class III N =54 | | | |
| | No. | % | No. | % | No. | % | | |
| **Mother's age** | | | | | | | | |
| • 15-24 | 80 | 65.0 | 28 | 22.8 | 15 | 12.2 | **0.001*** | 0.163 |
| • 25-34 | 107 | 54.3 | 55 | 27.9 | 35 | 17.8 | **0.001*** | |
| • 35-45 | 14 | 46.7 | 12 | 40.0 | 4 | 13.3 | 0.061 | |
| **Range, mean ±SD** | 17 –42 | 27.8 ±5.4 | 19 -45 | 29 ±5.9 | 20 -45 | 29 ±5.4 | 0.132 | |
| **Educational level** | | | | | | | | |
| • Illiterate | 48 | 57.8 | 24 | 28.9 | 11 | 13.3 | **0.001*** | 0.467 |
| • Read and write | 15 | 65.2 | 2 | 8.7 | 6 | 26.1 | **0.003*** | |
| • Primary school | 13 | 59.1 | 4 | 18.2 | 5 | 22.7 | **0.036*** | |
| • Preparatory school | 32 | 61.5 | 12 | 23.1 | 8 | 15.4 | **0.001*** | |
| Secondary school | 75 | 56.8 | 40 | 30.3 | 17 | 12.9 | **0.001*** | |
| • University | 18 | 47.4 | 13 | 34.2 | 7 | 18.4 | 0.091 | |
| **Occupation** | | | | | | | | |
| • House wife | 194 | 58.6 | 85 | 25.7 | 52 | 15.7 | **0.001*** | **0.037*** |
| • Employed | 7 | 36.8 | 10 | 52.6 | 2 | 10.5 | 0.076 | |
| **Residence** | | | | | | | | |
| • Urban | 62 | 51.7 | 35 | 29.2 | 23 | 19.2 | **0.001*** | 0.225 |
| • Rural | 139 | 60.4 | 60 | 26.1 | 31 | 13.5 | **0.001*** | |

* $P \leq 0.05$

Table (1) It can be noted from this table that, there was no statistically significant relation between **age categories, level of education, and residence** of the mother and degree of obesity generally **(**($p = 0.163$, $p = 0.467$**,** $p = 0.225$, respectively**).**On the other hand there was a significant association between special age category 15-24 and 25-34, and occupation with obesity ($p = 0.001$, $p = 0.001$, $p = 0.037$ respectively).

**Table (2): Classification of obesity according to Body Mass Index of high risk pregnant women:**

| Classes of obesity according to BMI | Frequency | Percent |
|---|---|---|
| **Obesity class I (29-34.9)** | 201 | 57.4 |
| **Obesity class II (35-39.9)** | 95 | 27.1 |
| **Obesity class III (≥40 )** | 54 | 15.4 |
| **Total** | 350 | 100.0 |
| **Mean ± SD** | 1.5800 ± 0.74415 | |

Table (2): shows that obesity among high risk pregnancy was ranged from class one (57.4%), class two (27.1%) and obesity class three (15.4%) with Mean ± SD 1.5800 ± 0.74415

**Table (3): Relation between Maternal Medical history and obesity classes: (#)**

| | | BMI | | | | | | P. value | P. value |
|---|---|---|---|---|---|---|---|---|---|
| | | obesity class I N =201 | | obesity class II N =95 | | obesity class III N =54 | | | |
| | | No. | % | No. | % | No. | % | | |
| **Maternal Medical history** | **total** | | | | | | | | |
| **None** | 216 | 139 | 64.4 | 55 | 25.5 | 22 | 10.2 | **0.001*** | **0.001*** |
| **Obesity** | 24 | 8 | 33.3 | 5 | 20.8 | 11 | 45.8 | 0.325 | |
| **Hypertension** | 45 | 12 | 26.7 | 18 | 40.0 | 15 | 33.3 | 0.549 | |
| **Diabetes** | 9 | 4 | 44.4 | 1 | 11.1 | 4 | 44.4 | 0.368 | |
| **Urinary stress incontinence** | 12 | 8 | 66.7 | 3 | 25.0 | 1 | 8.3 | **0.039*** | |
| **Kidney disease** | 29 | 18 | 62.1 | 6 | 20.7 | 5 | 17.2 | **0.004*** | |
| **Respiratory disease** | 20 | 12 | 60.0 | 4 | 20.0 | 4 | 20.0 | **0.041*** | |
| **Others** | 38 | 17 | 44.7 | 16 | 42.1 | 5 | 13.2 | **0.030*** | |

**# Table** includes multiple-choice variables

* $P \leq 0.05$

Concerning to maternal medical history, it can be observed that there was a statistically significant difference between obesity and medical history generally ($p = 0.001$). Such as urinary stress incontinence ($p = 0.039$) &kidney disease ($p = 0.004$) & respiratory disease ($p = 0.041$).On the other hand, obesity clarify no statistically significant difference with hypertension, Diabetes mellitus and obesity ($p = 0.549$, $p = 0.368$, $p = 0.325$ respectively).

**Table (4): Relation between Current antenatal risk factors associated with pregnancy and body mass index:**

| Current antenatal risk factors associated with pregnancy | BMI | | | | | | P. value | P. value |
|---|---|---|---|---|---|---|---|---|
| | Obesity class I N =201 | | Obesity class II N = 95 | | Obesity class III N =54 | | | |
| | No. | % | No. | % | No. | % | | |
| **None** | 74 | 62.2 | 32 | 26.9 | 13 | 10.9 | **0.001*** | **0.002*** |
| **Pregnancy induced hypertension** | 9 | 22.0 | 16 | 39.0 | 16 | 39.0 | 0.303 | |
| **IUFD** | 3 | 42.9 | 1 | 14.3 | 3 | 42.9 | 0.565 | |
| **Polyhydraminos** | 4 | 20.0 | 6 | 33.3 | 7 | 46.7 | 0.662 | |
| **Oligohydraminos** | 25 | 67.6 | 7 | 18.9 | 5 | 13.5 | **0.001*** | |
| **Diabetes mellitus** | 3 | 37.5 | 1 | 12.5 | 4 | 50.0 | 0.417 | |
| **PROM** | 23 | 48.9 | 16 | 34.0 | 8 | 17.0 | **0.027*** | |
| **Fetal macrosomia** | 2 | 20.0 | 3 | 30.0 | 5 | 50.0 | 0.497 | |
| **Preterm labour** | 12 | 54.5 | 9 | 40.9 | 1 | 4.5 | **0.012*** | |
| **Previous cesarean section** | 74 | 57.8 | 35 | 27.3 | 19 | 14.8 | **0.001*** | |
| **Renal disorders** | 2 | 66.7 | 0 | 0.0 | 1 | 33.3 | 0.564 | |
| **Respiratory disorders with pregnancy** | 4 | 57.1 | 2 | 28.6 | 1 | 14.3 | 0.368 | |
| **Gastrointestinal problems with pregnancy** | 5 | 41.7 | 2 | 16.7 | 5 | 41.7 | 0.472 | |
| **More than one risk factors** | 61 | 48.8 | 37 | 29.6 | 27 | 21.6 | **0.001*** | |
| **Others** | 35 | 61.4 | 13 | 22.8 | 9 | 15.8 | **0.001*** | |

* $P \leq 0.05$

Concerning to current antenatal risk factors, it can be observed that there was a statistically significant difference with obesity generally (p = 0.002). Such as oligohydraminos (p = 0.001) &PROM (p = 0.027) & preterm labour (p = 0.012).On the other hand, obesity no statistically significant difference with hypertension, Diabetes mellitus and fetal macrosomia (p = 0.303, p = 0.417, p = 0.497 respectively).

**Table (5): Prevalence of obesity at Qena university hospital:**

| Items | Number | Total |
|---|---|---|
| **Number of total admission at antenatal ward** | 1191 case | |
| **Number of high risk Obese pregnant women at this ward** | 350 case | ( 350 / 1191 ) * 100 = 29.3 % |

**Table (5)**: This table shows that the prevalence of obesity among high risk obese pregnant women at Qena university hospital was nearly one third (29.3%)

## V. Discussion

Obesity was recognized as a risk factor in pregnancy more than 50 years ago. Since then, numerous retrospective, prospective and case–control studies have demonstrated the association between maternal obesity and various pregnancy complications. This forms a continuum of risk from preconception through to the intra partum and puerperal period. This discussion will provide an overview of the clinical and scientific literature regarding obstetric complications of maternal obesity. **(Greer, et al., 2010).**

Concerning to the prevalence of obesity during pregnancy, the current study reveals that nearly one third of high risk pregnant women had obesity by its classes (29.3%). Nearly more than one half of them were obesity class one (57.4%), while obesity class two about (27.1%), and obesity class three was (15.4%).

Similarly, the prevalence of obesity in the United States has increased dramatically over the past 25 yea rs. NHNES found that in the United States, more than one third of women are obese, more than one half of preg nant women are overweight or obese, and 8% of reproductive-aged women are extremely obese. **(Flegal, et al, 2 012).** Concerning to Socio-demographic characteristics of the obese pregnant women, the current study illustrate s that there was a statistical significant difference between special category >25-34 and obesity .This finding wa s supported by **Aekplakorn ,et al. 2007; Balarajan and Villamor , 2009; Nasreen ,2009; Rayis, et al, 2010 a nd Mustafa,2010.**

Concerning to maternal medical history, it can be observed that there was a statistical significant difference between obesity and medical history generally. It is worth noting that there are significant association between respiratory disease as a medical history and obesity during pregnancy. This finding s may be related to the fact that Pregnancy induces a number of changes to pulmonary physiology and mechanics. Early in pregnancy, the alveolar ventilation is increased and pregnant women have a sense of dyspnea. Obesity has

similar effects on the pulmonary function. Thus, women who are obese and pregnant have minimal to absent pulmonary reserve and are prone to develop hypoxemia easily. **(Vasudevan, 2010).**

The present result illustrates that there was a statistical significant difference between obesity and urina ry stress incontinence as a maternal medical history, this findings may attribute the fact that increasing pressure of the growing uterus and fetal weight on pelvic floor muscles throughout pregnancy when intra-abdominal pres sure increases, pressure inside the bladder becomes greater than the urethral closure pressure, and the urethral sp hincter is not strong enough to close the urethra, resulting in urine leakage. This findings agree with what menti oned before which stated that the Prevalence ranging from 18.6 % to 75 %, **(Sangsawan, B. and Sangsawang, N. 2013, Bø K,,et al ,2012, Moher ,et al ,2009 and Martins ,et al.2010).**

Concerning to premature rupture of membrane, the present study revealed that there was a statistically significant relation between PROM and increasing body mass index. This results similar to (**Chen. etal., 2010, Osaikhuwuomwan, 2010 ; Nohr et al.,2007**), who stated that being overweight or obese before pregnancy, or gaining excessive weight during pregnancy, increased the risk of PPROM due to increasing physical stress that weaken the membrane besides , Obese women are also prone to infections of the genitourinary tract, and during pregnancy the proteases, collagenases, and elastases produced by bacteria can degrade the matrix and collagen of fetal membrane cells, and lead to membrane rupture.As regards to pregnancy induced hypertension there was no statistically significant difference between obesity and hypertension during pregnancy. According to hypertension as a maternal medical history and current antenatal risk factor there was no association between hypertension and obesity classification .This findings may be due to the size of the sample was not large enough to prove the association .But, it is worth noting that hypertension as family history of pregnant women significantly associated with increasing body mass index. This finding was similar to a significantly higher rate of pregnancy induced hypertension among obese pregnant women. P<0.001, (**Aghamohammadi, 2011).**

The present study revealed that there was no statistical significant difference between obesity and macrosomic fetus. There are studies which stand in opposition, (**Gunatilake & Perlow, 2011**) who stated that, women with obesity, independent of GDM, have a two-fold increased risk of macrosomic infants. In the same line **Yu et al., 2006**, stated that 17.5 vs. 9% compared to normal-weight women. Mothers of macrosomic infants are at higher risk for stillbirth, birth trauma such as shoulder dystocia, and poor blood glucose control (**McGowan & McAuliffe, 2010).** Also,(**Adesina, et al.,2011**),mentioned that the high rates of macrosomia in this study probably reflect the direct relationship between birth weight and maternal weight. This is further supported by the high rate of normal birth weights among the non-obese.

The present findings revealed that there was a statistical significant difference between obesity and oligohydraminus, this finding may be attributed to the fact that there is a vicious cycle between obesity and other risk factors during pregnancy, so there was indirect relation between obesity and oligohydraminos. It caused by other factors as hypertension, medication taken for hypertension , PROM, post term pregnancy and poor placental perfusion, these factors associated with increasing incidence of obesity and related to that oligohydraminos increased with obesity. It's most common in the last trimester (last 3 months) **(March of dimes, 2009).** There was a study confirm this association reported by **(Syed, et al, 2012)** who reported that Majority (70.7%) in high risk were post-dated pregnancies related to oligohydraminos.

The present study revealed that, there was a statistically significant association between Cesarean Section rate and increasing Body mass Index in the pregnant women. This finding agrees with what was mentioned before, that C-Section increased with increasing body mass index. This may be due to the presence of a combination of factors like inadequately controlled diabetes, hypertension, macrosomia, malpresentations and failure of induction of labour. This findings were consistent with **Aghamohammadi,.(2011) and Hashmi et al, (2010) ;**who found that cesarean section rate in the obese group was significantly high (64.4%, 37.3% ) respectively. The present findings revealed that there was not statistically significant different between preeclampsia as a current risk factor during pregnancy ,and increasing body mass index ,these findings was supported by (**Adesina, et al ., 2011)** who mention that the prevalence of preeclampsia was not significantly different ,(p value =0.59) (6.8%). This study stand in opposite with, (**Park et al, 2011**), who stated that the occurrence of preeclampsia was about (6.6%) with highly significance value in relation with obesity.

Several studies showed that the risk of preeclampsia is statistically significant associated with high BMI, **(Athukorala , et al., 2010) , ( Baksh. Et al., 2005),**

Preeclampsia is considered to be a systemic intravascular inflammatory response to pregnancy, with similarities to the obesity-induced inflammatory state .Obesity is associated with the development of preeclampsia, and both preeclampsia and obesity are independently associated with dyslipidemia, hyperinsulinaemia, and glucose intolerance (**Walsh, 2007).**

Concerning Diabetes Mellitus, the present findings revealed that there was no statistical significance difference between Diabetes Mellitus as maternal medical history, and as a current antenatal risk factors and obesity classes. This may be due to during pregnancy, the secretion of human placental lactogen, human chorionic gonadotrophin, and steroid hormones increase the resistance of target tissues to insulin. Obesity is an

independent risk factor for diabetes even in the non pregnant state. The risk of developing gestational diabetes mellitus (GDM) is about two, four, and eight times higher among overweight, obese, and severely obese women, respectively. (**VASUDEVAN , 2010)**.

**Adesina et al, 2011**, reported that risk of diabetes mellitus didn't had a significance value with obesity (p= 0.54). One study found that obesity was significantly associated with an increased risk for gestational diabetes mellitus **(Israel et al., 2011).**

As noted from the current study, there was a statistical significant difference between preterm labour and increasing body mass index .This finding may related to increased systemic inflammatory process, malnutrition which consider as a factor in the cause of preterm birth and decreased intake of calories, proteins, vitamins, and Minerals, which often are associated with decreased BMI, may explain the higher rate of preterm birth in pregnant women with low weight gain. This is supported by **Khatibi, et al., 2012,** who stated that increased body mass index was associated with an increased risk of PTD.

In literature, there is disagreement about the risk for preterm delivery in obese women. Some studies suggest a decreased risk, others an increased risk or even no difference compared with pregnant women with a normal BMI. **( Guelinckx, et al .,2007).**

The present study revealed that there was no statistical significant difference between obesity and macrosomic fetus. There are studies which stand in opposition, (**Gunatilake & Perlow, 2011**) who stated that, women with obesity, independent of GDM, have a two-fold increased risk of macrosomic infants. In the same line **Yu et al., 2006**, stated that 17.5 vs. 9% compared to normal-weight women. Mothers of macrosomic infants are at higher risk for stillbirth, birth trauma such as shoulder dystocia, and poor blood glucose control (**McGowan & McAuliffe, 2010).** Also,(**Adesina, et al.,2011**),mentioned that the high rates of macrosomia in this study probably reflect the direct relationship between birth weight and maternal weight. This is further supported by the high rate of normal birth weights among the non-obese.

By studying the relation between post term pregnancy and increasing body mass index, the result of the current study showed that there is statistical significant difference between post term pregnancy and body mass index. This result may be attributed to the fact that there is a vicious cycle between obesity as an independent risk factor during pregnancy and other complications, as obesity reduce spontaneous delivery and oligohydraminos, all this lead to post date of pregnancy.

There was a study stands in contradiction with this result stated that the change of having postdates may be slightly lower among obese women (R. R 0.79). (**salah, et al 2009).**

The present findings revealed that there was a statistical significant difference between obesity and oligohydraminus, this finding may be attributed to the fact that there is a vicious cycle between obesity and other risk factors during pregnancy, so there was indirect relation between obesity and oligohydraminos. It caused by other factors as hypertension, medication taken for hypertension , PROM, post term pregnancy and poor placental perfusion, these factors associated with increasing incidence of obesity and related to that oligohydraminos increased with obesity. It's most common in the last trimester (last 3 months) **(March of dimes, 2009).** There was a study confirm this association reported by **(Syed, et al, 2012)** who reported that Majority (70.7%) in high risk were post-dated pregnancies related to oligohydraminos.

## VI. Conclusions And Recommendations

The recent concern over maternal obesity is not surprising considering the increased national focus on the topic over the past decade, because of its high prevalence and causal relationship with serious medical and obstetric complications.

1- The result concluded that the hospital-based rate of obesity among high risk pregnant women at Qena University Hospital was one third of the total flow of pregnant women at this hospital.
2- Obesity among high-risk pregnancy was ranged from class one which represent about more than half of the sample (57.4%), class two (27.1%) and obesity class three (15.4%) with Mean ± SD 1.5800 ± 0.74415.
3- Complications of obesity increased among high risk pregnant women such as previous caesarean section rate (38.3%), PROM were (13.4%), pregnancy induced hypertension (11.7 %), other risk factors about (16.3 %).

## VII. Recommendations

**On the basis of the most important findings of the study, the following recommendations are suggested**:

- Preconception assessment and counseling should include the provision of specific information concerning the maternal and fetal risks of obesity in pregnancy and encouragement to undertake a weight-reduction program.
- At the initial prenatal visit, height and weight should be recorded for all women to allow calculation of BMI from pre-pregnancy and instructions for ideal weight gain should be reviewed both at the initial visit and periodically throughout pregnancy.

- Nutrition consultation should be offered to all overweight or obese women, and they should be encouraged to follow an exercise program. Nutrition and exercise counseling should begins from pre-puberty, during pregnancy, continues postpartum and before attempting another pregnancy.

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