Women's Knowledge About risk of excessive Gestational Weight Gain Risks at Selected Maternal and Child Health Centers at Minia District

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Abstract

Background: Obesity and overweight are on the rise in all age groups around the world, particularly in low- and middle-income countries. Given the connection between pre-pregnancy and obesity (BMI 30 kg/m2), excessive gestational weight gain (GWG), and post-partum weight retention (PPWR), these conditions are being viewed as emerging public health threats, with negative short- and long-term maternal and child outcomes. **Aim of the study:** To assess women's knowledge about risk of excessive gestational weight gin risks at selected maternal and child health centers at Minia district. **Design**: a descriptive research design. **Setting:** The study was conducted in Maternal and Child Health centers (MCH) at Samalut and Matay Centers affiliated to Minia Governorate. **Sample**: A convenient sample of 332 pregnant women was selected. **Two Tools were used**: the **first tool** is interviewing questionnaire was developed by the investigator to collect data and consist of two parts; **Part (I):** includes personal Character Part **(II):** knowledge of women regarding maternal nutrition during pregnancy. **Second tool** is Knowledge Assessment tool contains knowledge about weight gain during pregnancy to assess pregnant women knowledge about excessive weight gain during pregnancy and its risks. **Results**: 30.7% of pregnant women their age ranged from 20-24 years with a mean age 32.5 ± 0.939, while 10.2% of them their age ranged from 35-39 years. Half percent of pregnant women their body weight ranged from 50 to 70 kg, the mean body weight was 73.8 ± 11.7 kg and the mean height was 164.2± 11.7 cm. More than three quarters of pregnant women have unsatisfactory knowledge score. There is no statistically significant correlation between pregnant women knowledge and pregnancy complication. **Conclusion**: The level of knowledge about excessive weight gain during pregnancy and its effects was unsatisfactory. **Recommendation**: suggested that health education services be developed as a primary prevention of excessive weight gain in high-risk pregnant women.

Key Words: Excessive gestational weight gain, knowledge, pregnancy, risks.

Introduction

Excess weight is increasingly growing in all age groups worldwide, especially in countries with low and medium incomes. Given the association with negative short- and long-term maternal and child outcomes, pre-pregnancy obesity (body mass index, BMI 30 kg/m2), excessive gestational weight gain (GWG) and post-partum weight retention (PPWR) are seen as new public health challenges. Such findings include, later in life, obstetric or neonatal complications, obesity, type 2 diabetes (T2D) and cardiovascular diseases (CVD). Several adverse pregnancy effects are associated with excessive gestational weight gain (GWG).Obesity is more common, the occurrence of complications associated with being overweight during pregnancy, such as increased rates of hypertensive pregnancy disorders, foetal macrosomia, and caesarean birth rates, is growing, with more women entering pregnancy today with an elevated body mass index (BMI) **(Kominiarek et al., 2017).**

Guidelines for gaining weight from the Institute of Medicine (IOM) are widely accepted and endorsed by the American College of Obstetricians and Gynecologists (ACOG) and other professional organizations around the world. Lower weight gain ranges for women with higher pre-pregnancy BMI are recommended by the IOM weight gain guidelines, which were revised in June 2009 but are still close to those published in 1990. Many epidemiological evidence suggest that women who gain outside of them have better perinatal results than women who gain within these guidelines. Preterm delivery, gestational diabetes, caesarean birth, low birth weight, macrosomia, neonatal morbidity, and

postpartum weight retention are outcomes associated with weight gain outside of the guidelines. New research has also shown a link between higher maternal weight gain and childhood obesity **(Olson et al., 2013).**

Excessive gestational weight gain can lead to a lifetime of unhealthy mother and baby weight (The recorded incidence of high gestational age (LGA) neonates was 31 percent in a study of 180 obese pregnant women with BMI > 40 kg/m2).Other results noted that offspring born to mothers who acquired unnecessary pregnancy weight had a higher risk of being overweight or obese (27% to 73%) opposed to offspring whom mothers acquired ample weight. Throughout infancy and into adulthood, these macrosomic infants may experience obesity, with greater risks of getting diabetes, heart disease or other metabolic disorders **(Parikh et al, 2017).**

Pregnancy excess weight is linked with an increased incidence of pregnancy complications; an increased risk of postpartum problems may also be associated with it. In women with normal BMI, an increase in BMI during pregnancy was related to increase of 0.4 percentage points in postpartum infection rates, and an increase in more than one group of BMI was associated with an increase of 3.2 percentage points. The related rises were 2.2 percentage points and 1.2 percentage points for females who were overweight **(Thangaratinam et al., 2014).**

Measures to reduce excessive gestational weight gains tend to be successful, but the findings have been modest and the results are substantially heterogeneous. A recent study showed that obese women who engaged in dietary and

lifestyle intervention gained less kg than women who managed **(Skouteris et al., 2019).**

Public health nurses urge all pregnant women to consume nutritious food, with focus on mother and baby benefits. What to eat and how much to eat during pregnancy are advised. Discuss physical activity for all pregnant females as well. Women are encouraged to stay active as it will support her and her baby and aid her after birth with weight loss. Before increasing this exercise to 30 minutes every day of the week, moderate physical activity is prescribed three days a week in 15 minute bursts **(National Institute for Health and Care Excellence, 2015).**

Significance of the study:

The Eastern Mediterranean Region, including Egypt, excessive weight gain is drastically increasing. The prevalence of obesity and obesity in this area ranges from 74% to 86% among women and 69% to 77% among men **(World Health Organization, 2015)**, in addition, women between the ages 25-64 years had a 41 percent prevalence of obesity as the obesity of Egyptian adult women (BMI ≥30 kg/m2) and extreme obesity (BMI ≥35 kg/m2) increased from the twelfth and tenth highest in the world, it was found that the mean BMI of reproductive aged women increased from 26.31 to 29.2 in a study focused on Egyptian Demographic and Health Surveys. Moreover, the Egyptian Demographic and Health Survey found that during pregnancy, about 66 percent of married females aged 25-29 experienced excessive weight gain.

Egypt has the fifth highest number of obese women in the world over the age of fifteen, according to the World Health Organization. 75% of Egyptian females, over the age of 30, are estimated to be overweight or obese. Increased perinatal risk is associated with maternal obesity and excess gestational weight gain (GWG).In order to evaluate women's awareness of excessive gestational weight gain risks at Selected Maternal and Child Health Centers in Minia District, this study raises the risks for mothers and infants as Cesessrian section, obstructed labour, gestational diabetes, pregnancy induced hypertension.

Aim of the study

The current study aims to assess women's knowledge about risk of excessive gestational weight gain risks at selected maternal and child health centers at Minia district

Research Questions:

The study will answer the following questions:
- What is the level of knowledge regarding excessive weight gain during pregnancy?
- Is there is a relationship between women' knowledge of excessive weight gain during pregnancy and selected demographic characteristics

Subjects and methods
Research design:

A descriptive study design was utilized.

Setting

The study was conducted at Maternal and child Health centers (MCH) at Matay and Samalut centers. This setting was selected by random methods by putting all centers at Minia governorate in one ball then randomly selected two centers. These centres provide a variety of programmes, including mandatory vaccinations, family planning, antenatal

and postnatal care, and antenatal and postnatal care for women who visit MCH centres for family planning and antenatal care. The city of Matay is an Minia city affiliated to the Minia Governorate, located in the north of the Minya Governorate, bordered on the north by the Bani Mazar Center, and on the south by the Samalut Center, and 41 km away from the city of Minya, the governorate's capital. The city of Samalut is one of the centers of Minya Governorate, which is located 25 km north of Minia.

Sample: A convenient sample of 332 pregnant women attending antenatal care units at Samalout and matay health centers (180 cases from Samalout and 152 case from matay) according to inclusion criteria. All age group, cooperative, women with or without complication, women's with multiple pregnancy, women's diagnosed with diabetes mellitus, hypertension, renal disease, cardiac disease, thyroid, and hyperemesis gravidarum.

Tools:
Tool I: interviewing Questionnaire:-

The investigator created an interviewing questionnaire to collect data, which is divided into two parts:

Part I: personal Characteristics, It consists of (11) items including: Data related to women such as age, residence, educational status, working status, parity, gestational age , weight, height and BMI. Medical and Obstetric history (Number of gravid a, Number of delivery, Number of abortion, pregnancy spacing, complication during pregnancy.

- From Q1 to Q 8 assessed the demographic data of the studied subjects such as age, level of education , working status, No of delivery, gestational age, weight, height and body mass index
- From Q9 to Q 13 assessed the medical and obstetric history of the studied subjects such as No of pregnancies, No of deliveries, No of abortion, birth spacing between each pregnancy and complication during pregnancy.

Part II: knowledge of women regarding maternal nutrition during pregnancy, It includes (15) questions to assess of woman knowledge about nutrition during pregnancy. It consisted of two option yes or no option. From Q14 to Q 28.

Tool II : Knowledge Assessment Tool of weight gain during pregnancy: It consists of (30) inquires to assess of woman knowledge about weight gain , risks for mother and baby, Women's knowledge about safe and effective management of weight gain in pregnancy with response (Yes, No)(**Phelan et al., 2014).**

The Questionnaire was developed by investigator after reviewing national, international literature, textbook and magazines to assess pregnant women knowledge about excessive weight gain during pregnancy and its risks, the instrument consists of fifteen statements: The format of the all-statements included the (Yes, No) .

Scoring System:-
For knowledge outcomes, correct responses will be scored as (One), while incorrect and "don't know" responses will be scored as (Zero). The total knowledge scores will 45. Scores ≤ 22.5 (50%) will classified as unsatisfactory level of knowledge, scores > 22.5 (50%) will classified as satisfactory level of knowledge

Validity of Content:

The validity of the data collection methods, such as an interviewing questionnaire and an awareness assessment method for weight gain during pregnancy was tested by five experts in community health nursing, community medicine, and obstetric nursing. Content coverage, item order, consistency, relevance, applicability, wording, duration, style, and overall appearance were all assessed. Minor changes, such as rephrasing and rearrangement of certain sentences, were made in response to expert feedback and suggestions.

Reliability

The Cronbach's alpha coefficient was used to test the interview questionnaire's internal accuracy. A Cronbach's alpha coefficient of 0.00 means there is no reliability, while a coefficient of 1.00 means there is perfect reliability. A reliability coefficient of 0.70, on the other hand, is sufficient. Cronbach's alpha for reliability testing was performed for interviewing questionnaire was 0.78 and knowledge assessment tool of weight gain during pregnancy was 0.813.

Pilot Study

A pilot study was conducted before starting data collection on 10% of pregnant women who were excluded from the sample. The tools were administered to 30 pregnant women in MCH centers at Matay and Samalout centers after obtaining permission from the MCH centers authority. The aim of pilot study was to test the clarity of the tools and to estimate the time required to fill the sheets which was 20-30 minute according to the needed explanation. Based on the result of pilot study, the necessary modification in the sheets was done.

Ethical Concern

The ethics and study committee of Minia University's Faculty of Nursing gave their written approval. To gain their cooperation, oral consent was obtained from each participant after describing the purpose and objectives of the research. For the sake of privacy and confidentiality, each evaluation sheet was coded and the subjects' names were not printed on the sheets. Subjects had the option to withdraw from the study at any time.

Study Procedure

The Dean of the Faculty of Nursing at Minia University granted permission to conduct the research.

Following ethical committee approval at Minia University's Faculty of Nursing, an official letter from the directors of MCH Centers at Matay and Samalout was obtained for data collection. This letter included a brief description of the study's goals, as well as a request for permission.

In 2019, the investigator created data collection methods after conducting an exhaustive analysis of applicable national and international literature. Five experts in the field of nursing from Minia University's faculty of nursing and faculty of medicine updated the study tools in order to assess their material validity and feasibility. The required modifications included rephrasing and rearrangements of some sentences. Prior to data collection, a pilot study of thirty pregnant women was performed, with those who were not included in the study being omitted.

From August 2019 to January 2020, the investigator visited MCH centres twice a week (on Saturdays and Tuesdays) to recruit the study sample. According to inclusion criteria, all pregnant women who visited an antenatal care unit at an MCH centers for antenatal care services (6:8 women per week) were chosen. The average number of interview subjects per day was four, and the average time spent on each was about 20-30 minutes, depending on the individual's response.

After obtaining oral consent from each participant pregnant woman and describing the purpose and goals of the study to gain their cooperation, the pregnant women were interviewed. The questionnaire was introduced for the pregnant women to fill out, unless the participant was unable to read or write, in which case the investigator filled it out. The investigator read the questions to the participant and recorded their exact responses. Participants were given the opportunity to ask questions and receive explanations.

Statistical analysis

The statistical package for social science (SPSS) version 20 was used to collect, tabulate, and analyse the data. Numbers and percentages were used to represent descriptive data. The mean and standard deviation were used to present quantitative data. The Chi square test was used to see if there was a connection between two qualitative variables or if there was a difference between two or more proportions. Correlation was calculated between knowledge, birth spacing. Pregnancy complication using Pearson correlation test. Probability (p-value) equal to or less than 0.05 was considered significant in tests of relationships

Results

Table (1). Distribution of Study sample Regarding to their demographic characteristics (n=332)

Demographic variables	Samalout=180		Matay=152		Total=332	
	No	%	No	%	No	%
Age						
- Less than 20 years	36	20.0	33	21.7	69	20.8
- 20-24 years	54	30.0	48	31.6	102	30.7
- 25-29 years	36	20.6	32	21.1	68	20.5
- 30-34 years	36	20.0	23	8.6	59	17.5
- 35-39 years	18	9.4	16	17.1	34	10,2
Mean ± SD = 32.5 ± 0.939						
Education						
- Illiterate	72	40.0	64	42.1	136	41.0
- Preparatory	76	42.2	57	37.5	133	40.0
- University	32	17.8	31	20.4	63	19,0
Occupation						
- Employed	36	20.0	27	17.7	63	19.0
- House wives	144	80.0	125	82.3	269	81.0

Table (1) shows that, 30.7% of study subject their age ranged from 20-24 years with a mean age 32.5 ± 0.939, while 10.2% of them their age ranged from 35-39 years. In addition 81% of ware house wives. Their educational level revealed that 41% of women are illiterate and 40 % had preparatory education and 19% had university.

Table (2). Distribution of study sample regarding to their anthropometric measurement (n=332)

Anthropometric measurements	No	%
-Body weight / kg		
- 50-70	132	39.7
- 71-90	166	50.
- More than91	34	10.3
Mean ± SD =73.8 ± 11.7		
Height /cm		
- 150-160	93	28.0
- 161-170	170	51.2
- More than 171	69	20.8
Mean ± SD =164.2 ± 6.4		
Body mass index		
- 20-<25	34	10.2
- 25-<30	201	60.5
- 35+	97	29.3
Mean ± SD =30.4 ± 4.3		

Table (2) illustrates that,half 50 % of study subjects women their body weight ranged from 50 to 70 kg, the mean body weight was73.8 ± 11.7 kg. Regarding the mean height of study subjects was164.2± 11.7 cm. The body mass index of study subjects ranged from 25 to -<30 in 60.5% of study subjects with a mean 30.494 ± 4.323.

Table (3). Distribution of study sample regarding their mdical and obstetric history (n=332)

Medical and obstetric history	No	%
Number of pregnancies		
- One time	137	41.3
- Twice	102	30.7
- Three time	30	9.0
- More than three	63	19.0
Number of delivery		
- One Time	234	70.5
- Twice	64	19.3
- More than three	34	10.2
Number of abortion		
- No	235	70.8
- One time	97	29.2
Age of gestation		
- From 24-34 Week	132	39.8
- From 35-36 Week	98	29.5
- From 37-41 Week	34	10.2
- From 41 and more	68	20.5
Complication during pregnancy		
- No	201	60.6
- Preeclampcia	63	19.0
- Gestational Diabetes	34	10.2
- Abortion	34	10.2

Table (3) shows that, 41.3% of study subjects hade one pregnancy and 9% hade three pregnancies. Regarding their Number of deliveries 70.5% have one delivery, 19.3% have two delivery and 10.2% hade more than three deliveries. Regarding number of abortion 70.8% have no abortion but 29.2% have one abortion. Regarding age of gestation 39.8% have 24 to 34week, 29.5% have 35 to 36 week and 10.2% have 37 to 41weeksof gestation. Regarding complication during pregnancy 60.6% of study subjects have no complication, 19% have preeclmpcia, and 10.2% have gestational diabetes.

Table (4). Distribution of study subjects regarding their knowledge about weight gain during pegnancy (n=332).

Knowledge about weight gain during Pregnancy	Yes		No	
	No	%	No	%
Think about the healthy weight that you should increase during pregnancy?	234	70.5	98	29.5
During pregnancy, she should not gain any weight.	69	20.8	263	79.2
Increase in weight about 5-9 kg (11-20 lbs)	132	10.2	200	89.8
Increase in weight about 7-11 kg (15-25 lbs)	34	10.2	298	89.8
Increase in weight about 11.5-161 kg (25-35 lbs)	98	29.5	234	70.5
Increase in weight about 16.5-18 kg(28-40 lbs)	136	42.0	187	58.0

Table (4) illustrates that, knowledge about weight gain during pregnancy 79.2 % of study subjects reported no weight gain during pregnancy should not increase, 89.8% answered no about increase in weight about 5-9 kg, 70.5% answered no about increase in weight about 11.5-161 kg and 58% answered no about increase in weight about 16.5-18 kg.

Table (5); Distribution of Study Sample regarding their Knowledge about the safe and effective way to gain weight during pregnancy (n=332).

Knowledge about the safe and effective way to gain weight during pregnancy	Yes		No	
	No	%	No	%
Multiple meals	332	100.0	0	00.0
Eat two meals	132	39.8	200	60.2
Removing fats from meat	34	10.2	298	89.8
Stop eating after 8 pm at night during pregnancy	297	89.5	35	10.5
Choose milk and its low-fat products	132	39.8	200	60.2
Eat a little cake and chocolate	132	39.8	200	60.2
Drink a little soft drink	166	50.0	166	50.0
Drink a lot of fruit juice	63	19.0	269	81.0
Eat a lot of fruits and vegetables	98	29.5	234	70.5
Eat a little fast food	68	20.5	264	79.5
Eat a little fried food	30	9.0	302	91.0
Eat foods that contain less carbohydrates	29	8.1	303	91.3
Drink milk together instead of cow's milk	29	8.1	303	91.3
Eat organic meals	137	41.3	195	58.7

Table (6) illustrates that, Knowledge about safe and effective way to gain weight during pregnancy, all study subjects reported they should take multiple meals, 60.2%reported no two meals, 10.2% remove fats from meets, 89.5% stop eating after 8 pm at night during pregnancy, 60.2% reported no regarding to eat a little cake and chocolate. In addition 81.0%, 70.5%, 79.5%, 91.0%, 91.3%, 58.7% respectively of study subjects answered no regarding the following drink a lot of fruit juice, eat a lot of fruits and vegetables, eat a little fast food, eat a little fried food, eat foods that contain less carbohydrates and eat organic meals respectively.

Table (6).Distribution of Study Subjects regarding their Knowledge regarding Women' risks (n=332) .

Women' risks	Yes		No	
	No	%	No	%
Gestational diabetes	297	89.5	35	10.5
Preeclampsia	297	89.5	35	10.5
Preterm labor	132	10.2	200	89.8
Cesarean Section (CS)	268	80.7	64	19.3
High blood pressure during pregnancy	297	89.5	35	10.5
Weight retention after delivery	268	80.7	64	19.3
Obesity	68	20.5	264	79.5
Shoulder dystocia	137	41.3	195	58.7

Table (6) illustrates that, Knowledge regarding women' risks 89.5%of study subjects answered yes regarding to gestational diabetes, preeclampsia, and high blood pressure during pregnancy are common women risks. While 89.8% of study subjects answered no regarding preterm labor as risk, 79.5% and 58.7% also said no about obesity and shoulder dystocia as women risks.

Table (7).Distribution of Study Subjects regarding their Knowledge regarding Child's risks (n=332) .

Knowledge regarding Child's risks	Yes		No	
	No	%	No	%
Increase baby weight above normal	332	100.0	0	00.0
Increase gestational weight above normal	297	89.5	35	10.5
Childhood obesity	229	69.0	103	31.0
A dead child	297	89.5	35	10.5
Lower pregnancy life than normal	297	89.5	35	10.5
Congenital anomalies	268	80.7	64	19.3

Table (7) illustrates that, Knowledge regarding child risks 89.5%of study subjects answered yes regarding to increase gestational weight above normal, a dead child, and lower pregnancy life than normal but 69% of study subjects answered yes about childhood obesity as child risks and 80.7% as congenital anomalies
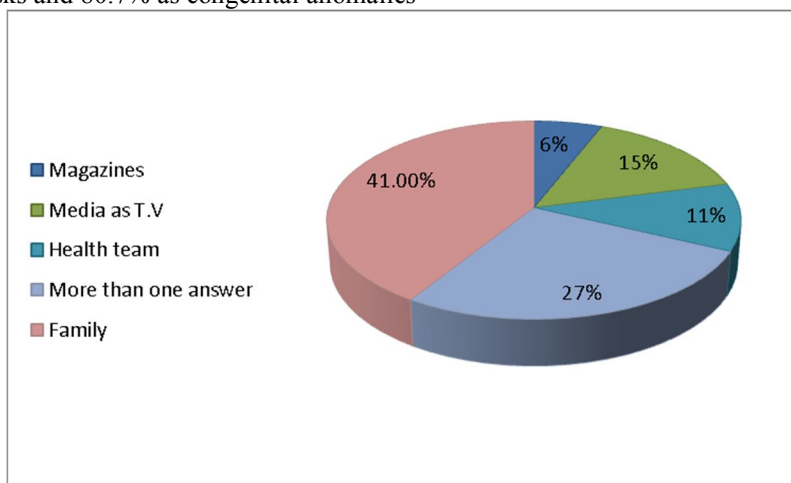
Figure (1) Distribution of study sample regarding their Source of Getting Information (n=332)

Figure (1) illustrates that, 41% of study subjects obtained their information regarding excessive weight gain during pregnancy from their families as their mothers, and grand-mothers, while 27% from more than one sources, 15% get information from social media as T.V and 6 % of women obtained their information from Magazine and Newspaper.

Table (8): Correlation between overall scores of women knowledge and Pregnancy complication (n=332)

Variables	Knowledge	Pregnancy complication
Knowledge		
- r.Value	1	-.060-
- P.Value	-	.277
Pregnancy complication		
- r.Value	-.060-	1
- P.Value	. 277	-

Table (8): reveals that there is no statistically significant correlation between pregnant women knowledge and pregnancy complication.

Table (9): Relation between knowledge of study sample and their some demographic variables (n=332).

Variables	Satisfactory		Un satisfactory		Chi	P
	N	%	N	%		
Age						
- Less than 20 years	15	4.5	54	16.3		
- 20-24 years	23	6.9	78	23.4		
- 25-29 years	14	4.2	54	16.3	118.5	0.000
- 30-34 years	15	4.5	44	13.4		
- 35-39 years	9	2.7	26	7.8		
Education						
-illiterate	30	9.0	106	54.4		
-Preparatory	30	9,0	103	31.0	40.7	0.03
-University	60	18.0	3	0,9		

Significant at (p-value <0.01)

Table (9): point's relation between knowledge of study sample and their some demographic variables wasa positive statistically significant relationship between knowledge score and age and education p value 0.000 and 0.03 respectively

Discussion

Prevalence rates of maternal obesity (pre pregnancy BMI>30kg/m2) differ across high-income countries, with 7.1 percent of pregnant women in Poland (the lowest European rate), 21% in the United Kingdom, and 31.8 percent in the United States (**National Maternity and Perinatal Audit, 2017**). Obesity rates among women of reproductive age in low and middle income countries range from 1% in Ethiopia to 39.6% in Egypt (**PostonL et al., 2016**). Obesity is linked to poor pregnancy outcomes, but a secondary review of a major study (Birthplace) discovered that over 60% of women with obesity but no other comorbidities or complications prior to term labour had vaginal deliveries with no maternal complications or intervention, and over 95% had births without neonatal unit admission or perinatal death (**Hollowell et al., 2016**).

Premature birth, low birth weight, intrauterine growth retardation, and iron deficiency anaemia are all risks associated with pre-gestational underweight. Obesity, on the other hand, is linked to gestational diabetes (GD), macrosomia, foetal prematurity, postpartum haemorrhage (PPH), and neonatal admission to a neonatal intensive care unit (NICU). Low weight gain during pregnancy is often linked to an increased risk of miscarriage, low birth weight, prematurity, and neonatal mortality, while excessive weight gain can lead to a variety of gestational complications, including GD and foetal macrosomia. As a result, an ideal BMI (between 18.5 and 24.9kg/m2) at conception is needed, as well as weight gain that follows the Institute of Medicine's (IOM) guidelines (**Gaudet et al., 2014**).

So that this study was conducted to assess women's knowledge of excessive gestational weight Gain Risks at Selected Maternal and Child Health Centers at Minia District.

Regarding demographic characteristics of study sample in present results showed that, more than one quarter (30.7%) of study subject their age ranged from 20-24 years with a mean age 32.5 ± 0.939, while minority (10.2%) of them their age ranged from 35-39 years. This finding agreed with studies conducted by **Ebrahimi et al, (2015),** found that median age was (26-35) years, **and Jennifer et al, (2015),** revealed that majority of the sample from age group (20-30) years. Contrary to this finding (**Bookari et al., 2016) in Australi,** found that the majority were in age group 30–39 years.

Regarding the educational level the findings, illustrated that fewer than half of women (41%) are unable to read and write. and (40.0 %) had basic education and minority (19%) had university. Contrary to the current study findings **Abdulmalek and Muhamadamian, (2017)**, in their study of the knowledge toward obesity and gestational weight gain of pregnant women who found that, two third of the study sample were from primary and secondary schools graduates (62.1.8%), and was supported by another study conducted in Erbil city by (**Mikha, 2013**) which reported that the majority of result were secondary school graduated. This was not similar to the results that were reported in Australia (**Shubet al, 2013),** (51.6%) were a tertiary education, in African American, (59%) were a college education, and in Australia (**Bookari et al., 2016**) reported that high school completed (19 %), Tertiary education (56.7%) and more than half (56%) held a university degree. In addition **UNICEF**, (**2014**) the percentage of the illiterate in Duhok was (50.5%).

Concerning the occupation the current study revealed that majority (81%) of subjects were house wives. This result was not similar to the results of the studies done in Erbil city by (**Mikha, 2013**), which showed (71.4%) of sample were housewives. And not similar to the studies were

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done in Australia (**Bookari et al., 2016**) which revealed that (85.5%) and (67.5%) of sample were housewives respectively.

Regarding to anthropometric measurement: The present study revealed that half (50 %) of study subjects their body weight ranged from 50 to 70 kg, the mean body weight was 73.8 ± 11.7 kg. Regarding the mean height of study subjects was164.2± 11.7 cm. The body mass index of study subjects ranged from 25 to -<30 in 60.5% of study subjects with a mean 30.4 ± 4.3. Nearly similar result in study done by **Shub etal(2013)** they discovered that BMI graded 50.7 percent of women as average weight (BMI 20-24.9 kg/m2), 28.0 percent as overweight (BMI 25-29.9 kg/m2), and 21.2 percent as obese (BMI 30). Of the women classified as obese, 54.7 percent were classified as obesity class I (BMI 30.0-34.9 kg/m2), 26.7 percent as obesity class II (BMI 35.0-39.9 kg/m2), and 18.7 percent as morbidly obese.

Regarding number of pregnancy the present findings showed that more than one third (41.3%) participants had one pregnancy and minority (9%) hade three pregnancies. Contrary to present study finding (**Abdulmalek and Muhamadamian 2017**) which found that primigravida was (41.8%) and multigravida was (58.2%), compared to the studies that were done: in Australia (**Shubet al, 2013)** , **(**48.4%) of the women were nulliparous, and in United State (African women) 48% were nulliparous.

Regarding to Knowledge about weight gain during Pregnancy: The current results showed that more than three quarters (79.2 %) of study subjects reported no weight gain during pregnancy should not increase, the majority (89.8%) answered no about increase in weight about 5-9 kg, more than half (70.5%) answered no about increase in weight about 11.5-161 kg and (58%) answered no about increase in weight about 16.5-18 kg.

This finding is consistent with a research conducted by **Abdulmalek and Muhamadamian (2017),** who discovered that many pregnant women in his study were unaware of the weight gain during pregnancy; approximately 62.5 % of pregnant women didn't know the best weight gain during pregnancy, and 20.3 % believed the best weight gain during pregnancy is 10-15 kg, while 14.8 % believed the best weight gain during pregnancy is 15-20 kg. The best weight gain during pregnancy, according to 14.8 percent, is 5-10 kg. If pregnant women do not have or seek accurate information about the GWG recommendations, or are already aware of such information, this can help to explain the high rate of noncompliance with the GWG recommendations (**Downs et al., 2014).**

Data related to, Knowledge regarding women' risks the current study showed that majority (89.5%) of study subjects reported that gestational diabetes, preeclampsia, and high blood pressure during pregnancy were common women risks. In addition to most study subjects 89.8% were unaware that preterm labor as risk, and shoulder dystocia as women risks. Also current study showed that majority of study subjects (89.5%) know the child risk from excessive weight gain during pregnancy as the following lower pregnancy life than normal but more than two third know (69%) know childhood obesity as child risks and 80.7% as congenital anomalies

This result was in line with study done by **Abdulmalek and Muhamadamian (2017)** who found that the plurality of studied population thought that the excess weight gain during pregnancy do not affect all the following as: the need for caesarean section, baby dies before delivery

(44.3%), having problems with delivery, giving a small baby, large baby, having a baby with a structural abnormality, having high blood pressure and abortion with no relationship between obesity and that problems.

Furthermore, **Truong et al., (2015)** reviewed previous research on excessive weight gain during pregnancy and its connection to macrosomia, gestational diabetes, gestational hypertension, preeclampsia, and caesarean delivery. **Truong et al. (2015)** looked at a group of nulliparous women who gave birth between 2011 and 2012. They discovered that women who gained more weight than the prescribed GWG were 1.5 to 2.5 times more likely to experience gestational complications. Pre-eclampsia, gestational diabetes mellitus (GDM), instrumental or operative delivery, failed induction, foetal macrosomia, neonatal hypoglycemia, and other complications are all linked to maternal obesity, excessive gestational weight gain (GWG), and obesity in infants and children, as well as perinatal mortality. In the developing world, maternal obesity is the single most important modifiable factor in stillbirth, according to **Beyerlein et al., (2018).** Overweight and obese pregnant women are less likely than women of average weight to accurately measure their own BMI, and overweight women who underestimate their BMI are more likely to gain weight throughout pregnancy.

Compared with (**Elias, 2015**) who found that the lowest perception was to the risk of spinal bifida (46%), and the highest perception was to the risk of shoulder dystocia (90%). In Iraq by (**Al-Kubaisy, 2014),** the need for caesarean section was in 38% of his studied sample compared with 17.1% in other study. **Hooker et al., (2013) in New Zealand** who found that many pregnant women were conscious of the complications of excess GWG, but great number was not aware of the extent of risks, with the majority of them underestimating risks as 64% of women were aware that there is high risk for a Small for gestational age (SGA) in obese women, and only 26.5% identified the risks for shoulder dystocia. Furthermore, (**Shub et al, 2013**) claimed that excess GWG or obesity was linked to an increased risk of pregnancy complications, but their understanding of these risks was limited. Preeclampsia or blood pressure issues were identified by 27.8% of women, and gestational diabetes was identified by 51%.

Caesarean section, operative delivery, preterm birth, and postterm delivery were all reported by less than 5% of women as being linked to maternal BMI or GWG. Obesity or GWG could cause neonatal complications, according to 72.8 percent of respondents, and macrosomia was indicated by 18.4 %. In addition **Haugen et al, (2014)** discovered that pregnant women had a low understanding of the prenatal complications associated with excess maternal weight, and that there were no substantial variations in women's awareness of many common obesity-related pregnancy complications across BMI categories.

Improving pregnant women's knowledge about maternal and fetal complication of overweight/obesity and excess GWG during the premarital period and during pregnancy may motivate women to manage and avoid excessive GWG, and improve health outcomes for herself and her baby.

Knowledge about the safe and effective management of weight gain during pregnancy the present findings illustrated that Study subjects were found to hold many in-correct knowledge about safe weight management in pregnancy all study subjects reported they should take

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multiple meals, more than one third (39.2%) reported eating two meals, minority (10.2%) remove fats from meets, majority (89.5%) stop eating after 8 pm at night during pregnancy, more than one third (39.8%) reported eating a little cake and chocolate. This finding correlated with study done by **Shub et al, (2013)** who reported more than a third of women claimed that consuming an organic diet, drinking more fruit juice, not eating after 8 p.m., or preferring full fat dairy products is healthy ways to control weight gain during pregnancy.

Regarding sources of obtaining information the present findings showed that more than one third (41%) obtained their information regarding excessive weight gain during pregnancy from their families as their mothers, and grand-mothers, while more than one quarter (27%) obtain their information from more than one sources, minority (15%) get information from social media as T.V, and 6% of women got their knowledge from magazines and newspapers. Contrary to present study finding **(Abdulmalek** and **Muhamadamian, 2017)** which found that 41.3% agreed that using internet for any information about weight during pregnancy may help, while only 1.3% of them thought that attending a class in the antenatal care (ANCs) about healthy eating during pregnancy will help

Concerning the correlation between women knowledge and pregnancy complication. The present findings revealed that there is significant correlation between women knowledge and pregnancy complication. This finding agree with study finding **by (Abdulmalek and Muhamadamian 2017)** which found that relation significant statistical association between pregnant women's knowledge toward obesity and gestational weight gain with their parity regarding their thought of weight gain during pregnancy, increasing chances of delivery baby in normal vaginal delivery, needing a caesarean section, baby dies before delivery, giving baby birth to a small baby, giving baby birth to a large baby and having a baby with structural abnormality

As regard relationship between total knowledge score and some demographic characteristics (age and education level). The present study showed that a positive statistically significant relationship between knowledge score and age and education p value 0.000 and 0.03 respectively. Similarly to present study finding **(Abdulmalek and Muhamadamian 2017)** which found that significant statistical association between pregnant women's knowledge toward obesity and gestational weight gain with their educational level regarding their thought of weight gain during pregnancy increasing only chance of delivery baby in vaginal delivery.

Conclusion

According to the results of this research, there was an unsatisfactory level of knowledge about excessive weight gain during pregnancy and its effects, and the majority of women got their information about excessive weight gain during pregnancy from their mothers and grandmothers. Women's ability to effectively overcome these issues during pregnancy can be limited by their lack of awareness of their personal BMI, gestational weight gain goals, and effective weight loss strategies.

Recommendations:
- The findings of the study illustrate the importance of establishing health education services as a primary prevention of excessive weight gain in high-risk pregnant women.
- Carrying too much weight during pregnancy can have negative effects on the foetus, increasing the child's risk of obesity later in life.
- Counseling on maternal diet also provides an opportunity to discuss feeding these same healthy and varied foods to infants and young children, who eat junk foods as well.
- Encourage research into health promotion campaigns aimed at preventing unnecessary weight gain during pregnancy.
- The effects of psychological influences on real GWG, such as depression, stress, social support, and attitude toward GWG.
- Further research to identify facilitators and barriers to health care providers implementing GWG guidelines in their clinical practice.

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