

DIETARY ASSESSMENT AND NUTRITION PATTERN OF MATERNAL WITH GESTATION DIABETES AT MISURATA MEDICAL CENTRE

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Abstract

Background: The gestational diabetes mellitus (GDM) is yet another pregnancy complication for a pregnant woman, GDM happens when the body fails to produce enough insulin to regulate the sugar in blood. A healthy dietary regimen and eating behavior regarding GDM is a necessarily to ensure the health and development of pregnancy stages. **Objectives:** This study was conducted to assess nutrition patterns of gestation diabetes, also to correlate fasting blood glucose and HbA1c with anthropometric parameters, lifestyle and dietary pattern of maternal with GDM at Misurata. **Materials and methods:** Hospital-based cross section study was performed on 150 participants, whose selected randomly from Misurata Medical Centre (MMC). The data were collected thoroughly structured questionnaire and patient file. **Result:** The majority of participants (68 %) were fall with age group 20–35 years, greater of maternal at third trimester (55 %), maternal (22 %) had delivered babies with birth weight than 4 kg. Greater maternal (75 %) had family history with diabetes mellitus, whose diagnosed with polycystic ovary syndrome (19 %) and obesity (72 %) obese. The results revealed that majority of participant (84 %) hadn't therapeutic diet. Highest rates of participants (57 %, 83 %, 80 %) had consumed high glycemic, fast and fatty food. Majority of participants (78 %) had elevated fasting blood glucose (≥ 120 mg/dl). Greater participants (92 %) had elevated HbA1c (≥ 6.5 %). Highly significant correlation ($P \leq 0.01$) of HbA1c and FBS with multi-pregnancies, age, birth weight and multiparty. Whereas, a significant correlation ($P \leq 0.05$) between weight birth, age, multi-pregnancy and abortion. **Conclusion:** the nutrition risks factors associated GDM will threatening health pregnancy unless the maternal committed with therapeutic diet plan.

Keywords: Gestation diabetes, lifestyle, maternal, Misurata, nutrition assessment.

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1. Introduction

Gestational diabetes (GDM) is a temporary condition that is described by increase in the level of sugar in the blood during pregnancy. It is usually occurring in the end of the second trimester to begin of the third trimester of pregnancy (from 14 to 28 weeks). Symptom of the GDM rarely recognized in most women. Possible symptoms like fatigue, excessive thirst, blurred vision, frequent urination, weight loss despite an increased appetite, nausea, and vomiting. However, doctors can diagnose the disease during a routine blood test [1]. Researchers could not completely understand the mainly cause of GDM, but there have found some hormones which increase during gestation, including: human placenta lactogen (HPL), and hormones that increase insulin resistance. These hormones effect on insulin works so the result is accumulating glucose in blood stream that

cause GDM also type 2 diabetes in future. More glucose in blood passes from placenta to the fetal that increase the risk of many problems. The nutrition pattern effect on the status of the women during pregnancy, so if there is no balanced nourishing this will cause some diseases one of them gestational diabetes [2].

The prevalence GDM of in 36 countries was determined in this reference based on several research papers. It was found that some countries have a large number of studies such as the USA, Canada, Australia, China and India, while it was found that most developing countries (such as Africa, South and Central America) lack statistical studies, so the extent of prevalence was estimated using the average of all available data in World Health Organization [3]. Some pregnant women have a high risk of developing GDM, that is determined by these risk factors such as overweight and obesity (before or after pregnancy), a lack of physical activity, past gestational diabetes or pre-diabetes, polycystic ovary syndrome, diabetes in a family history, past delivering a baby weighing more than 9 pounds (4.1 kilograms) or stillbirth, race women, who are Black, Hispanic, American Indian and Asian American have a higher risk of developing gestational diabetes, and women older than 25 [4]. This study was conducted to assess the dietary pattern and nutritional status of maternal with gestation diabetes, during their follow-up at Misurata Medical Centre.

2. Materials and Methods

2. 1. Location of study area

The study was performed in MMC at Misurata, Libya. Misurata is a city in the Misurata District in northwestern Libya, situated 187 km (116 mi) to the east of Tripoli and 825 km (513 mi) west of Benghazi on the Mediterranean coast near Cape Misurata. With a population of about 550,000, it is the third largest city in Libya, after Tripoli and Benghazi. It is the capital city of the Misurata District and has been called the trade capital of Libya. It is lied at longitude is 32°37'53" N and Latitude is 15°09'20" E. It located is 7 meters' height that is equal to 23 ft. above sea level.

2. 2. Research design

The cross-section hospital-based study was practiced to assess the dietary patterns, eating habits and risk factor of gestation diabetics, during their regular fellow up in obs. clinic. The reliable and simplified research design has selected to give a framework of study.

2. 3. Study population and ethical procedures

The study protocol (Protocol No. TN/2/2022) was approved by the Therapeutic Nutrition Department board through ethical committee of Faculty in 10/02/2022. The procedures followed in accordance with the ethical standard of the Misurata University. The study was carried out on 150 maternal with gestation diabetes, they were selected randomly during their follow-up. All of the pregnant women informed about the purpose of study. The researcher was explained importance of nutrition care system during pregnancy. Inclusion criteria were involved only maternal with gestation diabetes, each stage of gestation and living in Misurata.

2. 4. Data collection procedure

Well-structured questionnaire was performed to cover the objectives of study. Face to face interview of maternal with gestation diabetes have been done at MMC. The questionnaire was contained three comparts. The first part is sociodemographic characteristics, second part is medical history and lifestyle and third part is nutrition assessment. Structured questionnaire was prepared by English and translated into Arabic language. Pre-test of questionnaire was done before actual data collection and analysis just to check its accuracy, response to analysis and estimate which time it is need.

2. 5. Anthropometric parameter

The weight and height of each respondent was measured. All anthropometric data were recorded separated for each woman then BMI was calculated using procedure for taking anthropometric measurements and evaluation.

2. 6. Biochemical parameter

The last results of biochemical examinations (FBS, HbA1c) were collected from patient files after proved eligibility of data by physician. The patient file was presented during follow-up of maternal, while laboratory examinations should be updated. Respondents were classified to categories according medical condition.

2. 7. Data analysis

To perform calculations for statistical analysis, SPSS Statistical Version 18 and Graphs were used. Descriptive statistical methods: represented in the Frequency and Percent as well as Pie Chart. Pearson Correlation was used to study the relationship between variables. The relationship between two variables is significant if P-value is less than 0.05.

3. Results

The participant age categories in this study are shown in **Fig. 1**. The majority of participants were between the ages of 20 and 35 (68 %), followed by those between the ages of 36 and 45 (26 %), more than 45 (3 %), and younger than 20 (4 %).

The final delivery method used by participants is shown in **Table 1**. Frequency 90 (60 %) of participants were classified as having a cesarean section delivered, followed by vaginal deliveries at frequency 46 (31 %), and no deliveries at all at frequency 14 (9 %). Participants were divided into groups based on gestational stage.

Table 2 shows that the frequency of participants in the third trimester was frequency 82 (55 %), followed by frequency 63 (42 %), and frequency 5 (3 %), for the first trimester.

Participants' most recent baby's birth weight (in kilograms) was looked into. It is evident from **Table 3** that the majority of mothers delivered babies weighing between 3.5 and 4 kilograms (kg), 2.5 to 3 kilograms (kg), more than 4 kilograms (kg), and less than 2.5 kilograms (3 %) in 56 (38 %), 43 (29 %), 32 (22 %), 14 (9 %), and 5 (3 %) of the participant's pregnancies were still in progress.

Fig. 2 shows a mother with a history of type 2 diabetes in the family. The percent of individuals with a family history of type 2 diabetes mellitus was (75 %), followed by participants with an unknown and undiagnosed history of diabetes (13 %) and participants haven't a history with type 2 diabetes mellitus (12 %). The results of our study were neutral; however, it is unknown whether different subtypes of a family history of diabetes can function as separate risk factors for gestational diabetes mellitus (GDM).

The majority of participants had diagnosed with GDM for those have many pregnancy, frequency was 80 (53 %), 3rd pregnancy frequency was 41 (27 %), the 1st pregnancy frequency was 19 (13 %), and 2nd pregnancy frequency was 10 (7 %). as displayed in **Table 4**.

The prevalence of polycystic ovary syndrome (PCOS) among study participants was investigated. The small percentage of participants (frequency 29 percent, 19 %) had been diagnosed with PCOS, while bulk of participants hadn't PCOS (frequency 121 percent, 81 %), as displayed in **Fig. 3**. The research showed that gestational diabetes mellitus and polycystic ovarian syndrome are common among pregnant women.

The classification of research participants based on body mass index (BMI) is shown in **Table 5**. According to recommendations and indicators of anthropometric measurements taken during pregnancy, the BMI was calculated. The findings showed that most subjects falsely fell into the categories of obesity and overweight. Those who were identified as being obese at a higher frequency had a frequency of 108 percent (72 %), while those who were classified as being overweight at a higher frequency had a frequency of 42 percent (28 %). The findings showed that a rise in body mass index was linked to a greater incidence of gestational diabetes. Obesity increases the chance of developing metabolic syndrome later in life, pre-eclampsia, and gestational diabetes mellitus during pregnancy.

The participants' fasting blood glucose (FBG) tests. The majority of subjects had higher FBG levels; a frequency of 117, percent to 78 % compared to those had normal FBG range during survey, frequency of 33, percent to 22 %. When a mother has a high BMI before or during pregnancy, the pregnancy weight gain undoubtedly lowers an obese subject's insulin sensitivity. Therefore, pregnant women will be found to have higher fasting blood sugar and HbA1c levels. While the ma-

majority of participants had higher HbA1c levels above the recommended threshold level for GD, they did so more frequently (139 percent, percent 93 %) than the normal level of HbA1c (frequency 11, percent 7 %). So are displayed in **Table 6**. Elevated blood sugar (glucose) levels that start during pregnancy define gestational diabetes. A balanced, healthy diet can help manage gestational diabetes. When a baby is born, the condition normally goes away for pregnant women with gestational diabetes who are not using insulin.

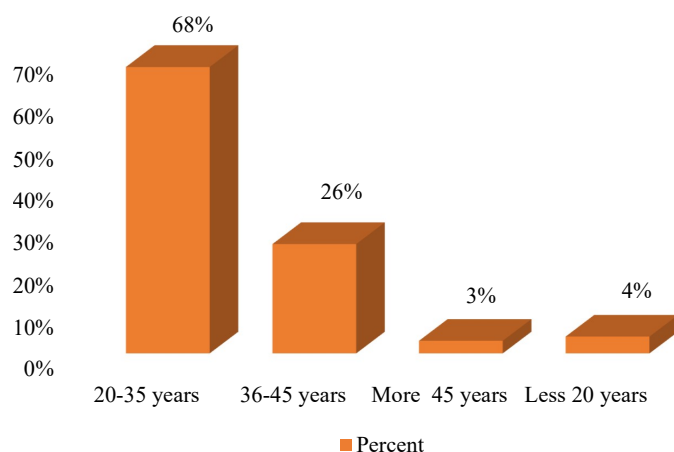


Fig. 1. Age categories of study participants

Table 1

The final delivery method of participants

Delivery process	Frequency	Percent
Vaginal delivery	46	31
C/S	90	60
None	14	9
Total	150	100

Table 2

The gestation stage of participants

Gestation stage	Frequency	Percent
1 st trimester	5	3
2 nd trimester	63	42
3 rd trimester	82	55
Total	150	100

Table 3

Distribution of participants according to birth weight of last baby

Birth weight (kg)	Frequency	Percent
Less 2.5	5	3
2.5-3	43	29
3.5-4	56	38
More 4	32	22
None	14	9
Total	150	100

The awareness and understanding of a balanced diet for gestational diabetes are shown in **Table 7**. It is obvious that a large number of participants had no idea what a therapeutic food plan for gestational diabetes was. They had a frequency of 126 percent at 84 %. However, those who were aware of the particular diet plan for gestational diabetes were frequent 24, and percent 16 %. The participants' knowledge of sweetened beverages was examined. Evidently, 86 percent of participants regularly drank

sweetened beverages, while 64 percent regularly drank no sweetened beverages at all. The individuals were divided into groups based on how often they ate fast food. The frequency of participants who regularly consumed junk food was 124, percent (83 %), while the frequency of participants who never did so was 26 percent (17 %). the grouping of individuals based on whether or not they consume fatty meat. A large proportion of participants ingested fatty meat; their frequency was 120, percent to 80 % percent, compared to frequency of 30, percent to 20 % percent for those who did not. Dietary assistance and nutrition counseling are simple to use and comprehend, and they offer healthy food choices, cooking techniques, and useful suggestions that inspire and motivate women to make changes to their eating habits.

Table 8 illustrates the relationships between the factors. According to the study's findings, there is a stronger ($P \leq 0.01$) association between the number of pregnancies and age, the number of deliveries and the last baby's weight, and the number of miscarriages and pregnancies. A significant association ($P \leq 0.05$) was found between the last child's weight and household income, as well as between age and miscarriage, the number of pregnancies and stillbirths, and the number of meals and pregnancies.

Table 4

Distribution of participates according to gestation number

Parity order	Frequency	Percent
1 st pregnancy	19	13
2 nd pregnancy	10	7
3 rd pregnancy	41	27
Last pregnancy	80	53
Total	150	100

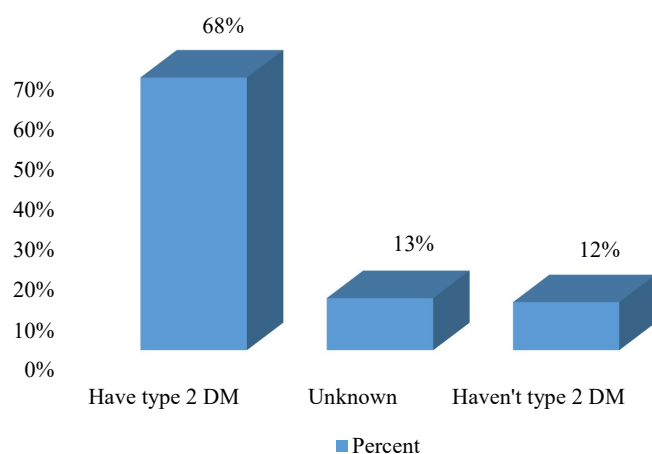


Fig. 2. Distribution of participants according to family history with diabetes mellitus

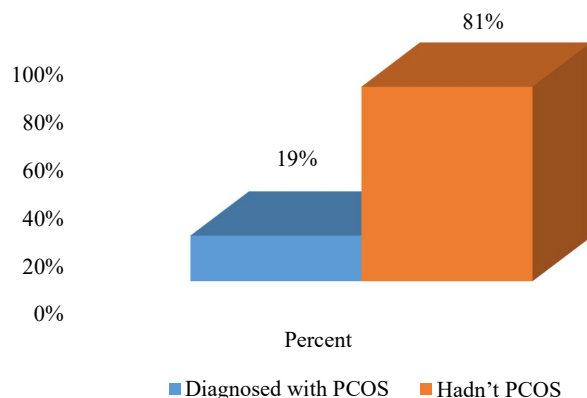


Fig. 3. Prevalence of polycystic ovary syndrome among study participants

Table 5
Classify population study according to BMI index

BMI	Frequency	Percent
Over weight	42	28
Obese	108	72
Total	150	100

Table 6
The fasting blood glucose and HbA1c test

Status	Fasting blood glucose		HbA1c	
	Frequency	Percent	Frequency	Percent
Normal	33	22	11	7
High	117	78	139	93
Total	150	100	150	100

Table 7
Do you have known about special diet regimen

Question	Answer	Frequency	Percent
Do you have therapeutic diet plan?	Yes	24	16
	No	126	84
Do have drinking sweetened beverage?	Yes	86	57
	No	64	43
Do you eating fast food?	Yes	124	83
	No	26	17
Do you eating fatty food?	Yes	120	80
	No	30	20

Table 8
Correlation between some parameters

Parameters	Index	Age	Income	Weigh of Last Baby	No. pregnancy
Age	<i>P</i> .Correlation	1	0.025	0.103	0.555**
	<i>P</i> =value	1.00	0.758	0.209	0.000
Income	<i>P</i> .Correlation	0.025	1	-0.168*	-0.017
	<i>P</i> =value	0.758	1.00	0.040	0.838
Weight of Last Baby	<i>P</i> .Correlation	0.103	-0.168*	1	-0.091
	<i>P</i> =value	0.209	0.040	1.00	0.266
No. pregnancy	<i>P</i> .Correlation	0.555**	-0.017	-0.091	1
	<i>P</i> =value	0.000	0.838	0.266	1.00
No. delivering	<i>P</i> .Correlation	0.145	-0.133	0.647**	0.111
	<i>P</i> =value	0.077	0.105	0.000	0.178
No. miscarriage	<i>P</i> .Correlation	-0.171*	0.078	-0.069	-0.349**
	<i>P</i> =value	0.037	0.345	0.404	0.000
No. stillbirth	<i>P</i> .Correlation	-0.109	0.091	-0.001	-0.189*
	<i>P</i> =value	0.185	0.267	0.993	0.021
FBG	<i>P</i> .Correlation	-0.031	0.021	-0.007	0.061
	<i>P</i> =value	0.708	0.797	0.929	0.460
HbA1c	<i>P</i> .Correlation	0.147	-0.088	0.039	0.102
	<i>P</i> =value	0.073	0.286	0.639	0.214

4. Discussion

The pancreas produces the hormone insulin, which functions as a key to allow blood sugar to enter body's cells for use as fuel. When the body can't create enough insulin while being pregnant, the result is gestational diabetes. The current study was carried out to assess the dietary

patterns, eating habits and risk factor of gestation diabetics in Misurata. The finding of this study revealed that the age factor good indicator of gestation diabetes. Each mother age group experienced an increase in gestational diabetes. The two most significant factors that independently influence the risk of GDM are obesity, family history, polycystic ovary syndrome and maternal age [4]. Our finding is agreed with some study, Certain maternal characteristics have been linked to the development of gestational diabetes mellitus, such as obesity, GDM in earlier pregnancies, older maternal age, ethnicity and multiparty as well as family history of diabetes [5]. The majority of participants are delivered with caesarean section, this finding is agreed with study reported that, the problem typically disappears when the baby is born. Babies whose mothers have gestational diabetes may be large (requiring a C-section delivery), have low blood sugar levels, and have respiratory difficulties. Children and women who have gestational diabetes are more likely to develop type 2 diabetes later in life [6]. Finding of current study is related to some studies stated that, gestational diabetes mellitus is a pregnancy-specific disease defined as 'diabetes that is first diagnosed in the second or third trimester of pregnancy that is clearly not overt diabetes' [7]. The data of our study found that, the multiparas had always a significantly lower incidence of GDM, and regardless of being of normal weight or obese before pregnancy [8]. More data were gathered for birth weight more than 4 kg, this agreed with study, Women at increased risk to GDM or prediabetes, malformation, stillbirth, subsequent abortions, birth weight >4.5 kg in previous pregnancies. That was observed for ethnic groups with increased risk for GDM e. such as Arabian countries [9, 10]. The finding of our study revealed the wide prevalence of obesity and overweight during pregnancy. It is agreeing with some reports, the Obesity raises the risk of metabolic syndrome in later life and increases the risk of gestational diabetes mellitus and pre-eclampsia during pregnancy. Children of obese mothers have a higher risk of maternal morbidity and mortality as well as a long-term risk of childhood obesity and metabolic dysfunction, which is consistent with the developmental roots of health and disease. Any woman can get gestational diabetes; however, you may be at increased risk if you are overweight, have had gestational diabetes in a previous pregnancy or have relatives with diabetes [11].

The data of study shows a greater of participants had over normal values of fasting blood glucose (≥ 120 mg/dl) and HbA1c (≥ 6.5 %). The finding of this study is accepted the recommendation of study stated that, women who meet the requirements for early-onset apparent diabetes (fasting plasma glucose >126 mg/dl, spontaneous glucose level >200 mg/dl, or HbA1c >6.5 % before 20 weeks of gestation) should be diagnosed with this condition and treated accordingly. Women at increased risk (history of GDM or prediabetes, malformation, stillbirth, subsequent abortions, birth weight >4.5 kg in previous pregnancies, obesity, metabolic syndrome, age >35 years, vascular disease, clinical symptoms of diabetes, e. g., glucosuria, or ethnic groups with increased risk for GDM or T2DM, e. g., Arabian countries, south and south-eastern Asia) should have undiagnosed type 2 [9].

Due to majority of participant's had poor dietary pattern regarding consumed high glyce-mic food such as artificial and soda beverages, white bread, grapes, and sweets. Also majority of participants practice more times during the week, they were eating junk food 83 %, fatty meat and high fat diet 80 %. The finding of our study is confirmed of some studies suggested that diets high in total fat, saturated fat, and lower consumption of carbohydrate, fruits, and vegetables during pregnancy are associated with a higher risk of developing GDM [12]. The SUN cohort in Spain demonstrates high consumption of potato, fast food, and sugar-sweetened beverages before pregnancy are independently associated with GDM [13]. Studies that have examined food groups and dietary patterns found that GDM was predicted by high intake of red and processed meats and a Western-type dietary pattern (i.e., high in red meat, refined sugars, and fried or snack foods) [14].

The finding of this study indicated higher significant correlation ($P \leq 0.01$) between multi-pregnancies, age, multiparty, birth weight and miscarriage. Whereas, a significant correlation ($P \leq 0.05$) between birth weight, income, age with miscarriage, multi-pregnancy, still birth and several meals. The finding of current study agreed with study, a newborn intensive care unit admission, preterm delivery, caesarean section, infants born large for gestational age, neonatal hypoglycemia, and hyperbilirubinemia were all independently associated with maternal hyperglycemia, according to the study's findings [15, 16].

5. Conclusions

The majority of participants 68 % were age group 20–35 years at third trimester 55 %, whose attended university level 61 %, whose had two deliveries were 31 %, cesarean section was reached 60 %, whose had birth weight of baby was 3.5–4 kg, they were reached 38 %, who's with family history for diabetes mellitus were 75 %, diagnosed with polycystic ovary syndrome were 19 %, prevalence of obesity and overweight among participants were 72 % and 28 % respectively. The results revealed that 84 % of patients didn't followed any diet regimen, whereas, 57 % of participants were drinking sweetened beverage.

Generally, the result revealed that a significant difference ($P \leq 0.05$) of fast blood glucose and HbA1c among participants. The higher significant correlation ($P \leq 0.01$) is between number of pregnancy, age, number of delivery, weight of last baby and number of miscarriage. Whereas, a significant correlation ($P \leq 0.05$) between weight of last baby, income, age miscarriage, number of pregnancy and still birth.

The study recommends by the following guideline to be healthy pregnancy and healthy baby before get pregnant, may be able to prevent gestational diabetes by losing weight if you're overweight and getting regular physical activity. Checking your blood sugar to make sure your levels stay in a healthy range. Eating healthy food in the right amounts at the right times, that Follow a healthy eating plan created by nutritionist.

Conflict of interest

The authors declare that they have no conflict of interest in relation to this research.

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The study was performed without financial support.

Data availability

Manuscript has associated data in a data repository.

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