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RESEARCH ARTICLE

Eating Habits and Food Consumption among Pregnant Women with and without Gestational Diabetes Mellitus

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ABSTRACT

Background and objectives: GDM (Gestational Diabetes Mellitus) is a growing epidemic that affects pregnant women and their offspring. Medical nutrition therapy (MNT) is the first line of gestational diabetes mellitus management. The study aimed to compare eating habits and food consumption in women with and without Gestational Diabetes Mellitus.

Methods: This comparative cross-sectional study was conducted using a questionnaire distributed over 85 pregnant women with the gestational diabetes mellitus and 85 pregnant women without gestational diabetes mellitus visiting Maternity Teaching Hospital at 24 to 40 weeks of gestation from April 1st 2022 to September 1st 2022. With the participants' verbal informal consent, basic data and anthropometric measures were collected.

Result: the result showed that the mean age for the gestational diabetes mellitus group was 34.8 ± 5.19 vs. 30.89 ± 5.93 for non-gestational diabetes mellitus group. In terms of medical, obstetric history and anthropometric shows that the following variables (Family history of diabetes, family history of gestational diabetes mellitus, history of gestational diabetes mellitus, para, gravida, pre pregnancy BMI, Hb) there was a statistically significant association between both groups, according to this study only there are significant association between both groups in these food items ((fruit fresh juice, sweetened soft drink, beef, egg, bread, pasta, rice, potato, yogurt, fruit and vegetables, adding sugar, chocolate, pastries and cake, ice cream).

Conclusions: there was a statistically significant association between both groups of study regarding eating habit and food consumption. This study will assist in increasing awareness about healthy and balanced nutrition throughout pregnancy, as well as define special nutritional tips for pregnant women.

Key Word: Eating Habits , Food Consumption, GDM.

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Introduction:

One of the health issues in pregnancy is Gestational Diabetes Mellitus (GDM) , described as any degree of glucose intolerance with onset or first detection during pregnancy, to distinguish it from pre-diagnosed type 1 or type 2 diabetes or maturity-onset diabetes of the young in pregnant women (Song et al., 2018). Advanced maternal age, a high body mass index (BMI), and a family history of T2DM are all significant individual risk factors for pregnancy-related high blood sugar(Nielsen et al., 2016) .Also GDM can be defined as "carbohydrate intolerance resulting in hyperglycemia of variable severity with onset or first recognition during pregnancy." (Alberti and Zimmet, 1998). Alternatively, it can be defined as “any degree of glucose intolerance with onset or first recognition during pregnancy” Women who have experienced gestational diabetes are at a higher risk of having Type 2 diabetes during the next five to 10 years(Conway, 2008). Effective GDM treatment improves prenatal outcomes, such as a lower risk of preeclampsia, macrosomia, and shoulder dystocia (Care and Suppl, 2021). If a woman's blood glucose level reaches 180 mg/dl (10 mmol/L), she should have an oral glucose tolerance test (OGTT) or a glucose challenge test (GCT) followed by an OGTT. Treatment begins with dietary changes and blood glucose monitoring; if hyperglycemia persists, insulin is prescribed. Blood glucose levels should be 105 mg/dl (5.8 mmol/l) or less before meals and 130 mg/dl (6.2 mmol/l) or less 2 hours after meals during pregnancy (Young et al., 2000) . To meet the nutritional needs of the fetus and mother, there is a nutritional requirement. Maternal nutrition and health play an important role in embryo development. Healthy mothers are more likely to have healthy babies. If a mother is malnourished, her offspring are more likely to be weak or malnourished, resulting in a high infant mortality rate. (Hossain et al., 2013). As a result, medical nutrition therapy is now the first-line therapy for GDM, with the addition of insulin and/or oral anti-hyperglycemic medications if glycemic goals are not met with diet and lifestyle alone. Nutrition therapy is critical because it can be used to manage all women with GDM. Acceptable nutrition therapy should encourage high-quality nutrient consumption, ideal gestational weight gains without overeating, and ideal fetal growth. Importantly, approximately 70% of women can control GDM strictly through lifestyle and nutrition, emphasizing the importance of accurate dietary recommendations. (Conway, 2008). In 2022, Pakistan. A comparative study conducted to determine dietary intake patterns in women with GDM and non-GDM, showed that dietary habits have a significant impact on the risk of GDM. Higher carbohydrate consumption and less fruit and vegetable consumption are the most common risk factors for GDM (Nadeem, 2022).Furthermore, nutrition counseling throughout pregnancy can encourage the use of healthy dietary patterns and the reduction of

future GDM risk factors, such as type 2 diabetes. Indeed, medical therapy practice guidelines recommend at least three visits with a dietitian. An ideal pregnancy diet for a woman with GDM provides adequate nutrition for fetal growth and maternal health while minimizing hyperglycemia and excessive weight gain. Nutrition counseling resulted in lower energy and saturated fatty acid intake, lower weight gains during pregnancy in obese women, and lower maternal weight gain and fasting serum glucose level in GDM women (Ali et al., 2013).Nutritional management is listed as a first line management strategy to help women with GDM maintain normoglycemic level Conflicting results on the nutritional factors of pregnancy complications, necessitate the conduct of this study. which is the first study conducted in Kurdistan and aimed to compare eating habits and food consumption in women with GDM and non-GDM by assessing food consumption and some other variables.

Methods: This study is a cross-sectional comparative study that was conducted in the Maternity Teaching Hospital in Sulaimanyah city. The Medical Ethical Committee gave ethical approval, with official permission from the Maternity Teaching Hospital, in addition, each participant provided verbal informed consent. A convenient sampling method was used to select 170 pregnant women with gestational ages equal and greater than 24 weeks, aged 19–46 years old (85 pregnant women diagnosed with GDM and 85 pregnant women without GDM) matched for age (±5) enrolled from April 1st 2022 to September 1st 2022, pregnant women who had previously been diagnosed with diabetes mellitus were excluded in the study.

Assessment of other variables: An interview-based method was used to obtain additional information about the age, residency, monthly income, level of education, gestational history, and medical history variables**.** Moreover, some other lifestyle factors were documented. Some biochemical tests are recorded.

Anthropometric measurement: pre pregnancy BMI of all women measured. Height (cm), weight (kg), and the body mass index (BMI) was calculated by dividing weight in kilograms by height in meters squared.

Assessment of food habits: To collect information about food habits, a validated semi-quantitative food frequency questionnaire (FFQ) of 28 items was used to determine the number of portions consumed by all respondents per week. The FFQ is simple and inexpensive to administer, and it can be used to monitor and control dietary intake over a long period of time. All participants in the current study were asked to estimate the number of times per week (categorized as rarely or never, 1-2 times, 3-5 times, or more than 5 times) she consumed these specific food products, as well as the amount

consumed per food item by comparing it to the specified reference portion.

Statistical analysis: In the current study all statistical analysis was performed using SPSS version. And P value < 0.05 considered as statistically significant.

Result: The distribution of the study participants by socio-demographic variables is shown in Table 1. The results show that the mean age for the GDM group was 34.8 ± 5.19 vs. 30.89 ± 5.93 for non GDM group. With a significant association p value = 0.04. In addition, for the following variables (residency, occupation, monthly family income, and educational level), the association was not statistically significant between both groups.

Table 1: Socio-demographic characteristics of study population.

Variables		Gestational diabetes mellitus No.(%)	Non gestational diabetes mellitus No.(%)	Total No.(%)	P-value
Age	<25	8(9.4)	16(18.8)	24(14.1)	0.04
	25-35	43(50.6)	49(57.6)	92(54.1)	
	>35	34(40.0)	20(23.5)	54(31.8)	
Mean±SD		34.8 ± 5.19	30.89 ± 5.93		
Residency	Inside of the city	62(72.9)	54(63.5)	116(68.2)	
	Outside of the city	23(27.1)	31(36.5)	54(31.8)	0.19
Occupation	Public Employee	12(14.1)	15(17.6)	27(15.9)	
	Private Employee	4(4.7)	11(12.9)	15(8.8)	0.22
	Self employed	5(5.9)	4(4.7)	9(5.3)	
	Housewife	64(75.3)	55(64.7)	119(70.0)	
Monthly family income	Sufficient	45(52.9)	34(40.0)	79(46.5)	
	Barely sufficient	31(36.5)	39(45.9)	70(41.2)	0.24
	Insufficient	9(10.6)	12(14.1)	21(12.4)	
Educational Level	Illiterate	3(3.5)	2(2.4)	5(2.9)	
	Read and write	7(8.2)	3(3.5)	10(5.9)	
	Primary	23(27.1)	20(23.5)	43(25.3)	0.51
	Secondary	25(29.4)	24(28.2)	49(28.8)	
	University, institute and Above	27(31.8)	36(42.4)	63(37.1)	

With respect to medical, obstetric history and anthropometric variables, Table 2 shows that 64.7%in GDM group 48.2%in non GDM group had a family history of diabetes mellitus; 37.6%of GDM group and 18.8% of non GDM group had a family history of GDM; only 23.5% in GDM 2.4% in non GDM group had a previous history of GDM, and 95.9% of all participants were not have allergies. In addition, the results demonstrated that the mean and standard division of gestational age by week for GDM group was (31.04 ± 3.52) vs. (32.07 ±

4.43) for the non GDM group. In addition, for the following variables (family history of diabetes, family history of GDM, history of GDM, Para, gravida, pre pregnancy BMI, Hb) the associations were statistically significant between both groups. While (gestational age, allergies, and history of abortion) were not significant.

Table 2: shows medical history, obstetric history and anthropometric measures of both groups:

Variables	Gestational diabetes No.(%)	Non gestational diabetes No.(%)	Total No.(%)	P value
Family history of diabetes				
Yes	55(64.7)	41(48.2)	96(56.5)	0.03
No	30(35.3)	44(51.8)	74(43.5)	
Family history of GDM				
Yes	32(37.6)	16(18.8)	48(28.2)	0.01
No	53(62.4)	69(81.2)	122(71.8)	
Previous history of GDM				
Yes	20(23.5)	2(2.4)	22(12.9)	< 0.001
No	65(76.5)	83(97.6)	148(87.1)	
Allergies				
Yes	4(4.7)	3(3.5)	7(4.1)	1.00
No	81(95.3)	82(96.5)	163(95.9)	
Gestational age(week)				
Mean ± S. D	31.04 ± 3.52	32.07 ± 4.43		0.09
Gravida				
Primy	13(15.3)	25(29.4)	38(22.4)	0.027
Multi	72(84.7)	60(70.6)	132(77.6)	
Para				
No	17(20.0)	30(35.3)	47(27.6)	0.026
≥1	68(80.0)	55(64.7)	123(72.4)	
Abortion				
No	52(61.2)	62(72.9)	114(67.1)	0.103
Yes	33(38.8)	23(27.1)	56(32.9)	
Pre pregnancy BMI				
Underweight <18.5	0(0.0)	3(3.5)	3(1.8)	< 0.001
Normal weight 18.5-24.9	17(20.0)	44(51.8)	61(35.9)	
Overweight 25-29.9	38(44.7)	23(27.1)	61(35.9)	
Obese more than 30	30(35.3)	15(17.6)	45(26.5)	
Hb				
Anemic <11.0	14(16.5)	30(35.3)	44(25.9)	0.005
not anemic ≥11.0	71(83.5)	55(64.7)	126(74.1)	

On the other hand, table 3 shows some lifestyle factors, In the current study, 48.2%, 32.9%, and 18.8% of GDM participants had good, fair, or poor appetite status, compared to 44.7%, 31.8%, and 23.5% who had good, fair, or poor appetite status, respectively. According to physical activity 24.7%, 62.4%, and 12.9% in GDM group vs 27.1%, 60.0%, and 12.9% in non GDM group were insufficiently active, sufficiently active, and very active. Additionally, the following factors (appetite status, snacks per day, meals per day, physical activity, smoking status, and alcohol consumption) result showed no significant association between both groups, while sleeping hours and drinking water were statistically significant.

Table 3: lifestyle factors of women with and without GDM:

Variables	Gestational diabetes No.(%)	Non gestational diabetes No.(%)	Total No.(%)	P value
Appetite status				
Good	41(48.2)	38(44.7)	79(46.5)	0.75
Fair	28(32.9)	27(31.8)	55(32.4)	
Poor	16(18.8)	20(23.5)	36(21.2)	
Snacks per day				
No Snack	43(50.6)	30(35.3)	73(42.9)	0.11
1-2 snacks	32(37.6)	42(49.4)	74(43.5)	
3-5 snacks	10(11.8)	11(12.9)	21(12.4)	
More than 5 snacks	0(0.0)	2(2.4)	2(1.2)	
Meals per day				
1-2 meals	32(37.6)	37(43.5)	69(40.6)	0.52
3-5 meals	50(58.8)	43(50.6)	93(54.7)	
More than 5	3(3.5)	5(5.9)	8(4.7)	
Smoking status				
X smoker	9(10.6)	12(14.1)	21(12.4)	0.48
Non smoker	76(89.4)	73(85.9)	149(87.6)	
Alcohol drinking				
Yes	1(1.2)	0(0.0)	1(0.6)	1.00
No	84(98.8)	85(100.0)	169(99.4)	
Physical activity				
insufficiently active	21(24.7)	23(27.1)	44(25.9)	
sufficiently active	53(62.4)	51(60.0)	104(61.2)	0.94
very active	11(12.9)	11(12.9)	22(12.9)	
Sleeping hours per mid night				
Less than 5 hr.	12(14.1)	36(42.4)	48(28.2)	
5-7 hr.	28(32.9)	33(38.8)	61(35.9)	< 0.001
More than 7	45(52.9)	16(18.8)	61(35.9)	
Drinking water per glass				

1-4 glasses	6(7.1)	15(17.6)	21(12.4)	< 0.001
5-8 glasses	6(7.1)	27(31.8)	33(19.4)	
More than 8 glasses	73(85.9)	43(50.6)	116(68.2)	
Obese more than 30	30(35.3)	15(17.6)	45(26.5)	

While according to eating habits and food consumption of women with and without GDM, in table 4, In total of 85 GDM pregnant women who participated in the study of 28 items in FFQ, all participants asked about number of consumed portion per week, labeled as rarely or never,1-2 times per week, 3-5 times per week, and more than 5 times per week. According to the result, there was a statistically significant association between both groups of study regarding following variables (fruit fresh juice, sweetened soft drink, beef, egg, bread, pasta, rice, potato, yogurt, fruit and vegetables, adding sugar, chocolate, pastries and cake, ice cream). on the other hand, other items of FFQ did not show a significant association between women with GDM and women without GDM.

Table 4: FFQ of eating habits and food consumption of women with and without GDM.

Variables	Gestational diabetes				Non gestational diabetes				P value
	Rarely or never No.(%)	1-2 times per week No.(%)	3-5 per week No.(%)	>5 times No.(%)	Rarely or never No.(%)	1-2 times No.(%)	3-5 times No.(%)	>5 times No.(%)	
Coffee	73(85.9)	9(10.6)	3(3.5)	0	66(77.6)	15(17.6)	1(1.2)	3(3.5)	0.11
Sweetened soft drink	62(72.9)	17(20.0)	4(4.7)	2(2.4)	26(30.6)	37(43.5)	12(14.1)	10(11.8)	0.001
Fresh Fruit juice	54(63.5)	19(22.4)	9(10.6)	3(3.5)	21(24.7)	34(40.0)	14(16.5)	16(18.8)	0.001
Tea	20(23.5)	5(5.9)	3(3.5)	57(67.1)	29(34.1)	9(10.6)	6(7.1)	41(48.2)	0.10
Beef	14(16.5)	52(61.2)	12(14.1)	7(8.2)	28(32.9)	26(30.6)	23(27.1)	8(9.4)	0.001
Chicken	25(29.4)	19(22.4)	33(38.8)	8(9.4)	26(30.6)	28(32.9)	25(29.4)	6(7.1)	0.37
Fish	69(81.2)	14(16.5)	2(2.4)	0	56(65.9)	24(28.2)	5(5.9)	0	0.07
Egg	34(40.0)	21(24.7)	8(9.4)	22(25.9)	41(48.2)	11(12.9)	19(22.4)	14(16.5)	0.02
Bread	4(4.7)	1(1.2)	2(2.4)	78(91.8)	0(0.0)	1(1.2)	11(12.9)	73(85.9)	0.001
Pasta	61(71.8)	14(16.5)	5(5.9)	5(5.9)	33(38.8)	24(28.2)	25(29.4)	3(3.5)	0.001
Rice	5(5.9)	15(17.6)	14(16.5)	51(60.0)	0(0.0)	9(10.6)	13(15.3)	63(74.1)	0.04
Potato	39(45.9)	32(37.6)	8(9.4)	6(7.1)	19(22.4)	46(54.1)	19(22.4)	1(1.2)	0.001
Milk	28(32.9)	9(10.6)	4(4.7)	44(51.8)	34(40.0)	7(8.2)	8(9.4)	36(42.4)	0.40
Yogurt	13(15.3)	8(9.4)	3(3.5)	61(71.8)	30(35.3)	5(5.9)	7(8.2)	43(50.6)	0.01
Cheese	37(43.5)	9(10.6)	2(2.4)	37(43.5)	51(60.0)	10(11.8)	2(2.4)	22(25.9)	0.09
Fruit	1(1.2)	1(1.2)	5(5.9)	78(91.8)	0(0.0)	0(0.0)	16(18.8)	69(81.2)	0.02
Vegetables	0(0.0)	1(1.2)	1(1.2)	83(97.6)	1(1.2)	11(12.9)	8(9.4)	65(76.5)	0.001
Butter	77(90.6)	7(8.2)	1(1.2)	0	75(88.2)	7(8.2)	3(3.5)	0	0.77
Oils	12(14.1)	20(23.5)	12(14.1)	41(48.2)	16(18.8)	17(20.0)	8(9.4)	44(51.8)	0.63
Margarine	10(11.8)	3(3.5)	7(8.2)	65(76.5)	1(1.2)	2(2.4)	9(10.6)	73(85.9)	0.03

Ghee	70(82.4)	9(10.6)	2(2.4)	4(4.7)	58(68.2)	17(20.0)	9(10.6)	1(1.2)	0.02
Olive oil	70(82.4)	12(14.1)	3(3.5)	0(0.0)	62(72.9)	17(20.0)	4(4.7)	2(2.4)	0.38
Adding sugar	51(60.0)	1(1.2)	0(0.0)	33(38.8)	30(35.3)	5(5.9)	8(9.4)	42(49.4)	0.001
Chocolate	79(92.9)	5(5.9)	1(1.2)	0(0.0)	27(31.8)	30(35.3)	24(28.2)	4(4.7)	0.001
Pastries	73(85.9)	8(9.4)	2(2.4)	2(2.4)	19(22.4)	26(30.6)	36(42.4)	4(4.7)	0.001
Cakes	74(87.1)	3(3.5)	7(8.2)	1(1.2)	30(35.3)	22(25.9)	30(35.3)	3(3.5)	0.001
Nuts	5(5.9)	32(37.6)	28(32.9)	20(23.5)	7(8.2)	39(45.9)	23(27.1)	16(18.8)	0.58
Ice cream	46(54.1)	22(25.9)	9(10.6)	8(9.4)	24(28.2)	22(25.9)	30(35.3)	9(10.6)	0.001
Eating out	60(70.6)	18(21.2)	5(5.9)	2(2.4)	43(50.6)	28(32.9)	12(14.1)	2(2.4)	0.04

Discussion: The purpose of this study was to determine whether there seemed to be a difference between eating habits and food consumption among pregnant women with and without GDM at a maternity teaching hospital in Sulaimanyah city. This study additionally examines sociodemographic characteristics, a variety of obstetric and medical histories, and lifestyle habits, which could be a reason for a change in eating habits. In this study, the mean age of the GDM group was statistically higher than that of the non GDM group, which was similar to a previous study that found age to be an important risk factor for GDM (Larrabure-Torrealva et al., 2018). While the residency variable showed a statistically significant association between groups, there was no statistically significant association regarding residency in the Ennazhiyil et al.'s study (Ennazhiyil et al., 2019). According to the result. in obstetrics characteristic only para and gravida has a significant between both groups despites of this result in Iran in descriptive-comparative study showed no significant between GDM and non GDM regarding para and gravida (Javid et al., 2016). One of the risk factors of GDM is family history of DM, there is a significant association between groups but in Kerala, in 59 GDM and 52 without GDM women, also the difference between this two group were significant (Ennazhiyil et al., 2019). Another risk factor is pre pregnancy BMI. A meta-analysis of 20 cohort studies from North America, Europe, and Australia found that pre-pregnancy overweight, obese, and severely obese women had nearly two, four, and eight times the risk of GDM as women with normal BMI(Callaghan, W. M., Chu et al., 2007). The result of this study showed a significant association between women with GDM's pre pregnancy BMI and women without GDM's pre pregnancy BMI. Coffee became the most popularly consumed drink around the world, and it contains a variety of antioxidants and micronutrients, In the current study, the results showed no significant association between groups of the study population regarding coffee consumption. A prospective cohort study in public hospitals in urban India on food habits in pregnancy and their association with gestational diabetes mellitus found no significant association between women with and without GDM regarding coffee consumption (Deepa et al., 2020). In this study's results, the majority of

the GDM group rarely or never had sweetened soft drink, whereas the majority of the non-GDM group had it 1-2 times per week, and there was a strong significant difference between groups in terms of sweetened soft drink per week. In contrast to this result, in a case-control study that aimed to investigate the association between socioeconomic, environmental, and lifestyle factors with GDM among pregnant, between 276 women in the GDM case group and 276 women in the non-GDM control group, showed no significance difference between case and control regarding sweetened soft drink p=1.00 (Carroll et al., 2018). Following water, tea is one of the most popular beverages consumed worldwide. Tea is widely consumed by people of all ages in the Kurdistan region, particularly adults; however, no research has been conducted in this region. regarding the possible influence of tea consumption on human metabolism. Especially pregnant women. In this region, black tea is commonly consumed and served with sugar, Hinkle et al. investigated the relationship between tea consumption and the risk of GDM. They conducted a large cohort study to determine the relationship between tea and coffee consumption and the risk of gestational diabetes in pregnant women. They reported that tea consumption did not consistently or significantly increase the risk of GDM (Hinkle et al., 2015). While in the current study, the majority of both groups were having tea more than five times per week, with no significant association between the two study groups (p = 0.1). The macronutrient with the strongest influence on postprandial blood glucose response is carbohydrate (CHO). Thus, in order to achieve glycemic control in women with GDM, carbohydrate moderation is critical. One of the food items that contain more than 5 grams of carbohydrates per serving is meat that may cause an increase in blood glucose levels (Ali et al., 2013). In a cohort study in India to investigate Food habits in pregnancy and its association with gestational diabetes mellitus, showed that a high intake of red meat is associated with an increased risk of developing GDM (Deepa et al., 2020). In the current study, there is a significant variation between two groups regarding meat consumption. There are numerous health benefits to eating fish (well-cooked) while pregnant. Fish is a rich source of protein, and some canned fish, including sardines, contain bones, that are high in calcium. Oily fish, such as salmon, mackerel, and sardines, are high in long-chain omega-3 fatty acids, which are beneficial to brain and eye health, as well as nervous system function in both mother and child. Fish, on the other hand, can be a source of environmental contaminants such as mercury, which is a heavy metal that naturally occurs in the environment, especially in the ocean. As a result, high maternal mercury exposure from eating fish can negatively affect the developing fetus's brain and nervous system. Thus Recommendations to limit fish intake during pregnancy due to concerns about environmental

contaminants have caused confusion and, in some cases, prevented consumption. It is critical for health professionals to accurately communicate the benefits of fish consumption as well as how potential risks can be reduced without restricting all fish consumption during pregnancy (de Seymour et al., 2019). Unfortunately, the current study found that the majority of respondents ate fish only rarely or never, with no statistically significant association in the results. Also, in another cohort study, there was no association in results between women with and without GDM regarding fish consumption (Deepa et al., 2020). In the current study, we looked at four major CHO types of food that are more popular in this region, beginning with bread, with nearly all of the respondents having bread more than five times per week, with a statistically significant difference between groups; additionally, a comparative study conducted in the United Arab Emirates revealed a significant difference in bread consumption between women with and without GDM (Ali et al., 2013). Also in another prospective cohort study to find the Influence of Diet and Lifestyle on the Development of Gestational Diabetes Mellitus and on Perinatal Results showed a significant association between women with and without GDM regarding bread (Yuste Gómez et al., 2022).

On the another hand rice become one of the most popular meal in Kurdistan region, nearly rice consumption become daily in all ages, also in this study most of participants in both groups have rice more than 5 times per week which means nearly every day, with a statistically significant variation between them, also in another comparative study to determine Diet and Carbohydrate Food Knowledge of Multi-Ethnic Women, demonstrate a significant difference between women with and without GDM(Ali et al., 2013). While in another case-control study of 313 women with GDM and 1464 women without GDM showed no significant variation regarding rice consumption (Deepa et al., 2020). Dairy products and foods such as milk, yoghurt and cheese provide the majority of Calcium Which is one of the most abundant mineral in the human body, performs a variety of basic functions such as bone mass maintenance, cell signaling, blood clotting, muscle contraction, and insulin secretion, among others, Ca absorption rises during pregnancy to meet the needs of fetal bone growth. For pregnant women, the RDA for calcium is 1000 mg/d, with an acceptable upper intake level of 2500 mg/d. in a prospective cohort study to examine the association between dietary Ca intake and risk of gestational diabetes mellitus (GDM) showed that higher intake of calcium reduce risk of GDM, in our study we focused on milk , yogurt, and cheese consumption of participants, in result there is no significant association between groups of study sample regarding milk consumption, both groups having milk more than 5 cups in a week. Also in Habiba I. Ali et al ‘s study showed no statistically difference

between women with and without GDM regarding milk consumption (Ali et al., 2013). In addition, in another cohort study also showed no statistically significant between women with and without GDM regarding milk consumption (Yuste Gómez et al., 2022). Another source of calcium is yogurt, in current study majority of respondent were having yogurt more than 5 times per week, with a statistically significant association between groups, while in Alba Yuste Gómez et al's cohort study demonstrates that there is no significant association between groups of study sample in yogurt consumption (Yuste Gómez et al., 2022). According to epidemiological studies, fruits and vegetables are important for human health because they help to reduce the incidence and mortality of a variety of diseases such as obesity, hypertension, and cardiovascular disease. An observational study of 2987 pregnant women found that eating a variety of fruits and vegetables throughout pregnancy may help prevent the development of GDM.(Li et al., 2021).In this study regarding fruit and vegetables consumption per week, nearly highest proportion of both groups were having fruit and vegetables more than 5 times per week, according to this result there is statistically significant variation between groups of study regarding consumption of fruit and vegetables.

Conclusion and Recommendation:

Result of this study suggest that there is a statistically significant association between both groups of study regarding eating habit and food consumption. Dietary patterns and food habits play an important role in the occurrence of many chronic diseases. Finding an appropriate dietary pattern, such as "fruits and dairy products," may aid pregnant women in avoiding GDM. To better understand the food habits and dietary pattern of pregnant women, a more detailed evaluation of the diet, analyzing quality and quantity, is required. Diet counseling for pregnant women in public hospitals can concentrate on avoiding negative pregnancy outcomes. Interventions to educate pregnant women in all socioeconomic strata about healthy food could be beneficial.

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AUTHOR CONTRIBUTIONS

Study concept; Writing the original draft; Data collection; Data analysis and reviewing the final edition by all authors.

DISCLOSURE STATEMENT

The authors report no conflict of interest

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