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Dietary Patterns and Occurrence of Gestational Diabetes Mellitus in Pregnant Women

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A B S T R A C T

Background: Gestational diabetes mellitus (GDM) is a common health problem during pregnancy which not only affects mother but also the fetus. GMD can be defined as any level of glucose intolerance that is primarily recognized during gestation is known as gestational diabetes mellitus. The prevalence of GDM is continuously increasing nationally and internationally. The pooled prevalence of gestational diabetes mellitus in Pakistan is 15.3%.

Objective: The study intended to compare the dietary habits of pregnant women with GDM and without GDM in Jinnah Hospital & Shaikh Zayed Hospital Lahore Pakistan.

Methodology: In this comparative cross-sectional study pregnant patients (150) were enrolled at the Jinnah Hospital & Shaikh Zayed Hospital who were between 24 and 28 weeks of their pregnancy over the course of a six-month period were given a questionnaire. Using the participants' full consent, dietary intake patterns in (75) GDM and (75) non- GMD subjects were evaluated using a Food Frequency Questionnaire (FFQ), 24-hour records, and three-day recalls.

Results: Total 150 participants (75 pregnant women with gestational diabetes mellitus (GDM) and 75 with non-GDM) were enrolled in current study. Analysis of the dietary intake of all pregnant women in the two groups indicated that their diets mostly consisted in carb (59.86%) with just minimal amounts of protein (15.53%) and fat (24.73%). The results indicate the need of educating and advising pregnant women on nutrition, particularly in Pakistan's lower- to middle-class communities, 110 (73%) participants out of 150, in order to decline the occurrence of GDM and increase the health of both the mother and the fetus. GDM was more likely to develop ($p = 0.005$) in patients consume diets high in carbohydrates. A family history of diabetes enhances a danger of developing GDM (P value = 0.001).

Conclusion: Food choices have big impact on the chance for developing gestational diabetes mellitus. Primary risk factors for gestational diabetes mellitus include a high intake of a diet rich in carbohydrates and a low intake of fruits and vegetables.

Keywords: Dietary Pattern, Gestational Diabetes Mellitus, Food Frequency Questionnaire

Introduction

Gestational diabetes mellitus is common health problem during pregnancy which was recognized in 1964 by O'Sullivan and Mahan.[1] Any level of glucose intolerance that is primarily recognized during gestation is known as gestational diabetes mellitus or GDM.[2] In gestational diabetes mellitus women develop hyperglycemia during pregnancy without having any history of diabetes. Mostly this is due to the insulin resistance and dysfunction of pancreatic beta-cells.[3] According to the International Diabetes Federation (IDF) the global standardize prevalence of GDM is 14.0%.[4]The pooled prevalence of

gestational diabetes mellitus in Pakistan is 15.3%.[5]Increase in prevalence of GDM is related with the increase in maternal obesity. Gestational diabetes mellitus has short term as well as long term adverse health effects on mother and fetus.[6] The 75-gram 2-hour oral glucose tolerance test (OGTT) with one or more unexpected results is the basis for the one-step technique used by the World Health Organization (WHO) to diagnose hyperglycemia during pregnancy.[7]

Poorly managed GDM has a strong connection with pregnancy obstacles.[8] About half of women with gestational diabetes who fail to get preventative care go on to progress type II diabetes, and a substantial number of these women do so within 10 years of giving birth.[9]Globally, and especially in countries that are emerging, the figure of cases of GDM is expected to rise by around 30 % in the next ten or twenty years.[2]

There is data that links dietary habits to the danger of gestational diabetes mellitus before and during pregnancy.[10] Consuming excessive amounts of animal protein, iron-containing foods, fat, cholesterol, eggs, red meat, and processed meat can increase the risk of gestational diabetes.[11] Conversely, higher amounts of nuts, fiber, and plant-based protein may lower the risk of GDM. [12] Dietary habits analysis is an effective way to evaluate the connection between diet and type-II diabetes since foods are often consumed in combinations.[13]

As dietary consumption was influenced by social, ethnic, cultural, and individual food preferences, studies of food intake and GDM in Asia are still infrequent with contradictory results.[14] Eat sweets and seafood to decrease your chance of getting gestational diabetes, suggests a Southern China study.[15] Another study which included people of Asian descent observed an adverse connection between consuming noodles and seafood and the risk of type-II diabetes.[16]

There is no research in Pakistan that looks at the association between pregnant women's eating patterns and GDM. According to the studies, 89% of pregnant women in Islamabad had a medium diversity of meals.[17,18] In different research in Rawalpindi, 50% of individuals were found to be underweight.[19,20] A study carried out in Punjab revealed that the primary obstacles to sustaining a nutritious diet during pregnancy were the high cost of food and inadequate prenatal assistance.[21]

In Pakistan, the majority of social classes are lower class to middle class. This group's literacy rate is low, and it lacks information regarding the importance of eating choices during pregnancy. In addition, since they are unable to purchase more fruits, vegetables, or foods rich in protein, people regularly eat diets high in carbohydrates. This leads to an increase in resistance to insulin, which ultimately results in GDM.

At the Jinnah Hospital & Shaikh Zayed Hospital, experts can educate patients about the value of eating habits during pregnancy and how these relate to gestational diabetes mellitus (GDM). A study was created to examine trends in eating habits throughout pregnancy and how they relate to GDM.

Methodology

The research investigation was cross-sectional and comparative in nature. The pregnant women, aged 18 to 40, were coming to Jinnah Hospital & Shaikh Zayed Hospital for a routine maternity appointment. Following a thorough briefing, the subjects gave their written consent. The OGTT was carried out based on any risk factors observed during the first-trimester appointment, such as a BMI greater than 30 kg, a previous macrosomic newborn weighing more than 4.5 kg, a history of GDM in the past, having an IUD, and a family history of diabetes.

Women who visited the antenatal clinic were the ones who were chosen to participate in the GDM. The following factors precluded study participation: multiple pregnancies, pregnancy with medical disorders (Pregnancy induced hypertension, pre-eclampsia, thyroid disorders with obstetric issues (Antepartum hemorrhage, premature rupture of membranes, Preterm labor), feverish medical ailments (Urinary tract infection, typhoid and malaria), etc.

Using World Health Organization (WHO) software, a sample of 150 persons was created. It was done using the reference study that was published in Journal of College of Physician and Surgeons Pakistan (JCPSP) 2014. The OGTT outcomes were combined with Proforma and questionnaires to gather the data. The Proforma includes demographic investigation about the participant's age, parity (number of pregnancies), literacy level, ethnicity, and employment status.

A food frequency questionnaire and a three-day, 24-hour recall were provided to the participants by the lead investigator, or by one or two qualified doctors working under the principal investigator's direction, in order to evaluate their dietary intake patterns. People are asked to remember all of their meals and drinks over the previous 24 hours using a standardized nutritional evaluation method known as a 24-hour dietary recall chart. Information may pertain to timing, food sources, food kinds, food amounts, drinks, dietary supplements, and the quantity of food consumed both within and outside the home. Since it is more precise when given more than one time to each individual, the three day 24 hour recall will be recorded. The

records for Sunday and the two days prior had been gained at the time of the discussion.

The food frequency questionnaire (FFQ) enlisted the foods, and participants were questioned how frequently they consumed each one. The Food Frequency Questionnaire (FFQ) is a dependable, easy-to-use, low-cost method of measuring food intake in health-promoting studies. This food frequency questionnaire (FFQ) includes 70 different foods. Food intakes were classified as never, once a day, once a week, monthly and yearly.

The amount of nutrients consumed was computed by adding the reported frequency of intake for each food, the reported size of the portion, and the reported nutritional makeup of the food, which was calculated by a certified nutritionist analyzing the reported food intake. Information regarding the composition of the uncooked food items was provided by the USDA. Alternative local food composition tables were examined in some cases when the USDA was unable to provide this information. Food consumption patterns were evaluated and correlations were examined in GDM participants using SPSS version 17. Continuous variables such as age were existing as Mean, Standard Deviation, Median, Range, and 95% confidence interval, whereas categorical data such as ethnicity, employment rank, socioeconomic position, and dietary habits were provided in frequency and percentages. The connection between food intake and GDM was examined using a Chi-square test. A p-value of 0.05 or less was measured statistically significant.

Results

In this trial, total 150 participants were included divided into two groups,75 GDM patients and 75 without GDM over a six-month period. The demographic parameters are presented in Table I. The mean age of the participants was 26.03 ± 4.37, from 18 to 40 years. Mostly members were graduated 61 (40.7%). There were 14 (9.3%), illiterate people, shown in the Figure I. Among them, 122 (81.3%) were Urdu speaking, and 137 (91.3%) were housewives. In terms of parity 86 (57.3%) out of 150 participants were mothers of more than one child. 110 (73%) of the participants belonged to the lower to middle class. Of the individuals, 80 (53.3%) had a family history of DM, while 56 (37.3%) had an experience of GDM in their previous pregnancies.

Analyzing the dietary intake patterns made it transparent that people in the two groups mostly consumed carbs with just minimal amounts of protein and fat. Figure II

Table I: The demographic parameters of women and their socio-economic status.

Demographic Parameters		*Participants (total 150) Number (%)*
Working status	House hold	137 (91.3)
	Part time worker	8 (5.3)
	Ful time worker	5(3.3)
Ethnicity	Urdu	122 (81.3)
	Sindhi	2 (1.3)
	Pathan	12 (8.0)
	Punjabi	14 (9.3)
Parity	Primigravida	58 (38.7)
	Multigravida	86 (57.3)
	Grand multigravida	6 (4.0)
Socioeconomic status	Lower	47 (31.3)
	Middle	63 (42.0)
	Upper	40 (26.7)
History of GDM in previous pregnancies		56 (37.3)
Family history of DM		80 (53.3)

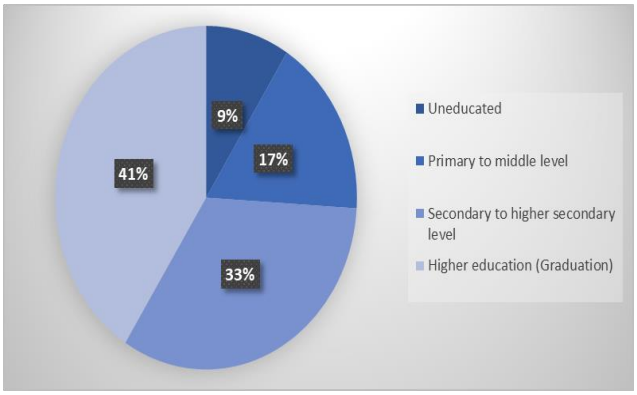

Figure 1. Educational status of pregnant women.

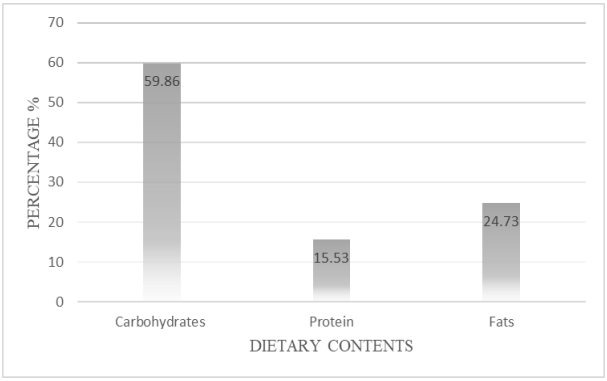

Figure II: Dietary composition of both groups in terms of percentage (carbohydrates, protein and fats)

Utilizing a 24-hour, 3-day recall interview, meal timing was assessed. More than half of the participants 66 (44%), 74 (49.3%), and 133 (88.7%) were found to have skipped

their breakfast, lunch, or dinner respectively. Regarding Sunday scheduling, 94 individuals (62.7%) skipped their lunch and 126 individuals (84.0%) skipped breakfast.

The relationship between GDM and food consumption patterns is demonstrated in Table II. Type II diabetes has been observed to have a significant connection with dietary eating behaviors. GDM was more likely to result from diets high in carbs (p = 0.005). A family history of diabetes enhances a danger of developing GDM (P value = 0.001). Females with a history of GDM were at high risk to be diagnosed with GDM in the present, if they had previously encountered GDM in a previous pregnancy 34(45.3%) or earlier. There was not sufficient evidence that we could find that meal timings and GDM are related. Table-III shows that there was no relationship between patterns of dietary nutrient intake and demographic variables such as age, level of literacy, ethnicity, parity, and socioeconomic status.

Table II: Relative dietary content of food consumption and occurrence of GDM in pregnant women.

Food contents	Women with GDM	Women without GDM	*P-value*
Carbohydrates	61.23±5.02	58.56±5.74	0.005 *
Protein	15.12±2.12	14.93±2.87	0.070
Fat	23.25±4.22	24.72±4.16	0.130
Family history of DM	Yes 52(69.3%) No 23(30.7%)	20(26.7%) 30(40%)	0.001 *
History of GDM in previous pregnancy	Yes 34(45.3%) No 41(54.7)	18(24.0%) 57(76.0%)	0.001 *

Categorical data is existing as frequency percentage and numeric data as mean ± SD. P-value < 0.05 was measured as statistically significant.

Table III: Relation of dietary habits with parity and socio-economic class of women

Dietary intake of pregnant women		*Mean ± SD*	*P-value*
Carbohydrates intake	Primigravida Multi gravida Grand multi	59.20 ± 6.19 59.53 ± 6.20 60.32 ± 2.58	0.43
Protein intake	Primigravida Multi gravida Grand multi	15.54 ± 3.15 15.63 ± 2.22 14.32 ± 2.05	0.85
Fat intake	Primigravida Multi gravida Grand multi	24.17 ± 4.00 24.37 ± 4.23 25.85 ± 1.87	0.46
Carbohydrates intake	Lower class Middle class Upper class	59.15 ± 6.43 59.55 ± 6.22 60.17 ± 5.75	0.29
Protein intake	Lower class Middle class Upper class	15.41 ± 2.3 15.68 ± 2.72 16.21 ± 3.23	0.70
Fat intake	Lower class Middle class Upper class	25.12 ± 4.54 24.75 ± 4.69 24.21 ± 3.01	0.56

Discussion

This research investigated patterns of dietary consumption throughout pregnancy and their connection to the incidence of gestational diabetes mellitus in Pakistani public hospitals. The majority of this study investigated eating patterns throughout pregnancy. Apart from the fact that most of the pregnant women in our study had diets high in carbohydrates and low in protein, no distinctive dietary pattern was identified. The food that was visible consisted mostly of potato chips, French fries, biryani, paratha, chapatti, and fizzy drinks.

Food portions that are energy dense, high in sugar and low in protein are considered to be a part of less nutritious dietary pattern. This phenomenon was not detected previously in Western states. A study by Hoffmann et al. claims that rice, pasta with beans and meat, eggs, poultry, and thick fruit juices are among the foods consumed in Brazil.[22] In the Southern United States, fresh fruit juices, fried fish liver, hog meat, peaches, eggs, and cereals were the most often consumed items, per a study by Volgyi E. et al.[23] The cultural and behavioral differences between Eastern and Western countries are the main reason for this.

Moreover, there was shown to be a substantial association between these detrimental dietary habits and the risk of GDM. According to research conducted in Iran, there is a strong link between unhealthy eating habits and the danger of type II DM.[24] We found that diets high in carbohydrates and low in protein (fish, meat, and eggs) were significantly associated with a high chance of GDM. The value of P is 0.005. Our findings conflict with studies on Chinese expectant mothers that found consuming diets high in protein and low in starch decreased the risk of GDM.[25]

The findings of an Indian study that connected eating red meat to a higher risk of GDM development are likewise at odds with our findings.[26] Moreover, consuming dietary fiber can slow down the time it takes for the stomach to empty, lessen the amount of nutrients absorbed during meals, and delay the time after a meal that blood glucose levels are raised.[27] A possible contributing factor to the development of GDM among the study participants was their dislike of vegetables and the fact that most of them were unable to afford to eat fruits.

The findings of our research line up with a Lahore study that linked the incidence of gestational hyperglycemia to a high-carb diet and poor intake of fruits and green leafy vegetables.[28] A multiethnic cohort research carried out in Singapore revealed that a diet high in fruits and vegetables was linked to a lower incidence of GDM; our data do not support this finding.

However, no correlation was discovered between decreased risk of GDM and diets rich in fruits and vegetables.[16]

Various factors, such as number of family members, financial status, literacy level, cultural influences, traditional views, and preference for particular foods, contribute to this unhealthy eating behavior. The majority of factors that predict GDM vulnerability are genetics. Hereditary abnormalities in beta cell and pancreatic function could be the cause of GDM.[29] 54 (72%) of the GDM participants in our study had a family history of diabetes. Our results are constant with Iranian research.[30]GDM risk may be influenced by dietary practices within a family. We discovered that the condition was more likely to develop in those with a history of GDM; p-value = 0.001. The same eating habits the family follows seem to be the most probable cause. Additional study has corroborated our findings.[16,31]

The variables of parity, maternal age, education, and socioeconomic level affect routine nutritional intake. While our study did not find a connection between the two, previous research has indicated that elder pregnant females were more probably follow a healthy diet both before and throughout their pregnancy.[32,33] A Chinese study found some correlations between dietary habits and socio-economic class. Pregnant women from higher-class backgrounds consumed more fruits, vegetables, dairy, soy, nuts, meat, fish, and prawns in addition to larger amounts of eggs, edible oils, alcohol, and other items. Furthermore,[34]our findings did not corroborate this.

Recommendation and Limitations

Pregnant women should get instruction and guidance from healthcare professionals regarding the need to eat expensive, seasonally appropriate cuisine. In order to minimize unfavorable pregnancy outcomes associated with GDM, food advice is available to expectant patients at public hospitals. Underreporting food intake on the food frequency questionnaire (FFQ) and three-day recall is one aspect of this subject. When their daily meals were, some of the participants found it difficult to remember.

Conclusion

Based on the study, more than half of our women have consumed less food than is advised, and this pattern has an important impact on the chance of developing gestational diabetes mellitus (GDM). The main risk factors for gestational diabetes mellitus are a diet high in carbohydrates and a diet low in fruits and vegetables. It has been noted that a family history of diabetes is more common in people with gestational diabetes mellitus.

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