



Effect of diet on gestational diabetes mellitus in pregnant women of district Lahore, Pakistan

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Key words: Gestational, diabetes mellitus, pregnancy, Diet.

<http://dx.doi.org/10.12692/ijb/16.4.12-18>

Article published on April 14, 2020

Abstract

To find out the diet association with gestational diabetes mellitus among pregnant women visiting services Hospital Lahore. A total of 100 pregnant women age range of 20-35 years were selected for the nine-month case control study. In case group female with gestational diabetes mellitus had been included while in control group female with normal blood sugar were added. Comparison of dietary intake measured among both groups. The sample was selected from services hospital Lahore. A questionnaire was used for data collection. A 24-hour dietary recall method was used to compute the nutrient intake among participants. The anthropometric measurements, body mass index and blood sugar levels were evaluated among participants of study. The study hypothesis was accepted or rejected by data analysis. The results showed that among 100 participants, a total of 42 % were moderately active, 26 % had sedentary lifestyle, 26% were lightly active and 3 % were highly active. A significant association was observed between fasting blood sugar and case control group $p=0.000$, and physical activity and case control group $p=0.000$. Association between diet and blood sugar level was observed and results showed that null hypothesis was rejected which means both the attributes were dependent as there was association between diet and blood sugar level $p=0.000$. The study concluded that the comparison of both case and control group showed that high carbohydrate diet low calcium and vitamin D diet low intake of polyphenol rich fruit such as dry fruit and green leafy vegetables increased the risk of gestational diabetes mellitus.

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Introduction

Gestational diabetes is a disorder in which blood glucose level increases during pregnancy (Dodd *JMet al.*, 2009). It mostly occurs between 6 to 7 months of pregnancy (Nadia Zaman *et al.*, 2013). During pregnancy placenta produces the hormones which increases the level of glucose in blood (Dornhorst & Frost., 2002). Pancreas failed to control this increase level of blood glucose and induce a condition which is known as a gestational diabetes mellitus (Al-Saleh *et al.*, 2004). Almost 10 to 13% of pregnancies extensively effected by gestational diabetes mellitus (Langer *et al.*, 1987). In last 20 years its prevalence has been increasing day by day (Much *et al.*, 2016). The pervasiveness of gestational diabetes in Pakistan is 3 to 9% (Lao *et al.*, 2001). Gestational diabetes is very common disorder in developed and underdeveloped country (Bo *et al.*, 2009). Incidence of GDM is very common among Asians, American sand Indians (Bain *et al.*, 2015).

The most common complication related to gestational diabetes mellitus are, premature baby, macrosomia, neonates low sugar leveleclampsia and abortion (Reader *et al.*, 2006). So early identification of gestational diabetes mellitus helps to treat it well. Balanced diet help in the prevention of gestational diabetes mellitus. The stunted amount of vitamin D level in pregnancy increased insulin resistance and increased susceptibility to gestational diabetes mellitus (Green *et al.*, 1990). Low carbohydrate diet intake prevents the development of gestational diabetes mellitus (McMahon *et al.*, 1998). Polyphenol rich dry fruit such as dry fruit decreased the probability of gestational diabetes mellitus (Cypryk *et al.*, 2008). Diet rich with fat content such as saturated fat and high cholesterol diet increases the occurrence of gestational diabetes mellitus (Dempsey *et al.*, 2005). Fasting blood sugar increases due to low intake of vegetable and fruit fiber and high consumption of sugar in diet (Evenson *et al.*, 2004). High Consumption of animal protein in diet increase susceptibility to pregnancy hyperglycemia (Landon *et al.*, 2008). Gestational high blood glucose prevented through the effective physical activity. Due

to balanced physical activity the frequency of type 2 diabetes mellitus is decreases (Turok *et al.*, 2003). Psychological factors plays very important role in the progress of hyperglycemia. Extensive intensity of stress causes high blood sugar level before meal. The inflated level of cortisol in respond to stress may affect the blood glucose level. Females with early onset of pregnancy suffering from depression may are at great risk of in the spread of high blood glucose level during antenatal period (Landon *et al.*, 2011). Energy consumption increases by physical activity. It also improves the eating behavior through the stimulation of insulin leptin and other endocrine mediators (Perucchini *et al.*, 1999). Depression plays important role in the development of poor eating behavior such as emotional eating and unhealthy eating (Schaefer *et al.*, 2004). A case-control study, was conducted to determine that Western dietary pattern increases the risk of altered blood sugar during pregnancy. For this purpose a total of 388 women were studied. Food frequency table was used to measure dietary intake. Western food pattern had been given to control group of studies. Sweats jams mayonnaise soft drinks salty snacks solid fat high-fat dairy products potatoes tea and coffee was included in western dietary pattern. The study results showed that female with western dietary pattern had increased percentage of pregnancy hyperglycemia as compared to those who don't follow this dietary pattern (Fatimah *et al.*, 2004). Pregnancy hyperglycemia is a alarming condition which incidence increasing day by day in Pakistan. So, it should be addressed so we can overcome the life-threatening condition related to this disease. This is also very important to decrease the mother and baby jejunity and fatality rate. The main intension of this study was to put one's finger on the dietary association with gestational diabetes mellitus.

Materials and methods

This was a case control study with the sample size of 100 pregnant females from February 2019 to October 2019 in Services hospital Lahore. The aim of study to determine the interrelation of diet with pregnancy high blood sugar level. Detailed questions related to

diet, physical activities were included in this analysis to appraise the relationship of food in the progression of this disease. The data was analyzed through statistical software (spss) version 25 and relationship between two variables was evaluated by application of chi square test.

Result and discussion

In Pakistan, there are few studies that focused on nutrient intake among pregnant women. Table1:

Shows the result of chi-square test with the degree of freedom (df). The p-value was also given. According to result the degree of freedom (df) value was 3 and value of chi-square was 48.544. After observing the p-value of result which was 0.000, less than alpha (α) value. Therefore, null hypotheses were not accepted both the attributes were not independent.

A compelling association between bread intake and case control group had shown in this result.

Table 1. Descriptive statistics (Mean and Std. deviation) of Anthropometric Measurements for case control variable.

Case variable	Parameter	Mean	Std deviation
	Height	62.56	0.760
	Weight	71.80	3.603
	Age	26.8	4.37
Control variable	Parameter	Mean	Std deviation
	Height	62.62	0.567
	Weight	70.14	4.101
	Age	29.5	4.746

The study result showed that there was strong association that high carbohydrate diet increased the possibility of gestational diabetes mellitus. (Pamela *et al.*, 2000) describe the effect on prenatal outcome of carbohydrate limitation in patients with diet-restricted pregnancy hyperglycemia. On the basis of carbohydrate containing diet two groups of women were formed none randomly, those with low carbohydrate diet (less than 42%) and those with high carbohydrate diet (more than 45%). Fasting and random blood sugar of both group were checked in

routine. Urinary ketones of both group evaluated daily. Comparison of both groups were made on the basis of Glycosylated hemoglobin, average value of fasting and random glucose levels, and need for insulin therapy. Demographically both groups were same. Women with low carbohydrate diet have shown the low level of random blood glucose level ($P < .04$) were observed. Few females needed insulin therapy with low carbohydrate diet ($P < .047$; relative risk [RR] 0.14; confidence interval of 95 percent [CI] 0.02, 1.00).

Table 2. Chi-square test Association of Chapatti among Case Control group.

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	45.593 ^a	3	.000
Likelihood Ratio	59.085	3	.000
Linear-by-Linear Association	37.650	1	.000
N of Valid Cases	100		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .50.

In the low-carbohydrate diet group, the ratio of LGA babies was minimum ($P < .035$; RR 0.22; 95% CI 0.05, 0.91). There was also decreased rate of cesarean deliveries for the group consuming low carbohydrate diet. In the low carbohydrate group ($P < .037$; RR 0.15; 95 percent CI 0.04, 0.94).limitation of carbohydrate in control group showed outcomes by

enhanced glucose control decreased the requirement of insulin treatment. Decreased occurrence of large gestational age babies and reduced cephalopelvic mismatch and macrosomia deliveries. Table 2 shows the result of chi-square test with the degree of freedom (df). The p-value was also given. According to result the degree of freedom (df) value was 3 and

value of chi-square was 45.593. After observing the p-value of result which was 0.000, less than alpha (α) value. Therefore, null hypotheses were not accepted both the attributes were not independent. A strong association between milk and case control group had

shown in this result. The conclusion of result showed that females with low intake of milk had been suffered from vitamin D deficiency which indirectly effects the metabolism of insulin and progress to defilement of gestational hyperglycemia.

Table 3. Chi-square test association of milk among case control group.

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	48.544 ^a	3	.000
Likelihood Ratio	61.937	3	.000
Linear-by-Linear Association	35.968	1	.000
N of Valid Cases	100		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.00.

In previous study the relationship of low level of vitamin D and progression of gestational high blood glucose level had been studied. (Maryland Iacoris *et al.*, 2012) analyzed that low level of vitamin D in pregnancy increased insulin resistance and increased susceptibility to gestational diabetes mellitus. Table 3: Showed the result of chi-square test with the degree of freedom (df). The p-value was also given. According to result the degree of freedom (df) value was 2 and value of chi-square was 16.772. After observing the p-value of result which was 0.000 less than alpha (α) value. Therefore, null hypotheses were not accepted both the attributes were not independent. A strong correlation between dry fruit

and case control group had been shown in this result. The analysis showed that females with low intake of dry fruit and green leafy vegetables had increased danger of pregnancy hyperglycemia. (Pham *et al.*, 2009) studied through random trial to assess the dietary pattern in association with pregnancy hyperglycemia. Overall 124959, females were included, in which 5786 women were belonged to gestational high blood glucose level. A total of 10 cohort, 1 cross sectional, and 1 case control study had been evaluated. Five study result showed that polyphenol rich food decrease the occurrence of pregnancy hyperglycemia and five studies showed no relationship.

Table 4. Chi-square test Association of Dry fruit intake with case control group.

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.772 ^a	3	.001
Likelihood Ratio	21.890	3	.000
Linear-by-Linear Association	8.002	1	.005
N of Valid Cases	100		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 1.50.

The overall analysis showed that danger of gestational hyperglycemia decreases between women with high consumption of polyphenol rich food.

Conclusion

The study concluded that the comparison of both case and control group showed that high carbohydrate diet

low calcium and vitamin D diet low intake of polyphenol rich fruit such as dry fruit and green leafy vegetables increased the possibility of gestational hyperglycemia Nutritional comparison of both groups strengthened this fact that diet plays important role in the progression of pregnancy hyperglycemia. Other comorbidities identified in the present study such as

high carbohydrate diet and sedentary lifestyle during pregnancy. Health status can be improved by using the tool of nutritional education and health promotion pattern. Longitudinal studies should be managed to estimate the comparison of nutritional status of healthy pregnant women with those suffering from gestational diabetes mellitus. So, overall the study concluded that effective nutrition intervention included; awareness regarding physical activity and nutrient intake should be directed towards pregnant women to improve maternal nutritional status. Pregnancy is a critical period in the life of a woman. In this stage if proper health status cannot be monitored, it can lead to several health complications included; birth defects, miscarriage, maternal and infant mortality. According to previous studies in Pakistan, the occurrence of gestational diabetes is very high between pregnant women. Therefore, the purpose of the study is to describe the nutritional status of a pregnant woman suffering from gestational diabetes. In turn, this study will help to make nutrition educational policies and create awareness regarding proper dietary intake among pregnant women in order to reduce illness and fatality rate. It is important to develop awareness of food intake during pregnancy so we can enhance the quality of life through balanced diet.

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