

# A Study on Dietary and Physical Modification among Gestational Diabetes Mellitus Patients

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## ABSTRACT

**Background:** Changes in dietary pattern and sedentary lifestyle increases the risk of Gestational Diabetes Mellitus that affect the fetal outcome and also increase the chances of developing type 2 diabetes mellitus in later stages of life.

**Aim:** The objective of the study is to assess the food habits and daily nutrient intake of GDM women, to assess the change in physical activity and to assess the perceived dietary changes occur in GDM patients.

**Methods:** Total 60 subjects from 3 different hospitals were enrolled by random sampling from 3 blocks of Allahabad district. Anthropometric measurements were taken for calculating BMI. Dietary intake and physical activity levels were collected by interviewing the subjects using a validated questionnaire.

**Statistical analysis:** Mean test was applied for deducting the relevant results.

**Results:** The results indicate that majority of women had a higher pre-pregnancy weight and BMI. Presence of family history of Type 2 diabetes was 60%. The mean Energy and Protein intake was slightly lower than the RDA. There was excess consumption of Fat and CHO. Calcium and Iron was also deficit by 12% and 26% respectively. Sedentary lifestyle was seen in majority of women.

**Conclusion:** The glaring fact was the consumption of energy-dense diet, high in saturated fat, low in unrefined CHO, deficit Calcium and Iron intake contributed to nutritional inadequacy in GDM women. Lifestyle was sedentary among these women; hence, the emphasis is on physical activity levels, because it is known to be beneficial and safe during pregnancy.

**Keywords:** Gestational Diabetes Mellitus, Dietary Pattern, Carbohydrate, Physical Activity.

## INTRODUCTION

Pregnancy is the phase of vibrant change for the mother as many physiological changes occur that affects maternal nutrient absorption and metabolism, appetite, energy and nutrient needs and meal patterns. Nutrition plays an important role and therefore pregnant mother need to be provided with an adequate and well balanced diet. Good nutrition becomes more important when the woman is diabetic. As diabetes has become

the most common endocrinological disorder complicating pregnancy, the growing epidemics of obesity and diabetes increases the incidence of GDM- Gestational Diabetes Mellitus (GDM) and the prevalence rates is 16-20% in India. <sup>(1)</sup> The reasons for increasing prevalence of diabetes are aging population structure, urbanization, sedentary lifestyle and improper dietary habits. Moreover, consumption of energy rich foods with decreased physical activity and subsequent obesity form the main

contributing factors. Studies have reported that vigorous physical activity before pregnancy and continuation of activity during pregnancy will reduce the risk of developing GDM. <sup>(2)</sup> Hence pregnant mother need to be provided with an adequate and well balanced diet as well as continuing physical activity is necessary to ensure adequate growth of foetus. <sup>(3)</sup> Moreover dietary intake is foundational to optimal pregnancy outcomes because nutritional quality and quantity have an impact on the overall growth and development of the foetus. <sup>(4)</sup> As nutrient intake along with dietary changes during pregnancy and physical activity during pregnancy plays a significant role to the growing foetus and the expecting mother, therefore the objective of the study is to assess the food habits and daily nutrient intake of GDM patients, to assess the change in physical activity of GDM patients and to assess the perceived dietary changes among GDM patients.

## MATERIALS AND METHODS

**Research approach:** Quantitative descriptive research approach was applied for the study.

**Research design:** The research design for the study is non-experimental descriptive design.

**Settings of the study:** 3 hospitals (Care, Jahangir and Phoenix) from 3 blocks namely Karely, Naini and Colonelganj of Allahabad district were taken respectively.

**Population:** Gestational Diabetes Mellitus Patients falling in the age group of 22-35yrs.

**Sample size:** 60 Gestational Diabetes Mellitus Patients in the age group of 22-35yrs who have met the inclusion criteria

**Sampling Technique:** Systematic Random Sampling was used.

**Criteria for Selection of Sample:**

**Inclusion criteria:** The inclusion criteria for the present study were:

- Gestational Diabetes Mellitus Patients who are willing to participate.

- Gestational Diabetes Mellitus Patients who can understand and speak Hindi and English.

- Gestational Diabetes Mellitus Patients of 3 Blocks of Allahabad District namely, Karely, Naini and Colonelganj.

**Exclusion criteria:** The exclusion criteria for the present study were:

- Gestational Diabetes Mellitus Patients who are known patients of Diabetes prior to pregnancy.

- Gestational Diabetes Mellitus Patients who were psychological ill.

- Gestational Diabetes Mellitus Patients who were not available when randomly selected.

**Development and description of the tool:**

A structured interview schedule was developed based on the objectives of the study; through review of literature on related studies, journals, and books. The questionnaire used in this study consists of three sections which are as follows:

SECTION A: Demographic data

SECTION B: Dietary habits and daily nutrient intake

SECTION C: Physical assessment

**Method of data collection:** Data regarding the subjects' background characteristics, personal and family medical history, lifestyle habits and behaviours, and course of pregnancy were collected by face-to-face interviews. The collected data included details like age, occupational status, education level, socio economic status, Gynaecology history, pre pregnancy weight, 24 hr dietary recall during pregnancy and physical activity level.

**Statistical techniques:** Mean test was applied on following data: Age (yrs), Age of Menarche (yrs), Gestational Age(wks), Heights(cms), Weight(kg), BMI(kg/m<sup>2</sup>), Plasma Glucose Fasting & PP(mg%) and Daily Nutrient Intake.

**Period of enquiry:** This study was started in the month of August and completed in the month of September.

## VARIABLES DESCRIPTION

**Nutrient intake:** The daily intake of Energy, Carbohydrate, Protein, Fat, Calcium and Iron through meals was considered as

dietary intake. The exchange list was used to convert the amount of consumed food in to the nutrients intake. The actual intake was then compared with the specific RDA.

**Dietary recall:** Dietary data was collected and analyzed using a 24-hour diet recall method. (5) Subjects were asked to recall foods taken over the past 24 hours using household measures relevant to Indian cuisine (serving bowls of various sizes, spoons or ladles) to assess the portion size. These food items were further converted to the raw food items and nutritive value was calculated. Data collected included information on current dietary pattern and food habits. The data from 24hr recall were analyzed and nutritive value was calculated using the exchange list.

**Anthropometric measurements:** Heights (m<sup>2</sup>) and weights (kg) of the individuals were recorded for calculating the BMI scores. (5)

$$BMI = wt (kg) / ht(m^2)$$

## RESULTS AND DISCUSSION

### FREQUENCY PERCENT OF GDM PATIENTS IN THE SAMPLE

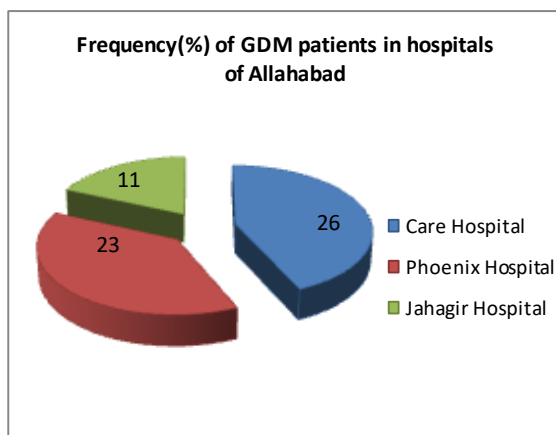


Figure 1: Frequency percent of GDM patients in the sample

The data illustrated in the above figure 1 pertaining to the frequency percent of various hospitals (namely Care, Phoenix and Jahagir) of Allahabad district. In the given sample, it clearly indicates that out of 60 GDM patients the highest frequency percent resides in the Care hospital i.e. 43.33 percent than the Phoenix (38.33

percent) and Jahagir hospital (18.33 percent).

Table 1: Effect of Demographic Features

Socio-Demographic Characteristics	GDM WOMEN n=30 (Mean)
Age (yrs)	31.31
Age of Menarche(yrs)	12.55
Gestational age(weeks)	22.50
Height(cms)	155.55
Weight (kgs)	61.50
BMI (kg/m <sup>2</sup> )	25.42
Plasma glucose fasting (mg %)	158
Plasma glucose, PP (2hr) (mg %)	210
PRE-PREGNANCY WEIGHT	n (%)
Normal	18 (30%)
Overweight	12 (20%)
Obesity Grade I	24 (40%)
Obesity Grade II	06 (10%)
Family history of Diabetes	32 (60%)

As shown in Table 1, the mean age of GDM women was 31.31 years, age of menarche was 12.55 years, gestational age (wks) of the subjects was 22.50 weeks and BMI was 25.42 kg/m<sup>2</sup>. Above table clearly indicate the mean plasma glucose fasting and plasma glucose PP is 158 mg% and 210 mg% respectively. Further the table clearly indicates the pre-pregnancy weight and it was observed that 30% GDM patients lie in the normal category, overweight subjects were 20%. Similarly, women falling in obesity category Grade I and II, were 40% and 10% respectively. As shown in Table 1, high percentage of GDM women had family history of type 2 diabetes i.e. 60%, indicating that presence of family history of Type 2 diabetes is one of the risk factors for the onset of gestational diabetes.

Table 2: Effect of Daily Nutrient Intake

Nutrient	RDA	Intake	% Excess / Deficit
ENERGY(kcal)	2250	2207	-2
PROTEIN(g/d)	82	67	-19
FAT(g/d)	30	42	+40
CHO	-	341	+21
CALCIUM(mg/d)	1200	1050	-12
IRON(mg/d)	35	26	-26

The dietary habits of the subjects revealed that majority of them were non-vegetarians (73%) while only 27% were vegetarians. Among non-vegetarians, there was preference for mutton chicken, and fish and was consumed weekly once by 56% of them, while others consumed more than once in a week.

Table 2 shows the daily nutrient intake of the subjects and it was evaluated from the data gathered by 24-hour dietary recall. Data obtained in household measures relating to the consumption of various food preparations were converted into raw quantities on the basis of standardized recipes.

Calorie recommendations as per ICMR were 35 kcal/kg body weights with additional 350 calories for pregnancy. These recommendations can be modified further for each patient based on weight gain and blood sugar control. Protein requirement was calculated as 1g/ kg body weight and an additional 0.5g /day for pregnancy in the first trimester, 7g/ day for pregnancy in the second trimester and 23g/day in the third trimester, visible fat recommendation was 30gms/d in addition invisible fat 30gms/day (saturated fat 1/3 rd of total fat intake). Carbohydrate requirement was calculated as per the ratio, 50% of the total calories and converted into grams for comparison between RDA and intake. The mean daily energy and nutrient intake of the subjects was computed and compared with Recommended Dietary Allowance (RDA) for pregnant women by ICMR 2010 (Table 2).

The energy intake was slightly lower than the RDA (2207 Kcal) i.e. 2% deficit in

GDM women. Protein intake was also largely deficit about 19% with poor intake of protein of low biological value. Fat consumption was excess by 40%. Two another important nutrients Calcium and Iron was seen deficit by 12 and 16 % respectively. Excess and inconsistent consumption of carbohydrate was seen.

Table 3: Perceived Dietary Changes Among Gdm Patients

DIETARY CHANGES	YES n (%)	NO n (%)
Reducing intake of sweets	34 (56.6)	26 (43.3)
Reducing intake of fatty and junk foods	28 (46.6)	32 (53.3)
Avoid Fasting	50 (83.3)	10 (16.6)
Frequent small quantity of foods	24 (40)	36 (60)
Substitute rice with ragi/wheat	18 (30)	42 (70)

Table 3 shows the dietary changes which occur during gestational diabetes mellitus. It is clear from the table that after diagnosing the disease majority (56.6%) of patients reduces the intake of sweets but 53.3% still taking the fatty and junk foods. 50% of women start avoiding at the time of pregnancy. Frequent small quantities of foods were taken by 60% while 40% do not have any schedule for frequently taking the foods in small quantity. After diagnosing the GDM only 30% women replace or substitute rice with ragi/wheat as prescribed by their dietician or concerned doctor rest 70% patients do not follow any such regime.

Table 4: Physical Assessment

ACTIVITY	BEFORE DIAGNOSIS		AFTER DIAGNOSIS	
	YES n(%)	NO n(%)	YES n(%)	NO n(%)
Do you have any schedule for exercise?	24(40)	36(60)	16(27)	44(73)
Do you involve in normal social activities with family, friends, neighbors or groups?	34(57)	26(43)	28(47)	32(53)
Are you doing your hobbies or recreational activities?	32(53)	28(47)	26(43)	34(57)
Do you give sufficient time for household chores?	46(77)	14(23)	32(53)	28(47)
Has your health interfered with your errands and shopping?	52(87)	08(13)	44(73)	16(27)
Do you sleep more than 8 hours?	32(53)	28(47)	46(77)	14(23)

Before diagnosing the GDM 24% patients were having schedule for exercise while after diagnosing the percentage declines to 16%. Similarly, majority of patients were involved in social and recreational activities before diagnosing but the percentage falls as the patients diagnosed. 32% patients sleep more than 8 hours before diagnosing and after diagnosing the percentage rises to 46%.

## DISCUSSION

The rise in blood sugar shown in table 1 was mainly due to the binge eating habit and craving developed due to pregnancy. Rituals and belief are another factor which makes them feel free to eat anything. It was also concluded in a study that cultural beliefs and practices during pregnancy and overall status of women in family presents as substantial barriers to

adhere with providers advice for effective diabetes management. If diabetes during pregnancy is poorly managed, it will harm both the mother and infant. <sup>(6)</sup> The observation indicates that it is crucial to attain adequate pre-pregnancy weight to experience normal pregnancy, to reduce the risk of complications like abnormal birth weight babies and also reduce the occurrence of GDM (Table 1). Study was done to assess the influence of pre-pregnancy weight, food habits and lifestyle on gestational diabetes and identify the contributing factors, they classified subjects as GDM women and control group based on their blood glucose levels. Of the women who participated in the study, majority of GDM women had a higher BMI ( $25.58 \pm 3.50 \text{ kg/m}^2$ ) than control group ( $24.02 \pm 3.18 \text{ kg/m}^2$ ). The number of women in obesity Grade I and Grade II in GDM women was high. <sup>(7)</sup>

Mean daily nutrient intake (Table 2) shows that the Energy intake was slightly lower than the RDA (2207 Kcal) i.e. 2% deficit in GDM women. This is due to various complications which arise during pregnancy like nausea and vomiting, constipation, heart burn or gastric pressure etc. because of these problems women do not take proper diet to meet the requirements. Protein intake was also largely deficit about 19% with poor intake of protein of low biological value. Fat consumption was excess by 40% and they consumed more of saturated fat and fat from packaged, processed and ready to eat foods. Two another important nutrients Calcium and Iron also deficit due to poor intake, lack of awareness, poor dietary habits, lack of counseling and misconception about the food given during pregnancy. There was excess consumption of CHO and CHO intake was inconsistent in meals, and exhibited intake of low unrefined CHO. Findings of a study revealed that the diet of the GDM women was not balanced in terms of quantity of nutrients and exhibited poor quality. The nutrient intake did not meet the RDA requirements; the consumption of

CHO was excess and inconsistent in meals. <sup>(8)</sup>

Table 3 shows the dietary changes that occur after diagnosing the GDM and it was seen that many of the foods that are craved during pregnancy are both sweet and high in fat, suggesting that changes in food preference might also be an underlying feature of food cravings during pregnancy. Increased body weight is also associated with a higher preference for fat and other fatty foods. From the data it is clear that majority of the patients do not follow the strict diabetic regime due to lack of awareness and craving developed in the pregnancy. However, people avoid fasting during this phase as to meet the increased requirement of the body.

Table 4 reveals that women are more sedentary during pregnancy and do not have a schedule for physical activity, because of feeling sick during pregnancy, low energy levels and lack of time. In addition to these factors there are more barriers like concern of safety of the unborn baby among these women which is preventing them from being physically active. A study states the decrease in the intensity of physical activity and preferred more sedentary activities like household activities, recreation, rest and sleep. <sup>(9)</sup>

## CONCLUSION

The results of the present study indicate that women diagnosed with GDM during pregnancy had a higher pre-pregnancy weight and BMI. Presence of family history of Type 2 diabetes was high in GDM women. The Energy intake was slightly lower than the RDA (2207 Kcal) i.e. 2% deficit in GDM women. Protein intake was also largely deficit about 19% with poor intake of protein of low biological value. Fat consumption was excess by 40%. There was excess consumption of CHO. Calcium and Iron also deficit due to poor intake and other factors. This study demonstrates that women are more sedentary during pregnancy and do not have a schedule for physical activity. Majority of

the patients do not follow the strict diabetic regime due to lack of awareness and craving developed in the pregnancy.

### RECOMMENDATIONS

There is a need to educate, counsel and raise awareness to choose the right type and quantity of foods, besides altering their dietary habits and food choices. Pregnant women do not indulge in the recommended levels of physical activity despite the well known benefits of it, the factors that can facilitate physical activity in these women is by creating awareness and educating them about the benefits, family support is required and also making the activities more enjoyable.

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