ASSESSMENT AND ANALYSIS OF HbA1C, DIETARY PATTERN OF WOMEN OF PRAYAGRAJ WITH GESTATIONAL DIABETES MELLITUS

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ABSTRACT

Gestational diabetes mellitus (GDM) is increasing globally concurrently with obesity. It causes pregnancy complications and puts the mother and offspring at risk of later type 2 diabetes (T2D). HbA1c, a measure of glycated haemoglobin which serves as an indicator of blood glucose control in the prior 3–4 months, may be an avenue for earlier identification of women at risk for GDM. ***Aim:*** *The objective is to examine HbA1c in gestational diabetes (GDM) and analyse nutrient intake of and dietary pattern of pregnant women with GDM.* ***Methods:*** *total 32 Gestational Diabetes Mellitus Patients in the age group of 22 - 35yrs were selected.* ***Statistical analysis:*** *Frequency and Mean test was be applied on to obtain the data.* ***Results:*** *The results indicate that majority of women had excess body weight and BMI before pregnancy. Before pregnancy, mean of the HbA1c among women showed 5.8% and 6.4% after pregnancy. Presence of family history of gestational diabetes mellitus was 50%. The mean energy, protein, calcium and iron intake was deficit than the RDA. There was excess and inconsistent consumption of Fat and CHO. Sedentary lifestyle was also seen in majority of pregnant women.* ***Conclusion:*** *Women with gestational diabetes mellitus during pregnancy had surpassing pre-pregnancy weight and BMI, HbA1c was found raised in women. The existence of type 2 diabetes in family history is also one of the reason of gestational diabetes mellitus. The energy, protein, calcium and iron was in deficit whereas the consumption of carbohydrate and fat was significantly high and inconsistent amount. Most of the women were superstitious. There were many women who used to avoid foods and were hesitated including some foods in diet. The lack of awareness and craving during pregnancy is also the reason. Lifestyle is also the reason, having sedentary life activities is the frequent reason of gestation diabetes mellitus in pregnant women.*

Keywords: Gestational Diabetes mellitus, HbA1c, Nutrient intake, BMI, sedentary lifestyle.

INTRODUCTION

Pregnancy is the stretch of effective changes in the mother as it bring out an array of complicated and sequential physiological changes that influence the nutrient absorption,

metabolism, appetite energy and nutrient obligations. Pregnant mother need to be administered with an ample and well balanced diet while nutrition plays an imperative role during pregnancy. The reason of gestational diabetes mellitus is the action of insulin, which gets abated due to imbalanced secretion of hormones by placenta. An auxiliary risk considerations include older age, overweight, obesity, excessive weight gain, a family history diabetes and history of still birth or giving birth to infant with congenital deformity. **(Varghese *et al.*, 2012).** HbA1c, a measure of glycated hemoglobin which serves as an indicator of blood glucose control in the prior 3–4 months, may be an avenue for earlier identification of women at risk for GDM. However, while HbA1c is currently used among high-risk women at the first prenatal visit to identify women with overt type 2 diabetes, it is not currently used to screen for GDM. **(Benaiges *et al.*, 2017)**. Lifestyle changes, including diet and physical activity, play an important role in the treatment of gestational diabetes. Some women with the condition are even able to control their blood glucose levels through these things alone – however, most will still need medications, such as insulin **(Diabetes UK, 2016).** Nutritional status of women is of much importance for the well-being of both the mother and the developing fetus. Two independent factors—prepregnancy body mass index (BMI) and weight gain during pregnancy—play important roles in determining the pregnancy outcome **(Choi *et al.*, 2011)**

MATERIALS AND METHODS

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

Research design: Non – experimental descriptive design was selected for the study.

Settings of the study: Kamla Nehru Hospital of Prayagraj district was taken respectively for the collection of data.

Population: 32 Gestational Diabetes Mellitus Patients in the age group of 22 - 35yrs who have met the inclusion criteria was selected for the study.

Sampling Technique: Systematic Random Sampling was selected for the study.

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 urban area of Prayagraj District.

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 was psychological ill.
• Gestational Diabetes Mellitus Patients who will not available when randomly selected

Development and description of the tool: A structured interview schedule was developed.

Method of data collection: Data regarding the respondent, background characteristics, personal and family medical history, lifestyle habits and behaviors, and course of pregnancy

were collected by interview method. The collected data included details like age, occupational status, education level, socio economic status, and physical activity level. Biochemical and clinical assessment was done.

Anthropometric measurement: BMI was calculate using formula weight (kg)/height (meter^2)

Dietary pattern: Including 24 hrs dietary recall, food consumption frequency, dietary habbits**,** was noted down.

Statistical techniques: Frequency and Mean test was applied to obtain the data.

RESULTS AND DISCUSSION

Table 1 shows the data that women aged 22-28 were 43.75 per cent and aged 29-35 years were 56.25 per cent.

It is a fact the incidence of GDM is increased by approximately 8 times for pregnant women age 35 years and over 25 years. According to **National Family Health Survey-4 (NFHS2015-16),** 22.9% of women in childbearing age in India are underweight (BMI <18.5kg/m2).

Table 2 shows that mean age of menarche was 13.09 years, gestational age of the respondents were 28.9 years, and gestation weeks of women was 31.50 weeks. This table apparently indicate the mean plasma glucose fasting and plasma glucose PP is 132 mg% and 205 mg% respectively. The family history of type 2 diabetes is one of the high possibility for the women for onset of gestational diabetes mellitus the above data also revealed that 50 per cent respondents were having family history of diabetes.

Accordingly, women who gained below guidelines are more likely to remain on diet control but have small for gestational age neonates **Theodoraki and Baldeweg (2008).**

A fasting glucose level>126 mg/dl or a random plasma glucose>200 mg/dl meets the threshold for the diagnosis of gestational diabetes mellitus.

The main risk factors are high maternal age, obesity, history of GDM, high parity, and family history of diabetes **(Teh et al. 2011, Collier et al. 2017).**

Table 3 shows the mean height of the women were 157.5 cm, mean weight was 65.8 kg and mean BMI was 26.7 kg/m^2 before pregnancy**.**

Table 4 shows that 6.25 per cent women were grade II obesity, whereas 31.25 per cent of the women were in the categories of grade I obesity, 43.75 per cent were overweight and 18.75 per cent were experiencing normal pregnancy weight.

According to **Choi (2011)** The rate of weight gain varies throughout pregnancy and its timing during pregnancy also has an impact on birth weight.

The prevalence of GDM is globally increasing along with obesity (Caballero 2007). In Finland, the prevalence of GDM was up to 16% in 2015 **(National Institute for Health and Welfare 2015).**

In 2014, 35% of pregnant Finnish women were overweight (BMI 25.0-29.9 kg/m2) and 13% were obese (BMI ≥30 kg/m2) (National Institute for Health and Welfare 2015). The consequences of GDM include pregnancy complications **(Catalano et al. 2012).**

The table 5 shows that mean of the HbA1c among women was 5.8 before pregnancy and 6.4 after pregnancy.

MT Rahman (2009) stated that regular blood samples can be used to determine HbA1c levels, which give an idea of glucose control over a longer time period.

HbA1c is the product of an irreversible non-enzymatic binding of glucose to plasma proteins, specifically haemoglobin (Hb). The mean plasma glucose over the erythrocyte life span is correlated with a degree of glycosylation. It is a single, non-fasting blood test and reflects glucose levels over the previous 4–8 weeks. As compared with glucose testing, it has been shown to have greater reliability with <6% inter laboratory variation.3 Thus, HbA1c test has improved analytical stability with greater standardisation between assays and less preanalytical variation **(D'Emden M, 2014).**

Table 6 represents that women during pregnancy are more sedentary even after diagnosed with Gestational diabetes mellitus and are not attentive towards the physical activities and exercises, Most of the women had sleep more than 8 hours.

According to observational studies **(Tobias et al. 2012, Schoenaker et al. 2015),** and a few lifestyle intervention studies **(Jing et al. 2015, Koivusalo et al. 2016, Petrella et al. 2016, Bruno et al. 2017),** possibly modifiable risk factors for GDM include physical activity and diet.

Table 7 shows that most of the women were following vegetarian diet (87.5 %) followed by non-vegetarian and ovo-vegetarian diet (6.25 %). 34.37 per cent women had 4 meals a day, 56.25 Per cent women didn't skipped the meals whereas 43.75 per cent women used to skip meals.

The Finnish Gestational Diabetes Prevention Study (RADIEL, 2016) reported a positive outcome for the prevention of GDM in high-risk women by lifestyle interventions, including diet and exercise. However, this positive outcome needs to be interpreted with caution. The results were only marginally significant, after adjustment for multiple factors, and the control group was more historical rather than an alternative active intervention. Nonetheless, this is important information to have in our goal to reduce GDM development.

Jelena Meinilä (2017) Dietary intake characterized by high consumption of vegetables, fruits, and dietary fibre and low consumption of high-fat/high-sugar foods and red and processed meat are associated with lower risk of GDM.

Table 8 shows the intake of energy, protein, calcium and iron was deficit whereas the consumption of fat and carbohydrate was in excess and inconsistent which led to the gestational diabetes mellitus in pregnant women.

According to Rahman et al., (2008) any diet needs to provide sufficient calories for pregnancy, typically 2,000-2,500 kcal with the exclusion of simple carbohydrates. The main goal of dietary modifications is to avoid peaks in blood sugar levels. This can be done by using slow release carbohydrate sources. Since insulin resistance is highest in mornings, breakfast carbohydrates need to be restricted more.

Markovic et al., (2016) examined the effects of a low-GI diet compared with a higher fiber diet on pregnancy outcomes for women at high risk of GDM. No significant differences were noted. It is possible that the diet of women in pregnancy is generally less than optimal and studies in pregnancy.

Hernandez et al. (2016) in a tightly controlled pilot study reported that the standard low-carbohydrate/high-fat diet for women with insulin resistance may have unintended consequences for infant health. The higher-carbohydrate and hence lower-fat diet may reduce maternal insulin resistance.

CONCUSION

The outcome of the present study, demonstrated that the women diagnosed with gestational diabetes mellitus during pregnancy had surpassing pre-pregnancy weight and BMI, HbA1c was found to be raised after pregnancy. The existence of type 2 diabetes in family history was also the reason of gestational diabetes mellitus in pregnant women. The energy, protein, calcium and iron was in deficit whereas the consumption of carbohydrate and fat was in excess and inconsistent amount. Most of the women were superstitious. Hence, there were many women who used to avoid foods and were hesitated including some foods in diet.

Mass of the inmates followed sporadic diabetes regime. The lack of awareness and craving during pregnancy is also the reason. Lifestyle is also the reason, having sedentary life activities is the frequent acumen of gestation diabetes mellitus in pregnant women.

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Table 1. Distribution of age of Women with Gestational diabetes mellitus

S.No.	Age of particulars		Frequency (N=32)	Percent
1.	**Age (yrs.)**	22-28	14	43.75
		29-35	18	56.25

Table: 2. Distribution of respondents according to Personal data

S.No.	Particulars	GDM Women n=32 (Mean)
1.	Age of Menarche (yrs.)	13.09
2.	Age of Pregnancy (yrs.)	28.9
3.	Gestational age (weeks)	31.50
4.	Plasma glucose fasting (mg/dl)	132
5.	Plasma glucose, PP (2hr) (mg/dl)	205
6.	**Family history of Diabetes**	16(50 %)

Table:3 Anthropometric measurement of Gestational diabetes mellitus women before pregnancy.

S.No.	Anthropometric measurements	Mean
1.	Height	157.5
2.	Weight	65.8
3.	BMI (Kg/m^2)	26.7

Table: 4 pre-pregnancy weight of the respondents

S.No.	Pre-Pregnancy Weight	Mean n (%)
1.	Normal	6 (18.75%)
2.	Overweight	14 (43.75%)
3.	Obesity Grade I	10 (31.25 %)
4.	Obesity Grade II	02 (6.25 %)

Table: 5 HbA1c of respondents before and after term pregnancy

S.No.	HbA1c	Mean Value (%)
1.	Before pregnancy	5.8
2.	Term pregnancy	6.4

Table: 6. Distribution of Respondents according to lifestyle

S.No.	Activity	Before Diagnosed		After Diagnosed	
		Yes	No	Yes	No
1.	Do you have any schedule for exercise	16	16	14	18
2.	Heath interference with your daily life activities and shopping	25	07	23	09
3.	Do you sleep more than 8 hours	16	16	25	07

Table: 7. Distribution of respondents according to dietary assessment

S.No.	Dietary assessment		Frequency (N=32)	Percent
1.	**Type of Diet**	Vegetarian	28	87.5
		Non- vegetarian	02	6.25
		Ovo-vegetarian	02	6.25
2.	**Meals per day**	2 Meals	06	18.75
		3 Meals	08	25
		4 Meals	11	34.37
		5 Meals	07	21.87
3.	**Skip or Omit Meals**	Yes	14	43.75
		No	18	56.25

Table:8. Mean Daily Nutrient Intake

Nutrient Intake	RDA (2010)	Intake	Difference	t-value	t-tab	Result
Energy (Kcal)	2250	2214	-36	2.06	2.776	NS
Protein (g/d)	82	52	-30	0.057	2.776	NS
Fat (g/d)	30	54	+24	3.417	2.776	S
Carbohydrate*	337	410	+73	4.647	2.776	S
Calcium (mg/d)	1200	1042	-158	1.20	2.776	NS
Iron (mg/d)	35	22	-13	0.06	2.776	NS

***Approximate value RDA (2010)**