

NUTRITIONAL ADEQUACY OF GESTATIONAL DIABETES AND PRE-GESTATIONAL DIABETES WOMEN

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ABSTRACT

Background: Gestational Diabetes mellitus (GDM) has emerged as an important public health problem affecting mothers and their offspring in later life. The role of diet is highly important as adequate and good nutrition is needed to the mother and foetus.

Aims & Objective: It is imperative to study the nutritional adequacy of these patients and the objective of the study is to identify women with gestational glycaemia and assess their nutritional adequacy in gestation.

Material and Methods: Pregnant women (n=504) reporting to a Diabetes Referral centre at Chennai were selected by purposive sampling and screened for glucose intolerance at the first visit. The socio-demographic details, anthropometry and bio-chemical assessment was done. About 240 women in the 25-30 age groups, primi and in the first trimester were selected to study the nutritional adequacy in the antenatal period using a food frequency questionnaire and 24-hour recall method. The mean nutrient intake was calculated and compared with the RDA of pregnant women (ICMR).

Results: The findings 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.

Conclusion: The glaring fact was the consumption of energy-dense diet, high in saturated fat, low in unrefined CHO, dietary fibre and deficit iron intake contributed to nutritional inadequacy in the GDM women.

KEY-WORDS: Carbohydrates; Gestational Diabetes Mellitus; Normal Glucose Tolerance; Pre-Gestational Diabetes Mellitus; Recommended Dietary Allowance

Introduction

Pregnancy is the period of dynamic change for the mother as it triggers an array of complex and sequential physiological changes that affect maternal nutrient absorption and metabolism, appetite, energy and nutrient needs and meal patterns. Pregnant mother need to be provided with an adequate and well balanced diet and nutrition plays an important role during pregnancy. However, when the woman is diabetic, good nutrition is even more essential. 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.^[1] The projected rates are attributed to the aging population structure, urbanization, sedentary lifestyle and improper dietary habits. Consumption of energy dense foods combined

with decreased physical activity and subsequent obesity form the main contributing factors. The diagnosis of GDM offers a unique opportunity in identifying individuals who will be benefitted by early therapeutic intervention with diet and exercise, thus normalizing the weight to delay or even possibly prevent the onset of diabetes.^[2]

Hence pregnant mother need to be provided with an adequate and well balanced diet necessary to ensure sufficient energy intake for adequate growth of foetus without draining on mother's own tissues to maintain her pregnancy.^[3] 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.^[4] As nutrient intake plays a significant role to the growing foetus and the expecting mother, it is imperative to study the nutritional adequacy of these patients and the objective of the study is to

identify women with gestational diabetes mellitus and assess their nutritional adequacy in gestation.

Materials and Methods

Locale and Selection of Subjects

The study was conducted in a referral centre for diabetes (urban setting) in Chennai City. The subjects comprised of five hundred and four consecutive pregnant women who attended the centre over a study period of six months and were screened for glucose intolerance at the first visit. Pregnant women who had visited the diabetic referral centre for the first time to screen for glucose intolerance and those women who had come for follow-up visits during the gestational period were selected. From the screened patients, the subjects of the study comprised of gestational and pre-gestational diabetes women and were selected on the basis of the inclusion criteria. Inclusion criteria were (i) pregnant women who were in the 25-30 age group (ii) primi (iii) were in their 1st trimester of pregnancy and (iv) underwent sedentary activity.

Sample Size

The subjects included 120 gestational diabetic women and 120 pre-gestational diabetic women, selected by purposive sampling. Those women with glucose intolerance with first recognition during pregnancy were grouped as gestational diabetic (GDM) and those who had diabetes prior to their last menstrual period were grouped as Pre-gestational diabetic (PGDM).^[5] Thus the study was completed with a total of 240 subjects, which constituted 48% of the total patients.

Study Design

Data on socio-demographic details were collected using a standardized questionnaire. Biochemical assessment namely the estimation of blood glucose and HbA1c was done to determine the glycemic status of the selected subjects at the first visit. The information about the food habits and dietary practices, likes and dislikes, number of meals taken, eating habits between meals and intake of staple cereals was collected using a questionnaire cum interview schedule.

Information on dietary intake was collected by 24 hour dietary recall method.

Nutritional Adequacy

Qualitative and quantitative information about frequency of consuming different foods was obtained from the selected subjects using food frequency questionnaire (FFQ) with special emphasis on CHO, protein and fat rich foods. The subjects were asked if the particular food item was consumed on a daily / weekly / monthly basis. This information complemented the 24-hour recall. The information thus obtained was analyzed to determine the amount of various food items consumed. Energy and nutrient intake was calculated using the Nutritive value of Indian foods.^[6] The mean nutrient intake was then compared to the Recommended Dietary Allowances (RDA) of the ICMR 2010. The mean nutrient intake was statistically analyzed using independent 't' test to compare with the RDA and find the significant difference.

Results

Glucose Intolerance

Of the 504 pregnant women screened for glucose intolerance in pregnancy in the referral centre for diabetes, 352 subjects (70%) had Gestational Diabetes Mellitus (GDM) and 80 subjects (16%) had diabetes before pregnancy (PGDM) and 14% of women had Normal Glucose Tolerance (NGT).

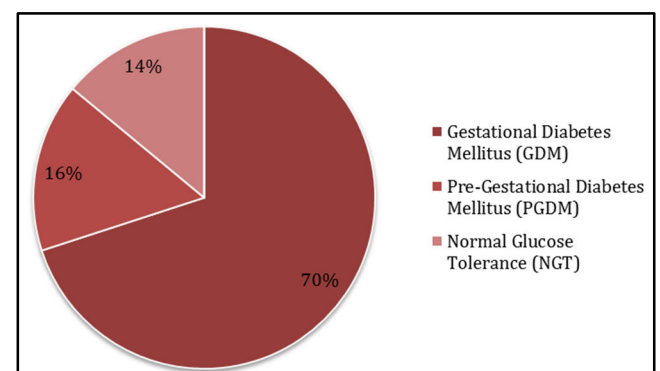


Figure-1: Glucose Intolerance in Pregnancy

Socio-Demographic profile

The GDM and PGDM women were mainly from the 26-30 age groups, whereas the normal glucose tolerance women were in the early adulthood in the 21-26 age group which coincides with the

earlier findings that advanced age for pregnancy is a contributing factor for diabetes.

Dietary Pattern

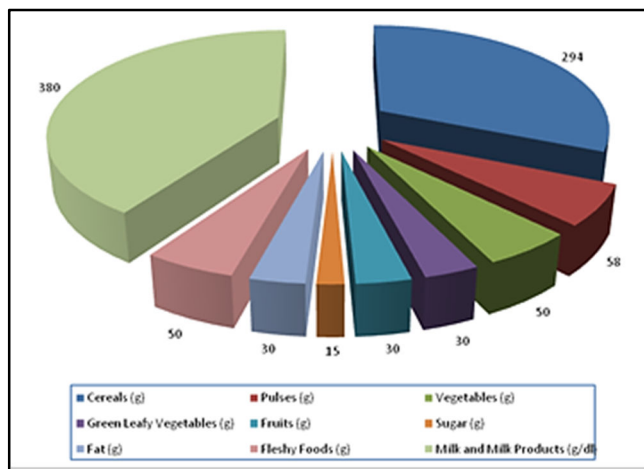


Figure-2: Mean Consumption from Food Groups

As depicted in Figure 2, the mean consumption from food groups revealed increased consumption of cereals as rice was the staple food of the subjects (294 g/day). The mean intake of pulses was (58 g/day) and mainly contributed from daily consumption of pulses and dhal in their diet. The mean consumption of vegetables and green leafy vegetables was less, contributing only 50 g and 30 g respectively, thus reducing the fibre component in their daily diet. The consumption of fats was higher (30 g / day) and more inclusion of saturated fat in the form of fried foods, use of ghee, butter and cheese was observed. The consumption of milk and milk products was satisfactory.

Food Habits

The dietary habits of the subjects revealed that majority of them were non-vegetarians (73%) while only 27 percent were vegetarians. Among non-vegetarians, there was preference for fish, chicken, and meat and was consumed weekly once by 53% of them, while others consumed more than once in a week.

Daily Nutrient Intake

The daily nutrient intake of the subjects was evaluated from the data gathered by 24- hour dietary recall complemented with food frequency questionnaire. Data obtained in household measures relating to the consumption of various food preparations were converted into raw

quantities on the basis of standardized recipes. The daily consumption of various foods was thus calculated and evaluated for its nutrient content using nutritive value of Indian foods.

Table-1: Mean Daily Nutrient Intake

Nutrients	RDA	GDM		PGDM	
		Intake	% Excess/Deficit	Intake	% Excess/Deficit
Energy (KCal)	2250	2362	+5	2139	-4
Protein (g)	82	58**	-30	50**	-40
CHO(g)	-	348**	+24	298**	+11
Fat (g)	30	39**	+30	28**	-7
Fibre (g)	40	24**	-40	30**	-25
Iron (mg)	35	25	-29	24	-31

** P<0.01: Significant at 1% level

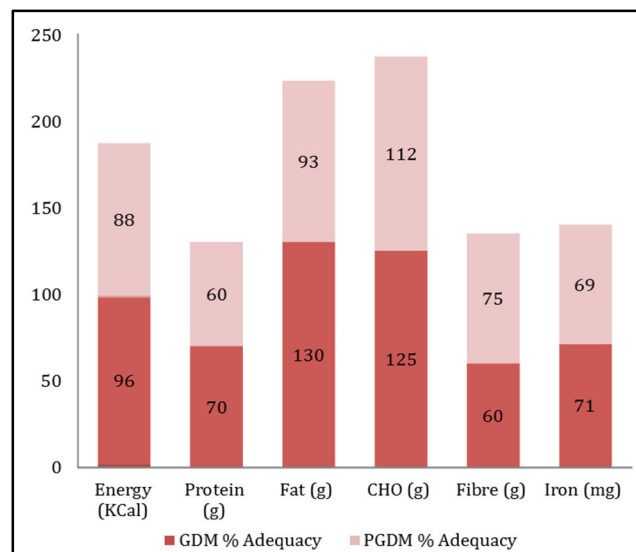


Figure-3: Percentage Adequacy of Nutrients

The mean daily energy and nutrient intake of the subjects was computed for both the groups and compared with Recommended Dietary Allowance (RDA) for pregnant women by ICMR 2010. (Table 1)

The energy intake was higher than the RDA (2362 KCal) in the case of GDM women, with a 5% excess and 4% deficit in the case of PGDM women. Protein intake was deficit in both the groups 30% and 40% for GDM and PGDM respectively with poor intake of protein of high biological value (Figure 3).

There was excess consumption of CHO and CHO intake was inconsistent in meals, and exhibited intake of low unrefined CHO. Fat consumption was excess by 7% in the GDM women and they consumed more of saturated fat and fat from packaged, processed and ready to eat foods. Fibre was deficit by 40% and 25% respectively for GDM

and PGDM women as dietary fibre intake was low. Iron, an important nutrient during gestational period also showed a deficit of 29% in GDM and 31% in PGDM women.

Discussion

American Diabetes Association (ADA) recommends screening for selective (high risk) population. But compared to selective screening, universal screening for GDM detects more cases and improves maternal and neonatal prognosis.^[7] The increased prevalence is attributed to the aging population structure, urbanization, the obesity epidemic and physical inactivity in the Indian population.^[8,9]

Regarding the type of family, majority of the subjects had a nuclear family structure. Fairly large numbers of subjects were graduates (90.5%) but only 35% were employed. The working women took profession like nursing, teaching and IT jobs. Data reflected the majority of the subjects were in the high income capital group.

The dietary pattern revealed that the number of meals the subjects consumed in a day, ranged from three to five and usually comprised of breakfast, lunch and dinner with midmorning and tea time snacks. Only 33% of them exhibited the habit of eating in between meals and the food items consumed were snacks, biscuits, cold drinks, tea or coffee. The consumption of fruits was fair with apple, guava, sweet lime and banana being the common fruits consumed on a daily basis. There was minimum consumption of sugar and sugar products to 10-15g/day and a majority (83%) of the subjects avoided sweets totally.

Energy requirement during pregnancy comprises the normal requirement for an adult women and an additional requirement for foetal growth plus the associated increase in body weight during pregnancy.^[10] Carbohydrate consumption constitutes the bulk of the total calorie intake as the cereals are staple diet in India. More refined or processed foods were taken in the form of snacks by the subjects. It is important that the higher intake of protein recommended during pregnancy should come from a normal, varied diet and not from commercial high-protein supplements and

could easily be met from dietary sources such as cereal, pulse, milk based vegetarian diets and consumption of egg.^[11]

With economic transition, health transition too, has taken place in India, with more and more proportion of people shifting to processed, refined and convenient foods, the importance of dietary fibre and its digestibility is acquiring greater significance.^[12]

Conclusion

Among the pregnant women attending the diabetes referral centre, the occurrence of GDM was higher than PGDM. In both the GDM and PGDM women, the quantity of the nutrients was not balanced and exhibited poor quality. Comparison of the subjects according to the nutrient adequacy revealed that there was excess consumption of CHO and fatty foods and it was inconsistent in meals.

The glaring fact was the consumption of energy-dense diet, high in saturated fat, low in unrefined CHO, dietary fibre and deficit iron intake contributed to nutritional inadequacy in the GDM and PGDM women. There is a need to educate, counsel and raise awareness in these women, to choose the right type and quantity of foods, besides altering their dietary habits and food choices. It is utmost important to seek nutrition intervention for controlling the disease and the food plan must be tailor-made to the individual and modified as needed throughout pregnancy.

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