



**ORIGINAL RESEARCH PAPER**

**Medical Science**

**DIETARY BEHAVIOR AND PHYSICAL ACTIVITY STATUS OF SELECTED NEWLY DETECTED TYPE 2 FEMALE DIABETICS**

**KEY WORDS:** Type 2 Diabetes, Dietary behaviour, Physical activity

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**ABSTRACT**

Increased number of diabetes in India is likely to be due to a significant increase in the incidence of type 2 diabetes caused by unprecedented rates of urbanization which results in environmental and life style changes. The investigation was designed to study the anthropometric indices, physical activity and diet pattern of selected diabetics. Around 214 newly detected female type 2 diabetics, who visited the Diabetes specialties centres in Coimbatore were the subjects. The data collection carried out through structured questionnaire which included the information on age, sex, marital status, family history of diabetes, symptoms onset, known medical illness, physical activity, anthropometric measurements and clinical parameters. Dietary pattern and intake of the subjects assessed by food frequency questionnaire and 24hour diet recall method. Among the selected subjects 48% of the females were overweight, whereas only 45% of females stood with normal BMI, grade-I obesity were 4% and grade-II obesity 3%. Nearly 69% of females were not involved in any type of physical activities. It was found that higher intake of carbohydrates and fat contribute to increased energy intake. There was protein and fibre inadequacy. From this study it was concluded that elevated anthropometric indices and faulty diet are related with an increased risk of developing diabetes. Nutrition education has a great role in the treatment of T2DM.

**INTRODUCTION**

T2DM is a major public health problem, accounting for significant premature mortality and morbidity. The growth in prevalence of the condition appears to be closely linked with obesity. Over the last five years, a number of large observational studies have suggested an association between the onset of T2DM and Vitamin D deficiency. Vitamin D has serious effects on insulin action, and may impact on a number of pathways which may be of importance in the development of T2DM (Ozfarat and Chowdhury, 2010).

Studies have shown that the prevalence of diabetes in urban Indian adults is about 12.1%, the onset of which is about a decade earlier than their western counterparts and the prevalence of T2DM is 4-6 times higher in urban than in rural areas. The risk factors peculiar for developing diabetes among Indians include high familial aggregation, central obesity, insulin resistance and life style changes due to urbanization (Gupta *et al.*, 2012).

Observations of the relations between food choices and health have been made since ancient times. The principal goal of nutritional guidance has changed from the prevention of nutritional deficiencies to the prevention of chronic diseases. This evolving purpose of nutritional guidance has demanded that research in nutritional epidemiology play an increasingly important role. The present study is a Nutritional epidemiology as it pertains to the relations between diet and health in human populations

So the present study was designed with the following objectives as to screen the anthropometry measures, physical activity and dietary habits of newly detected T2DM, and to educate the selected subjects on lifestyle modifications.

**METHODOLOGY**

Study was conducted in Coimbatore city, by purposive sampling, the investigator enlisted around 214 newly detected female type 2 diabetics, who visited the Diabetes Specialties Centre from June 2012 – May 2013 in Coimbatore, the inclusion criteria- newly detected type 2 diabetes FBS: >100 mg/dl, HbA1c >5.6 %, Oral Glucose Tolerance Test- FBS: >126mg/dl, 2hr :> 200mg/dl and exclusion criteria- Osteoporosis, Complicated cases of diabetes mellitus, known cases of type 2 diabetes on treatment. Data collection carried out through structured questionnaire regarding their age, sex, marital status, family history, symptoms onset, known medical illness, anthropometric measurements, clinical parameters, physical activity status and dietary habits was assessed by

24hr diet recall and food frequency questionnaire (FFQ). Under anthropometric measurement, body weight, height, waist and hip circumferences were measured. Body weight determined using a digital scale to nearest 0.1 kg. Height measured with portable Seca Stadiometer 2080 to nearest 0.1 cm. BMI was computed as the ratio of weight (kg) per height in meter square (m<sup>2</sup>). Waist circumferences (WC) measured at the minimum circumference between umbilicus and iliac crest; hip circumference (HC) measured at widest circumference around buttocks; waist –to –hip ratio calculated. The biochemical investigations carried out were fasting and post-prandial blood glucose and HbA1c. All the parameters were run using Roche, Germany - Cobas b 101 POC systems and diagnostic kit. Diet guidelines were provided to all selected subjects to be aware on risk of overweight, obesity and diabetes. Individual counseling was given to all selected newly diagnosed female diabetics to prevent complications.

**RESULTS AND DISCUSSION**

**1. Background information**

Information regarding the age, sex, marital status, family history, symptoms onset and known medical illness of all the selected subjects were discussed under the following subheadings.

**Age**

Over the past 30 years, the status of diabetes has changed from being considered as mild disorder of elderly to one of the major causes of morbidity and mortality affecting youth and middle aged people. It is important to note that the rise in prevalence is seen in all six inhabited continents of the globe. Diabetes also develops at a younger age in Indians (Mohan *et al.*, 2007). Among the selected female diabetics it was found that most of their age was between 30 years to 35 years. Nearly seven percent of the selected females belong to 25-30 years of age.

**Marital status and Family history of diabetes**

Maximum percentage 74% females were married and 26% females were unmarried and 91% of the female subjects were employed in various sectors.

Family history of diabetes is not only a risk factor for the disease but is also positively associated with risk awareness and risk-reducing behaviors and a useful screening tool for detection and prevention of diabetes.

**Symptoms at onset of diabetes**

Symptoms of type 2 diabetes occur slowly. Increased thirst,

frequent urination, excess sugar in blood, increased hunger, weight loss, fatigue, vision problem, slow healing or frequent infections and patches of dark skin which can be a sign that body is resistant to insulin. (Zeitz et al, 2003). Among the selected 214 female newly detected diabetics 85 subjects recorded the symptoms of weight loss, polydipsia (27%), tiredness (18%), giddiness (6%) and urinary tract infection (13%). Around 29 females were diagnosed as diabetes by undergoing general checkup.

**Other medical illness**

Among the selected samples 14 females have informed that they already have hypertension and they were on drugs, 16 females with hypertriglyceridemia and 6 females were with hypothyroidism and on treatment.

**2. Anthropometric status**

There is a strong association between excess weight and risk of incident diabetes and showed that BMI, WC and WHR had a similar association with incident diabetes. Hadaegh et al (2009) state in a study that over a median follow up of 3.5 years (11 months-6.3 years), 114 individuals developed diabetes (4.1%). The risk for developing diabetes was significantly higher for the highest quartile of BMI, WC, WHR respectively, compared to the lowest quartile, and the risk decreased but remained statistically significant when abnormal glucose tolerance was included in the multivariate model.

**Table-1 Anthropometric status of all the selected subjects as indicated by BMI**

S. No	Anthropometric measures	Mean ± SD value of measures
1	Mean age (yrs)	33.9 ± 3.08
2	Height (cm)	156.6 ± 4.15
3	Weight (kg)	64.21 ± 8.37
4	BMI(kg/m <sup>2</sup> )	26.17 ± 3.14
5	Waist(cm)	93.7 ± 4.18
6	Hip (cm)	99.67 ± 4.61
7	WHR(w/h)	0.94 ± 0.04
	<b>BMI status</b>	<b>Criteria</b>
8	Underweight	< 18.5
9	Normal	18.5-24.9
10	Over weight	25-29.9
11	Obesity grade I	30-34.9
12	Obesity grade II	35-39.9
13	Obesity grade III	>40
14	<b>Total</b>	<b>214</b>

Some studies have suggested that waist circumference (WC) is a better predictor for DM than other indicators of obesity and also shown that the waist-to-hip ratio (WHR) is the best predictive anthropometric variable for development of type 2 DM. According to WHO criteria (2000) the BMI (kg/m<sup>2</sup>) less than 18.5 is underweight, between 18.5 to 24.9 is normal, 25 to 29.9 is overweight, 30 to 34.9 is obese grade-I, 35 to 39.9 is obese grade-II and more than 40 is obese grade-III.

From table-1 it was clear that among the selected subjects 48% of the females were overweight, whereas only 45% of females stood with normal BMI. Grade-I obesity were 4% grade-II obesity 3% females.

**3. Biochemical Profile**

In our study the biochemical parameters fasting and post prandial blood glucose level, HbA1c values were determined for the selected subjects. The Oral Glucose Tolerance Test was taken for eight female and test results proved that they were with diabetes by showing their second hour serum glucose value more than 200mg/dl for six female subjects and for two female subjects their fasting serum glucose value crossed 126mg/dl. For the remaining 206 females, the mean blood glucose levels at 10 to 12 hours fasting and 1.5hours postprandial blood glucose levels (mg/dL) for females were 142.91±39.82 and 246.4±69.28, majority (51% females) of

their glycosylated haemoglobin were under fair control, 48 female (22%) were diagnosed to be in good control and 27% female and were identified with poor HbA1c control.

**4. Dietary Behavior**

The food choices of all the selected female subjects are expressed in the following table, shows that only 11% of females and 3% of males were pure vegetarian, 5% of both female and male were ova vegetarian and the majority of females (84%) and males (92%) were non vegetarians. Regarding food allergy, only two females had reported that they have skin allergy (rashes) on consumption of chicken. Among the selected subjects only nine females (4%) had the habit of fasting (avoiding one meal) twice monthly. Nearly 21 females (10%) informed that they fasted only occasionally.

**Food Frequency Pattern and 24 hour diet recall**

It was revealed from table-2 that among the females subjects intake of energy, carbohydrate and fat consumption were excess than the daily requirements 147kcal, 21.2grams and 9.17grams respectively. Protein and fibre were deficit by 10.86grams and 6.13grams respectively.

**Table-2 Comparison of Daily Nutrient Intake by FFQ and 24HDR**

Nutrient	Females (n =214 )	FFQ & 24HDR Correlation For females	
		FFQ	24HDR
Energy (Kcal)	2030 ± 285	2047 ± 293.4	0.9531
Protein (g)	44.6 ± 5.2	44.14 ± 5.08	0.4592
Fat (g)	30.5 ± 2.6	29.17 ± 2.73	0.0004
CHO (g)	297.07 ± 12.3	296.20 ± 12.27	0.1332
Fibre (g)	18.4 ± 1.8	18.87 ± 1.98	0.0462

From Food Frequency Questionnaire it was found that the intake of cereals and millets, vegetables, roots and tubers, sugars, fat, egg and meat was more than the recommended intake whereas the intake of pulses, fruits and milk was lesser than the recommended intake which also a pathway to increase the glycemic parameters. It was concluded that higher intake of carbohydrates and fat contribute to increased energy intake. There is protein and fibre inadequacy. There is a strong positive correlation between FFQ and 24 hour diet recall for energy intake whereas other nutrients also have positive correlation technically.

**Preference of Junk Foods, Fried Foods and Aerated Drinks**

None of the selected subjects preferred junk foods and aerated drinks daily. Puffs and Pastries consumption preference was by 16% females in weekly twice, 22% females prefer once in fortnight. A maximum preference of all the above said junk foods and aerated drinks was monthly once followed by once in fortnight by the subjects. Only 4% females informed that they never preferred noodles, 14% females not preferred pizza and burger, and only three percent females never preferred puffs and pastries.

**5. Physical Activity**

Nelson, et al., (2007) report the key finding that the health benefits of physical activity depend mainly on total weekly energy expenditure due to physical activity. In scientific terms, this range is 500 to 1,000 MET-minutes per week. A range is necessary because the amount of physical activity necessary to produce health benefits cannot yet be identified with a high degree of precision; this amount varies somewhat by the health benefit. Accordingly the data from the GPAQ was used to assess the physical activity of the selected subjects and categorized them into groups of varying health benefits that it might produce. The details are presented in the following table 3.

**Table- 3 Physical activities (MET minutes per week) among the Selected Subjects**

MET minutes per week	Kind of Activity	No. of females	Percentage	Health benefits
≤ 500	Gardening & slow walking	02	01	Minimal
500 - 1000	Walking & jogging	48	22	Substantial
≥ 1000	Brisk walking & jogging, workouts	16	8	Great
Physical inactivity	148	69	Of concern	
<b>Total</b>	<b>214</b>	<b>100</b>		

It was awful to know that 69% of females were not involved in any type of physical activities. Only 8% of females spent regular time for normal walking, 48 females were engaged in physical activities for 3 to 4 days a week. Therefore, urgent steps need to be initiated to promote physical activity to stem the twin epidemics of diabetes and obesity in India.

**Conclusion:**

Higher intake of carbohydrates and fat contribute to increased energy intake. There is protein and fibre inadequacy. Lack of physical activity and obesity increases the risk for development of diabetes in the later stage of a person's life. Diet survey of the subjects indicated high intake of fats, carbohydrates and energy and inadequate intake of proteins, fibre and iron as compared to their recommended values. Wide prevalence of associated health problems among the hyperglycemic subjects clearly emphasized need of their diet and lifestyle modifications.

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