

RURAL vs. URBAN DIFFERENCES IN DIET AND THE PREVALENCE OF DIABETES MELLITUS IN WESTERN INDIA

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Diabetes mellitus is an endocrinological disorder affecting each and every cell of the body thereby bringing about alterations in the metabolism of proteins, carbohydrates and lipids. These metabolic alterations lead to the development of secondary complications resulting in the thickening of the basement membrane thereby affecting all the organs, finally leading to the multiple organ failure. Hence understanding of the disease from various angles becomes quite important in the prevention or in the management of this disorder. A number of epidemiological surveys carried out in various parts of our country has clearly brought out the urban vs rural differences in the prevalence of this disorder [1,2]. Even though the diet has a major role to play in controlling the blood sugar level, it is very difficult to find out and specify dietary differences in the diabetic diets in rural or urban set up because of the following reasons. Firstly, the diets of diabetics may or may not necessarily represent the usual diet consumed by them due to changes introduced at the onset of the disease. Secondly in the Indian set up there is usually no major change required to be made in the diet of diabetics as compared to other family members. Keeping these major observations in mind, the dietary differences of urban and rural population of Gujarat, one of the states in Western India, is discussed.

Methodology Used : One of the methodologies commonly used in quantifying the dietary intake of nutrients of an individual is the 24 hr dietary recall method. Though it is a quick method which takes into account the foods consumed during the past 24 hrs., it may not represent the persons true diet. Alternatively, food weightment method has been found quite reliable compared to the 24 hr dietary recall method as this method actually takes care of the food consumed by the individual more accurately. In the recent past, along with these methods, food frequency method has also been used which is based on the frequency of consumption of a particular nutrient. Thus each method has its own merits and limitations (Table 1).

Table 1

Merits and Limitations of various dietary recall techniques

	Merits	Limitations
24 Hr. Dietary Recall Method	<ul style="list-style-type: none"> * Most common method * Random selection of respondents * Cheapest method for a large population because less trained personnel required 	<ul style="list-style-type: none"> * Subject may not recall properly day's food consumption * Hawthorne effect * Less suitable for surveying food consumption of individuals
Food Frequency Method	<ul style="list-style-type: none"> * Generally used to test the frequency of consumption of a particular nutrient * Idea about the consumption of a food item by an individual 	<ul style="list-style-type: none"> * Actual quantities of various food item consumed cannot be judged
Food Weightment	<ul style="list-style-type: none"> * Amount of food consumed is recorded more accurately, hence is more useful in cases where sample size is small and accuracy is more important 	<ul style="list-style-type: none"> * Very costly because more trained personnel are required for supervision * Hawthorne effect

Dietary intake of Gujaratis : People of Gujarat consumed a varied pattern of meals consisting of cereals, pulses alongwith high intake of buttermilk and liberal use of oil and ghee. Traditional foods of Gujaratis consisted of roltas with sabji for the lunch and khichdi, sabji and kadhi for the dinner. Due to the cattle rearing, the milk consumption is high. Seasonal fruits like papaya, mango and chikkoo are also consumed. Over the years, there has been a gradual change in the meal pattern, as people have moved from rural set up to urban areas. During this transitional period, fried foods such savouries, papad were consumed along with tea. Better mode of transportation has brought rapid industrialization and created a large number of industrial

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societies. This brought the movement of the people from other states with different culture and tradition to various parts of Gujarat, thus influencing the eating of Gujarati people. The advent of fast food centres have also contributed to a distinct change in the meal pattern of rural Gujaratis. The foods forming the various meals during this transitional period has been shown in Table 2.

Table 2

Meal pattern of Gujarat

Meal	Traditional	Transitional	Modern
Morning	Milk	Tea + Savouries	+ Sweets + Puri + Samosa + Parathas
Afternoon	Rotlas Sabji	+ Papad + Chutney + Pickle	+Fast Foods (Idli, Vada, Bhajiya, Dosa)
Evening	-	+ Tea + Sev Mamra	+ Pizza + Potato Chips
Dinner	Khichadi Kadhi Sabji	Dhebra Dhokla Muthia	+ Pastries + Bhel Puri + Chocolates Spicy, oily, free sugar foods

Glycemic Index	Modern
Modern	Fats Oils Free sugars
Transitional	- Complex CHO
Tradition	- Fibre

	TRADITIONAL	MODERN
Energy	Intake = Expenditure	Intake Expenditure
Salt	Moderate	Excess
Fat	Moderate	High
Vitamin C	Moderate	Low

The distinct feature of present day Gujarati meal pattern include a) the addition of sugar practically to all food items b) liberal use of oil and ghee c) consumption of papad and pickle regularly and d) various snacks and sweet dishes typical of Gujarat which are consumed by all the people of various regions of Gujarat . The traditional diet consumed by the rural Gujaratis clearly indicate that the caloric content was limited with more of complex carbohydrates coming from cereals, pulses, vegetables and fruits, b) less of free sugar c) the amount of total fat, SAFA, cholesterol and animal protein were less and d) meal was rich in antioxidants and vitamins e) more of dietary fibre f) more of food bulk than of caloric density and early satiety feeling. Overall each traditional meal is more or less a balanced one. The analysis of nutrients (macronutrients) of normal and diabetics (Table 3) revealed no major differences in

Table 3

Nutrient intake of Gujaratis

Macronutrients (Normals)

	Calories (Kcals)	CHO (gms)	Protein (gms)	Fat (gms)	Fibre (gms)
Rural	2400	366	65.7	48.7	9.7
Urban	1955	266	55.73	58	6.42
Tribal	2257	-	64.25	-	-

Macronutrients (Diabetics)

	Calories (Kcals)	CHO (gms)	Protein (gms)	Fat (gms)	Fibre (gms)
Urban	1850	242.9	55.09	160.4	6.7

protein and carbohydrates whereas the intake of fat in both the population groups was exceedingly high which was similar to the intake of diabetics. When the predominantly consumed foods were looked into, the data revealed that protective nutrients were higher in the diets of tribals, whereas they were moderate in the diets of rural Gujaratis and low in the diets of urban population. Another feature of urban diet is the higher glycemic index of foods as compared to the diets of rural population [3,4]. These interesting observations have indicated the possibility of the influence of various other factors in the higher prevalence of diabetes in the urban set up which is indicated in the Table 5.

Table 4**Normally Consumed Foods**

	Tribal	Rural	Urban
	* Millets * Flesh Foods - turtles, wild pigs, crabs, fish snakes, rats	* Jowar, Bajra *Roots & tubers * Khichadi * GLVs – eg. Methi, Tandaljo	* Processed Foods (cereals, pulses, fast foods)
Fibre	High	Moderate	Low
Fat	Low	Moderate	High
Antioxidants	High	Moderate	Low
GI of Foods	Low	Moderate	High

Table 5**Difference between Rural & Urban Set Up**

		Rural	Urban
1.	Life Style	Active	Sedentary
2.	Environment	Less pollution	More Pollution
3.	Stress	Less	More
4.	Family	Joint	Nuclear
5.	Eating habits	Very Regular	HighlyIrregular
6.	Foods consumed	Low Risk	High Risk
7.	Consumption of Cereals & Pulses	More	Less
8.	Consumption of Fat	Less	More
9.	Animal Foods	Less	More
10.	Processed Foods	Less	More
11.	Fibre	More	Less

Conclusion: From the above data, it becomes clear that as the population moves into an urban set up, number of changes are brought in their life style to the eating habits, type of food along with the environmental changes and stress induced factors. Apart from heredity, any of these factors either singly or in combination may be contributing to the prevalence of diabetes mellitus.

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