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## Frequency of Food Consumption in Diabetes Mellitus Type II Subjects in Abha and Khamis Diabetic Centres in Saudi Arabia



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### ABSTRACT

**Background:** A sedentary lifestyle and prevalence of obesity are the key factors which lead to an increasing prevalence of Type II diabetes mellitus. There is strong evidence that modifiable risk factors such as obesity and physical inactivity are the main non-genetic determinants of the disease and could be modified. **Objectives:** To determine the prevalence of obesity ( $\geq 30$  BMI - body mass index) among the selected subjects. To assess the frequency of food consumption of the selected subjects. **Subjects and methods:** A cross-sectional study was adopted. Around 451 female subjects aged 20-50 years, with Type II diabetes mellitus were selected randomly from Abha and Khamis Mushayat Diabetic care centers. The data were collected by a questionnaire which included background information and frequency of food consumption. Other biochemical and anthropometric parameters were measured using standard procedures. The statistical analysis was done on SPSS 20 platform. **Results:** The socioeconomic background did not correlate with frequency of food consumption, BMI and other selected anthropometric (waist and hip circumference) and biochemical parameters such as fasting and random blood sugar levels. Regarding the frequency of food consumption, it can be stated that most of the food groups were consumed daily by a significant majority of the subjects, except fast food and junk food. However, no significant association existed between a frequency of food consumption and BMI and glycemic parameters. With regards to the BMI status of the subjects, a majority of the subjects were in the Grade II and Grade I obesity ranges indicating a high prevalence rate of obesity in the diabetes mellitus subjects. Totally, the prevalence of obesity in the present study in type II diabetes mellitus subjects was 69.5%. **Conclusion:** Stressing the importance of a balanced low glycemic diet and adequate physical activity through regular counseling of the diabetes subjects, to treat and prevent obesity is the need of the hour.

## INTRODUCTION:

In recent years, it has become apparent that many people with type II diabetes are able to reverse diabetes through methods including low carbohydrate diets, which means very low-calorie diets and exercise. (1)

A sedentary lifestyle and prevalence of obesity are the key factors which lead to an increasing prevalence of Type II diabetes mellitus. An interaction between a genetic predisposition and behavior and environmental factors leads to Type II diabetic mellitus (2). There is strong evidence that modifiable risk factors such as obesity and physical inactivity are the main non-genetic determinants of the disease (3).

In Saudi Arabia, 25.5% of the urban population is diabetic in comparison with 19.5% in rural areas. There are also regional differences in the prevalence of type II diabetes, with the Northern (27.9%) and Eastern (26.4%) provinces experiencing greater rates than the Southern region (18.2%), where a rural lifestyle is more common (4) and the population less prone to obesity than those on the Northern and Eastern provinces (5). The ratio of people with type II diabetes in urban and rural areas is 235 to 100 in Oman (6) and 400 to 100 in Egypt (7).

The development of type II diabetes mellitus and its complications can be prevented if detected and treated at an early stage. In recent years, it has become apparent that many people with type II diabetes are able to reverse diabetes through methods including low-carbohydrate diets, very low-calorie diets and exercise (1). Making healthy lifestyle changes can often prevent obesity and in turn, prevent or postpone the incidence of diabetes mellitus type II (8).

## MATERIALS AND METHODS:

The Diabetic centers in Abha and KhamisMushayat cities were selected to study the prevalence of obesity in Type II diabetes mellitus. 451 female subjects with type II diabetes mellitus were selected randomly for the study. The subjects were selected from the age group of 20-50 years. An interview schedule was prepared to include details such as socioeconomic data and frequency of food consumption. BMI and other anthropometric (waist and hip circumference) and biochemical parameters such as fasting and random blood glucose levels were measured. A cross-sectional study was conducted.

**RESULTS:**

**1) Family background of the selected subjects**

The socio-economic background of the selected subjects is presented in the following tables:

**Table 1: Area of residence of the selected subjects**

		Valid Percent
Valid	KhamisMushayat	49.7
	Abha	50.3
	Total	100.0

Almost an equal number of subjects (around 50%) were selected from Abha and Khamis Mushayat Diabetic centers in Saudi Arabia, due to ease of accessibility.

**Table 2: Education of the study subjects**

		Valid Percent
Valid	No	53.6
	Yes	46.4
	Total	100.0

A majority of the subjects were not educated (53.6%), whereas the remaining 46.4% were educated.

**Table 3: Occupation of the study subjects**

		Valid Percent
Valid	No	33.1
	Yes	66.9
	Total	100.0

A majority of the subjects did not have an occupation (86.1%), whereas the remaining 13.9% had an occupation.

**Table 4: Members of the family and ancestors if diabetic**

		Percent	Valid Percent	Cumulative Percent
Valid	No	33.1	33.1	33.1
	Yes	66.9	66.9	100.0
	Total	100.0	100.0	

A majority of the family members and ancestors had diabetes (66.9%), whereas the remaining 33.1% were not diabetic.

2) BMI status of the study subjects

Table 5: BMI status of the study subjects

		Valid Percent
Valid	Normal weight	5.3
	Overweight	25.2
	Grade 1 obesity	31.1
	Grade 2 obesity	29.8
	morbid obesity	8.6
	Total	100.0

A majority of the study subjects were in Grade I (31.1%-BMI=30-34.9) and Grade II (29.8% - BMI = 35 -39.9) categories. Twenty-five percent of the subjects were overweight (25-29.9 BMI). Only 5.3% of the subjects were of normal weight BMI. Around 8.6% of the subjects had morbid obesity ( $\geq 40$  BMI). Totally, the prevalence of obesity in type II diabetic mellitus subjects was 69.5%.

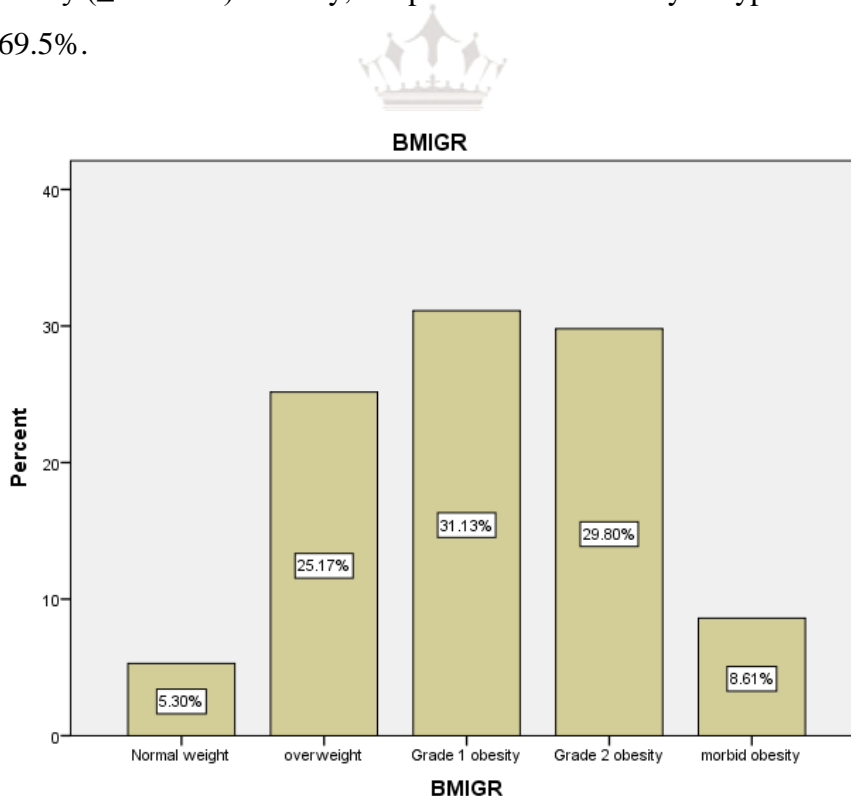


Figure 1: BMI status of the study subjects

**3) Other anthropometric and biochemical parameters of the study subjects**

**Table 6: Anthropometric and biochemical parameters**

Parameters	Minimum	Maximum	Mean	Std. Deviation
Height (cm)	140.00	170.00	156.8146	5.00720
Weight (kg)	55.00	115.00	81.3974	13.04713
Waist circumference (cm)	77.00	140.00	103.8675	13.58267
Hip circumference (cm)	85.00	150.00	115.4437	12.36535
Fasting blood sugar (mg/dl)	70.00	305.00	137.2185	48.85132
Random blood sugar (mg/dl)	100.00	460.00	251.4172	89.92837

The mean of all the above parameters such as mean BMI (33), waist circumference (103.86cm), hip circumference (115.44cm), were well above the standards thus indicating obesity and central obesity. Also fasting (137.2mg/dl) and random (251.42mg/dl) blood sugar levels were also well above the diagnostic criteria for diabetes mellitus. Hence it can be stated that the subjects did not have controlled blood sugar levels. The complications of diabetes mellitus will set in if hyperglycemia is not controlled. Also, the central obesity parameters show their prevalence of to be very high in type II diabetes mellitus patients.

**4) Frequency of food consumption of the selected subjects**

**Table 7: Frequency of consumption of cereals**

		Valid Percent
Valid	Weekly	1.3
	Daily	98.7
	Total	100.0

A majority of the selected subjects (98.7%) consumed cereals daily, whereas a very small percent of the subjects (1.3%) consumed cereals on a weekly basis.

**Table 8: Frequency of consumption of pulses and grams**

		Valid Percent
Valid	Never	4.0
	Monthly	2.0
	Fortnightly	2.6
	Weekly	12.6
	Daily	78.8
	Total	100.0

A majority of the subjects consumed pulses and grams daily (78.8%), whereas only 2.0% of the subjects consumed pulses on a monthly basis.

**Table 9: Frequency of consumption of fats and oils**

		Valid Percent
Valid	Never	21.2
	Monthly	23.8
	Fortnightly	15.9
	Weekly	22.5
	Daily	16.6
	Total	100.0

A majority of the subjects consumed fats and oils only on a monthly basis (23.8%) whereas only 15.9% of the subjects consumed it fortnightly. Around 16.6% consumed it daily.

**Table 10: Frequency of consumption of vegetables**

		Valid Percent
Valid	Monthly	4.0
	Fortnightly	12.6
	Weekly	25.2
	Daily	58.3
	Total	100.0

A majority of the subjects consumed vegetables daily (58.3%). Only 4% of the subjects consumed vegetables on a monthly basis.

**Table 11: Frequency of consumption of fruits**

		Valid Percent
Valid	Never	.7
	Monthly	4.0
	Fortnightly	11.3
	Weekly	25.2
	Daily	58.9
	Total	100.0

A majority of subjects consumed fruits daily (58.9%), whereas only 0.7% never consumed fruits. Some of the subjects (25.2%) consumed fruits on a weekly basis.

**Table 12: Frequency of consumption of milk and its products**

		Valid Percent
Valid	Never	5.3
	Monthly	.7
	Fortnightly	9.9
	Weekly	12.6
	Daily	71.5
	Total	100.0

A majority of the subjects consumed milk and its products on a daily basis (71.5%), whereas 5.3% did not consume milk and its products and 0.7% of the subjects consumed it on a monthly basis.

**Table 13: Frequency of consumption of nuts**

		Valid Percent
Valid	Never	39.1
	Monthly	33.8
	Fortnightly	7.9
	Weekly	3.3
	Daily	15.9
	Total	100.0

A majority of the selected subjects (39.1%) never ate nuts, while a smaller percentage (15.9%) consumed nuts daily.

**Table 14: Frequency of consumption of meat, fish, and eggs**

		Valid Percent
Valid	Never	.7
	Monthly	4.6
	Fortnightly	2.6
	Weekly	30.5
	Daily	60.9
	Total	100.0

A majority of the subjects consumed meat, fish, and eggs daily (60.9%), followed by 30.5% who consumed it weekly. Only 0.7% of the subjects did not consume these foods.

**Table 15: Frequency of consumption of sugar and sweets**

		Frequency	Valid Percent
Valid	Never	28	18.5
	Monthly	35	23.2
	Fortnightly	15	9.9
	Weekly	37	24.5
	Daily	36	23.8
	Total	151	100.0

A majority of the subjects consumed sugar and sweets on a weekly basis (24.5%), followed by 23.8% on a daily basis. Only 9.9% of the subjects consumed sweets fortnightly.

**Table 16: Frequency of consumption of beverages**

		Valid Percent
Valid	Never	3.3
	Monthly	3.3
	Fortnightly	2.0
	Weekly	16.6
	Daily	74.8
	Total	100.0

A majority of the subjects (74.8%) consumed beverages daily, followed by 16.6% who consumed it weekly. Only 3.3% never consumed beverages.

**Table 17: Frequency of consumption of pasta products**

		Valid Percent
Valid	Never	29.8
	Monthly	25.2
	Fortnightly	12.6
	Weekly	21.9
	Daily	10.6
	Total	100.0

A majority of the selected subjects (29.8%) did not consume pasta products. A minimum of 10.6% consumed these products daily.



**Table 18: Frequency of consumption of fast and junk foods**

		Valid Percent
Valid	Never	58.3
	Monthly	23.8
	Fortnightly	9.3
	Weekly	6.6
	Daily	2.0
	Total	100.0

A majority of the subjects did not consume fast and junk foods (58.3%). Only a minimum of 2.0% consumed these foods on a daily basis.

### DISCUSSION:

The socioeconomic background did not correlate with frequency of food consumption, BMI and other selected anthropometric (waist and hip circumference) and biochemical parameters such as fasting and random blood sugar levels. This may be due to the fact that the subjects were already diabetic and suffering from severe hyperglycemia. Regarding the frequency of food consumption, it can be stated that most of the food groups were consumed daily by a significant majority of the subjects, except fast food and junk food. However, no significant association was found between frequency of food consumption, BMI, and glycemic parameters.

With regards to the BMI status of the subjects, a majority of the subjects were in the Grade II and Grade I obesity range indicating a high prevalence rate of obesity in the diabetes mellitus subjects. Totally the prevalence of obesity in the present study in type II diabetes mellitus subjects was 69.5%. This is somewhat higher than the prevalence of obesity in adults, adolescents, and children in the Middle Eastern/North African region, which is amongst the highest worldwide ranging between 2%–55% in adult females and 1%–30% in adult males while the prevalence in adolescents and children range from 5%–14% (9). An estimate from the National Center for Health Statistics (NHANES III) reported that 78.5% of diabetics were overweight, and 45.7% were obese (10).

This scenario has to be managed both by the subjects and the dietitians, because uncontrolled type II diabetes mellitus may lead to severe complications and early death. In order to fight this disease, efforts from the dietitians and physicians should be towards

counseling the patients on the importance of maintaining a balanced diet, normal weight and having good physical activity during the day, in addition to exercise.

## CONCLUSION:

With regards to the BMI status of the subjects, a majority of the subjects were in the Grade II and Grade I obesity range indicating a high prevalence rate of obesity in the diabetes mellitus subjects. Steps should be taken by the dietitians' by constant counseling to prevent and eradicate obesity and thereby type II diabetes mellitus in the long run.

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