Food Habits and Diabetes Mellitus in Female Patients in Hail City

Shahida Banu Shamsuddeen[*], Marivic R. Jamison*,
Manar Mlih Sabih Al Shammary[**]

[*]*(Department of Clinical Nutrition, College of Applied Medical Science, University of Hail, Saudi Arabia)*
[**]*(Student, Department of Clinical Nutrition, College of Applied Medical Science, University of Hail, Saudi Arabia)*

I.   Introduction

Diabetes mellitus (DM), or simply **diabetes**, is a group of metabolic diseases in which a person has high blood sugar, either because the pancreas does not produce enough insulin, or because cells do not respond to the insulin that is produced [1]. This high blood sugar produces the classical symptoms of polyuria (frequent urination), polydipsia (increased thirst) and polyphagia (increased hunger).

The World Health Organization (WHO) defines diabetes as a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism that results from defects in insulin secretion, insulin action, or both. Diabetes mellitus is by far the most common metabolic disorder, its prevalence varying widely worldwide and ranging from as low as <1% to >50% [2-7]. Diabetes is associated with reduced life expectancy; the significant morbidity associated with diabetes arises from micro vascular complications, increased risk of macro vascular complications (ischemic heart disease, stroke, and peripheral vascular disease), and diminished quality of life [8]. There are three main types of DM.

- **Type 1 DM** results from the body's failure to produce insulin. This form was previously referred to as "insulin-dependent diabetes mellitus" (IDDM) or "juvenile diabetes".
- **Type 2 DM** results from insulin resistance, a condition in which cells fail to use insulin properly. This form was previously referred to as non insulin-dependent diabetes mellitus (NIDDM) or "adult-onset diabetes".
- The third main form, **gestational diabetes** occurs when pregnant women without a previous diagnosis of diabetes develop a high blood glucose level. It may precede development of type 2 DM.

Diabetes mellitus (DM) is an increasing public health problem worldwide [9]. The global epidemic of people with type II diabetes is largely due to population growth, aging, urbanization, and the scourge of obesity and physical inactivity. The total number of people worldwide with type II diabetes was expected to increase from 171 million in 2000 to 366 million in 2030 [10]. According to the international Diabetes Federation (IDF) the prevalence worldwide already reached 366 by 2011 and could well reach 530 million people in 2030 [10]. Diabetes mellitus the most common chronic endocrine disorder affecting an estimated 5% to 10% of the adult population in industrialized Western countries, Asia, Africa, Central America and South America, and it has a large impact on society [10,11,12]. There is an increased concern about the rising tide of type II diabetes and its associated complications in the Arabic-speaking countries (East Mediterranean, Arabic peninsula, and Northern Africa) as these regions have some of the highest rates of diabetes in the world [13]. The prevalence in males was 26.2% and females was 21.5%, and the overall prevalence of Diabetes in adults in KSA is 23.7% in 2004 [14]. Saudi Arabia has one of the highest percentages of Diabetes in the world, with an estimated number of 2,065,300 people diagnosed with the disease by 2010, which is 16.8% of the population (although some studies have shown this percentage to be higher) [15]. Fewer epidemiological studies were conducted among the rapidly growing population in the Hail region of Saudi Arabia.

Therefore, we designed this study with the following objectives:

II.   Objectives

1. To determine the demographic and social profile of diabetes mellitus in among the females in Hail city of Saudi Arabia.
2. To study the association of diabetes mellitus in relation to nutritional habits of the people of Hail.

III.   Methodology

A cross sectional survey was planned to determine the prevalence of diabetes mellitus among the female inhabitants of Hail city of Saudi Arabia.

1.2. Design and Sample

The study was designed as a cross-sectional survey conducted in Hail city during the winter 2012 -13 semester. The sample size was 80 females were randomly selected between the age group of 15yrs to 80yrs for the study. Patients visiting King Khalid Hospital of Hail City during the months of November to December, 2012 were included in this study. All questions were administered to the subjects to provide the information on their medical history of diabetes and dietary habits. Data were collected through a face-to-face interview using a structured questionnaire. The study included only female Saudi nationality with diabetes mellitus. The sample chosen was from all socioeconomic level.

1.3. Data Collection

Self-reported questionnaire and anthropometric measurements were used for data collection. Prior to filling out the questionnaire, the subjects were informed about the study and were given instructions on how to fill out the questionnaire completely and truthfully. Data collection was done on a standardized survey questionnaire with information related to demographic and socioeconomic details, food frequency, snacking and meal skipping pattern, frequency of eating outside, watching television, weight gain and physical activity.

Anthropometric measurements weight and height were collected using the standard procedures from the sample. Body Mass Index (BMI) was calculated according to the formula (weight (kg) /height^2 (mt)) [16]. According to World Health Organization (WHO), 2004, [17] weight status was classified into four categories: underweight (BMI $\leq$ 18.5), normal weight (BMI between 18.5 – 24.9), overweight (BMI between 25–29.9), and obese (BMI $\geq$ 30).

1.4. Validation of the Questionnaire:

For content validity (back to back translation), the questionnaire was initially translated into Arabic and then converted back to English and pre-tested for question accuracy and clarity.

1.5. Data Analysis

The data set was cleaned and edited for inconsistencies. Missing data were not statistically computed. Statistical analyses were performed using the Statistical Package for Social Sciences (version 16.0, SPSS, Inc) software. Descriptive statistics such as means and standard deviations were calculated for the continuous variables and frequencies for qualitative data. Associations were established using chi-square analysis. All reported *P* values were made on the basis of 2-sided tests and compared to a significance level of 5%; differences were considered statistically significant at $P < 0.05$ or $P < 0.01$.

IV. Results

A total of 77 female patient suffering from Diabetes mellitus were included in the study. Table No 1 presents the demographic and anthropometric profile of the study subjects (n=80). The total mean age $\pm$ SD was 40.99 $\pm$ 20.22 years (range 15-89). The mean BMI $\pm$ SD was 27.85 $\pm$ 6.02.

Figure 1 presents the distribution of BMI groups in the study population which suggests that 2.6 % were underweight, 31.17 % were with normal weight while 33.77 % had overweight and 32.47 % were obese. Since the subjects are all diabetic, majority seems to be (nearly 66 %) either overweight or obese proving the link between them.

Table No 2 represents the demographic and medical history of the study population. Nearly 45% of the population with age 46 years and above. About 68% of the population falls in the income group of SR5000 to SR10000. There is no genetic history of the disease but frequent weight gain was seen in nearly 56% of the population. 78% of the samples did not perform any physical activity which might also be a cause of their disease.

Table No 3 represents the sample's lifestyle of meal pattern in response to the type of meal they skip, frequency of snacking and eating outside and snacking while watching television. It was estimated that nearly 66% of the sample skip their dinner. Almost half of the population eat snacks while watching television and about 60% of the population have meals outside their home like in hotels, restaurants, fast foods, cafeterias etc.

Figure 2 prevalence of other health problems. Nearly 35% of the population suffer from high Blood Pressure and 18.2% of the sample have high level of cholesterol.

Figure 3 represents the influencing factors for frequent weight gain in the study population. It is very clear that the samples who eat outside home shows about 62.8% frequent weight gain and 40.6% shows absence of frequent weight gain those who do not eat outside home. Whereas the samples who does regular physical activity shows 87.5% absence of frequent weight gain in compare with the samples who do perform any physical activity 30.2% shows frequent weight gain. Similarly, with factors like eating while watching TV also shows 41.9% a history of weight gain and 53.1% shows absence of a history of weight gain.

V. Tables And Figures

Table: 1 Demographic and Anthropometric Profile of the Study Population

Variables	Minimum	Maximum	Mean	Std. Deviation
Age (years)	15	89	40.99	20.22
Height (cm)	135	180	157.30	8.21
Weight (kg)	43	111	68.79	15.17
BMI (kg/m^2)	18.1	42.3	27.85	6.024

Figure: 1 Prevalence of BMI groups in the study diabetic population
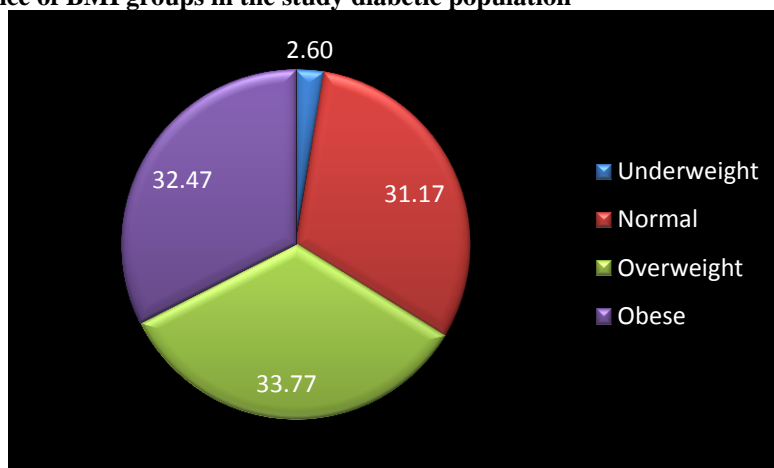
Table : 2 Characteristics of the Study Population by Demographic and Medical History

Variables		Frequency	Percentage
Age	45 or less yrs	42	54.5
	46 or more yrs	35	45.5
Income	<5000 SR	20	26.0
	5000-10000 SR	52	67.5
	>10000 SR	5	6.5
Genetic history	Yes	23	29.9
	No	54	70.1
History of frequent Weight Gain	Yes	43	55.8
	No	32	41.6
	3	2	2.6
Physical activity	Yes	60	77.9
	No	17	22.1

Table: 3 Meal Patterns of the Study Population

Variables		Frequency	Percentage
Type of meal skip	Breakfast	14	18.2
	Lunch	12	15.6
	Dinner	51	66.2
Frequency of skipping meals	Daily	11	14.3
	Weekly	14	18.2
	monthly	8	10.4
	Rarely	44	57.1
Freq of snacking	Once	9	11.7
	Twice	16	20.8
	Thrice	29	37.7
	Many times	23	29.9
Eating snacks while watching TV	Yes	36	46.8
	No	41	53.2
Freq eating outside	Yes	46	59.7
	No	31	40.3

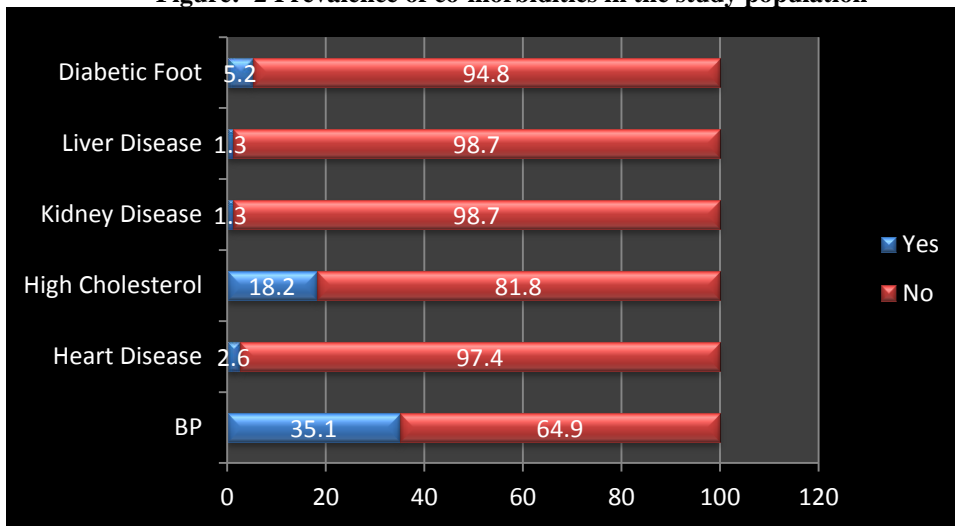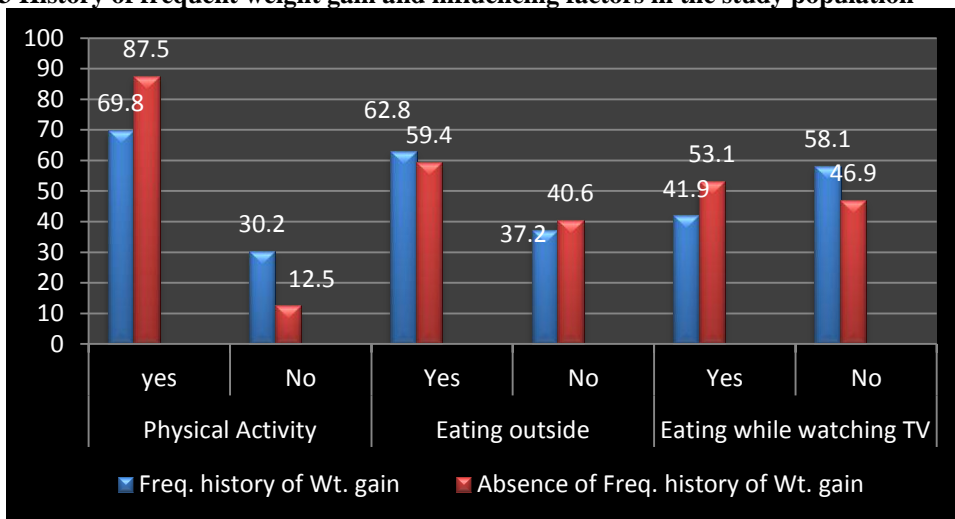**Figure: 2 Prevalence of co-morbidities in the study population**

Figure. 3 History of frequent weight gain and influencing factors in the study population

VI.   Discussion

The results from the study indicate that the study population(only females) who were diabetic was also suffering from co-morbidities and have risky dietary profile. This goes in consistency with the study done by Hassan H Fatani [18] which highlights the prevalence of diabetes among women in Saudi Arabia. The results showed an overall prevalence of diabetes was 4.3%. Prevalence also differed with sex. The overall prevalence in women (5.9%) was twice that for men (2.9%;). Obesity occurred in 41.2% of our diabetic subjects compared to 29.3% in nondiabetic subjects. This agrees with our study on the risk factors like high prevalence of obesity, hypertension and high cholesterol along with diabetics observed in the study subjects indicate the future health complications possible for this population.

According to Sara Wild et al.,[19] worldwide prevalence of diabetes for all age-groups was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030. The prevalence of diabetes is higher in men than women, but in fact there are more women with diabetes than men. The urban population in developing countries is projected to double between 2000 and 2030. It goes in consistency with study of J.E Shaw et al., [20] which states that the world prevalence of diabetes among adults (aged 20–79 years) will be 6.4%, affecting 285 million adults, in 2010, and will increase to 7.7%, and 439 million adults by 2030. Between 2010 and 2030, there will be a 69% increase in numbers of adults with diabetes in developing countries and a 20% increase in developed countries.

The prevalence of diabetes in Saudi Arabia according to Khalid A. Alqurashi et al [21] was 34.1% in males and 27.6% in females. Females <50 years old had a higher prevalence than males in the corresponding age range 34.1% and 25.1%, respectively.

According to El-Hazmi MAF, Warsy overweight and obesity are common in both males and females, particularly females [22]. From the demographic data of the survey which states that most of the population with moderate income are obese and overweight with less physical activity. A study on Lack of exercise says that the climatic conditions and the life pattern in Saudi Arabia affect the extent of physical activity carried out daily, particularly by older people. As our population are from an high altitude area it is obvious that the habit of performing physical exercise is very rare[23].

The study also predicts the lifestyle of the population. The consumption of snacks, eating outside has become very common among the sample which attribute to diabetes mellitus. The choice of food and their changed dietary habits can be a contributing factor to diabetes mellitus. Dietary habits. The Saudi diet includes a high intake of carbohydrates in the form of bread, dates, sugar, potatoes, etc. and is believed to be one of the major factors involved in obesity [23].

Genetic factors. The role of genetic predisposing factors is well established for diabetes mellitus. The finding that diabetes mellitus accumulates in Saudi families confirms that genetics has a significant role to play in the etiology of diabetes [23]. On contrary, in our study almost two third of the population predicts no genetic history of diabetes mellitus in their family.

In addition, there may be other factors which other health problems like hypertension, heart diseases, high cholesterol, kidney and liver diseases may further contribute to the development of diabetes mellitus in the Saudi population.

VII. Conclusion

To conclude, this study provides information on the health status of the females suffering from diabetes mellitus. The study also highlights on the epidemiological information of diabetes mellitus as a health problem among females. The study also emphasizes on level of knowledge of the population about diabetes mellitus. Thus it is suggested that serious steps has to be taken on the intervention programs among the people. Soon a national level prevention program must be implemented with a broad knowledge on the diabetes mellitus relating to risk factors, management and preventive measures should be promoted in the public specially targeting high- risk groups.

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