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ORIGINAL ARTICLE

Assessment of lipid profile, SGOT, SGPT and Alkaline Phosphatase and Diet History in patients with diabetes in Hamedan, North-Western Iran

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ABSTRACT
Diabetes is among the common disorders in Iran. The aim of this study was to assess the lipid profile, SGOT, SGPT and alkaline phosphatase and diet history in patients with diabetes in Hamedan, North-Western Iran. This was a retrospective cross-sectional study conducted on type I and II diabetic patients (from newly diagnosed to severe stage) who admitted to hospital or medical centers in Hamedan, during 2007-2009. Personal questionnaire, food frequency questionnaire and face to face interview were used to collect the data. The data was analyzed using Chi-square test and one-way ANOVA. The frequency of type 2 diabetes was significantly higher than type 1 diabetes ($p<0.001$). The frequency of type 1 or 2 diabetes was higher in females than males ($p<0.05$). Mean age of patients was higher in type II diabetic patients than type I diabetic patients ($p<0.001$). Meat daily intake was significantly higher than standard minimum required intake in patients with diabetes ($p<0.001$). Results also show that vegetable daily intake in patients with diabetes type I was significantly lesser than minimum required amount ($p<0.001$). Serum triglyceride and urea level was significantly higher in patients with diabetes compared with control group ($P<0.01$ and $P<0.001$, respectively). In conclusion, Hamedan, North-Western Iran, is facing a considerable growth of diabetes may resulting partly from diet pattern, requiring adopting immediate preventing measures to control this growth.
Keywords: *Type I diabetes, Type II diabetes, Lipid profile, Diet history, Hamedan, Iran.*

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INTRODUCTION

Diabetes is the most common metabolic disease in the world and the number of people suffering diabetes is overwhelmingly increasing. According to the global estimates of world health organization, prevalence of diabetes among adults (20-79 years) is 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 [1]-[3]. Epidemiologic studies indicate diverse distribution of diabetes in Iran. Studies show that the prevalence of diabetes in Isfahan (central part of Iran) among adults (35 years or older) is 7-8 % and in Yazd (central part of Iran) is 16.3% and in Booshehr (southern part of Iran) is 13.6 [4]. The prevalence of type 2 diabetes is considerably higher in the Islamic Republic of Iran than other developing countries [5]. A number of underlying causes, including age, gender, diet, lack of physical activity, underlying diseases, genetic factors and family history, pregnancy and smoking contribute to development of diabetes [6]. Overweight and obesity are major risk factor for diabetes [7]. Moreover, diet is one of the most important factors contributing to development of diabetes [8]. Global studies indicate that western dietary pattern plays an important role in incidence and progression of diabetes [9]. Compliance of appropriate and healthy dietary pattern characterized by high consumption of fruits and vegetables, whole grain, fish and poultry and decreased consumption of red meat, processed food, sugar-sweetened beverages plays an important role in management and prevention of diabetes [10], [11]. Lipid disorders are also the main manifestation of diabetes that ultimately leads to long term complications and damage to various body organs [12], [13]. There is also association between diabetes and plasma urea and creatinine levels [14]. The studies also show that diabetes development can impair liver and the heart muscle cells by which may influence levels of serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT),

alkaline phosphatase (ALP) and creatine kinase (CK) [15]. Despite all the studies, the factors leading to diabetes has always been a mystery and still not fully understood. According to high prevalence of diabetes in Iran, and also existing controversies on data resulting from previous studies in Iran, particularly in Hamedan (North- Western Iran), this study aims to assess the lipid profile, SGOT, SGPT and alkaline phosphatase and diet history in patients with diabetes in Hamedan, North-Western Iran.

MATERIALS AND METHODS

This was a retrospective cross-sectional study conducted on type I and II diabetic patients (from newly diagnosed to severe stage) who admitted to hospital or medical centers in Hamedan, during 2007-2009. Data collection methods were questionnaire and interviewing which was designed by the project researchers according to previous studies [3], [4], [16]-[19]. We used also personal information standard questionnaire including questions about personal variables (age, sex, patients' education and job and parent's education and job). The questionnaire reliability was assessed by repeated test and correlation coefficient was more than 0.9. Patients' usual dietary intakes were assessed by means of 168-items food frequency questionnaire (FFQ) which could estimate the last year dietary intake. This questionnaire was along with three dimension standard portion size of each food item designed according to Willett method [20] . Patients were asked to report each food item consumption frequency according to consuming in day, week and month or year pattern [21]. The reproducibility of this FFQ was previously assessed by a group of 132 patients who answered questions twice with a year interval [22]. For assessment of lipid profile, SGOT, SGPT, alkaline phosphatase activity and serum levels of creatinine and urea in patients with diabetes, data from laboratory results (before treatment and receiving drug) were obtained and categorized based on fasting blood glucose (FBS) concentration: FBS in the range of 115 to 180 mg/dl was considered as diabetic and FBS higher than 180 mg/dl as severe diabetic condition. To statistically analyze the data, chi-square and one-way analysis of variance were used. All analyses were performed using the Statistical Package for Social Sciences software version 19 (SPSS Inc., Chicago, IL, USA). Game's-Howell test was used as post hoc. An alpha level less that 0.05 was accepted as statistical significant. The ethical considerations pertaining to all research participants were carefully regarded.

RESULTS

Table 1 indicates demographic information of patients with diabetes type I and II in Hamedan.

Table 1: Demographic information of patients with diabetes type I and II in Hamedan.

Variables	Type II diabetes (n=449)	Type I diabetes (n=171)
Age (Mean±SD) (years)		
men	74.51±16.94	55.31±16.99
women	58.55±10.94	55.37±16.79
Sex (%)		
male	36.53	38.02
female	63.47	61.98
Education (%)		
illiterate	23.6	4.6
primary school	38.5	41
secondary school	13.4	27.5
diploma degree	18.8	13.5
associate degree	1.8	4.6
bachelor degree	3.9	8.8

According to the results of this study, type II diabetes frequency was significantly higher than type I diabetes ($P<0.05$). Our findings also show that the number of female patients was significantly more than male patients ($p<0.001$). Mean age in both sexes of type II diabetic patients was significantly higher than type I diabetes ($p<0.001$). It is shown that most diabetic patients are poorly educated. It is also indicated that parents educational levels were highly illiterate or primary school (87.74% of fathers and 92.2% of mothers (in diabetes I), and 59.14% of fathers and 62.58% of mothers (in diabetes II)). Figure I also indicates the age range in patients with diabetes, according to which, type I diabetes was observed mostly in the age range of 16 to 30 years old and type II diabetes was observed mostly in the age range of 46 to 60 years old.

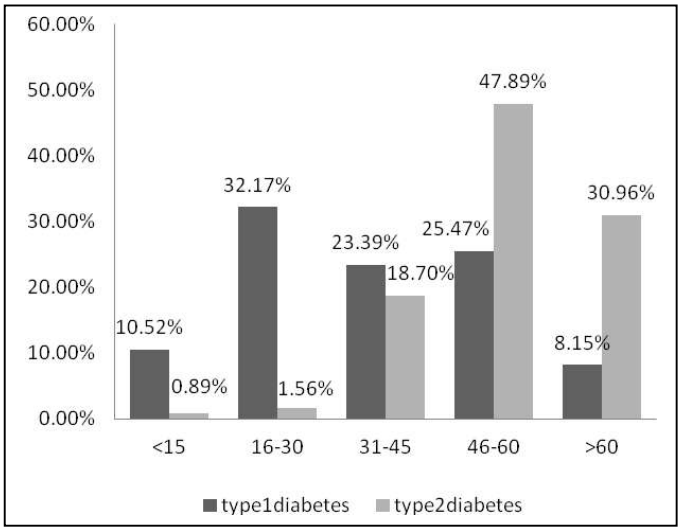

Figure 1. Age range in patients with diabetes type I and type II in Hamedan.

Table 2 represents means of different food groups daily intake in type I diabetes in men and women before diabetes diagnosis and treatment.

Table 2: Means of different food groups daily intake in type I diabetes

Food Groups	in Men (Servings±SD)	P-value	in Women (Servings±SD)	P-value
Dairy	**2.74±1.26**	**N.S**	**2.96±1.26**	**N.S**
Fruits	**1.86±3.49**	**<0.001**	**2.83±1.86**	**N.S**
Vegetables	**2.01±1.02**	**<0.001**	**2.16±1.02**	**<0.001**
Meat	**6.75±2.54**	**<0.001**	**6.27±2.54**	**<0.001**
Cereals	**6.39±1.38**	**N.S**	**5.92±1.38**	**N.S**

The data are indicated as Mean±SD. P-values are expressed in comparison with minimum required daily intake (are not appeared in the table: for more information refer to "Suggested Servings from Each Food Group" (American Heart Association)) . N.S. represents no significant difference.

Results show that vegetable daily intake in both sex was significantly lesser than standard minimum required amount ($p<0.001$). Besides, meat daily intake in both sex, and also fruits daily intake in men are significantly higher than standard minimum required amount ($p<0.001$). There was no significant difference in other dietary parameters.

Table 3 represents means of different food groups daily intake in type II diabetes in men and women .

Table 3: Means of different food groups daily intake in type II diabetes

Food Groups	in Men (Servings±SD)	P-value	in Women (Servings±SD)	P-value
Dairy	2.35±1.15	N.S	2.32±0.95	N.S
Fruits	2.33±1.23	N.S	2.64±1.45	<0.001
Vegetables	2.34±1.24	N.S	2.78±3.57	N.S
Meat	7.22±2.32	<0.001	6.30±1.95	<0.001
Cereals	6.39±1.38	N.S	5.92±1.38	N.S

The data are indicated as Mean±SD. P-values are expressed in comparison with minimum required daily intake (are not appeared in the table: for more information refer to "Suggested Servings from Each Food Group" (American Heart Association)) . N.S. represents no significant difference.

Results show that mean meat daily intake in both sex and also mean fruit intake in women was significantly higher than minimum required intake in patients with type II diabetes in Hamedan ($p<0.001$). There was no significant difference between other food groups. For assessment of lipid profile, SGOT, SGPT, alkaline phosphatase activity and serum levels of creatinine and urea in patients with diabetes, obtained data from laboratory results (before treatment and receiving drug) were compared with control groups ;i.e., the data of healthy subjects with corresponded age and sex. The results indicated that serum triglyceride level was significantly higher in patients with diabetes (both type I and type II) compared with control group ($P<0.01$). Serum urea level was also significantly higher in patients with diabetes (both type I and type II) compared with control group ($P<0.001$). Alkaline phosphatase activity was lower in patients with diabetes type I compared to control group (Tables 4-6: In all tables the data are indicated as Mean±SD and P-values are expressed compared with control. N.S. represents no significant difference).

Table 4: Serum triglyceride (TG) , cholesterol (Chol), HDL and LDL in diabetic (D) and severe diabetic (SD) patients compared with control group.

Groups	TG(X±SEM) (mg/dl)	P	Chol(X±SEM) (mg/dl)	P	HDL(X±SEM) (mg/dl)	P	LDL(X±SEM) (mg/dl)
Control	132.5±12.8		193.6±9.1		40±1.1		100±1.1
D	198.8±14.1	<0.01	204±5.6	N.S	42.78±5.13	N.S	80.68±26.32
S.D	212.1±17.8	<0.01	207.5±6.9	N.S	41±3.94	N.S	87.86±18.19

Table 5: Serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT) and alkaline phosphatase (ALP) in diabetic (D) and severe diabetic (SD) patients compared with control group.

Groups	SGPT(X±SEM) (U/L)	P	SGOT(X±SEM) (U/L)	P	ALP(X±SEM) (U/L)	P
Control	23.1±2.5		23.3±2		214.9±16.7	
D	25.4±2.1	N.S	24.4±1.9	N.S	175±9.9	<0.05
S.D	27±2.6	N.S	23.7±2.1	N.S	223±16.6	N.S

Table 6: Serum urea and creatinine in diabetic (D) and severe diabetic (SD) patients compared with control group.

Groups	Urea(X±SEM) (mg/dl)	P	Creat(X±SEM) (mg/dl)	P
Control	20±1.15		0.978±0.089	
D	32.85±8.91	<0.001	0.964±0.037	N.S
S.D	40±14.89	<0.001	0.988±0.054	N.S

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DISCUSSION

According to the results the prevalence of type II diabetes was more than type I in our study population. There are other studies showing the increasing global trend of diabetes prevalence and incidence [4], [23]-[25], with emphasis on higher prevalence of type II diabetes than type I, especially in Iran [26], [27]. The result of our study also indicated that the number of type I and II female diabetic patients was more than male. This is in accordance with other global reports [28]-[29]. However, contrary to our study, there are two studies conducted in Spain and Portugal showing that diabetes mellitus prevalence was significantly higher in men than women [30], [31]. Our results showed that most of type I and II diabetic patients are poorly educated. There are also other studies showing that poor educated people are facing 28% increased risk of diabetes mellitus. In other words, lower socioeconomic level has been associated with a poorer health and higher incidence of chronic disease and diabetes [32]-[34]. In contrast to our study, there are studies suggesting that type II diabetes is more prevalent among those with high socio-economic position in middle- and low-income countries [35]-[38]. Lower socio-economic status may bringing about higher stressful life [39] contributing to diabetes development [40], [41]. Our findings also showed that mean vegetable consumption in people with type I diabetes in both sexes was lesser than standard level. Moreover, in diabetes type I and II, meat consumption in both sexes was higher than the minimum standard intake. Global studies indicate that healthy diet plays important role in prevention and management of diabetes [10], [11]. There are also studies showing that diets rich in fibers such as vegetables, apple, barley and seeds have an effective role in blood glucose management in diabetic patients. There are some studies suggesting that fruit may be differentially associated with diabetes compared with vegetables [42], [43]. A plausible biological mechanism to explain the beneficial effect of quantity of fruit and vegetable intake on type II diabetes is via the low energy and high fiber content of fruit and vegetable and their ability to reduce the overall energy content of the diet. It has previously been demonstrated that those who consume the highest quantity of fruits and vegetables in comparison with low consumers have a lower risk of weight gain [44], [45], a major risk factor for diabetes [46]. There are studies indicating that the high intake of processed meat is associated with a higher risk of type II diabetes development compared with no intake of processed meat [47]. A large meta-analysis also suggests that both processed meat and unprocessed red meat are associated with higher risk of diabetes; however, the association of processed meat and incident diabetes was considerably stronger than for unprocessed red meat [48]. Our findings also showed that serum triglyceride and urea levels were higher in patients with diabetes type I and II, and alkaline phosphatase activity was lower in patients with type I diabetes. In line with our findings, there are studies demonstrating the higher serum levels of free fatty acids in patients with diabetes [49], which in turn, contributes to insulin resistance [50] resulting in diabetes development. Chronic hyperlipedemia is the main manifestation of diabetes that ultimately leads to long term complications and damage to various body organs [12], [13]. Studies have shown that postprandial triglyceride levels is significantly higher in diabetic patients compared with non-diabetic individuals [51]. On the other hand, diabetes is the most common cause of kidney failure, which in turn, is followed by increased plasma urea and creatinine levels [14]. Although studies show that increased glucose levels occurring in diabetes may influence levels of SGOT, SGPT and alkaline phosphatase activity [15], we did not observe significant change in SGOT, SGPT levels in patients with diabetes in our study, however, there was a significant decrease in alkaline phosphates only in diabetic and not sever diabetic patients. This is the issue required to be investigated precisely in future studies to determine whether there are changes in transaminase enzymes and other enzymes including alkaline phosphatatse and creatine kinase in patients with diabetes.

CONCLUSION

Occurrence of diabetes was more common in females than males and of type 2 diabetes was more common than type 1 diabetes. Higher meat consumption in dietary pattern was observed in patients with diabetes. Increased serum triglyceride and urea level was also common in patients. Conclusively, Hamedan, North-Western Iran, is facing a considerable growth of diabetes may resulting partly from diet pattern, requiring adopting immediate preventing measures to control this growth.

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