

ORIGINAL RESEARCH

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A survey study in diabetic subjects on the general information about diabetes mellitus, it's social aspects, complications and treatment**Gokhan Colpan¹, Merve Colpan², Canan Ersoy³**¹*Department of Internal Medicine, Uludag University Medical School, Bursa, Turkey, Çanakkale State Hospital, Çanakkale, Turkey (Present address),*²*Department of Psychiatry, Uludag University Medical School, Bursa, Turkey*³*Department of Internal Medicine, Division of Endocrinology and Metabolism, Uludag University Medical School, Bursa, Turkey*

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Abstract

Diabetes mellitus (DM) is a metabolic disorder affecting many people worldwide, and its complications have become a global public health burden. Most diabetic patients are not aware of their conditions and the importance of the disease until complications develop, despite education programmes. This study was conducted to evaluate the general information level of diabetic patients about DM, its social aspects, treatment and complications. Patients with type 1 and 2 diabetes were enrolled in the study. A face to face questionnaire was applied to obtain patients' general information and diabetes awareness. To evaluate the overall knowledge, 40 questions were asked. In the assessment of the total scale scores (TSS), each correct answer was scored as 1 and incorrect as 0 point. The mean age of 120 participants was 42.5±15.4 years, 60.8% were females, 75% were married. The information levels about the complications were statistically significantly higher in female diabetics than males. Information level about treatment of diabetes was higher in single diabetics compared to married ones. Married group had significantly higher scores concerning complications compared to single group. The results for the general information level, social aspect of diabetes, treatment and TSS were found to be statistically significantly higher in high education level group compared to low. In conclusion, education level of a patient seems to be the most prominent contributor of level of knowledge of diabetes, its complications, treatment and social aspects.

Keywords: diabetes mellitus; questionnaire; knowledge; education; complication; treatment**Introduction**

Diabetes mellitus (DM) is a metabolic disorder affecting about 383 million adults worldwide, and its complications have become a global public health burden. The number of patients with diabetes is projected to reach 592 million in 2035 [1]. Although type 1 diabetes is observed in all age groups, the incidence of diabetes among the age group between 7-15 years is higher. The ratio of type 1 diabetes is approximately 10% among all diabetic patients, while 80-90% is type 2 diabetes [2-4]. Type 2 diabetes may continue undiagnosed for many years. During this course, metabolic disorders and damages in various organs appear [1,5].

DM can progress to serious complications including myocardial infarction, stroke, peripheral vascular disease, hypertension, chronic kidney disease, neuropathy, retinopathy, foot lesions and death if the condition is undiagnosed in its early stage and not treated effectively [1,2,6]. The Turkish Diabetes Epidemiology Study

(TURDEP) is a cross-sectional, population-based survey that included 24,788 subjects conducted to investigate for the first time the prevalence of diabetes and impaired glucose tolerance (IGT) nationwide in Turkey. In this study prevalence of diabetes was 7.2% [7]. A second cross-sectional, population-based survey, TURDEP-II including 26,499 randomly sampled adults was conducted after 12 years by the same group to determine the prevalence of diagnosed and undiagnosed diabetes and their 12-year trends. The age-standardized prevalence of diabetes to the TURDEP-I population was 13.7%. Compared to TURDEP-I, the rate of increase for diabetes was 90% during the last 12 years [8].

Most diabetic patients are not aware of their conditions and the importance of the disease until complications develop, despite education programmes. While there are numerous studies on diabetes epidemiology and treatment, researches assessing the information level of patients are rare. For that reason we aimed to conduct this questionnaire based study, evaluating the general information level of patients about DM, treatment and disease-related complications and also social aspects of the disease with the assessment of variables such as gender, marital status, education level, occupation, socioeconomic status and diabetes type in diabetic patients who were admitted to our center.

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Materials and Methods

Study protocol and participants

Sixty type 1 and 60 type 2, a total of 120 consecutive diabetic patients over the age of 18 years, admitted to Endocrinology and Metabolism and General Internal Medicine outpatient clinics were enrolled in the study. The study was conducted in accordance with the Declaration of Helsinki and principles for Good Clinical Practice and was approved by local ethics committee. After receiving the written informed consents and informing the subjects about the given questionnaire, questions were asked face to face. At the end of the questionnaires, gender, marital status, education level, occupation and income level of the subjects were recorded.

Questionnaire

The questionnaire was designed taking into account the basic knowledge that patients should know about diabetes and the questions mostly asked during diabetes education sessions and outpatient admissions. Patients were assessed on 40 questions with simple "yes" or "no" answers. The questionnaire consisted of four different parts. The first 11 questions were assessing the patient's general information about diabetes (Is there only one type of diabetes?, is diabetes familial?, is diabetes a contagious disease?, frequent urination during the day and/or night, dry mouth, weight loss: Are these the symptoms of diabetes?, is diabetes a disease of middle or advanced age?, can diabetes be diagnosed during childhood?, do you think that diabetes prevalence in the community is more than 10 %?, is diabetes accompanied with obesity, atherosclerosis and hypertension?, do you think that diabetes can lead to an emergency?, do you know which investigations are prompted in your follow-up? and should diabetics stop smoking?). The questions between 12 and 23 were assessing the social aspects of the disease (Can you easily declare that you're a diabetic?, is being diabetic, a kind of insufficiency?, is diabetes a lifestyle?, did you need to change your future plans, your business and personal life after having the diagnosis of diabetes?, do you hide that you are diabetic when you participate in a new community?, are you ashamed of using insulin if you had to use (or using already) in the community?, would you marry with a diabetic like yourself?, do you blame your family for being diabetic?, do you want to carry a diabetic's identity card?, do you have a health care provider that you are constantly being followed-up?, is there a phone number you can call or a place you can admit in case of emergency?, does diabetes impair sexual function in men and women?); between 24 and 34 were assessing the information level of patients about treatment (After receiving the diagnosis of diabetes, should you change your diet, alcohol consumption, smoking habits?, is medical nutrition treatment essential in the treatment of diabetes?, is it possible to treat diabetes without using

medication or insulin?, are there any side effects of the pills used for diabetes?, is it true that higher number of medications mean better diabetes treatment?, is insulin obtained from animal sources?, is there insulin addiction?, are you afraid of injecting insulin?, can higher than recommended doses of insulin cause a life threatening status?, should the treatment for diabetes be changed when a diabetic woman is pregnant?, would you accept if diabetes treatment is possible with surgery?). The remaining questions between 35 and 40 were assessing the information level of patients about the complications of the disease (Can diabetes cause blindness?, can uncontrolled diabetes cause kidney failure?, are diabetics at higher risk of heart disease than normal people?, do diabetics are at risk of suffering a stroke at a higher rate than normal people?, do diabetics have to pay attention to foot hygiene and selection of shoes?, is there a possibility of occurring foot ulcers and leg amputation (surgical removal of the leg) in patients with poorly controlled diabetes?).

In the assessment of the total scale scores (TSS), each correct answer was scored as 1 and each incorrect answer was scored as 0 point. The maximum score was 40, if all the questions were correctly answered. Scores were compared separately in all categories. During these comparisons, groups were analysed for gender as female vs male; for marital status as married vs single; for occupation as employed (officer, worker and self-employed) vs unemployed (retired, housewife, student and non-employed); for education as low education (illiterate, literate, primary school graduates) vs high education level (high school and university graduates); for income as low income level (under 500 USD) vs high income level (above or equal to 500 USD). This amount was based on the average income level of our country in the data of "The State Institute of Statistics" at the time the survey was conducted.

Reliability of survey

A pre-testing process was administrated to 20 outpatients and their answers given were collected. Based on these, the investigators agreed on the wording of the questions and the ability of each patient to understand all the items. All these patients were randomly selected and not part of the validation study. Internal consistency and test-retest statistical methods were used to evaluate the reliability and reproducibility of the survey. The same survey was applied to the patients twice at different times. Cronbach's alpha coefficient (α) was calculated to evaluate internal consistency of the survey ($\alpha=1$). Test-retest reliability was assessed with Pearson's correlation coefficient ($r=1$, $p<0.001$). To see the harmony between the individual questions, each question were compared with McNemar test. It was found to be compatible to all questions ($p>0.05$).

Statistical analysis

The data was analysed using the SPSS software package of version 13.0 for Windows (SPSS, Inc., Chicago, IL). All numerical variables were given as mean $\pm$ standard deviation. Pearson's and Fisher's exact chi-square tests were used in the comparison of categorical variables. Continuous variables of two groups were compared with independent sample t-test or Mann-Whitney U test according to the distribution of the data. p values less than 0.05 were considered to be significant.

Results

Among 120 participants enrolled, 60 subjects (50%) were type 1 and 60 (50%) were type 2 diabetic patients. The mean age of the study population was 42.5 ± 15.4 years, and 60.8% (n=73) of the participants were females. The mean ages of type 1 diabetics were lower than those of type 2 diabetics (29.8 ± 8.1 vs. 55.2 ± 9.4 years, $p < 0.05$). The gender distribution of both groups was similar (female to male ratio: 38/22 in type 1 diabetics and 35/25 in type 2 diabetics, $p = 0.575$). The marital ratios in type 2 diabetics were higher than in type 1 diabetics (93.3% vs. 56.7%, $p < 0.001$). There were 2 illiterates, 1 literate, 15 primary school graduates, 23 high school graduates and 19 university graduates in type 1 diabetics and 3 illiterates, 4 literates, 32 primary school graduates, 12 high school graduates and 9 university graduates in type 2 diabetics. The high education ratios in type 1 diabetics were higher than in type 2 diabetics (70% vs. 35%, $p < 0.001$). Among type 1 diabetics there were 9 officers (15%), 8 workers (13.3%), 5 self-employed (8.3%), 5 retired (8.3%), 10

students (16%), 19 housewives (31.7%), 4 non-employed (6.6%) participants. Among type 2 diabetics there were 3 officers (5%), 2 workers (3.3%), 4 self-employed (6.7%), 21 retired (35%), 28 housewives (46.7%), 2 non-employed (3.4%) participants. There was a significant difference in occupational status among both groups ($p < 0.001$). Thirty five (58.3%) of type 1 diabetics and 45 (68.3 %) of type 2 diabetics had low monthly income ($p = 0.256$). In type 2 group only 2 participants reported their monthly income to be over 1300 \$.

There was no statistically significant difference in terms of TSS between type 1 (34.2 ± 2.9) and type 2 (33.4 ± 3.0) diabetic groups. The scores regarding general information (8.9 ± 1.2 vs 8.6 ± 1.1), social aspects (9.8 ± 1.5 vs. 9.8 ± 1.3) and complications (5.8 ± 1.4 vs. 5.8 ± 0.3) of diabetes mellitus were comparable in type 1 and type 2 diabetic groups, respectively ($p > 0.05$). Type 1 diabetics had statistically significantly higher scores in terms of treatment of diabetes compared to type 2 diabetics (9.6 ± 0.9 vs. 9.0 ± 1.2 , $p = 0.019$).

Effect of gender on TSS

In whole group analysis, we found that scores for the general information level, social aspects of diabetes and TSS were statistically indifferent between females and males. Only the score of information level about the complications of diabetes was higher in female diabetics than males, ($p < 0.05$). In subgroup analysis, type 1 diabetic females had higher scores than males concerning the complications of diabetes, as was the case in whole group analysis ($p = 0.025$) (Table 1).

Table 1. Comparison of the survey scores about diabetes mellitus in diabetic patients according to gender

Categories of Questionnaire, scores	Female			Male		
	Type 1 (n:38)	Type 2 (n:35)	Total (n:73)	Type 1 (n:22)	Type 2 (n:25)	Total (n:47)
General information	9.1 ± 1.0	8.6 ± 1.5	8.8 ± 1.3	$8.7 \pm 1.4^\dagger$	8.6 ± 1.4	8.6 ± 1.4
Social aspects	9.8 ± 1.5	9.9 ± 1.2	9.8 ± 1.3	9.8 ± 1.5	9.6 ± 1.6	9.7 ± 1.5
Treatment	9.5 ± 0.9	9.0 ± 1.3	9.3 ± 1.1	9.7 ± 0.9	9.1 ± 1.1	9.4 ± 1.0
Complications	6.1 ± 1.5	5.9 ± 0.2	6.0 ± 1.1	$5.4 \pm 1.0^\dagger$	5.8 ± 0.5	$5.6 \pm 0.7^*$
Total Scale Score	34.5 ± 2.8	33.6 ± 3.1	34.1 ± 3.0	33.7 ± 3.1	33.2 ± 3.0	33.4 ± 3.0

$^\dagger p = 0.025$ vs. female type 1 DM; $^* p < 0.05$ vs. total female DM.

Level of knowledge according to the marital status

Information about treatment of diabetes was statistically significantly higher in single diabetics compared to married ones in whole group evaluation ($p = 0.045$). Married diabetic group had statistically significantly higher scores for the information on complications than the single

group ($p < 0.001$) in whole group evaluation. In subgroup analysis, type 1 diabetic singles had statistically significantly higher scores than married ones about social aspects of diabetes ($p = 0.028$) and married ones than singles about complications of diabetes ($p = 0.023$) (Table 2).

Table 2. Comparison of the survey scores about diabetes mellitus in diabetic patients according to marital status

Categories of Questionnaire, scores	Single			Married		
	Type 1 (n:26)	Type 2 (n:4)	Total (n:30)	Type 1 (n:34)	Type 2 (n:56)	Total (n:90)
General information	8.8 ± 1.3	9.0 ± 0.8	8.8 ± 1.0	9.0 ± 1.2	8.6 ± 1.5	8.7 ± 1.4
Social aspects	10.2 ± 1.5	9.5 ± 0.5	10.1 ± 1.4	$9.5 \pm 1.4^\dagger$	9.8 ± 1.4	9.7 ± 1.4
Treatment	9.8 ± 0.7	9.0 ± 1.4	9.7 ± 0.8	9.4 ± 1.0	9.0 ± 1.2	$9.2 \pm 1.1^*$
Complications	5.5 ± 0.8	5.5 ± 0.5	5.5 ± 0.8	$6.1 \pm 1.6^\dagger$	5.9 ± 0.3	$5.9 \pm 1.0^{**}$
Total Scale Score	34.3 ± 2.6	33.0 ± 3.1	34.1 ± 2.6	34.2 ± 3.2	33.4 ± 3.1	33.7 ± 3.0

$^\dagger p = 0.028$ and $^\dagger^\dagger p = 0.023$ vs. single type 1 DM; $^* p = 0.045$ and $^{**} p = 0.001$ vs. single total DM.

Education level

In whole group evaluation, the results for the general information level, social aspect of diabetes, treatment and TSS were found to be statistically significantly ($p<0.001$, $p=0.002$, $p=0.044$ and $p<0.001$, respectively) higher in high education level group compared to low education level. In subgroup analysis, type 1 diabetics with high

education level had statistically significantly higher scores in general information level ($p=0.018$), social aspect of diabetes ($p=0.019$) and TSS ($p=0.011$) compared to ones with low education level. Type 2 diabetics with high education level had statistically significantly higher scores in social aspect of diabetes ($p=0.03$) and TSS ($p=0.015$) compared to ones with low education level (Table 3).

Table 3. Comparison of the survey scores about diabetes mellitus in diabetic patients according to education level

Categories of Questionnaire, scores	Low education			High education		
	Type 1 (n:8)	Type 2 (n:39)	Total (n:57)	Type 1 (n:42)	Type 2 (n:21)	Total (n:63)
General information	8.4±1.0	8.3±1.6	8.3±1.4	9.1±1.2†	9.1±1.0	9.1±1.1*
Social aspects	9.1±1.5	9.5±1.3	9.4±1.4	10.1±1.4††	10.3±1.3‡	10.2±1.3**
Treatment	9.3±0.9	8.9±1.3	9.1±1.2	9.7±0.9	9.2±0.9	9.5±0.9***
Complications	5.7±0.5	5.8±0.4	5.8±0.4	5.8±1.6	5.9±0.2	5.9±1.3
Total Scale Score	32.7±2.6	32.7±3.2	32.7±3.0	34.9±2.8†††	34.8±2.2‡‡	34.8±2.6*

† $p=0.018$, †† $p=0.019$ and ††† $p=0.011$ vs. low education level type 1 DM; ‡ $p=0.03$ and ‡‡ $p=0.015$ vs. low education level type 2 DM; * $p=0.001$, ** $p=0.002$ and *** $p=0.044$ vs. low education level total DM.

Employment status

It was found that employed group had statistically significantly higher scores compared to unemployed group in social aspects of diabetes and TSS ($p=0.005$ and

$p=0.018$, respectively). In subgroup analysis, employed type 2 diabetics had higher scores than unemployed ones in terms of social aspects of diabetes and TSS ($p=0.001$ and $p=0.011$, respectively) (Table 4).

Table 4. Comparison of the survey scores about diabetes mellitus in diabetic patients according to employment status

Categories of Questionnaire, scores	Employed			Unemployed		
	Type 1 (n:22)	Type 2 (n:9)	Total (n:31)	Type 1 (n:38)	Type 2 (n:51)	Total (n:89)
General information	9.2±1.0	9.1±1.2	9.1±1.1	8.8±1.2	8.5±1.5	8.6±1.4
Social aspects	10.2±1.0	11.1±0.6	10.4±1.0	9.6±1.6	9.6±1.3‡	9.6±1.4*
Treatment	9.4±1.0	9.5±0.7	9.4±0.9	9.7±0.8	9.0±1.3	9.3±1.1
Complications	5.5±0.8	5.8±0.3	5.6±0.7	6.0±1.6	5.8±0.3	5.9±1.0
Total Scale Score	34.5±2.8	35.6±2.0	34.8±2.6	34.1±3.0	33.0±3.0‡‡	33.5±3.1**

‡ $p=0.001$ and ‡‡ $p=0.011$ vs. employed type 2 DM; * $p=0.005$ and ** $p=0.018$ vs. employed total DM.

Income status

It was found that there was no difference in monthly income levels among groups in whole group comparisons. In subgroup analysis, type 2 diabetics with high monthly

income had statistically significantly higher scores in general information level ($p=0.049$) when compared to type 2 diabetics with low monthly income level (Table 5).

Table 5. Comparison of the survey scores about diabetes mellitus in diabetic patients according to monthly income

Categories of Questionnaire, scores	Low income			High income		
	Type 1 (n:35)	Type 2 (n:41)	Total (n:76)	Type 1 (n:25)	Type 2 (n:19)	Total (n:44)
General information	9.0±1.1	8.3±1.5	8.6±1.4	8.8±1.2	9.2±1.1‡	8.9±1.2
Social aspects	9.5±1.5	9.8±1.2	9.7±1.3	10.2±1.4	9.8±1.6	10.0±1.5
Treatment	9.5±0.8	9.0±1.3	9.3±1.1	9.7±1.0	9.0±0.9	9.4±1.0
Complications	5.9±1.7	5.9±0.3	5.9±1.1	5.7±0.7	5.8±0.5	5.7±0.6
Total Scale Score	34.1±2.8	33.1±3.1	33.6±3.0	34.4±3.1	34.0±2.8	34.2±3.0

‡ $p=0.049$ vs. low monthly income type 2 DM.

Discussion

The frequency of diabetes is increasing both in the world and in our country. It is important to understand the level of knowledge of diabetics about the disease, its complications and treatment, as well as its social aspects. We designed a questionnaire taking into account the basic knowledge that patients should know about diabetes and the questions mostly asked during diabetes education sessions and outpatient admissions.

Gender is one of the variables that may affect the information level. Most of the studies conducted in diabetic patient groups indicated no difference between the female and male genders concerning general information level about diabetes and its treatment [9-11]. In our study, when we investigated our whole group, we found that diabetic females had higher scores in general information, social aspects, complications of diabetes and TSS compared to males. There was a statistically significant difference concerning only complications of the disease in

whole group analysis and in type 1 subgroup analysis. This may be due to the fact that females are more curious about their health status compared to males and they obtain more information about their diseases.

In a survey conducted, no difference was observed according to the marital status in terms of general information level in diabetics [12]. Similar results were obtained in a national study and no difference was observed in the general information level with regard to marital status in diabetes [11]. In our study, single patients had statistically significantly higher scores in the treatment of diabetes and married ones about the complications of diabetes. There were more single patients in type 1 diabetics and married patients in type 2 diabetics. Type 2 group was older than type 1. Single patients in type 1 group using necessarily insulin might be the explanation for higher score of knowledge on diabetes treatment. They might be trying to learn more about treatment aspects. Older patients with longer duration of DM might have more complications and that might be the reason for the higher score concerning diabetic complications in the married group.

When we investigate the relationship between the level of general information about diabetes and the level of education, there are reports in several surveys indicating that general information level about diabetes are less among illiterates, low degree educated and elderly patients [9,13,14]. It's known that education level is the most predictive factor for the general information level of diabetic patients [15]. According to some studies conducted, it was determined that in some minority groups, individuals had less diabetic education and had lower levels of information about diabetes treatment compared with Caucasians [16,17]. In a study conducted with 886 type 1 and type 2 diabetic patients, it was claimed that in order to prevent the complications, the two highly important indicators were education level and socioeconomic status [18]. In a study conducted both in rural and urban areas, it was shown that although patients have some knowledge about diabetes symptoms and complications, awareness about their management was lacking [19]. In our study, when we compared lower and higher education level groups, we found that patients with higher education level had higher levels of knowledge about general information, social aspects, treatment of diabetes and TSS as expected. This result may be related with the higher understanding capacity, problem solving capability, ability to access and use the information in individuals with higher educational level. Having an occupation and being employed are factors directly related to socioeconomic status. In our study, patients who were employed had higher knowledge level concerning social aspects of diabetes and TSS. This might be due to the fact that employment is directly related to education level in

our country. Most of the unemployed people are the ones with generally lower educational status. On the other hand, we could not demonstrate the effect of monthly income on level of knowledge about the disease and related facts in whole group analysis. The gap between lower and higher incomes was very narrow in our study group which might explain this indifference.

When we compared the level of knowledge in terms of type of diabetes, patients with type 1 diabetes had more information about treatment of the disease. This fact might be due to insulin dependence of type 1 diabetics who usually try hard for learning and better applying the treatment options. Besides percentages of high school and university graduates were higher in type 1 compared to type 2 diabetics in our study group.

In conclusion, our study demonstrated that, in whole group evaluation, female diabetics had statistically significantly more information about the complications of diabetes compared to males, single diabetics had statistically significantly more information about the treatment of diabetes compared to married ones, married diabetics had statistically significantly more information about the complications of diabetes than single ones, diabetics with higher education level had statistically significantly more knowledge about general information, social aspects, complications of diabetes and TSS than the ones with lower education level and employed diabetics had statistically significantly more information about the social aspects of diabetes than unemployed ones. As it was previously reported in different studies, education level of a patient seems to be the most prominent contributor of level of knowledge of diabetes, its complications, treatment and social aspects. Every effort should be made to increase the general level of education and diabetes education in the population.

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