A COMPARISON BETWEEN HBA1C LEVELS AND KNOWLEDGE AND ATTITUDES CONCERNING DIABETES AMONG TYPE 1 AND TYPE 2 DIABETICS

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ABSTRACT

Aim: The purpose of this study was to compare the knowledge of and attitude to diabetes with HbA1c levels in type 1 and type 2 diabetics.

Materials and methods: The sample of the study consisted of 118 type 1 diabetics and 125 type 2 diabetics, a total of 243 individuals. Sampling strength was 92%. A personal characteristics identification form, a diabetes knowledge assessment form (prepared separately for type 1 and type 2 diabetics), a Diabetes Attitude Scale (DAS), and the HbA1c values of the participants for the previous three or six months were used.

Results: All diabetics had a good level of knowledge of diabetes, and their diabetes attitude scores showed that they had a positive attitude. There was a strong correlation between the mean knowledge scores of the diabetics in the study and their mean DAS scores for type 1 diabetics (r = 0.76, p < 0.001) and a medium level correlation for type 2 diabetics (r = 0.72, p < 0.001). A statistically significant negative correlation was found between HbA1c levels and knowledge and DAS scores of type 1 and type 2 diabetics. As knowledge of diabetes and DAS scores increase, so HbA1c levels fall.

Conclusion: Type 1 and type 2 diabetic patients, knowledge and attitude affects HbA1c levels. All healthcare staff and particularly nurses should eliminating lack of knowledge with the help of continuous education programs.

Key words: Type 1 diabetes, Type 2 diabetes, Knowledge level, Attitude to diabetes, HbA1c, Nursing education.

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Introduction

Diabetes is a health problem which requires long term care and treatment, creates problems for individuals and society because of its complications, and whose prevalence is steadily increasing\(^1\). World has 386,667.28 people with diabetes (8.33%) having Turkey in upper extreme of prevalence of diabetes with 14.9%, seven percentage points higher that Italy with 7.71% of prevalence\(^2\). From 1980 to 1998, the age-adjusted rate of diagnosed diabetes was similar for men and women. However, in 1999, the rate for males began to increase at a faster rate than that of females. From 1980 to 2011, the age-adjusted rate of diagnosed diabetes increased 156% (from 2.7% to 6.9%) for males and 103% (from 2.9% to 5.9%) for females\(^3\).

With the discovery of insulin and oral antidiabetic drugs, the life expectancy of increased, and for this reason the attitudes of diabetics towards diabetes ad their HbA1c levels have been affected as they have begun to live longer. Diabetes is a divergence from health, and it may not cause a change in an individual’s attitude to diabetes in order to cope with the new situation. The purpose of diabetes management is to review the knowledge and attitudes of diabetics concerning to improve treatment compliance, and achieve glycemic control\(^4\).
Increasing individuals’ motivation their positive attitudes and knowledge are the basis of diabetes treatment\(^4\). In developing a positive attitude, approaches must be adopted to discourage patients from denying their illness and to ease the way for them to accept the situation. It has been shown that raising the level of knowledge of diabetes contributes to developing a positive attitude to the disease in diabetic patients\(^3,5\).

One of the best indicators of glycemic control in diabetics is the HbA1c level. As the attitude of diabetic patients towards diabetes develops, so their glycemic control is expected to improve\(^1\). In the literature it has been reported that knowledge of diabetes and attitudes to diabetes affect HbA1c levels\(^6,12\).

It has been established that patients with a negative attitude to diabetes encounter more obstacles in their care, and that their HbA1c levels are higher\(^16\).

Education given by nurses is of great importance in developing the attitudes and knowledge of diabetics towards their own health. Positive results can be obtained in the control and treatment of diabetes by means of a simple nursing intervention program\(^17-20\).

This study was planned with the aim of determining the relationship between knowledge level, attitude to diabetes and HbA1c levels in the management of diabetes. One study was found examining these three factors together in diabetics in Turkey.

The aim of this study was to investigate the knowledge of diabetes and attitudes to the disease among type 1 and type 2 diabetics by comparing them with their HbA1c levels.

Materials and methods

The study was carried out in the endocrinology clinic and outpatients’ department of a university in the province of Bursa, Turkey. It was conducted as a descriptive study to determine the level of knowledge of diabetics, their DAS scores and their HbA1c levels, and the correlation between them.

Participants and sample of study

The population of the study comprised type 1 and type 2 diabetics registered at the clinic and outpatients’ department of the Endocrinology Clinic of Uludağ University Medical Faculty Hospital.

The sample consisted of a total of 243 diabetics, 118 with type 1 diabetes and 125 with type 2 diabetes, between the ages of 18 and 65, diagnosed with diabetes at least six months previously.

Data collection

A personal characteristics identification form, a diabetes knowledge assessment form (prepared separately for type 1 and type 2 diabetics), a diabetes attitude scale (DAS), and the HbA1c values of the participants for the previous three or six months were used in the collection of data.

The personal characteristics identification form was created by the researchers, benefiting from the relevant literature\(^1\). The form included space for age, gender, education level, marital status, diabetes type, duration of diabetes, education on diabetes, individuals in the family with diabetes, and diabetes complications.

The Diabetes Information Knowledge Assessment Form

The diabetes information knowledge assessment form was prepared for type 1 and type 2 diabetics separately by the researchers, making use of the literature\(^1\). This form was created in order to assess the level of knowledge of the diabetics included in the study. The knowledge assessment form created for type 1 diabetics consisted of 35 questions on all the knowledge included in diabetic education, while that prepared for type 2 diabetics consisted of 33 questions on all knowledge included in diabetes education. The questions on these forms were evaluated as correct (1), or incorrect or unanswered (0). Raw scores of 0-35 for type 1 diabetics and 0-33 for type 2 diabetics were obtained and converted to a scale of 0-100 for ease of interpretation. A high total score on the diabetes knowledge assessment form showed that the patient had sufficient knowledge of his/her illness.

The original form of The Diabetes Attitude Scale (DAS) was developed by America National Diabetes Commission and the Turkish adaptation and validity and reliability studies(Cronbach alpha 0.90) were carried out by Özcan in 1999. The DAS consists of 34 Likert-type questions and is applicable to type 1 and type 2 diabetic adults. Its test-retest correlation coefficient is 0.71, and the general scale Cronbach on the subgroups and their correlations were evaluated, and were found to be within the limits of 0.39-0.94. The results show that the scale can be used with diabetics as a valid and reliable means of measurement. The scale is composed of a
total of seven sub-scales, and the items are evaluated with Likert-type scoring ranging from 1 to 5. A score of >3 denotes a positive attitude, while a score of ≤3 shows a negative attitude (16). Higher or lower scores strengthen the attitude in the same direction.

The patients’ HbA1c values from the previous three or six months were obtained from their files.

**Data collection**
Research data was collected at the hospital by the researcher by means of one-to-one interviews with the patients.

**Statistical analysis**
All the statistical analyses were carried out using the SPSS 20.0 for Windows. In the evaluation of the data, numerical values, percentages, Pearson correlation and multiple regression analysis were used.

**Ethical aspects of the study**
Permission was obtained to carry out the study from the ethics committee of the Medical Faculty Hospital of the University. In addition, the necessary explanation was given to the patients who consented to take part in the study, and written approval was obtained from them.

**Results**
Among the Type 1 diabetics, 52.54% were female, 29.66% were high school graduates, 27.96% had had diabetes for 6-10 years, 72.03% had received diabetes education, and their average age was 35.59 years. 60% of the Type 2 diabetics were female, 26.4% were high school graduates, 27.2% had had diabetes for 6-10 years, 57.6% had received diabetes education, and their average age was 52.79 years. Table 1 shows patients’ average scores on the subscales of the diabetes attitude scale and on the total scale.

The strongest positive attitude of the type 1 diabetics was Attitude to Team Care, and the weakest positive attitude of the type 2 diabetics was Attitude to Adaptation to the disease (Table 2)

The results of the multiple regression analysis showed that the attitudes to diabetes and the knowledge scores of the type 1 and type 2 diabetics had a statistical effect on their HbA1c levels. It can be said that variations in HbA1c levels in 76% of the type 1 diabetics and in 72% of the type 2 diabetics can be ascribed to their knowledge levels and their attitudes to diabetes (Table 3).

Table 1: Identifying Characteristics of Type 1 and Type 2 Diabetics (n:243).

<table>
<thead>
<tr>
<th>Identifying Characteristics</th>
<th>Type 1</th>
<th>Type 2</th>
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<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>62</td>
<td>75</td>
</tr>
<tr>
<td>Male</td>
<td>56</td>
<td>40</td>
</tr>
<tr>
<td>Duration of Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5 years</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>6-10 years</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>11-15 years</td>
<td>25</td>
<td>32</td>
</tr>
<tr>
<td>16-20 years</td>
<td>28</td>
<td>18</td>
</tr>
<tr>
<td>&lt;21</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Diabetes Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>85</td>
<td>72</td>
</tr>
<tr>
<td>No</td>
<td>33</td>
<td>53</td>
</tr>
<tr>
<td>Age *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X±Sd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 1 Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X±Sd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%6.6 ± 1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%6.8 ± 1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes Knowledge Score *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71.0 ±11.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68.0 ±9.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAS total *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.58±0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.65±0.43</td>
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</tbody>
</table>

Table 2: Average scores of Diabetes on the Diabetes Attitude Scale.
Discussion

Diabetic patient education consists mainly in providing knowledge about diet, exercise, and drug treatment in relation to glycemic control, enabling the patient to feel better\(^{(21,22)}\). In our study, 72.03% of type 1 diabetes patients and 57.06% of type 2 diabetes patients had received diabetes education. It has been reported that diabetes education is effective in changing the lifestyle of patients, that their attitude and perceptions in relation to the disease are more positive after education, and that they can manage their illness better\(^{(23)}\). In Turkey, there are follow-up programs in the struggle against diabetes. Also in Turkey, it was found in a study by Dündar et al.\(^{(24)}\) that half (51.4%) of a study group over the age of 20 had sufficient knowledge of diabetes.

It was found in our study that the DAS score of the type 1 diabetes was \(4.58 \pm 0.62\), and that of the type 2 diabetes was \(3.65 \pm 0.43\). In a study in this topic by İnkaya and Karadağ\(^{(25)}\) the diabetes attitude score was found to be 4.06, Kartal et al.\(^{(13)}\) found it to be 3.48, and in a study by Mollaoğlu et al.\(^{(26)}\) it was found that those who had previously received diabetes education had a DAS score of \(3.95 \pm 0.28\), while those who had not scored \(3.66 \pm 0.34\).

As Table 2 shows, the type 1 diabetics had the highest positive score in the subdimension of Attitude to Team Care, and the type 2 diabetics had the lowest positive score in the Attitude to Adaptation to the Illness; this shows strong satisfaction with the approach of the health team, and medium satisfaction with Adaptation to the Illness. The high attitude scores of the type 1 diabetics may be explained by the fact that this age group was younger, and more open to change, novelty, and communication. It can be said that the average DAS score of over 3 means that both groups were successful in adapting to the illness.

In the regression analysis in Table 3, it was found that the patients’ scores on attitudes and knowledge concerning diabetes statistically affect-ed HbA1c levels. It was determined that there was a positive relation between knowledge scores and DAS, and a negative correlation between knowledge and attitude scores and HbA1c.

Similarly, Ambigapathy et al.\(^{(26)}\) established that there was a positive correlation between patient knowledge levels and attitudes, and that those who had a good knowledge of diabetes had a better attitude to the disease. It has been found in other studies that knowledge of diabetes is effective in developing a more positive attitude to diabetes and in raising attitude scores\(^{(24,27-29)}\). Kartal et al.\(^{(13)}\) reported that the average DAS scores of patients whose levels of conformity to treatment were good were higher than those of patients whose levels of conformity to treatment were poor.

It is known that those who have adequate knowledge of the illness achieve better glycemic control than those whose knowledge is not adequate\(^{(30)}\). Similarly to the findings of our study, McPherson et al.\(^{(13)}\) reported that there was a negative relationship between knowledge scores and HbA1c. In other studies, increase in the level of knowledge of diabetes has been found to lower HbA1c levels\(^{(9,13,14)}\), and an improvement in the levels of HbA1c has been observed\(^{(13)}\).

Results which did not accord with those of our study were seen in a study by Hu et al.\(^{(31)}\). No correlation was found between the level of knowledge of diabetes and glycemic control. It is thought that this result could be for physiopathological reasons such as patients’ reactions to drugs, or inadequate diabetes self-management by the patients.

The management of diabetes requires a multidisciplinary approach, and the team should not be overcome by the rapidly changing knowledge of diabetes. Nurses have an important role in creating a professional database, obtaining up-to-date information and making this information easy to use\(^{(32,33)}\). Continuous patient education and the achievement of glycemic control seem possible. There are studies of interventional responses by nurses by means of education and the improvement of deteriorating HbA1c values\(^{(17-20)}\).

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Type 1</th>
<th></th>
<th>Type 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DAS</td>
<td>(-19.79)</td>
<td>0.71</td>
<td>0.00</td>
<td>0.87</td>
</tr>
<tr>
<td>Knowledge Level</td>
<td>(-16.88)</td>
<td>0.73</td>
<td>0.00</td>
<td>-16.25</td>
</tr>
</tbody>
</table>

Table 3: Examination of the Independent Variables Affecting the HbA1c levels of Type 1 and Type 2 Diabetics (n:243).
Hilliard et al.\(^\text{34}\) reported that the quality of life of type 1 and type 2 diabetics was improved with continuous education programs, and better glycemic control was achieved.

According to these findings, it can be said that an increase in the level of diabetes knowledge has an effect on the development of a positive attitude to the illness, and that it lowers HbA1c levels.

**Conclusion**

In conclusion, it was found that HbA1c levels were similar in type 1 and type 2 diabetics. It was seen that previous diabetic education had a positive effect, raising knowledge of and attitude to diabetes, and lowering HbA1c levels. In addition, as diabetes knowledge scores and DAS scores rose in the diabetics in the study, so HbA1c levels fell. The DAS scores of both groups were above average, although those of the type 1 diabetics were higher.

It is principally nurses who, with the help of continuous education programs, can determine the knowledge, beliefs and attitudes concerning diabetes, identify shortcomings and solve problems by working to change patients’ knowledge and attitude and to monitor HbA1c levels. For this reason, it may be recommended that further studies be conducted to determine and increase knowledge of diabetes and attitude of adaptation to diabetes.

**References**


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