Evaluation of Diabetic Patient Care Quality in Primary Care

Birinci Basamakta Diyabetik Hasta Bakım Kalitesinin Değerlendirilmesi

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ABSTRACT

OBJECTIVE: The aims of this study were to evaluate (1) the glycemic regulation, (2) diabetic complications and nephropathy, (3) comorbid diseases (4) the health conditions of the diabetic patients in primary care.

MATERIAL and METHODS: A questionnaire of 65 questions including demographic data, history and physical examination of the patients, and laboratory findings was filled out by 36 family physicians.

RESULTS: Of the 249 patients who were included in the study, 25 (10%) were type1 and 224 (90%) were type 2 diabetic patients. The mean age was 56.14 ± 12.28 (range 14 to 86) years. In the last 6 months, 211 (84.7%) had measured HbA1c values, where the mean value was 7.3 ± 1.5 (range 4.5 to 13.6). More than half of the patients had HbA1c values higher than 7% (113, 53.5%). Proteinuria in spot urine was checked in 73.5% (183) of the patients. The microalbuminuria test was not performed in primary care.

CONCLUSION: The results of this study demonstrated that there are many properties of the diabetic patients that are controlled at low levels including glycemic control, smoking cessation, vaccination status, diet, exercise and diabetic nephropathy diagnosis that could be managed in primary care.

KEY WORDS: Diabetes, Patient care, Evaluation, Nephropathy, Primary care

ÖZ

AMAÇ: Bu çalışmanın amaçları birinci basamakta diyabetik hastaların (1) glisemik düzenlemelerinin, (2) diyabetik komplikasyonlar ve nefropatinin, (3) komorbid hastalıkların (4) sağlık durumlarının değerlendirilmesidir.

GEREÇ ve YÖNTEMLER: Demografik veriler, hastaların hikaye ve fizik muayene bulguları ve laboratuvar bulgularını içeren 65 soruluk anket formu 36 aile hekimi tarafından uygulanmıştır.

BULGULAR: Çalışmaya dahil edilen 249 hastanın 25'i (%10) tip 1 ve 224'ü (%90) tip 2 diyabetik hastalardı. Ortalama yaş 56,14 ± 12,28'di (aralık 14-86). Son 6 ayda, 211 (%84,7) hastanın HbA1c değerleri ölçülmüş olup, ortalama değer 7,3 ± 1,5'ti (aralık 4,5-13,6). Hastaların yarısından çoğunun HbA1c değerleri %7'nin üzerindeydi (113, 53,5%). Spot idrarda proteinüri %73,5 (183) hastada kontrol edilmişti. Mikroalbuminüri testi birinci basamakta yapılmıyordu.

SONUÇ: Çalışma, birinci basamakta diyabetik hastaların glisemik kontrol, sigara bırakılması, aşılanma, diyet, egzersiz ve diyabetik nefropati tanısı gibi kontrol edilebilecek özelliklerinin kontrolünün düşük düzeyde olduğunu göstermiştir.

ANAHTAR SÖZCÜKLER: Diyabet, Hasta bakımı, Değerlendirme, Nefropati, Birinci basamak

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INTRODUCTION

The prevalence of diabetes in adults was 6.6% in 2010 and it is estimated that the prevalence will be 7.8% in 2030 with an increase of 1.8%. In other words, the 285 million diabetic patients will become 438 million 15 years from now. The prevalence in Europe was stated as 8.5% in 2010, and it is expected to rise to 10% in 2030 (1). According to the TURDEP study performed in 2006, the prevalence of diabetes mellitus (Type 2) in Turkey is 7.2% (2). The TURDEP II study that was performed later revealed an increase in the prevalence to 13.7% (3).

The rapid increase in the prevalence of diabetes mellitus patients has also increased the number of patients with the complications of diabetes mellitus. There is no doubt that interventions both for prevention of diabetes mellitus and its complications are required. Increasing the patient care quality has become an important subject, especially in the last ten years (4). Many clinical guidelines have been prepared to obtain optimal patient care in diabetes mellitus in many countries (5-9).

Diabetic patients are a big group of primary care patients. A family physician having 3000 patients will be dealing with approximately 411 diabetes mellitus patients. Family physicians have an important role in the management of diabetes mellitus patients as the small numbers of internal medicine specialists, endocrinologists and nephrologists may not be sufficient in providing the optimal care. Defining the problems in diabetic patient care standards is required in order to be able to take measures for the prevention of both acute and chronic complications of diabetes mellitus.

The aims of this study were to evaluate [1] the glycemic regulation, [2] diabetic complications and nephropathy, [3] comorbid diseases [4] the health conditions of the diabetic patients in primary care.

MATERIALS and METHODS

Study Population

The study was performed between February-May 2014 in Kayseri. There are 32 Family Medicine Centers in Kayseri. Twelve of these were randomly selected to represent all socio-demographic levels. The planned number of patients was defined as 250 with power analysis (80% power, 5% mistake, 20% prevalence). Thirty six family physicians participated in the study. Family physicians were asked to apply a questionnaire to the patients and then to perform a physical examination and record the available laboratory findings.

Inclusion criteria were: patients over 18 years with diabetes diagnosis and patients who gave informed consent. Exclusion criteria were: those not giving informed consent, pregnant, patients less than 18 years old, and those unable to cooperate. This study was approved by the Ethics Committee of Erciyes University.

Questionnaire

The questionnaire included questions on demographic data and medical history, physical examination, laboratory evaluation and referrals. The data was collected according to the components of the comprehensive diabetes evaluation in the Standards of Medical Care in Diabetes 2014, and Quality and Outcomes Framework Achievement Data 2012/2013 diabetes mellitus indicators. Data on diabetic complications and hypertension was obtained from the doctors' previous records and the patient history.

Statistical Analysis

The IBM SPSS Statistics 21.0 Statistical Package was used in statistical analysis. The dependent variable was the presence of diabetes, and the independent variables were age, gender, occupation and marital status. The presence of a statistically significant difference in the observed and the expected frequencies, testing the difference between two groups, and connection between two variables was performed by parametric methods for continuous variables, and non parametric tests for others. Chi-squared test's exact method was used the comparison of categorical variables. The results were evaluated in 95% confidence interval. $P<0.05$ was considered statistically significant.

RESULTS

There were 249 patients in the study consisting of 97 (39%) men and 152 (61%) women (Table I). The mean age was 56.14 ± 12.28 (range 18-86) years. Of these subjects, 25 (10%) were type 1 diabetes, and 219 (90%) were type 2. Thirty-one (12.4%) were single, and 216 (86.7%) were married. The majority of the patients were housewives (139, 55.8%), 47 (18.9%) were retired, and 63 (25.3%) were from various occupations. The patients' education level was as follows; 41 (16.5%) illiterate, 29 (11.6%) literate, 115 (46.2%) elementary school, 40 (16.1%) high school and 24 (9.6%) university graduate.

The initial diagnosis of diabetes was made as follows: 132 (53.0%) in general hospitals, 46 (18.5%) in Family Medicine Centre, 35 (14.1%) in private hospitals, 32 (12.9%) in university hospitals. The initial diagnosis was usually made during periodic examinations (105, 42.2%). The most common complaints on admission were dry mouth and tiredness (65, 26.1%).

One hundred and forty-one (56.6%) patients had visited a dietitian. Seventy-seven (30.9%) patients were obeying their diabetic diet. Eighty-six (34.5%) patients were regularly exercising. The patients were most commonly informed about the disease by their doctors (236, 94.8%). Of the patients, 92 (36.9%) had patient education on diabetes.

Of the patients, 107 (43%) had changed the initial medicine. The most common reason for this change was insufficiency as seen in 95 (38.2%). The use of oral antidiabetics was the commonest medicine type (207, 83.1%), and metformin was

Tablo I: Demographic properties of the patients.

	n	%
Gender		
Women	152	61
Men	97	39
Marital status		
Single	31	12.4
Married	216	86.7
Occupation		
Housewives	139	55.8
Retired	47	18.9
Others	63	25.3
Education		
Illiterate	41	16.5
Literate	29	11.6
Primary School	115	46.2
High School	40	16.1
University	24	9.6

the most common (185, 74.2%). One hundred and one patients (40.6%) were using metformin alone, and 84 patients (33.6%) in combination with other oral antidiabetics. Twenty-two percent of the patients using metformin reported gastrointestinal complaints. One hundred and eight patients (44.2%) were using insulin. Twenty-two patients (4.8%) were using complementary medicine. One hundred and seven (43.0%) patients were using acetylsalicylic acid. Of the patients, 214 (85.9%) stated that they were compliant with the timing and the dose of their medicine.

Forty-five patients (18.1%) were smoking. Fifty three (21.3%) patients had their annual influenza vaccination, 10 (4%) had received their pneumococcal vaccination in the previous 5 years. There was a statistically significant difference regarding the diabetes education and pneumococcal vaccination ($p<0.05$). Of the ones who had diabetes education, 89% were not vaccinated and all of the vaccinated had diabetes education. Thirty percent of the men and 16% of the women had received their influenza vaccination.

Chronic complications were observed in 46 (18.5%) of the patients (Figure I). Neuropathy was the most common chronic complication (29, 11.6%). Nephropathy was present in 15 (6.0%) patients.

Seventy-five patients (30.1%) had hypertension and 61 (24.5%) had coronary artery disease. Acute complications were observed in 53 (21.3%) of the patients. Hypoglycemia was the most common acute complication (38, 15.3%) followed by diabetic ketoacidosis (9, 3.6%) and hyperosmolar non-ketotic coma (8, 3.2%). The presence of thyroid disease was stated by 21 (8.4%) of the patients. Of these, 6 (2.4%) were hypothyroidism and 5 (2.0%) were hyperthyroidism.

In the last 12 months, the patients had presented to the doctor for the following reasons: 161 (64.7%) for eye examination, 64 (25.7%) for neurologic examination 120 (48.2%) for dental examination, and 51 (21.5%) for psychiatric examination.

The mean Body Mass Index was 31.04 ± 5.59 (minimum 17.48, maximum 53.54). Hypertension was present in 144 (57.8%) of the patients (≥130/80 mm/ Hg). The mean systolic blood pressure was 133.49±16.96 (90-200), and the mean diastolic blood pressure was 80.11±10.6 (range 60-114). Of the patients, the pulse rate was measured in 195 patients and tachycardia was present at 4 (1.6%) of them. There was acanthosis nigricans in 14 (5.6%) of the patients, and 20 (8.0%) had lipoatrophy at the injection site. Of the patients, 136 (54.6%) had burning sensation at feet, 105 (42.2%) had pain at feet, 116 (46.6%) had numbness at feet. Thirty-seven (14.9%) had a nail deformity. In addition, eighteen (7.2%) had atrophic skin and 17 (6.8%) had a bone deformity. Seventy-four (29.7%) of the patients had decreased sensation. Forty-five (18.1%) patients had weakness in reflexes. Of the patients, 31 (12.8%) had weak/ lost tibialis anterior pulse and 32 (12.8%) had weak/lost dorsalis pedis pulse. Fifty (20.1%) of the patients had fungal infection at feet and/or hand.

Two hundred and eleven 211 (84.7%) patients had HbA1c results in the last 6 months. The mean HbA1c value was 7.3 ± 1.5 (range 4.5 -13.6). More than half of the patients had HbA1c values higher than 7% (113, 53.5%).

In the last 6 months, fasting plasma glucose (FPG) was checked in 227 (91.1%) patients, and postprandial glucose (PPG) was checked in 165 (66.2%). The mean FPG was 153.9±62.7, and the mean PPG was 225.9±89.9. The evaluation of FPG was;

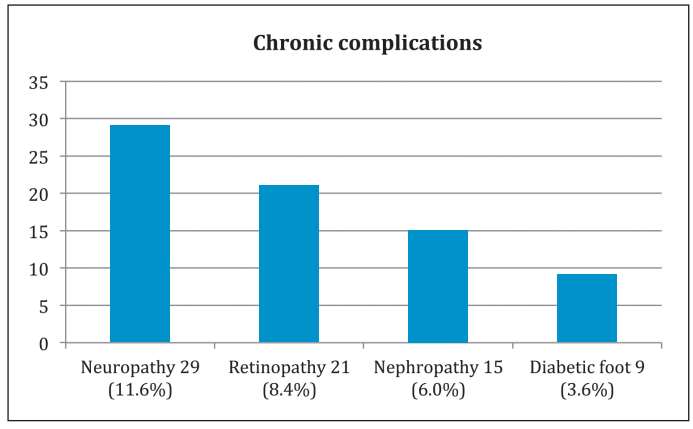

Figure 1: *Chronic complications of 249 diabetes mellitus patients.*

Tablo II: Laboratory results.

	%	Mean±SD
FPG	91.1	153.9±62.7
PPG	66.2	225.9±89.9
Total cholesterol	90.7	203±41.11
LDL	90.7	122.44 ± 33.53
TG	90.7	199.7±114.9
Creatinine	79.5	1.32±6.83
AST	79.5	23.22±11.11
ALT	79.5	27.29±16.04

SD: Standard deviation, **FPG:** Fasting plasma glucose, **PPG:** Postprandial glucose, **LDL:** Low density lipoprotein, **TG:** Triglycerides, **AST:** Aspartate Aminotransferase, **ALT:** Alanine Aminotransferase.

96 (38.6%) normal (70–130 mg/dl), 131 (52.6%) high (≥130 mg/dl) and 2 (0.8%) patients had low (<70 mg/dl) levels. Of the patients 56 (22.5%) had normal PPG (<180) and 109 (43.8%) had high values (<180) (Table II).

Of the patients 226 (90.7%) were checked for LDL, HDL, total cholesterol, and TG in the last 6 months. The mean LDL was 122.44 ± 33.53. Sixty (24.1%) patients had normal LDL level (≤100mg/dl), and 166 (66.7%) had high levels. Seventy-two (28.1%) of the patients had normal HDL values (≥50 mg/dl in women, and ≥40 mg/dl in men) and 156 (62.7%) had low HDL values. The mean total cholesterol was 203±41.11, TG was 199.7±114.9. Of the patients 85 (34.1%) had normal TG values (≤150), and 138 (55.4%) had high TG values. In this study, a TG≥150 was associated with a 2,159 increase in HbA1c ≥7.

The mean AST was 23.22±11.11 and 13 (5.2%) of these were high (AST≥40). The mean ALT was 27.29±22.5 and 14 (5.6%) of these were high (ALT≥55).

Creatinine was checked in 198 (79.5%) of the patients in the last 6 months. Of these 191 (76.7%) was normal and 7 (2.8%) had creatinine values higher than 1.5 mg/dl. Of the patients 66 (26.5%) had not been checked for proteinuria in spot urine in the last 6 months. Of the ones who had urinalysis, 5 (2.7%) had proteinuria in urine dipstick.

DISCUSSION

Statement of Principal Findings

This study demonstrated that; [1] The rate of diabetic patients diagnosed at primary care was 18.5%, [2] The use of oral antihyperglycemic medicine was very common at 83.9% in primary care and metformin was the most common oral antihyperglycemic medicine used (74.2%) either alone (40.6%) or in combination with other antihyperglycemic medicine (33.6%) and 44.2% were using insulin. [3] In the last 6 months, 84.7% had measured HbA1c values, where the mean value was 7.3 ± 1.5 (range 4.5 to 13.6). More than half of the patients had HbA1c values higher than 7% (113, 53.5%). [4] Forty-five (18.1%) were smoking. [5] Fifty-three (21.3%) had received the influenza vaccine and 10 (4.0%) the pneumococcal vaccine, [6] Chronic complications were observed in 46 (18.5%) of the patients and nephropathy was present in 15 (6.0%) patients.

Comparison with Existing Literature

In a study, the reported HbA1c control level was 40.5% and the mean level was 7.6% (10). In another study performed on primary care patients, the rate of HbA1c levels <7% was 32.1% and the mean HbA1c level was 8.8%. (11). In our study, the mean HbA1c level was lower with 7.3%. More than half of the patients had HbA1c values higher than 7% (113, 53.5%).

In a study performed in Kayseri in 2007 by Çıtıl et al., use of insulin only was 11.2% and the insulin use rate was 23.4% (12). The rate of insulin use was higher in our study with 44.2%. This may suggest us that patients in our study group may be convinced to use insulin more by family physicians. Mollema et al. have reported in their study that the patients thought that self blood glucose measurement (8.6%) and insulin injection (12.5%) was painful and they were afraid of making blood glucose measurements and insulin injection (13). In another study where obstacles in insulin treatment was investigated, 20% of the patients had anxiety of injections, 27% tenderness at the injection sites, 37% had pain at the injection sites (14). In our study, besides the complaints about injection, insulin use was considerably high when compared with the previous studies (12). The rate of oral antihyperglycemic use in our study was similar to the rate reported by Çıtıl et al. (83.1% vs. 87.1%) (12).

The rate of diabetic patients examined by ophthalmologists were two thirds, 61% and 42% in three different studies and examination by a neurologist was reported as 7% (15-17). In our study, examination rate by an ophthalmologist was 64.7% and neurologic examination had been performed in 25.7%. The use of acetylsalicylic acid has been investigated in many studies and the American Diabetes Association suggests its use in diabetic patients (18-20). The rate of acetylsalicylic acid use in our study was 43.0%. Hypertension rate in diabetes patients was reported as 30-75% and this rate was 75% in our study (21-22). This high rate of hypertension in our study group shows that special attention is needed for the management of hypertension.

The rate of hypoglycemia has been reported as 8.8% in a study, whereas this rate was 15.3% in our study (23). The most common chronic complications of diabetes mellitus have been reported as retinopathy (7.2%) and neuropathy (9.7%) in two different studies (24,25). In our study, neuropathy was 11.6% and retinopathy was 8.4%. Nephropathy was lower than these with 6.0%. Mıstık et al. have reported an influenza vaccination rate of 8.8% and no pneumococcal vaccination in a group of diabetic

patients (26). The rate of influenza (21.3%) and pneumococcal vaccination (4%) in this study are higher when compared with Mıstık et al.'s study. However, there is still necessity to increase these rates and patient education may be helpful.

The evaluation of proteinuria in diabetic patients with urine dipstick may cause a delay in the diagnosis as a positive test with a urine dipstick may correspond to stage 3 diabetic nephropathy. However, diabetic nephropathy should be diagnosed at earlier stages (27). In our study, proteinuria test with sticks in spot urine was performed in 73.5% of the patients, where proteinuria was present in 2.7%. In order to detect diabetic nephropathy at earlier stages, either family physicians should be able to check microalbuminuria in their laboratories (which is currently not performed) or send to hospitals for microalbuminuria test yearly. It has been reported in a study that hypertension increases as lipids increase and hypertension and hyperlipidemia increases diabetic nephropathy (28). In our study, low density lipoprotein levels were high in 66.7% of the patients with a mean value of 122.44 mg/dL. Creatinine was measured in 79.5% of the patients in the last six months and 2.8% of these were high. Creatinine may be a warning parameter for diabetic nephropathy and its measurement is suggested at least once a year. However, in people with low muscle mass, normal levels may be evaluated wrong. Diabetic nephropathy may be present in people with low muscle mass with normal creatinine values.

Strengths and Limitations

There are not many studies showing the diabetic patient care status in primary care and in secondary and tertiary care as well. Nationwide studies like TURDEP I and II have provided very important data on current positions (2, 3). However, local data like the data obtained from our study is useful in determining the management strategies. The limitation of the study is that there was no intervention for increasing the patient care quality in this study, where the aim was to obtain information required to define strategies.

Implications

The huge numbers of diabetes mellitus patients makes the patient care a big challenge for the healthcare providers. The secondary and tertiary care doctors consisting of internal medicine specialists, endocrinologists, neurologists, ophthalmologists and nephrologists are not sufficient in number to give the optimal care.

CONCLUSIONS

The results of this study demonstrated us that there are many properties of the diabetic patients which are controlled at low levels, including the glycemic control, smoking cessation, vaccination status, diet, exercise and diabetic nephropathy diagnosis which could be managed in primary care. Family physicians working in Family Health Centers may play a better role in the management and coordination of diabetic patient care.

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