

## Original Article

# The Relation between Anger Level and Metabolic Control Variables in Type 2 Diabetes

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### Abstract

**Objective:** The study has been conducted to determine the relation between anger level, manners of expressing anger and the metabolic control variables in type 2 diabetes.

**Methods:** This descriptive and cross-sectional study was conducted in 177 patients with type 2 diabetes presenting at the endocrinology and metabolic diseases clinic of Cumhuriyet University Health Services Application and Research Hospital in Turkey between February and June 2017. Data is acquired through Patient Identification Form and Constant Anger and Manner of Expressing Anger Scale.

**Results:** The mean duration of disease among individuals was  $12.41 \pm 10.56$  years and 57.1% had another chronic disease. 46.4% of the individuals developed diabetic complications; average rate of total cholesterol is above the limit, fasting glucose level, HbA<sub>1C</sub>, triglyceride and LDL cholesterol levels are above the target value. The constant anger and anger control of the individuals are at medium level while intrinsic anger and extrinsic anger levels are below the average. It is determined that there is a significant low degree positive relation between individuals' constant anger and intrinsic anger score averages, and the disease period, HbA<sub>1C</sub>, LDL cholesterol and HDL cholesterol levels ( $p < 0.05$ ).

**Conclusion:** In this study, it was determined that type 2 diabetic individuals obtain a medium-level anger; the more the anger levels rise, the more HbA<sub>1C</sub> and LDL cholesterol rates increase. Therefore health professionals can support individuals risky in sense of constant anger and anger control.

**Key Words:** Diabetes, anger, manners of expressing anger, metabolic control.

### Introduction

As an important health problem, type 2 diabetes is a chronic metabolism disease requiring life-long treatment (Sonmez & Kasim, 2013). Changes in life style including diet, physical activity, drug use and blood sugar evaluation are necessary in type 2 diabetic individuals (Karlsen, Oftedal, & Bru, 2012). In addition to this, the distress, come up with disease symptoms, complications and the treatments applied, concern for the future, the belief of losing self-sufficiency, the anxiety of being

dependent to others and the fears about the body image may affect individuals' lives negatively. That's why diabetic patient may come up against a range of problems and struggles physically, emotionally and socially (Tav et al., 2010). This situation causes psychological problems in diabetic individuals (Yi et al., 2008; Sonmez & Kasim, 2013; Kucuk, 2015). In literature, compared to the general population, it is stated that psychological problems are seen more in diabetics (Whittemore, Melkus, & Grey, 2005).

Psychological concerns by affecting both neuroendocrine and hormonal manners and, indirectly, the treatment and tracking of type 2 diabetes lead to blood sugar irregularity (Yi et al., 2008; Abraham et al., 2015). On the other hand, reactions such as anger, temper, and psychological defense make the curation and adaptation of the disease harder. Distempered patient struggles in following the rules regarding diet, treatment management and physical activities (Kucuk, 2015). This condition may cause a vicious circle by affecting the diabetic management and metabolic control negatively (Karlsen, Oftedal, & Bru, 2012).

Anger, as an extremely natural, universal, understandable, restrainable emotion given to unsatisfied wishes, unwanted outcomes and unexpected expectations is a regenerative feeling between individuals if expressed right. But, it also has the potential to turn into an aggressive and extremely devastating reaction reflected on behaviors destructively and out of control (Bodur, Infal, & Kurt, 2010). In literature, it is stated that constant anger leads to a decrease in number and sensibility of beta adrenergic receptor; accordingly resulting in sympathetic activation, while constant anger level creates a risk factor for hypertension, ischemic heart disease, and atrial ventricular arrhythmias (Golden et al., 2006; Celik et al., 2009). Besides, the exasperation individual has been through may cause conflicts in interpersonal relations and other health problems (Andersson, Jansson, & Archer, 2008).

Considered as a risk factor for cardiovascular diseases, anger control in type 2 diabetics gains importance (Golden et al., 2006). On the other hand, the connection between high anger level and the risk of type 2 diabetes as well as poor glycemic control are presented in international studies (Yi et al, 2008; Abraham et al., 2015).

Nevertheless, limited researches has been done on subjects like regular anger level, manners of expressing anger or temper control in type 2 diabetic individuals

(Penckofer et al., 2007; Yi et al, 2008; Celik et al., 2009).

The study has been conducted to determine the relation between anger degree, manners of expressing anger and metabolic control variables in type 2 diabetic patients.

## Methods

### Study Design and Sample

It is a descriptive and cross-sectional research. The population of the research is composed of 283 individuals diagnosed as type 2 diabetics applied to endocrinology and metabolic diseases clinic of Cumhuriyet University Health Services Application and Research Hospital between the dates 1 February – 1 June 2017. Also, calculated according to the population number unknown paradigm calculation formula, with 95% confidence interval and 0.05 margin of error, the population size has been detected as 158 people. In this regard, 177 individuals at a sufficient cognitive level, without any verbal communication problem or diagnosis of a psychiatric disease, diagnosed as type 2 diabetic for at least 6 months agreed on participating in the research and are included in the study.

### Data Collection Tools

The data is acquired through patient identification form, constant anger and manner of expressing anger scale, and metabolic control variables form.

**Patient Identification Form;** This form is composed of 20 questions researchers prepared in accordance with literature analysis examining sociodemographic characteristics (age, gender, marital status, training, occupation) and disease data (name and period of the disease, drug use, presence of complication etc.) (Yi et al., 2008; Kara & Cinar, 2011; Sonmez & Kasim, 2013).

**Constant Anger and Manner of Expressing Anger Scale:** Developed by Spielberger (1983), its availability and reliability in our country has been established by Özer (1994). Dealing with the feeling and expression of temper in terms of state and durability, this

scale is made up of 4 sub-dimensions; constant anger (10 items), intrinsic anger (8 items), extrinsic anger (8 items), temper control (8 items), and 34 subjects. In the evaluation, "Never defines" is 1 point, "Slightly defines" 2 points, "Fairly defines" 3 points, and "Thoroughly defines" is 4 points. Constant anger subscale minimum point is 10, maximum point is 40, while intrinsic and extrinsic anger and temper control subdimensions minimum point is 8 and maximum point is 32. Without a general total point of the scale, the items of 4 subdimensions compose the total score of that subdimension. The high scores got from constant anger subscale show the extent of temper level, high scores obtained from intrinsic anger subscale show the repressed anger, high scores received from extrinsic anger subscale mean anger is repressed easily and high scores got from temper control subscale mean the anger is controlled. High scores obtained from constant anger, intrinsic and extrinsic anger subdimensions are interpreted as negative while high scores got from temper control subdimensions are interpreted positive (Ozer, 1994). The Cronbach alpha rates of constant anger, intrinsic and extrinsic anger and temper control subdimensions found in the study are respectively 0.85, 0.72, 0.83 and 0.85.

**Metabolic Control Variables Form:** In the form organized to evaluate the metabolic control variables of diabetic individuals the rates of fasting blood glucose, total cholesterol, triglyceride, LDL Cholesterol, HDL Cholesterol, HbA<sub>1c</sub>, and blood pressure are included. The blood pressure of individuals is determined by the researches via measurement. For other parameters, evaluation of the medical attendant is asked for while attending the clinic. The data of these parameters are obtained from laboratory result paper.

### Data Collection

Data is collected by the researchers by talking face to face in a room suitable for discussion. Data, regarding to the metabolic parameters of patients, are acquired from

patient file. Filling up the data forms and measuring blood pressure lasted approximately 25-30 minutes.

### Ethical Approval

Before collecting data, a written permission is received from the ethical committee of a university (Decision no: 2016-12/17). Moreover, each attendant joining the study is informed about the content and voluntary participation and their verbal consent is taken.

### Data Analysis

Data is interpreted in SPSS (Statistical Package for the Social Sciences) version 17.0 software. Sociodemographic and disorder traits of diabetic individuals are evaluated with percentage and average test while the relation between disease period and metabolic parameters and constant anger and manner of expressing anger score averages are evaluated through Pearson correlation analysis. Relevance in statistical assessment is regarded as  $p < 0.05$ .

### Results

The mean age of the participants was  $56.64 \pm 11.56$  years; 57.6% are women, 78.5% are married, 13.6% are illiterate, 49.2% are housewives, 72.9% are financially average, 3.4% do not have any health insurance, and 19.2% live alone.

One third of the diabetic individuals are obese and 26% still smoke while 11.3% use alcohol. 35.6% of the participants with average disease period of  $12.41 \pm 10.56$  years use insulin while 19.2% do not implement the treatment regularly. 57.1% of diabetics have another chronic disease, 46.9% have hypertension and 31.2% have chronic coronary failure.

A 49.2% of diabetic individuals pay attention to their diets and 29.9% do regular exercise. 46.4% of diabetics possess diabetic complications; 35.5% retinopathy and 23.1% neuropathy. 67.2% of the participants have been hospitalized due to diabetes or its complications for at least once within a year's time. 84.2% of diabetic individuals

indicated that they are informed about their disease by a doctor or a nurse while 26% judge their general health state as poor. (Table 1).

**Table 1. Some Sociodemographic Characteristics of Diabetic Individuals**

Characteristics	n	%
Age (year) (M±SD)	56.64±11.56 (min=21, max=74)	
Duration of disease (year) (M±SD)	12.41±10.56 (min=1, max=36)	
Body Mass Index (kg/m <sup>2</sup> )		
<18.5	7	4.0
18.5 - 24.9	46	26.0
25 - 29.9	57	32.2
≥30	67	37.8
Smoking status		
Current smoker	46	26.0
Never smoker	103	58.2
Ex-smoker	28	15.8
Using alcohol		
Current user	20	11.3
Never user	152	85.9
Ex-user	5	2.9
Treatment type		
Oral antidiabetic treatment	51	28.8
Oral antidiabetic and insulin therapy treatment	63	35.6
Insulin treatment	63	35.6
Implement of treatment regularly		
Yes	143	80.8
No	34	19.2
Other chronic disease		
Yes	101	57.1
No	76	42.9
Attention to diet		
Yes	87	49.2
Partially	69	39.0
No	21	11.8
Doing regular exercise (at least 20 minutes' walk every day, etc.)		
Yes	53	29.9
Partially	71	40.2
No	53	29.9
Diabetes-related chronic complication		
*Yes	82	46.4
Retinopathy	29	35.5
Neuropathy	19	23.1
Nephropathy	10	12.3
Diabetic foot / Amputation	13	15.8
Myocardial infarction	9	10.9
Stroke	2	2.4
No	95	53.6

The frequency of hospitalized due to diabetes or its complications for at least once within a year's time		
Never	58	32.8
One time	49	17.7
Two time	39	22.0
Three times and over	31	17.5
Informed status about the disease by the doctor or nurse		
Yes	149	84.2
No	28	15.8
General health state		
Good	38	21.5
Moderate	93	52.5
Poor	46	26.0

\* n is variable

**Table 2. Distribution of Metabolic Parameters in Diabetic Individuals**

Metabolic Parameters	Min-Max	M ± SD
Fasting blood glucose (mg/dl)	60-453	167.92±72.62
HbA <sub>1c</sub> (%)	5.40-14.70	8.77±2.60
Systolic Blood Pressure (mmHg)	90-150	120.45±13.89
Diastolic Blood Pressure (mmHg)	50-100	75.39±10.06
Total Cholesterol (mg/dl)	75-500	202.31±77.67
Triglyceride (mg/dl)	63-610	182.13±105.78
LDL Cholesterol (mg/dl)	51-260	133.02±40.19
HDL Cholesterol (mg/dl)	20-72	41.98±10.97

**Table 3. Distribution and Correlation of Constant Anger and Manner of Expressing Anger Scale Score Averages in Diabetic Individuals**

Constant Anger and Manner of Expressing Anger Scale	Range of obtainable scores (min-max)	Range of scores obtained (min-max)	M±SD
Constant Anger	10-40	10-40	24.70±7.04
Intrinsic anger	8-32	9-30	17.53±4.78
Extrinsic anger	8-32	8-32	17.44±6.09
Temper control	8-32	8-32	20.10±4.87

**Table 4. The Relation Between Constant Anger and Manner of Expressing Anger Scale Score Averages and Period of Disease and Metabolic Parameters in Diabetic Patients**

Parameters	Constant Anger	Intrinsic anger	Extrinsic anger	Temper control
Duration of disease	r=.223, p=0.003**	r=.301, p=0.000**	r=.243, p=0.001**	r=-.089, p=0.241
Fasting blood glucose	r=.043, p=0.566	r=.141, p=0.062	r=.291, p=0.000**	r=-.120, p=0.110
HbA <sub>1</sub> C	r=.297, p=0.002**	r=.237, p=0.014*	r=-.164, p=0.092	r=.130, p=0.183
Systolic Blood Pressure	r=-.024, p=0.755	r=.036, p=0.637	r=.014, p=0.856	r=-.111, p=0.140
Diastolic Blood Pressure	r=.005, p=0.946	r=.056, p=0.461	r=.073, p=0.331	r=-.124, p=0.087
Total Cholesterol	r=.126, p=0.127	r=.259, p=0.001**	r=.252, p=0.002**	r=-.099, p=0.232
Triglyceride	r=.036, p=0.654	r=.150, p=0.060	r=.205, p=0.010*	r=-.150, p=0.060
LDL Cholesterol	r=.209, p=0.008**	r=.292, p=0.000**	r=.271, p=0.001**	r=.098, p=0.217
HDL Cholesterol	r=-.368, p=0.001**	r=-.226, p=0.045*	r=-.075, p=0.514	r=.017, p=0.882

r: Pearson correlation analysis; \* P <0.05; \*\* p <0.01

Data related to metabolic parameters of diabetic patients are given in Table 2. Accordingly, the average value of systolic and diastolic blood pressure and HDL cholesterol is close to the target value while average rate of total cholesterol is above the limit and fasting glucose level, HbA<sub>1</sub>C, triglyceride and LDL cholesterol levels are above the target value.

The distribution of score averages of constant anger and manner of expressing anger scale in diabetic patients is given in Table 3. Hence, it is determined that anger level (24.70±7.04) and temper control (20.10±4.87) are at average while intrinsic (17.53±4.78) and extrinsic (17.44±6.09) anger levels are low.

It is stated that statistically there is a significant low degree relation between individual's constant anger and intrinsic anger score averages and period of disease, HbA<sub>1</sub>C, LDL cholesterol and HDL

cholesterol rates, extrinsic anger score averages and disease period, fasting glucose, total cholesterol, triglyceride and LDL cholesterol rates (p<0.05). it is clarified that temper control level has no connection with disease period and metabolic parameters (p>0.05) (Table 4).

### Discussion

The evidence of the research conducted to determine the relation between anger level and manners of expressing anger and metabolic control variables in type 2 diabetic individuals is discussed comparatively in accordance with literature knowledge.

Ensuring control in type 2 patients is essential in prevention of unwanted side-effects of the treatment and complications developed with diabetes (Kara & Cinar, 2011). The target values to obtain metabolic control in diabetic individuals are submitted with American Diabetes Association report (2011) and Turkey Endocrinology and

Metabolism Organization Guideline (2013) as; LDL cholesterol <100 mg/dl (in diabetics been through a primary cardiovascular incident <70 mg/dl), triglyceride <150 mg/dl, HDL cholesterol in male >40 mg/dl, in female >50 mg/dl, total cholesterol <200 mg/dl, systolic and diastolic blood pressure  $\leq$ 140/80 mmHg and HbA<sub>1c</sub>  $\leq$ 6.5. It is determined that systolic and diastolic blood pressure and HDL cholesterol rates are close to the target value while total cholesterol rate is above the limit, and fasting blood glucose, HbA<sub>1c</sub>, triglyceride and LDL cholesterol rates are above the target value. In the study of Kara and Cinar (2011) it is identified that average body mass index, fasting blood sugar, triglyceride and HDL cholesterol levels of diabetic patients are at poor control degree, average HbA<sub>1c</sub> and total cholesterol rates are at limit while average blood pressure levels are at good control limit. In another study, it is confirmed that metabolic controls of 54.9% of diabetic individuals are poor, 29.3% are at limit and 24.8% are good (Citik, Ozturk, & Gunay, 2010). In a study examining five observational researches including 6.442 type 2 diabetics, it is seen that HbA<sub>1c</sub> rate of two thirds of the participants is above >6.5% and systolic blood pressure rate is high at limit (Vazquez et al., 2014). These results proved that metabolic control of diabetic patients is not enough and the training and counselling practice aiming diabetic management needs to be carried out in defiance of personal risk factors and individual life style.

Living with type 2 diabetes is considered as a tough period. Especially, it is known that poor glycemic control and intense treatment bring along psychological problems in diabetic individuals (Karlsen, Oftedal, & Bru, 2012). Also, it is stated that insufficient control of blood glucose level cause disappointment and anger (Penckofer et al., 2007). Research has shown that type 2 diabetic individuals obtain a medium level anger, they neither suppress nor express their temper easily. In a study conducted on type 1 diabetics, it is indicated that the temper level of the participants are at normal limits

(Muscatello et al., 2017). In other studies, however, it is proved that diabetic patients have a higher level of anger compared to healthy individuals (Kolbasovsky, 2004; Kiziltas et al., 2016). In a qualitative study conducted with type 2 diabetic women, it is seen that most of the women experienced anger and this affected their life quality negatively (Penckofer et al., 2007). In a research done comparatively with healthy individuals, it is decided that individuals with a physical disease has a more intense anger level, still, the intrinsic anger level of diabetic patients are lower than individuals with cardiovascular, gastro-intestinal and skin diseases (Batigun, Sahin, & Demirel, 2011).

Examining similar studies, the results of the research show that constant anger level in diabetics is low compared to the study of Savasan (2009) with hypertension patients, is high compared to the study of Gülec et al. (2004) made with women with fibromyalgia syndrome, and is similar to the study of Engin et al. (2006) conducted on alcohol and drug addicted individuals. In contrast to these results, in a study comparing diabetic, migraine and cardiac patients with healthy individuals, it is seen that temper, extrinsic anger level and anger reaction in diabetic patients have similarities with healthy individuals, and the temper level of diabetics is lower than migraine patients. In the same study, it is determined that intrinsic anger level of diabetics is lower than individuals with other diseases (Hamedi & Azamameri, 2013). In another study aiming to diagnose the chronic disease (diabetes, leukemia and chronic kidney failure) of the participants including teenagers half of whom are diabetic with a chronic disease, it is seen that there is not a difference between constant, intrinsic and extrinsic anger and temper control levels (Bodur, Infal, & Kurt, 2007). According to the research finding, it is obvious that temper level in diabetic individuals show distinction when compared to literature; temper level can be defined as normal or high. This situation proves that more long term studies should be carried out

with a similar practice group. Our research result, however, shows the fact that temper level in disease management period in diabetic individuals also needs to take place between parameters tracked. By this way, we believe that strategies can be fostered for individuals in need of support for temper control.

Recently, in literature studies examining the relation between anger, anger expression and diabetic progress are also found. But, the results obtained from these studies are inconsistent. In a longitudinal study aiming to determine the effect of anger on diabetic progress, it is confirmed that there is not a significant difference between temper levels (low, average, high) of individuals and fasting blood glucose rates while high anger level increases the risk of diabetes 34% (Golden et al., 2006). In another prospective study, it is determined that intense anger is related to type 2 diabetes development and 17.2% of the individuals with high level anger developed diabetes (Abraham et al., 2015).

Chronic diseases like diabetes damage mental and psychological well-being and affect coping skills with anger negatively (Yi et al., 2008). It is stated in the study that the anger control of diabetic individuals are on average. Besides, it is seen that anger control level of diabetics is low compared to hypertension patients (Çelik et al., 2009; Savasan, 2009), is similar to fibromyalgia patients (Gulec et al., 2004) and alcohol and drug addicted individuals (Engin et al., 2006). The result of the research proves that improvements in effective temper control and awareness are necessary for diabetic patients.

Throughout the study, it is seen that constant and intrinsic anger levels of diabetic individuals increase when the period of the disease, HbA<sub>1</sub>C and LDL cholesterol rates rise, however, anger control is not affected by disease period and metabolic parameters. Another study showed that the anger level of individuals with an HbA<sub>1</sub>C rate over %6.5 is higher (Kiziltas et al., 2016).

In a research conducted with 100 diabetic patients, it is seen that high coping skills with temper is effective in ensuring low HbA<sub>1</sub>C rate (Yi et al., 2008). In the study of Tsenkova et al. (2014) it is also determined that low temper control is connected with high glucose rates. In contrast to these studies, in another research, it is identified that HbA<sub>1</sub>C rates of individuals with low temper level ( $8.98 \pm 0.65$ ) are higher compared to individuals with high temper level ( $7.71 \pm 0.35$ ), yet this circumstance is detected as unreasonable (Altekin et al., 2006). In a study examining psychological conditions related to diabetes like anger, disappointment and fear, it is seen that there is no difference between HbA<sub>1</sub>C rates and psychological conditions of type 2 diabetic women (Whittemore, Melkus, & Grey, 2005). However, in a study conducted with 11.614 healthy individuals, it is determined that there is a statistically significant advanced relation between anger level, triglyceride and HDL cholesterol values, there is no connection with systolic blood pressure levels while triglyceride and HDL cholesterol rates of individuals with intense temper level is high (Golden et al., 2006).

The result of the research shows the necessity of the discussion of psychological aspects like anger while sustaining the target metabolic control in diabetic individuals. Especially, drawing attention on the presence of anger and anger control as a distinct topic will create positive outcomes in terms of giving utterance to existing anger and asking for help. Also, experimentally controlled studies on this subject will provide clearer results for the evaluation of the effectiveness of anger on metabolic parameters.

### Study Limitations

As it is conducted in a single university with diabetic patients applied and agreed participation at a specific time zone, generalization to its own population is the study's essential limitation. Also, the input acquired about anger level and temper control is based upon self-statements of the individual.

## Conclusions

In accordance with the results obtained from the study, it is determined that metabolic control parameters of diabetic individuals are not at the recommended level, their anger levels are on average, they do not suppress their anger, but cannot express it easily, and HbA<sub>1c</sub> and LDL cholesterol rates rise parallel to anger level. Regarding these results, in order to provide target metabolic control parameters counselling on training individuals about diabetes and management knowledge as well as anger expression and control, adapting patients to the treatments such as diet, exercise and glucose tracking, examining psychological matters like experiencing temper periodically, and supporting individuals risky in sense of constant anger and anger control are suggested. Moreover, it is clear that similar researches with a large practice group including healthy individuals will be beneficial.

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