Original Article

The perception of risk related to complications and its relation with metabolic parameters in diabetic individuals

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Abstract

Aim: For an efficient disease management and prevention of the development of complication, diabetic individuals are expected to establish a new life style right from the diagnosis. The perception of risk related to the disease has importance in the adaptation of the diabetic individuals to the new life style. The research is conducted to identify the perception of risk related to complications and it's relation with metabolic parameters in diabetic individuals.
Materials and Methods: This descriptive research was conducted in 237 diabetic individuals applied to a Diabetes Polyclinic of a university hospital. The data was acquired by patient identification form, The Risk Perception Survey–Diabetes Mellitus Scale and metabolic control variables form.
Results: Individuals' knowledge of the risk related to diabetic complications are at a good level while the perceived risk level is high. It is particularly confirmed that individuals perceive complications such as heart attack, high blood pressure and vision problems risky at a higher level. A positive correlation is established between the period of disease and risk knowledge, HbA1c level and worry, and fasting blood sugar and risk perception (p<0.01).
Conclusion: In the study, it is determined that, despite the high level of risk knowledge related to complications, the diabetic management of individuals is not enough while the risk perception is high. It is confirmed that the risk perception of metabolic parameters is especially related to worry level.

Keywords: Complications; diabetes mellitus; HbA1c risk perception

INTRODUCTION

Diabetes, diagnosed from the high level of glucose in blood, is regarded as the epidemic of 21st century for being a health problem growing in Turkey and all around the world (1). Besides, because of its high mortality and morbidity rates as well as its increasing socio-economic burden, diabetes is an important public health issue mostly discussed and worked upon for a solution in recent years (2,3). For an efficient disease management, for the prevention of the development of complication and to maintain life quality, diabetic individuals are expected to establish a new life style right from the diagnosis. The perception of risk related to the disease has importance in the adaptation of the diabetic individuals to the new life style (4-6). In literature, risk perception is defined as the subjective judgement of people on the characteristics and severity of the risk (7). Risk perception, besides what people think about risk, can also form basis for how people feel (8). The sense of risk related to the identity of disease (acute or chronic, the phase of illness, symptoms), social consideration, adaptation to illness (individual's recognition of the disease), self-care behaviors and treatment experience (9), composes one of the most important components of many health behavior theories (6,10). High level of risk perception may affect the willingness of individuals in taking precautions (11), and encourage healthy life style such as healthy eating and sufficient physical exercise (5,12). In studies conducted in literature, it is stated that the risk perception related to the development of the disease and complication in diabetic individuals affects well-being, diet, exercise and drug compatibility (9), and self-care behaviors (13,14); is interrelated with emotional dysregulation (15) and depression (6). In this regard, to establish a positive attitude in diabetic individuals and encourage adaptation to the treatment, the evaluation of risk perception regarding disease and complications is crucial (4,16). It is also necessary for the measurement of

the risk perceived, for the identification of the individuals ready to register to the strategies of preventing diabetes (11), and the administration of the programs about avoiding complications (17). It is assumed that, diabetic individuals' evaluation of risk perception and its correlation with training and treatment schedule of patients will be helpful in the management of diabetic individuals as well as the prevention of complications.

MATERIALS and METHODS

Aim and Study Design
The study was conducted as cross-sectional and descriptive in order to determine the perception of risk related to complications and it's relation with metabolic parameters in diabetic individuals.

Sample
Population of the research is composed of 354 adult diabetic individuals applied to a Diabetes Polyclinic of a university hospital in Istanbul, Turkey between June and September 2019. Regardless of the election of sample, reaching the number of population in the timeline set, was the aim. In this respect, 237 individuals, diagnosed with diabetes for at least 6 months, aged 18 or over, literate, unidentified with a diabetic complication, without a disability in nonverbal communication related to impairments like hearing-understanding-speech and willing to fill up the questionnaire are included in the sample. However, 117 individuals, developed diabetic complication, unable to use nonverbal communication, refused participating in the study and did not complete the data collection forms are excluded from the study.

Data Collection Tools
The data is acquired through "Patient Identification Form", "The Risk Perception Survey–Diabetes Mellitus Scale (RPS-DM)", and metabolic control variants form.

Patient Identification Form: This form is composed of 22 questions including sociodemographic properties (age, sex, height, weight, marital status, education, occupation, financial status, smoking, alcohol use, etc.) and the characteristics of the disease (duration of the disease, type of diabetes, other chronic diseases, treatment type, implement of treatment regularly, etc.)

The Risk Perception Survey–Diabetes Mellitus (RPS-DM) Scale: The Turkish validity and reliability of the scale developed by Walker (18) is studied by Yılmaz et al. (19). The scale is a measurement tool consisting information and risk perception related to diabetic complications. Including 25 items, this scale, features two sub-dimensions as "risk knowledge" and "composite risk perception". Composite risk perception, on the other hand, is composed of four parts as "worry", "optimism", "personal disease risk" and "environmental risk". Risk knowledge, with an increased number changing between 0 and 3, is considered as a good level of risk data related to diabetic complications. Composite risk perception is estimated from the average score obtained from the grades

of worry, optimism, personal risk and environmental risk (range=1-4). High point shows the increase in risk level perceived regarding diabetic complications (18,19). In the Turkish adaptation study of the scale, the Cronbach alpha value were found to be 0.76 for the risk information sub dimension, 0.83 for the worry sub dimension, 0.91 for the optimistic bias sub dimension, 0.89 for the personal disease risk sub dimension, and 0.92 for the environmental risk sub dimension (19). In this study, the Cronbach alpha value of the scale for sub-dimension of risk data and sub-dimension of united risk perception are found as 0.77 and 0.89 respectively.

Metabolic Control Variants Form: In the form organized to evaluate the metabolic control variants of diabetic individuals, the rates of fasting blood glucose, postprandial blood sugar, and HbA1c are evaluated. The measurement of these parameters is asked for while attending the clinic. The data of these parameters are obtained from laboratory result paper. The values obtained from the measurements made after eight hours of fasting for pre-prandial blood sugar and two hours after eating for postprandial blood sugar, are recorded.

Implementation
Data is collected by the researchers by talking face to face in a room suitable for discussion. Researchers informed the participants about the purpose and the importance of the study and applied data collection tools to individuals accepted participating in the study. Besides, the blood pressure of the participants were checked by the researchers. The measurement of the metabolic parameters by a medical attendant was asked from the participants during the application to the polyclinic. The data of these parameters are obtained from laboratory result paper. 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: 2018-22/02). Moreover, each attendant joining the study is informed about the content and voluntary participation and their verbal consent is taken. The study was conducted in accordance with the ethical standards of the Helsinki declaration.

Evaluation of the Data
Data is interpreted in SPSS 22.0 package program. Sociodemographic and disorder traits of diabetic individuals are evaluated with percentage and average test while the relation between RPS-DM sub-dimension score averages and disease period and metabolic parameters is evaluated through Pearson correlation analysis. Mann Whitney U test and Kruskal-Wallis Test were used to compare the sociodemographic characteristics of individuals with diabetes and the RPS-DM sub-dimension mean scores. The level of statistical significance was determined as below 0.05 in all tests.

RESULTS

Diabetic individuals' average age is 51.1±14.8 (range of 18 to 68) years, and 24.8% are 35 or below, 34.8% are between 36 and 54, and 40.4% are 55 or above. Sixty-four percent of the participants are women, 76.1% are married, 39.6% graduated from secondary school, 37.8% do not work, 63.2% are expressed that the economic situation is moderate, 3.7% do not have any health insurance, and 4.3% live alone. Seventeen percent of the diabetic individuals still smoke while 6.8% use alcohol. Disease-related characteristics of individuals with diabetes are shown in Table 1.

Table 1. Characteristics of the diseases in diabetic individuals	
Characteristics	**%**
Duration of disease (year) (M±SD)	11.12±6.34
Type of diabetes	
Type 1	32.7
Type 2	68.3
Treatment type	
Diet	3.2
Oral antidiabetic treatment	27.1
Oral antidiabetic and insulin therapy treatment	32.2
Insulin treatment	37.5
Implement of treatment regularly	
Yes	87.4
Partly	9.7
No	2.9
Other chronic disease	
Yes	42.6
No	57.1
Attention to diet	
Yes	42.1
Partly	48.5
No	9.4
Doing regular exercise (at least 20 minutes' walk every day, etc.)	
Yes	33.4
Partly	37.2
No	29.4
Diabetes control frequency	
Once in a month	1.2
Once in a three month	56.8
Once in a six month	35.4
Once a year	4.3
Irregular	2.3
The frequency of hospitalized due to diabetes for at least once within a year's time	
Never	91.5
One time	7.8
Two time	0.6
Body Mass Index (kg/m2)	
<18.5	6.2
18.5 - 24.9	27.4
25 - 29.9	30.4
≥30	36.0

Data related to metabolic parameters of diabetic patients are given in Table 2. Accordingly, it is determined that the fasting blood glucose, postprandial blood glucose and HbA1c average value of individuals are above the target rate.

Table 2. Distribution of metabolic parameters in diabetic individuals			
Metabolic Parameters	**Min-Max**	**M ± SD**	**Median**
Fasting blood glucose (mg/dl)	70-254	138.25±38.08	130
Postprandial blood glucose (mg/dl)	78-450	197.36±65.42	180
HbA1c (%)	4.9-11.8	7.52±1.47	7.4

It is determined that the risk knowledge of individuals regarding diabetic complications are at a good level (2.71±0.87) and composite risk perceived level (2.31±0.76) is above the average. Besides, it is stated that participants were partially worry (2.79±0.73); optimistic in a medium level (2.66±0.76) and personal disease risk and environmental risk factors were low (2.13±0.75 and 1.69±0.79 respectively) (Table 3).

Table 3. Distribution of sub-dimension score averages of the RPS-DM Scale			
Sub-dimension of the RPS-DM Scale	**Range of obtainable scores**	**Range of scores obtained**	**M±SD**
Risk Knowledge	0-3	0-3	2.71±0.87
Composite risk perception	1-4	1-4	2.31±0.76
Worry	1-4	1-4	2.79±0.73
Optimistic	1-4	1-4	2.66±0.76
Personal Disease Risk	1-5	1-4.2	2.13±0.75
Environmental Risk	1-4	1-3.78	1.69±0.79

It is seen that majority of diabetic individuals acquire enough knowledge on diabetic complications (Table 4). Also, it is determined that individuals perceive complications such as heart attack, high blood pressure and vision problems risky at a higher level (Table 5).

Table 4. Distribution of responses given to the statements related to risk knowledge sub-dimension of RPS-DM Scale			
Risk knowledge	**Increase the risk of getting diabetes complications %**	**Have no effect on the risk %**	**Decrease the risk of getting diabetes complications %**
Checking your feet every day	3.7	8.1	88.2
Keeping blood sugar levels close to normal	5	0.6	94.4
Having a yearly eye exam	4.3	5	90.7

Table 5. Distribution of responses given to the statements related to the risk of health problems regarding diabetes

Risk of health problem	Almost no risk %	Slight risk %	Moderate risk %	High risk %
Heart attack	31.1	33.5	19.3	16.1
Foot amputation	61.5	16.1	14.3	8.1
Cancer	72.0	14.3	5.6	8.1
Vision problems	36.0	11.8	33.5	18.6
High blood pressure	34.2	8.1	15.5	42.2
Numb feet	49.1	11.8	24.8	14.3
Stroke	75.2	6.8	6.8	11.2
Blindness	75.2	6.2	7.5	11.2
Kidney failure	62.1	8.1	13.0	16.8

The relationship between the sociodemographic characteristics of individuals with diabetes and the RPS-DM sub-dimension mean scores is given in Table 6. Accordingly, there is a significant difference between age groups in terms of risk knowledge (p=0.009), worry (p=0.013), optimistic (p=0.001), environmental risk (p=0.001) and composite risk perception (p=0.001). As a result of the bilateral post hoc comparisons made to determine which age group the difference originated from; It was determined that risk knowledge and environmental risk perception were lower and worry was higher under 35 years of age. It was found that the level of optimistic was higher in patients over 55 years of age. Similarly, a statistically significant difference was found in terms of the educational status of individuals, and the sub-dimension of optimistic (p=0.002), environmental risk (p=0.001) and composite risk knowledge (p=0.018). It has been determined that individuals with primary school education have higher levels of optimistic and lower perception of environmental risk.

Table 6. The relation between sociodemographic characteristics and score averages of the RPS-DM Scale of diabetic individuals

Characteristics	Risk knowledge	Composite risk perception				
		General	Worry	Optimistic	Personal disease risk	Environmental risk
Age (year)						
≤ 35	2.00±1.13	2.63±0.30	3.13±0.78	2.18±0.79	2.42±1.04	2.31±0.72
36-55 yaş	2.54±0.76	2.38±0.33	2.84±0.74	2.38±0.60	2.01±0.92	1.78±0.84
≥ 55	2.49±0.90	2.33±0.24	2.78±0.55	2.82±0.46	1.89±0.55	1.27±0.55
KW; p	9.410; 0.009**	24.990; 0.001**	8.668; 0.013*	28.949; 0.001**	5.473; 0.065	44.810; 0.001**
Gender						
Female	2.39±0.97	2.42±0.31	2.94±0.64	2.49±0.67	2.03±0.82	1.7±0.83
Male	2.38±0.88	2.44±0.33	2.76±0.78	2.53±0.63	2.14±0.9	1.7±0.76
Z; p	-0.347; 0.728	-0.325; 0.745	-1.538; 0.124	-0.398; 0.691	-0.686; 0.493	-0.180; 0.857
Marrital status						
Married	2.48±0.87	2.42±0.31	2.91±0.65	2.52±0.64	2.10±0.83	1.65±0.79
Unmarried	2.13±1.08	2.44±0.32	2.82±0.79	2.46±0.71	1.98±0.9	1.85±0.84
Z; p	-2.236; 0.025*	-0.561; 0.575	-0.61; 0.542	-0.677; 0.499	-1.232; 0.218	-1.037; 0.300
Education status						
Primary school	2.44±0.90	2.32±0.23	2.85±0.6	2.75±0.59	1.84±0.47	1.32±0.63
Secondary school	2.38±0.87	2.46±0.31	2.95±0.83	2.29±0.74	2.17±1.03	1.85±0.82
Highy school	2.34±1.02	2.49±0.35	2.87±0.67	2.43±0.6	2.19±0.93	1.93±0.83
KW; p	0.305; 0.859	8.068; 0.018*	0.774; 0.679	12.561; 0.002**	2.121; 0.346	22.093; 0.001**
Smoking status						
Yes	2.26±0.86	2.40±0.36	2.81±0.86	2.31±0.77	1.92±0.92	2.02±0.85
No	2.37±1.04	2.46±0.32	2.88±0.69	2.57±0.63	2.15±0.87	1.69±0.82
Z; p	1.514; 0.469	2.411; 0.299	0.200; 0.905	3.327; 0.189	2.725; 0.256	6.018; 0.052

*p<0.05; **p<0.01

Table 7. The relation between sociodemographic characteristics and score averages of the RPS-DM Scale of diabetic individuals						
Parameters	Risk knowledge	Composite risk perception				
		General	Worry	Optimistic	Personal disease risk	Environmental risk
	r; p	r; p	r; p	r; p	r; p	r; p
Duration of disease	0289 ; 0001*	0.125 ; 0.114	0.044 ; 0.583	-0.008 ; 0.923	0.194 ; 0.054	0.099 ; 0.210
Fasting blood glucose	-0.063 ; 0.425	0.254 ; 0.001*	0.248 ; 0.002*	-0.189 ; 0.057	0.302 ; 0.001*	0.136 ; 0.084
Postprandial blood glucose	-0.107 ; 0.179	0.065 ; 0.414	0.195 ; 0.053	-0.150 ; 0.059	0.081 ; 0.310	0.105 ; 0.188
HbA1c	-0.198 ; 0.052	0.112 ; 0.159	0.207 ; 0.009*	-0.160 ; 0.054	0.055 ; 0.490	0.135 ; 0.089
*p<0.01						

A statically meaningful positive relation with a rate of 28.9% between the duration of disease and risk knowledge sub-dimension score averages is established (p<0.01). It is determined that there is a statically meaningful relation in a positive direction between fasting blood sugar level and composite risk perception, worry and personal disease risk sub-dimension score averages with rates of 25.4%, 24.8%, 30.2% respectively (p<0.01). In addition to that, a meaningful positive relation with a rate of 20.7% between HbA1c level and worry sub-dimension score average is identified (p<0.01) (Table 7).

DISCUSSION

Majority of diabetic individuals can develop several microvascular complications in time (20). For this reason, in recent years, studies focusing on the prevention and management of complications related to diabetic individuals are given importance. In this study, the identification of the risk perception regarding the development of complication in diabetic individuals and its relation with metabolic parameters is aimed.

Diabetic complication risk can be reduced by a healthy life style and pharmalogical agents. Moreover, for the prevention and decrease of complications in diabetic individuals, risk knowledge is important (21). In this respect, in order to be sure whether the individuals' health state is under risk or not, examination of the risk knowledge regarding complication development may be guiding (14). In the study, it is clear that, the risk knowledge of the individuals regarding diabetic complications is at a good level. Research evidence is parallel with literature, and in other studies conducted, a high level of risk knowledge regarding complications in diabetic individuals is established (6,14,18). In another study, however, it is stated that, some of the individuals did not understand the risk knowledge, only two third of them could range the risks according to the information given (22). Research finding indicates that, diabetic individuals acquire an intended level of knowledge considering the prevention and decrease of complications. Nevertheless, factors like overweight and raised rates of metabolic parameter values observed in majority of the individuals participated in the study, it is clear that, high level of knowledge is not

enough for the prevention of the complications. It may result from diabetic individuals' lack of practice of the knowledge they obtain.

Risk perception in diabetic individuals, is a real fact that affects the management of the disease and the development of diabetic complications (6,8). The evaluation of risk perception and correction of the knowledge prejudiced are important to encourage implementation of the treatment in diabetic individuals and their self-care behaviors typical to the disease (4,23). In the study it is determined that, individuals' perceived risk level related to complications are high and especially heart attack, high blood pressure and vision problems are accepted as top risks. In a systematic compilation, it is identified that, perceived risk considering macrovascular complication development is higher than microvascular complication risk. In the same study, it is emphasized that, mostly cardiovascular risks were focused on (4). In another study, although the general risk perception of the diabetic individuals were in a low degree, perceived risk levels for personal risk dimension factors such as vision problems, heart attack, stroke, renal failure, and amputation were above the average (24). A different study states that, 68% of diabetic individuals do not consider cardiovascular diseases as a serious complication of diabetes, and the awareness of complications like blindness (65%) or amputation (36%) are higher than heart disease (17%), heart attack (14%), or stroke (5%) (25). In the study of Huang et al. (23) it is also clarified that, risk perception like stroke and nephropathy are at a higher level than other complications. In a research studying the risk perception related to major complications in diabetic individuals, it is determined that, 31.6% of the participants have a high level of risk perception for blindness while 33.7% have for recent renal failure and 25.1% for amputation (26). In a study conducted with type 2 diabetic individuals, it is established that, participants are unrealistically pessimistic about cardiovascular disease and stroke development risks, and experience an exaggerated level of risk perception (27).

In contrast to these studies, a research pointed out that, the risk perceptions of the individuals regarding diabetic complications are at a low degree, and individualized risk

estimations, especially death perceptions, are restricted (22). Likewise, in the study of Wattanakul (14), a low level of risk perception in diabetic individuals related to complications is established. In the study of Allen et al. (8) is determined that most of the diabetic individuals have a lower negativity risk in terms of sociodemographic features, and they slightly care about the approaches necessary for the negative health events. A low degree of risk perception for developing complications may lead to risky health behaviors (14). In our study, diabetic individuals' high level risk perception for complications is assessed as a positive outcome in respect to the realization and implementation of a change in life style aiming prevention of the complications.

In the study, it was found that individuals under the age of 35 had low risk information, but the level of risk perception was high. Additionally, in the study, it was found that individuals with low education level had low risk perception. In the study of Rovner et al. (6) was no difference between age and gender and risk perception; it has been determined that the level of education is decisive in the perception of risk. In the same study, it was found that individuals with fewer years of education had a higher risk perception (6). The study finding is compatible with the literature and shows that the level of education is important in risk perception.

A positive correlation is established between the period of disease and risk knowledge, HbA1c level and anxiety, and fasting blood sugar and risk perception. In the study of Shreck et al. (9) a relation between risk perception and glycaemic control is not established. In other studies, as well, it is determined that, there is not a relation between HbA1c level and risk perception (6,14,24). In a research studying the relation between risk perception and parameters apart from metabolic control, it is identified that, the treatment of diabetes does not affect the risk perception of high blood pressure and high cholesterol level (12). Research evidence inconsistent with literature shows that, risk knowledge increases along with the disease period while risk perception for complication is inversely related to diabetes management.

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 the risk perception related to complications is based upon self-statements of the individual. Despite these limitations, this study is the first study that measures the perceptions of the risk of complications related to diabetic individuals in Turkey.

CONCLUSION

In the study, it is determined that, despite a high degree of risk knowledge regarding complication development, the disease management of diabetic individuals is not well, but their risk perception is elevated. In this respect, additional to the disease instructions, right from the first diagnosis of diabetes, healthcare professionals are recommended to provide training for the prevention of the complications, support patients with a high risk of complication to maintain a healthy life style, and evaluate the risk perception of the individuals related to complication development with the real state of risk. Also, it is recommended that the study be conducted with a larger population and multicenter.

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