www.jcimcr.org

JCIMCR OPEN ACCESS Journal of Clinical Images and Medical Case Reports

ISSN 2766-7820

Research Article

Open Access, Volume 3

The effect of quality of life and depression on the compliance of patients with type 2 diabetes

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Received: Jun 20, 2022

Accepted: Jul 14, 2022

Published: Jul 21, 2022

Archived: www.jcimcr.org

DOI: www.doi.org/10.52768/2766-7820/1962

Abstract

Background: In recent years, many studies have shown the close relation of quality of life and depression to the compliance of patients with type 2 diabetes. The aim of the present study is to examine the relation between quality of life and depression to compliance with antidiabetic treatment. The effect of demographic profile in levels of depression, quality of life and compliance with antidiabetic treatment was examined as well.

Methods: Current research is quantitative research, original, descriptive and correlational with non-experimental design. Sample was consisted of 185 Greek patients with diabetes type 2 in Greek public hospital of Athens, with a mean age of 56 years. Questionnaire of ADDQoL19 was used to measure Quality Of Life (QOL), CES-D for depression and MARS-5 for compliance. Parametric independent samples t-test, One Way ANOVA and non-parametric Kruskal Wallis was used in significance 5%.

Results: Diabetes 2 patients presented low levels of compliance to treatment, symptoms of depression and moderate QOL. QOL was associated with the appearance of depressive symptoms ($p<0,01$), while QOL and depression with compliance to treatment ($p<0,01$). Moreover, depression, QOL as well as compliance were affected by sociodemographic and clinical variables ($p<0,05$).

Conclusion: Low quality of life is associated with higher appearance of depressive symptoms while patients with higher levels of depression present lower compliance with antidiabetic treatment. Quality of life, depression and compliance with antidiabetic treatment are significantly affected by the demographic and clinical profile.

Keywords: Depression; Quality of life; Compliance; Diabetes.

Introduction

Adherence to therapy is defined as the extent to which a person's behavior in taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider. Patients presenting with type 2 diabetes mellitus are initially encouraged to maintain a healthy diet and exercise regimen, followed by early medication that generally includes one or more oral hypoglycemic agents and later may include an injectable treatment [1].

Depression is twice as common in patients with DM type 2 than in the general population, and the results show that 15–30% of patients with diabetes meet the criteria of depression. After a first episode of depression, patients with DM relapse more easily in relation to other patients [2]. Depression is a risk factor for hypertension, hyperlipidemia and heart disease and each of these factors which increase the risk of heart attacks among diabetic patients. Despite the fact that association is complex and can vary among patients with type 1 and type 2 DM, it is evident that depression is associated with poor glycemic control. Moreover, patients with depression and diabetes show higher rates of retinopathy and microangiopathy compared to non-diabetic patients who suffer from depression [3]. Pathophysiologically, patients with type 2 DM present a combination of reduced insulin secretion and increased insulin resistance. There are psychosocial and emotional interactions of diabetes related to self-esteem, self-care, everyday life and general quality of life. Multicenter studies have shown that the prevalence of depression is at least double among diabetic patients than in the general population [4].

The presence of diabetic complications [mainly cardiovascular complications, visual disturbances (up to blindness), renal failure, neuropathy, diabetic foot and possibly lower limb amputation] leads to physical disabilities, lack of ability to take care of themselves and perform simple daily activities, for the patient and his/her family. Moreover, the treatment itself through increase of body weight (which mainly affects women) and the cause of hypoglycemia, burdens both the regulation of diabetes and the quality of patients' lives. Especially the fear of hypoglycemia forces diabetics to seek or need the help of third parties, hesitate to form social relationships, develop fears (e.g., about driving) resulting in losing their self-esteem and leading to isolation. The latter is observed mainly in young diabetics [5].

According to researches, at least one in five people with diabetes is depressed. In most cases, however, the problem is not recognized because of the association of diabetes with stressful situations, which release feelings of anxiety, frustration and sadness and often cause emotional exhaustion. It is often that an unreal belief is formed that it is natural for diabetes to be depressing [6]. The emotions that a person with diabetes seems to experience are his own anxiety about the course of diabetes, frustration, about everything he/she would like to do but cannot do, mourning, about all the opportunities he/she thinks he/she has lost and grief for the future, which the person often sees as uncertain. Still, the person can feel fear when he/she has to face the increased glycemic regulation requirements, anger because he/she thinks it's unfair that something like this happens to him/her and guilt, because he/she may not always be able to regulate the glucose levels [7]. In addition, there may be a "feeling of helplessness", frustration and hopelessness. All of these feelings are normal reactions, although not found in all people with diabetes, nor with the same intensity. But when all these feelings are accompanied by classic depression symptomatology, such as loss of interest and pleasure, feeling of resignation, negative thoughts about self and the future, self-destructive behavior, appetite and sleep disorders, aggression, anxiety and severe fatigue, may signal the onset of depression [8]. The fact that depression occurs more often in people with diabetes than in the general population does not mean that diabetes causes depression or that depression causes diabetes [9,10]. They do not have identical causal factors. But there seems to be vicious circle, during which the demanding conditions and the diabetes-related difficulties create depression symptomatology, which makes it difficult to adhere to the regulatory framework, increasing the likelihood of the occurrence or intensification of resignation behaviors, limited physical activity, overeating, obesity and smoking. This behavior magnifies the problems, resulting in the exacerbation of depression [11,12]. Depression is holding the person back from achieving satisfactory regulation of diabetes mellitus. The inability the for self-care creates depression feelings and uncomfortable mood, decreased energy, limited functionality and effectiveness and negative evaluation of self and the situation [13].

Current research examines levels of quality of life, depression and compliance with antidiabetic treatment at diabetes 2 patients. In addition, aim of study is to examine the association between quality of life with depression and compliance with antidiabetic treatment. Furthermore, to identify possible relationship between depression and compliance with antidiabetic treatment. The effect of demographic profile in levels of depression, quality of life and compliance with antidiabetic treatment is examined as well. The 5 research hypotheses are represented below:

H1: A person with type 2 diabetes presents symptoms of depression.

H2: A person with type 2 diabetes has a poor quality of life.

H3: Low quality of life is associated with the appearance of depressive symptoms.

H4: Low quality of life has a negative impact on compliance with antidiabetic treatment.

H5: The presence of depressive symptoms adversely affects compliance with antidiabetic treatment.

Materials & methods

Current search is quantitative research, original, descriptive and correlational with non-experimental design. The quantitative research was chosen, because the concepts of depression, quality of life and compliance with antidiabetic treatment are measurable, thus, it is convenient for the researcher to measure them [14] and examine the 1st and 2nd research hypothesis. In addition, in quantitative researches, it is possible to examine relationships between variables [15], using statistical and mathematical methods in numerical data [16]. Thus, it is possible to examine the 3rd, 4th and 5th research hypothesis. Furthermore, major advantage of quantitative research is that large amount of data can be stored and analyzed, as well as

those results can be generalized for the population research, using the inductive approach in representative sample. The non-experimental design was chosen because aim of research is to compare samples, spot differences, without identifying the reason [17]. In this study the compliance of the anti-diabetic treatment is the dependent variable. Depression and quality of life are the independent variables.

Population of research is considered the diabetes 2 patients in Greece. Regarding sample, it was consisted by 185 Greek patients with diabetes type 2 in Greek public hospital of Athens, with mean age 56 years, height 170 cm, weight 82 Kg and 7 years patients. The majority of participants are married people, with secondary level of education, who live in urban area, currently working and ex or present smokers. According to exclusion criteria, patients with diabetes type 1, metabolic syndrome, youth diabetes with onset of puberty and gestational diabetes will be excluded. Also, patients who have at least one of the following comorbid conditions: ESLD, ESRD, cancer, new-onset diabetes after organ transplantation, or a recent cardiovascular event within 3 months before the start of the study will be excluded. Moreover, patients with active psychosis, substance abuse or psychiatric hospitalizations in the past 6 months will be excluded. Finally, patients with severe cognitive impairment will be excluded.

A questionnaire of 76 items was used, divided in 4 sections. The 1st section refers to demographic characteristics with 11 items of closed-type questions or brief responding. The 2nd section refers to quality of life an includes the ADDQoL19 questionnaire. The latest version of the questionnaire was used ADDQoL-19 translated into Greek, which acquired by Health Psychology Research Ltd (license number CB796). ADDQoL-19 includes 2 general questions for quality of life and impact of disease. The question for quality of life is responded via a 7 Likert point scale from -3 to 3 where -3 indicates the worst quality of life and 3 the best (-3=Extremely bad, -2=Very bad, -1=Bad, 0=Neither good nor bad, 1=Good, 2=Very good, 3=Excellent). The question for the impact of disease is responded via a 5 Likert point scale from -3 to 1 where -3 indicated better quality of life and 1 the worst.

Then there are 2 sub-sections of 19 items which refer to impact of the disease and the importance of quality of life. In the sub-section which refers to the impact of the disease, participants respond questions about how would be the quality of their life, if they did not have diabetes on a five Likert point scale from -3 to 1(-3=Very much better, -2=Much better, -1=A little better, 0=The same, 1=Worse). In the sub-section which refers to the importance of the quality of life, participants respond question on four Likert point scale (0=Not important at all, 1= Slightly Important, 2= Important, 3=Very important). Unlike other QoL measures, the ADDQoL is an individualized questionnaire measure of the impact of diabetes and its treatment on QoL. Preliminary evidence of reliability and validity is established for adults with diabetes. Findings suggest that the ADDQoL will be more sensitive to change and responsive to differences than generic QoL measures [18].

The 3rd section of the questionnaire involves the CES- Depression Scale [19]. The CES-D is a brief questionnaire which contains 20 questions in a four Likert point scale from 0 to 3 (0=Rarely or none of the time (less than 1 day), 1=Some or a little of the time (1-2 days), 2=Occasionally or a moderate amount of time (3-4 days), 3=Most or all of the time (5-7 days)) and measures the frequency of the symptoms associated with depression. Scores range from 0 to 60, with high scores indicating greater depressive symptoms. In particular, scores greater or equal to 15 indicate clinical depression. The CES-D is used as a screening tool to identify persons at risk for clinical depression. As for acceptability, it is written at the third-grade reading level. It has internal consistency and high internal consistency, also it has validity. The CES-D is widely studied in the literature and deemed an accepted measure of depression. It adequately correlates with other valid self-report depression scales to provide concurrent validity. Finally, it is sensitive to change since the test–retest changes have been found before and after treatment, as well as before and after a stressful life event [20].

The 4th section of the questionnaire involves the MARS-5 questionnaire which asks respondents to rate the frequency of performing each of five behavioral aspects of non-compliance, on a five-point scale from 1 to 5 (1=Always, 2=often, 3=sometimes, 4=seldom, 5=never). The total score is calculated by the sum of questions and values range from 5 to 25. Score below 20 represents low compliance, while score in the interval resents partial compliance. MARS-5 was shown to have good reliability and validity in diabetic patients. MARS-5 performed well on several psychometric indicators, showing good internal consistency in diabetic patients. The MARS-5 indicates reasons for poor adherence, which might assist the selection of appropriate interventions, tailored to address the specific reasons for nonadherence. MARS-5 is effective at identifying whether patients are at risk of nonadherence and can also be used to assess adherence reports over the course of the treatment. MARS-5 shows promise as a self report tool for measuring patients' reports of their use of medication across a range of illnesses [21].

Data analysis was performed in IBM SPSS 24, while coding in the Microsoft Office Excel 2016. Nominal variables were represented using frequencies and percentages, while Likert questions and scale variables with mean and standard deviation (M ± SD). Significance was set at 5%. In order to test correlation between variables that are not normally distributed, spearman correlation was used. Normality was checked with Shapiro Wilk test. Mean differences between 2 independents large (n≥30) samples were tested using independent samples t-test. Mean differences between 3 or more independents large (n≥30) samples were tested using ANOVA. In cases that significant differences were spotted, post hoc analysis Bonferonni was used to identify which samples have different mean values. Kruskal Wallis test was used to check the distribution of 3 or more samples that are not normally distributed [22].

Researcher observed all the necessary ethical issues that refer to the nature of research and to the psychology of participants. The ethical issues involved in the research fully meet the requirements of the BPS Code of Conduct. In particular

→ Participants were informed about the research aims of the survey

→ Before completing the questionnaires, participants were invited to participate in the survey, completing the specific consent form from.

→ The voluntary role of the participant was highlighted, as well as the anonymity and the need for responsible participation and the honesty and validity of his answers.

→ Participants were informed from the beginning that they can withdraw from the process within 48 hours. If this happens, they were informed that the data they have given will be

destroyed.

→ Participants were informed that if they wish they could be informed about the result of the research.

→ Researcher gave his personal details to participants, in case they want to communicate.

Results

Table 1 represents the qualitative demographic characteristics of participants of the current research. Concerning gender, the 54,6% (N=101) were females, while 45,4% (N=84) were males. With regard to marital status, 80,5% (N=149) were married, 8,6% (N=16) single, 5,9% (N=11) widowers and 4,9% (N=9) divorced. In relation to the level of education, 58,9% (N=109) had studied in secondary school, 30,3% (N=56) had Bachelor degree, 5,9% (N=11) had studied in primary school, while 4,9% (N=9) had master degree. Regarding the place of residence, 68,6% (N=127) live in urban area, 22,7% (N=42) in rural and 8,6% (N=16) in semi-urban area. Also, 70,3% (N=130) are currently working, while 29,7% (N=55) are unemployed. Furthermore, 56,2% (N=104) have smoked in the past, 26,5% (N=49) smoke in the present, while 17,3% (N=32) have never smoked. Finally, 54,1% (N=100) are not drinking alcohol, whereas the rest 45,9% (N=85) of the sample are drinking.

Below, Table 2 and Graphs from 12 to 13 include questions that are related to the quality of life. According to the results, 59,5% (N=110) declared that their quality of life is good, 21,1% (N=39) neither good nor bad, 8,1% (N=15) bad, 7,6% (N=14) very good, 2,7% (N=5) very bad, 0,5% (N=0,5) extremely bad, while the same percentage 0,5% (N=0,5) had excellent quality of life. Additionally, 43,8% (N=81) answered that their quality of life would be a little better if they didn't have diabetes, 38,9% (N=72) much better, 10,8% (N=20) very much better, 5,9% (N=11) the same and 0,5% (N=1) worse.

Table 1: Demographic data.

Variable	Category	N	f%
Gender	Male	84	45,4
	Female	101	54,6
Marital status	Single	16	8,6
	Married	149	80,5
	Widower	11	5,9
	Divorced	9	4,9
Education	Primary	11	5,9
	Secondary	109	58,9
	Bachelor	56	30,3
	Master	9	4,9
Place of residence	Rural	42	22,7
	Urban	127	68,6
	Semi-Urban	16	8,6
Currently working	No	55	29,7
	Yes	130	70,3
Smoking	Never	32	17,3
	Past	104	56,2
	Present	49	26,5
Alcohol	No	100	54,1
	Yes	85	45,9

In Table 3, the results about depression scale are represented. Participants declared how often they have felt or behaved in the following ways, during the past week through a scale from 0 to 3 [(0=Rarely or never (less than 1 day), 1=Some or a little of the time (1-2 days), 2=Occasionally or a moderate amount of time (3-4 days), 3=Most or all of the time (5-7 days)].

Participants felt occasionally or a moderate amount of time (3-4 days), that everything they did was an effort (M=1,94±0,82), the feeling of fearfulness (M=1,85±0,84), that they could not get "going" (M=1,83±0,87), bothered by things that usually don't bother them (M=1,81±0,75), depressed (M=1,76±0,84) and that they could not shake off the blues even with help from their family or friends (M=1,76±0,85). Equally, they answered that occasionally or a moderate amount of time (3-4 days), their sleep was restless (M=1,74±0,80), they felt sad (M=1,70±0,87), lonely (M=1,62±0,87) and they enjoyed life (M=1,61±0,83).

Table 2: Quality of life.

Variable	Category	N	f%
In general, my present quality of life is	Excellent	1	0,5
	Very good	14	7,6
	Good	110	59,5
	Neither good nor bad	39	21,1
	Bad	15	8,1
	Very bad	5	2,7
	Extremely bad	1	0,5
If I did not have diabetes, my quality of life would be	Very much better	20	10,8
	Much better	72	38,9
	A little better	81	43,8
	The same	11	5,9
	Worse	1	0,5

N: Frequency. f%: Valid percent %

Table 3: Depression Scale.

Variable	M	SD
I felt that everything I did was an effort	1,94	0,82
I feltfearful	1,85	0,84
I could not get "going"	1,83	0,87
I was bothered by things that usually don't bother me	1,81	0,75
I feltdepressed	1,76	0,84
I felt that I could not shake off the blues even with help from my family or friends	1,76	0,85
Mysleepwasrestless	1,74	0,80
I feltsad	1,70	0,87
I feltlonely	1,62	0,87
I enjoyedlife	1,61	0,83
I washappy	1,60	0,82
I had trouble keeping my mind on what I was doing	1,58	0,82
I felt hopeful about the future	1,51	0,82
I felt I was just as good as other people	1,47	0,86
I hadcryingspells	1,38	0,99
I felt that people dislike me	1,37	0,88
I did not feel like eating; my appetite was poor	1,36	0,93
I talked less than usual	1,35	0,93
Peoplewereunfriendly	1,29	0,86
I thought my life had been a failure	1,23	1,02

Table 4: MARS, (1-5, 1=Always, 5=Never)

Variable	M	SD
I take less medicines than instructed	3,91	1,01
I stop my medicine for a while	3,64	0,97
I alter the dose of my medicine	3,50	0,94
I miss out on a dose of the medicine	3,47	0,79
I forget to take my medicines	3,38	0,81

Table 5: Depression-CES.

Statistic	Value
M	31,37
95% lower bound	30,00
95% upper bound	32,74
SD	9,45
Minimum	0,00
Maximum	57,00
% of clinical depression (≥16)	91,9%

Table 6: Factors of QoL.

Factors	Minimum	Maximum	M	SD	95% Lower	95% upper
AWI	-9,00	2,32	-3,21	1,78	-3,47	-2,96
Present QoL	-3	3	0,61	0,90	0,48	0,74
Hypothetic QoL	-3	1	-1,54	0,79	-1,65	-1,42

Table 7: Spearman correlations between Depression-CES and Factors of QoL.

Factors of QoL	Depression-CES
AWI	0,132
Present QoL	-,221**
Hypothetic QoL	-,241**

**p<0,01

Table 8: Spearman correlations between MARS-Compliance and Factors of QoL.

Factors of QoL	MARS-Compliance
AWI	-,352**
Present QoL	-0,022
Hypothetic QoL	-0,040

**p<0,01

Besides, their answers were placed between the scales "some or a little of the time (1-2 days)" and "occasionally or a moderate amount of time (3-4 days)", as for how often they felt happy (M=1,60 ± 0,82), had trouble keeping their mind on what they were doing (M=1,58 ± 0,82), felt hopeful about the future (M=1,51 ± 0,82) and felt they were just as good as other people (M=1,47 ± 0,86).

Further, they answered that some or a little of the time (1-2 days), had crying spells (M=1,38 ± 0,99), felt that people dislike them (M=1,37 ± 0,88), did not feel like eating; their appetite was poor (M=1,36 ± 0,93), talked less than usual (M=1,35 ± 0,93), people were unfriendly (M=1,29 ± 0,86) and thought their life had been a failure (M=1,23 ± 1,02).

In the last chapter of the current survey, participants answered in the following questions, that are related to the frequency that they do the following actions, through 5 scales (1=Always, 2=Often, 3=Sometimes, 4=Seldom, 5=Never).

Table 4 showed that participants seldom take less medicines than instructed (M=3,91 ± 1,01), as well as seldom stop their medicine for a while (M=3,64 ± 0,97). In addition, their responses were placed between the scales "sometimes" and "seldom", in respect to the frequency that they alter the dose of their medicine (M=3,50 ± 0,94), and miss out on a dose of the medicine (M=3,47 ± 0,79). In conclusion, they forget to take their medicines sometimes (M=3,38 ± 0,81).

Research hypothesis

H1: A person with type 2 diabetes presents with symptoms of depression.

Table 5 represents results for "Depression-CES factor". Mean value is 31,37 ± 9,45, with 95% confidence interval to be (30,00, 32,74), minimum value 0,00 and maximum 57,00. Values equal or greater than 16 indicate clinical depression. Percentage of participants that represent clinical depression is 91,9% (N=170). The 1st research Hypothesis is confirmed.

H2: A person with type 2 diabetes has a poor quality of life.

Table 6 represents results for factors of QoL. Concerning "AWI", mean value is -3,21 ± 1,78, with 95% confidence interval to be (-3,47, -2,96), minimum value -9 and maximum 2,32, indicating moderate quality of life. Regarding "Present QoL" mean value is 0,61 ± 0,90, with 95% confidence interval to be (0,48, 0,74), minimum value -3 and maximum 3, indicating moderate to good quality of life. As far as "Hypothetic QoL" is concerned mean value is -1,54 ± 0,79, with 95% confidence interval to be (-1,65, 1,42), minimum value -3 and maximum 1, indicating that if participants did not have diabetes would be little or much better. Generally, quality of life could be considered as moderate, so the 2nd Research hypothesis is not confirmed.

H3: Low quality of life is associated with the appearance of depressive symptoms

Table 7 represents results of spearman correlations between "Depression-CES" factor and factors of QoL, where there was a statistically significant negative correlation with "Present QoL" (r=-0,221, p<0,01) and "Hypothetic QoL", (r=-0,241, p<0,001), confirming the 3rd research hypothesis as far as present quality of life is concerned.

H4: Low quality of life has a negative impact on compliance with antidiabetic treatment.

Table 8 represents results of spearman correlations between "MARS-Compliance" factor and factors of QoL, where there was a statistically significant negative correlation with "AWI" (r=-0,352, p<0,01). Results do not confirm the 4th research hypothesis. Participants that feel high negative impact of diabetes indicate higher levels of compliance with antidiabetic treatment.

H5: The presence of depressive symptoms adversely affects compliance with antidiabetic treatment.

Table 9 represents results of spearman correlations between

Table 9: Spearman correlations between Depression-CES and Factors of QoL.

Variable	MARS-Compliance
Depression-CES	-,354**

**p<0,01

"MARS-Compliance" factor and "Depression-CES", where there was a statistically significant negative correlation (r=-0,354, p<0,01) confirming the 5th research hypothesis.

Discussion

In current search participated 185 diabetes type 2 patients, almost equally distributed concerning gender, with mean age 56 years, height 170 cm, weight 82 Kg and 7 years patients. The majority of participants are married people, with secondary level of education, who live in urban area and are currently working. Most of sample were ex or present smokers, while half of them drink alcohol.

Patient compliance was ranked in low levels. They sometimes or seldom alter the dose of their medicine and miss out on a dose of the medicine. However, participants stated that seldom take less medicines than instructed, as well as seldom stop their medicine for a while.

The 1st research hypothesis of research was confirmed. Patients with type 2 diabetes presented symptoms of depression. In particular, participants felt occasionally or a moderate amount of time (3-4 days), that everything they did was an effort, fearfulness, that they could not get "going", bothered by things that usually don't bother them, depressed and that they could not shake off the blues even with help from their family or friends. Equally, they answered that occasionally or a moderate amount of time (3-4 days), their sleep was restless, felt sad and lonely.

According to the meta-analysis of Anderson et al [23], severe depression was noticed in 14,7% of diabetics and depressive symptoms in 26%, of his sample. Although, in our sample there were more people who had mild or moderate depression. The same, another epidemiological study of 90686 participants found that depression was more prevalent in people with diabetes, regardless of the fact that they had diagnosed or undiagnosed diabetes [24].

The 2nd research hypothesis of research was not confirmed. Participants with type 2 diabetes did not represent a poor quality of life. The majority of participants stated that the present quality of life is moderate to good.

Zioga et al, [25] had found low living standards for diabetics in Greece, and the findings of this study are also consistent with many previous studies conducted in diabetic patients in other countries, which show that in general this population group is likely to report lower levels of quality of life related to physical and mental health, compared to the general population [26]. Also, other recent data indicated a higher prevalence of depression in a Brazilian population with diabetes and a consequent reduction in its quality of life, most notably in physical functioning and physical role, this study evaluated subjects aged between 40–60 years [27]. Finally, in research by Malliarou et al [28], in which life quality of DM patients was studied, it was suggested that these people's life quality was of a lower standard compared to the general population. Regarding results of our research, quality of life levels seems to be higher.

However, most of participants referred that if they did not have diabetes, their quality of life would be a little or much better. Participants claimed that if they did not have diabetes their physical appearance would be a little better, as well as the people's reaction, leisure activities, sex life, financial situation, personal relationship, friendship & social life. Besides, they mentioned that a little or much better would be their life if they did not have diabetes, regarding their working life, their motivation, physical health, dependence on others, freedom to drink, living conditions, self-confidence, journeys, family life, feelings about future and holidays. Lastly, they claimed that their freedom to eat would be much better, if they didn't suffer from the disease of diabetes 2. Importance of quality of life was mentioned by the patients of current research.

The 3rd research hypothesis was confirmed. Low quality of life was associated higher appearance of depressive symptoms. In addition, patients with higher levels of depression stated that their life would be much better if they did not have diabetes.

Low quality of life is associated with depressive symptoms, not only in diabetes, but also in geriatric patients and patients with COPD, showing that depression is strongly associated with the perceived quality of life of the patient [29]. In addition, another study shows that higher levels of depressive symptoms are associated with an impaired quality of life in individuals with diabetes. Diabetes specific quality of life is severely lower among individuals with diabetes and depressive symptoms [30].

The 4th research hypothesis was not confirmed. Low quality of life did not have a negative impact on compliance with antidiabetic treatment. Participants that feel higher the negative impact of diabetes, indicated higher levels of compliance with antidiabetic treatment. However, previous research has shown that adherence to antidiabetic treatment is associated with increased quality levels of life [31,32]. A possible explain for this difference in our research is the fear that patients with serious negative impact of the disease would feel, which leads to them to higher compliance.

The 5th research hypothesis was confirmed. The presence of depressive symptoms affected negatively the compliance with antidiabetic treatment. Participants with higher levels of depression, presented lower compliance with antidiabetic treatment. As it has been stated, patients' emotional state greatly affects antidiabetic therapy. Also, lifestyle issues (diet, exercise) are greatly affected by the onset of depressive symptoms [4]. Also, another meta-analysis shows a significant association between depression and treatment nonadherence in patients with diabetes. Treatment nonadherence may represent an important pathway between depression and worse diabetes clinical outcomes [33].

Current search can be generalized for 7 years patients of diabetes 2, with mean age 56 years old, height 170 cm, weight 82 Kg. The majority of patients were married people, with secondary level of education, who live in urban area, are currently working and are ex or present smokers. In addition, in some cases, non-parametric tests were accomplished, because of small size of the comparing samples. New search is recommended with larger sample, where its size would be calculated by the size of the population of diabetes 2 patients in Greece [14].

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