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ORIGINAL RESEARCH

The Impact of Anxiety and Depression Symptoms on Cardiovascular Risk Factor Control in Patients Without a History of Atherosclerotic Cardiovascular Disease

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Background: Anxiety and depression by affecting lifestyle interfere with preventive actions aimed at eliminating or reducing modifiable risk factors for cardiovascular diseases (CVD).

Purpose: The objective of the study was to assess the impact of anxiety and depression on the achievement of therapeutic goals regarding CVD risk factors in patients without a history of atherosclerotic CVD.

Patients and Methods: The study included 200 patients (median age 52.0 [IQR 43.0–60.5] years). Control of the basic risk factors was assessed: blood pressure, BMI, waist circumference, physical activity, smoking status, LDL cholesterol, triglycerides, and blood glucose. The data analysis included a comparison of the number of controlled risk factors and the percentage of subjects who achieved the therapeutic goal for each of the cardiovascular risk factors. The risk of CVD was assessed with SCORE2 and SCORE2-OP. Anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS). On both subscales (HADS Anxiety and HADS Depression), subjects could achieve normal, borderline, and abnormal scores.

Results: The median number of controlled CVD risk factors was 4.0 (IQR 3.0–5.0), and the median CVD risk assessed with SCORE2 and SCORE2-OP was 3.0% (IQR 1.5–7.0%). Median scores for HADS Anxiety were 3.0 (IQR 2.0–6.0) and for HADS Depression 3.0 (1.0–5.0). Patients with symptoms of anxiety and depression had significantly fewer controlled risk factors (HADS Anxiety p=0.0014; HADS Depression p=0.0304). Among subjects with anxiety and depression, there was a significantly lower percentage of those with a normal waist circumference (HADS Anxiety p=0.0464; HADS Depression p=0.0200) and regular physical activity (HADS Anxiety p=0.0431; HADS Depression p=0.0055). Among subjects with anxiety, there was a significantly lower percentage of those with a normal BMI (p=0.0218) and normal triglyceride concentrations (p=0.0278).

Conclusion: The presence of anxiety and depression may affect the control of CVD risk factors in individuals without a history of atherosclerotic CVD. Assessment of anxiety and depression symptoms should be part of a comprehensive examination of patients with high CVD risk.

Keywords: anxiety, depression, cardiovascular diseases, risk factors

Introduction

The classic risk factors for cardiovascular disease (CVD) are mainly related to lifestyle. New research suggests that psychological factors, especially anxiety and depression, are also risk factors for CVD.[1–3] Anxiety and depression are among the major mental health disorders in the general population.[4,5] Depression is associated with a poorer prognosis and

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increased healthcare costs in patients with CVD. On average, one in five patients with coronary artery disease or heart failure suffers from depression, and the incidence of depression is at least three times higher than in the general population.[6–8]

Health behaviors that are risk factors for CVD, including a sedentary lifestyle, inappropriate eating habits, nicotinism, and increased alcohol consumption are common in people with symptoms of anxiety and depression.[9] Depression may reduce the motivation and engagement of patients to undertake health-promoting behaviors and take their medication while increasing the likelihood of unhealthy behaviors.[10–13] The European Society of Cardiology (ESC) guidelines on CVD prevention pay particular attention to the anxiety and depression in the context of primary prevention.[14] The implementation of these recommendations allows for early mental health interventions as part of the comprehensive management of CVD risk factors in the early stages preceding cardiovascular events.[5,15–20] In line with these recommendations, we designed a cross-sectional study aimed at assessing the relationship between the occurrence of anxiety and depression symptoms and the fulfillment of therapeutic goals regarding basic cardiovascular risk factors in the group of primary care patients without a history of atherosclerotic cardiovascular disease (ASCVD).

Materials and Methods

This study is part of a broader cross-sectional research project on CVD risk factors in the Polish population characterized by high risk of CVD.[20–22]

Characteristics of the Study Group and Organization of the Study

The study included 200 patients without symptomatic ASCVD, aged 18 to 80 years (median age 52.0 [IQR 43.0–60.5] years) who had been diagnosed 6 to 24 months before study enrolment with at least one of the following conditions: hypertension (ICD10: I10), diabetes (ICD10: E11), or hypercholesterolemia (ICD10: E78), defined according to the ESC guidelines.[23–25] Specific inclusion criteria encompassed the inclusion of subjects who began pharmacological treatment for hypertension and/or lipid disorders and/or type 2 diabetes within 6 to 24 months. Exclusion criteria included treatment for any other chronic disease, lack of patient consent, or impossibility of giving informed consent. In patients with diabetes (n=38) CV risk assessment was not performed due to the lack of complete data required for assessment with the use of SCORE2-Diabetes, an algorithm specifically dedicated to this group.[26] The characteristics of the study group are presented in Table 1.

Table 1 Characteristics of the Study Group

Parameter		Entire population (n=200)		Non-diabetic population (n=162)	
		n	%	n	%
Age	Median (IQR)	52 (43.0–60.5)		51 (41.0–59.0)	
Gender	Male	67	33.5	54	33.3
	Female	137	66.5	108	66.7
Arterial hypertension	Diagnosed	127	63.5	111	68.5
Diabetes mellitus	Diagnosed	38	19.0	0	0
Hypercholesterolemia	Diagnosed	90	45.0	76	46.9
Active smoking status	Declared	30	15.0	24	14.8
Systolic blood pressure	≥140mmHg	39	19.5	29	17.9
Diastolic blood pressure	≥90mmHg	21	10.5	16	9.9
Systolic / diastolic blood pressure	≥140 mmHg and/or ≥90 mmHg	45	22.5	33	20.4

(*Continued*)

Table 1 (Continued).

Parameter		Entire population (n=200)		Non-diabetic population (n=162)	
		n	%	n	%
BMI[a]	Underweight (<20.0 kg/m^2)	11	5.5	11	6.8
	Correct weight (20.0–24.9 kg/m^2)	72	36.0	62	38.3
	Overweight (25.0–29.9 kg/m^2)	84	42.0	68	42.2
	Obesity (≥30 kg/m^2)	33	16.5	21	13.0
Waist circumference	Normal fat distribution (F<80 cm, M<94 cm)	74	37.0	61	37.7
	Moderate central fat accumulation (F≥80 cm, M≥94 cm)	57	28.5	48	29.6
	High central fat accumulation (F≥88 cm, M≥102 cm)	69	34.5	53	32.7
Physical activity	No activity	30	15.0	23	14.2
	Low activity	110	55.0	88	54.3
	Regular activity	60	30.0	51	31.5
Serum LDL-C[b] concentration	≥100 mg/dl	154	77.0	126	77.8
Serum TG[c] concentration	≥150 mg/dl	37	18.5	25	15.5
Fasting plasma glucose	≥100 mg/dl	83	41.5	58	35.8
Number of controlled CV[d] risk factors	0	2	1.0	1	0.6
	1	5	2.5	3	1.9
	2	15	7.5	11	6.8
	3	43	21.5	33	20.4
	4	52	26.0	40	24.7
	5	35	17.5	32	19.8
	6	32	16.0	27	16.7
	7	10	5.0	9	5.6
	8	6	3.0	6	3.7
SCORE2 and SCORE2-OP	Low and Moderate	NA[e]	NA[e]	96	59.3
	High	NA[e]	NA[e]	41	25.3
	Very high	NA[e]	NA[e]	25	15.4
HADS Anxiety	Normal	161	80.5	134	82.7
	Borderline	26	13.0	18	11.1
	Abnormal	13	6.5	10	6.2
HADS Depression	Normal	181	90.5	150	92.6
	Borderline	13	6.5	9	5.6
	Abnormal	6	3.0	3	1.9

Abbreviations: [a]BMI, body mass index; [b]LDL, low-density lipoprotein cholesterol; [c]TG, triglycerides; [d]CV, cardiovascular; [e]NA, not applicable.

The first stage of patient recruitment involved the analysis of medical digital records in four primary care facilities[27,28] in three cities between spring 2018 and autumn 2019. Patients meeting the inclusion criteria were identified. The next stage of the study was to invite patients for an individual visit at the study site. Each of the study participants gave their informed consent to participate in the study, in accordance with the principles of Good Clinical Practice and the requirements of the Declaration of Helsinki. The study was approved by the Ethics Committee of Nicolaus Copernicus University in Toruń, Collegium Medicum in Bydgoszcz (study approval reference number KB 586/2017).

The study visit included: measurement of arterial blood pressure, assessment of body mass index (BMI), waist circumference, physical activity history, smoking status, blood sampling for total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), triglycerides (TG), and fasting plasma glucose, as well as anxiety and depression symptom assessment with the use of Hospital Anxiety and Depression Scale (HADS).

Each patient had their arterial blood pressure measured twice in a semi-sitting position using semi-automatic sphygmomanometers. Classification and diagnosis of arterial hypertension were based on the current criteria of the European Society of Cardiology.[29]

The history of smoking status was verified by assessing the concentration of carbon monoxide in exhaled air with Bedfont Scientific Micro+ Smokerlyzer monitor. A result of >10 ppm was considered indicative of active smoking.

Biochemical blood tests included in the study protocol were performed on fasting venous blood using the Alinity ci-series analyzer (Abbott, Wiesbaden, Germany).

Physical activity was assessed based on patients' declarations using the question: "Which of the following terms best describes your non-professional activity?" with 4 possible answers: [1] "I do not engage in any physical activity other than professional work"; [2] "Most of the time only light physical activity"; [3] "Intense physical activity at least 20 minutes 1–2 times a week"; [4] "20 minutes of intense physical activity more often than twice a week". Responses 3 and 4 were considered to be the appropriate level of physical activity.

The following criteria were adopted for risk factor control (the risk factor defined as controlled):

1. Systolic blood pressure <140 mmHg and diastolic blood pressure <90 mmHg;
2. BMI 20.0–24.9 kg/m^2; however, patients with BMI <20.0 kg/m^2 were not included in the analysis of uncontrolled risk factors with regards to BMI (11 patients);
3. Waist circumference <80 cm for women and <94 cm for men;
4. Regular physical activity - intense physical activity for 20 minutes or more at least 1–2 times a week;
5. No smoking status - The declared status of a non-smoker was objectively confirmed by a concentration of carbon monoxide in exhaled air ≤10 ppm;
6. LDL-C <100 mg/dl (<2.6 mmol/l);
7. TG <150 mg/dl (<1.7 mmol/l);
8. Fasting glucose: <100 mg/dl (<5.6 mmol/l).

The number of controlled risk factors, as well as the percentage of subjects whose CVD risk factors were within the therapeutic target range were assessed.

CVD risk was assessed for all patients using Systematic Coronary Risk Evaluation 2 (SCORE2) and Systematic Coronary Risk Evaluation 2 - Older Persons (SCORE2-OP) algorithms, according to the guidelines of the European Society of Cardiology.[30,31] The risk assessment was adjusted for Poland as a high-risk country based on the SCORE2 and SCORE2-OP risk regions.[30,31] Cardiovascular risk was expressed as a percentage and then defined as low or moderate, high, and very high based on ESC guidelines.

Symptoms of anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS). The HADS is a standardized and validated tool commonly used to assess symptoms of anxiety and depression.[32,33] It consists of 14 questions, with 7 questions assessing symptoms of anxiety (HADS Anxiety) and 7 questions assessing symptoms of depression (HADS Depression). On each of the subscales, the subject can score from 0 to 21 points, with a higher score indicating stronger symptoms of anxiety and depression. For each of the subscales, three score ranges were set to

define a normal score (≤7 points), a borderline score indicating moderate symptoms (8 to 10 points), and an abnormal score indicating significant symptoms of anxiety and depression (≥11 points).[34]

Statistical Analysis

The statistical analysis was carried out using the Statistica 13.0 package (TIBCO Software Inc, California, USA). Continuous variables were presented as means with standard deviations and/or medians with interquartile range. The Shapiro–Wilk test demonstrated a non-normal distribution of the investigated continuous variables. Therefore non-parametric Kruskal–Wallis one-way analysis of variance was used for comparisons between groups. Categorical variables were expressed as the number and the percentage and were compared using the $\chi 2$ test. Results were considered significant at $p<0.05$.

Results

The median number of controlled CVD risk factors was 4.0 (IQR 3.0–5.0), and the median CVD risk assessed with SCORE2 and SCORE2-OP was 3.0% (IQR 1.5–7.0%). Median scores indicating symptoms of anxiety and depression as measured by HADS were 3.0 (IQR 2.0–6.0) for HADS Anxiety and 3.0 (1.0–5.0) for HADS Depression.

The Results of the HADS Anxiety subscale were not observed to differentiate the results in terms of studied parameters (Table 2). On the other hand, subjects with an abnormal score in HADS Depression subscale were

Table 2 Comparison of the Studied Parameters Depending on the Level of the HADS Anxiety Subscale Scores

Parameter	HADS Anxiety						
	Normal		Borderline		Abnormal		p
	Mean (±SD)	Median (IQR)	Mean (±SD)	Median (IQR)	Mean (±SD)	Median (IQR)	
Age (years)	50.7 (±14.1)	52.0 (41.0–60.0)	57.4 (±10.8)	57.0 (52.0–73.0)	50.0 (43.0–58.0)	50.5 (±10.7)	0.0579
SBP[a](mmHg)	127.3 (±13.9)	125.0 (120.0–134.0)	127.7 (±14.5)	126.0 (116.0–140.0)	125.0 (115.0–126.0)	125.7 (±21.0)	0.6977
DBP[b] (mmHg)	76.4 (±9.2)	76.0 (70.0–82.0)	77.9 (±7.7)	80.0 (70.0–85.0)	74.0 (65.0–85.0)	74.8 (±13.1)	0.4339
WC[c] (cm)	87.5 (±11.8)	87.0 (80.0–94.0)	88.3 (±10.3)	84.0 (82.0–98.0)	90.0 (88.0–108.0)	93.6 (±18.6)	0.3001
BW[d] (kg)	76.1 (±14.0)	75.0 (65–85.1)	71.7 (±15.2)	68.6 (60.0–85.1)	75.0 (68.0–102.0)	80.2 (±21.8)	0.3965
BMI[e] (kg/m^2)	26.3 (±3.9)	25.09 (23.9–28.7)	25.9 (±3.8)	16.1 (24.0–27.8)	28.4 (25.0–33.1)	28.3 (±5.7)	0.2061
TC[f] (mg/dl)	219.2 (±43.5)	215.2 (189.5–246.1)	207.6 (±37.5)	205.8 (186.0–249.6)	220.7 (211.6–227.3)	215.2 (±21.9)	0.4032
LDL-C[g] (mg/dl)	130.2 (±39.1)	127.7 (103.5–155.8)	125.2 (±37)	121.4 (104.1–174.9)	130.4 (98.4–139.8)	122.9 (±27.6)	0.7842
TG[h] (mg/dl)	119.4 (±73.2)	105.0 (79.7–134.6)	131.9 (±67.6)	106.2 (91.2–125.9)	119.2 (82.2–163.7)	119.9 (±55.2)	0.6780
FGC[i] (mg/dl)	101 (±20.5)	97.6 (90.8–106.3)	100.2 (±18.2)	99.7 (95.0–104.2)	96.3 (90.1–100.1)	96 (±12.7)	0.6844

Abbreviations: [a]SBP, systolic blood pressure; [b]DBP, diastolic blood pressure; [c]WC, waist circumference; [d]BWm, body weight; [e]BMI, body mass index; [f]TC, total cholesterol; [g]LDL-C, low-density lipoprotein cholesterol; [h]TG, triglycerides; [i]FGC, fasting glucose concentration.

significantly older (p=0.0450) and had significantly larger waist circumference (p=0.0105), body weight (p=0.0381), and BMI (p=0.0328) (Table 3).

The highest risk of CVD assessed with the use of SCORE2 and SCORE2-OP was found in subjects with symptoms of anxiety and depression at a borderline level for both HADS Anxiety (p=0.0072) and HADS Depression (p=0.0177). In turn, patients with symptoms of anxiety and depression (borderline and abnormal levels) in both HADS subscales (HADS Anxiety p=0.0014; HADS Depression p=0.0304) had significantly fewer controlled risk factors (Table 4).

Analyzing the percentages of subjects achieving control of individual risk factors, it was found that among subjects with symptoms of anxiety and depression, there was a significantly lower percentage of those with a normal waist circumference (HADS Anxiety p=0.0464; HADS Depression p=0.0200) and regular physical activity (HADS Anxiety p=0.0431; HADS Depression p=0.0055). In addition, among subjects with anxiety, there was a significantly lower percentage of those with a normal BMI (p=0.0218) and normal triglyceride concentrations (p=0.0278) (Figure 1).

Discussion

Depression is one of the best-documented psychosocial factors of poorer prognosis and reduced quality of life of patients with CVD.[10,35] The assessment of psychosocial status is considered a necessary element to be observed during the overall diagnosis of the patient.[14,22,36] Conditions associated with depression such as disengagement, social isolation,

Table 3 Comparison of the Studied Parameters Depending on the Level of the HADS Depression Subscale Scores

Parameter	HADS Depression						
	Normal		Borderline		Abnormal		p
	Mean (±SD)	Median (IQR)	Mean (±SD)	Median (IQR)	Mean (±SD)	Median (IQR)	
Age (years)	50.8 (±13.5)	52.0 (42.0–60.0)	59.4 (±14.1)	57.0 (52.0–73.0)	59.2 (±8.5)	59.5 (50.0–64.0)	0.0450[j]
SBP[a](mmHg)	126.9 (±13.8)	125.0 (118.0–135.0)	127.3 (±17.2)	127.0 (116.0–140.0)	137 (±25.24)	125.0 (120.0–150.0)	0.8025
DBP[b] (mmHg)	76.3 (±9.1)	76.0 (70.0–82.0)	77.6 (±12.4)	78.0 (70.0–85.0)	81.7 (±8.96)	80.0 (78.0–85.0)	0.4433
WC[c] (cm)	87.3 (±11.9)	86.0 (80.0–94.0)	90.5 (±10.2)	86.0 (82.0–98.0)	104.8 (±13.95)	105.0 (90.0–113.0)	0.0105[j]
BW[d] (kg)	75.6 (±14.5)	74.0 (65.0–85.0)	71.4 (±16.3)	69.0 (60.0–85.1)	89.7 (±13.31)	93.5 (77.0–102.0)	0.0381[j]
BMI[e] (kg/m^2)	26.3 (±4.0)	25.9 (23.9–28.7)	25.8 (±4.8)	26.0 (24.0–27.8)	30.4 (±3.23)	29.2 (28.1–34.0)	0.0328[j]
TC[f] (mg/dl)	218.4 (±42.1)	215.2 (192.4–242.1)	213.4 (±43.2)	215.7 (18.6–249.6)	195.9 (±24.07)	200.9 (178.6–216.2)	0.3467
LDL-C[g] (mg/dl)	129.8 (±38)	127.5 (104.9–155.0)	130.1 (±43.3)	120.4 (104.1–174.9)	106.4 (±26.44)	101.7 (84.1–121.0)	0.2494
TG[h](mg/dl)	121.1 (±74.1)	101.9 (78.2–137.6)	121 (±33.4)	123.3 (91.2–125.9)	119.2 (±45.22)	118.7 (85.0–141.6)	0.4931
FGC[i] (mg/dl)	99.9 (±18.3)	97.0 (90.7–106.3)	107.2 (±32.2)	99.3 (95.0–104.2)	107.1 (±27.33)	99.9 (90.1–126.9)	0.6756

Notes: [j]p<0.05.

Abbreviations: [a]SBP, systolic blood pressure; [b]DBP, diastolic blood pressure; [c]WC, waist circumference; [d]BW, body weight; [e]BMI, body mass index; [f]TC, total cholesterol; [g]LDL-C, low-density lipoprotein cholesterol; [h]TG, triglycerides; [i]FGC, fasting glucose concentration.

Table 4 Total CVD Risk Assessed with the SCORE2 and SCORE2-OP Algorithms and the Number of Adequality Controlled CV Risk Factors According to the Level of Anxiety and Depression Symptoms by the HADS Scale

HADS subscale	HADS level	N	SCORE2 and SCORE2-OP			Number of Controlled Risk Factors		
			Mean (±SD) [%]	Median (IQR) [%]	p	Mean (±SD)	Median (IQR)	p
Anxiety	Normal	134	5.99 (± 6.99)	3.0 (1.5–6.5)	0.0072[a]	4.47 (±1.59)	4 (3–6)	0.0014[a]
	Borderline	18	8.97 (±7.34)	6 (3.5–17)		3.38 (±1.5)	3 (3–4)	
	Abnormal	10	3.05 (±2.83)	1.75 (1–4)		3.77 (±1.42)	4 (3–5)	
Depression	Normal	150	5.41 (±6.43)	3 (1.5–6.5)	0.0177[a]	4.37 (±1.63)	4 (3–6)	0.0304[a]
	Borderline	9	12.90 (±11.70)	8.5 (5.5–17.0)		3.38 (±1.19)	3 (3–4)	
	Abnormal	3	4.17 (±0.29)	4.0 (4.0–4.5)		3.67 (±0.82)	3.5 (3–4)	

Notes: [a]p<0.05.

lack of emotional support, and concomitance of fear and anxiety associated with the onset of the disease contribute to neglect in all aspects of life, including a decrease or loss of interest in previously enjoyable activities.[37–40] The American Heart Association highlights the impact of mental health and well-being on the occurrence and prognosis of patients with CVD. Attention is drawn to the link between chronic stress, anger, anxiety, depression, pessimism, and an increased risk of CVD.[41] Depression itself is associated with increased mortality after MI.[42] In one meta-analysis, depression was shown to be associated with both cardiovascular and all-cause mortality in patients after myocardial infarction.[43] Similar results were also obtained in a meta-analysis focusing on patients with coronary artery disease.[43]

To the best of our knowledge, the presented assessment of the relationship between the severity of depression and anxiety symptoms and the risk of CVD is the first such study in individuals without symptomatic ASCVD.

Particularly noteworthy is the greater severity of anxiety and depression symptoms going together with poorer control of risk factors. This appears to be supported by reports by some authors suggesting that anxiety and depression may be associated with a lower quality of life and less commitment towards the care for health.[10,35,38–40] Depression may decrease the motivation and engagement of cardiac patients to undertake health-promoting behaviors such as caring for diet, physical activity, and taking medication[11] and at the same time increase the likelihood of unhealthy behaviors.[10] It is worth noting that a higher risk of CVD as measured by SCORE2 and SCORE2-OP was found in subjects with symptoms of anxiety and depression in both HADS subscales. In turn, patients with symptoms of anxiety and depression had significantly fewer effectively controlled risk factors.

In addition, more severe symptoms of depression in people of older age, with larger waist circumference, body weight, and BMI strongly suggest a causal relationship between these risk factors in individuals without clinically evident ASCVD. Such a two-way relationship with respect to modifiable risk factors was previously observed in people with confirmed CVD.[44–46] For many years now, we have seen the aging of the population and an increase in the incidence of chronic diseases, including cardiovascular diseases and mental disorders. Geriatric patients with diagnosed depressive disorders have a higher risk of CVD, and at the same time, CVD may be associated with a higher risk of depression.[44–46] Our results complement these observations in the group of people without clinically evident ASCVD.

Clinically important is the frequent co-occurrence of classic CVD risk factors with obesity.[47–50] In addition, in our analysis, people with higher severity of anxiety and depression were less likely to achieve the therapeutic goal regarding physical activity. As Sin et al[51] show, depression and anxiety are associated with lower adherence to pharmacotherapy and difficulties in maintaining healthy behaviors and self-control. Dietary care and the resulting opportunities to reduce eg lipid levels (including

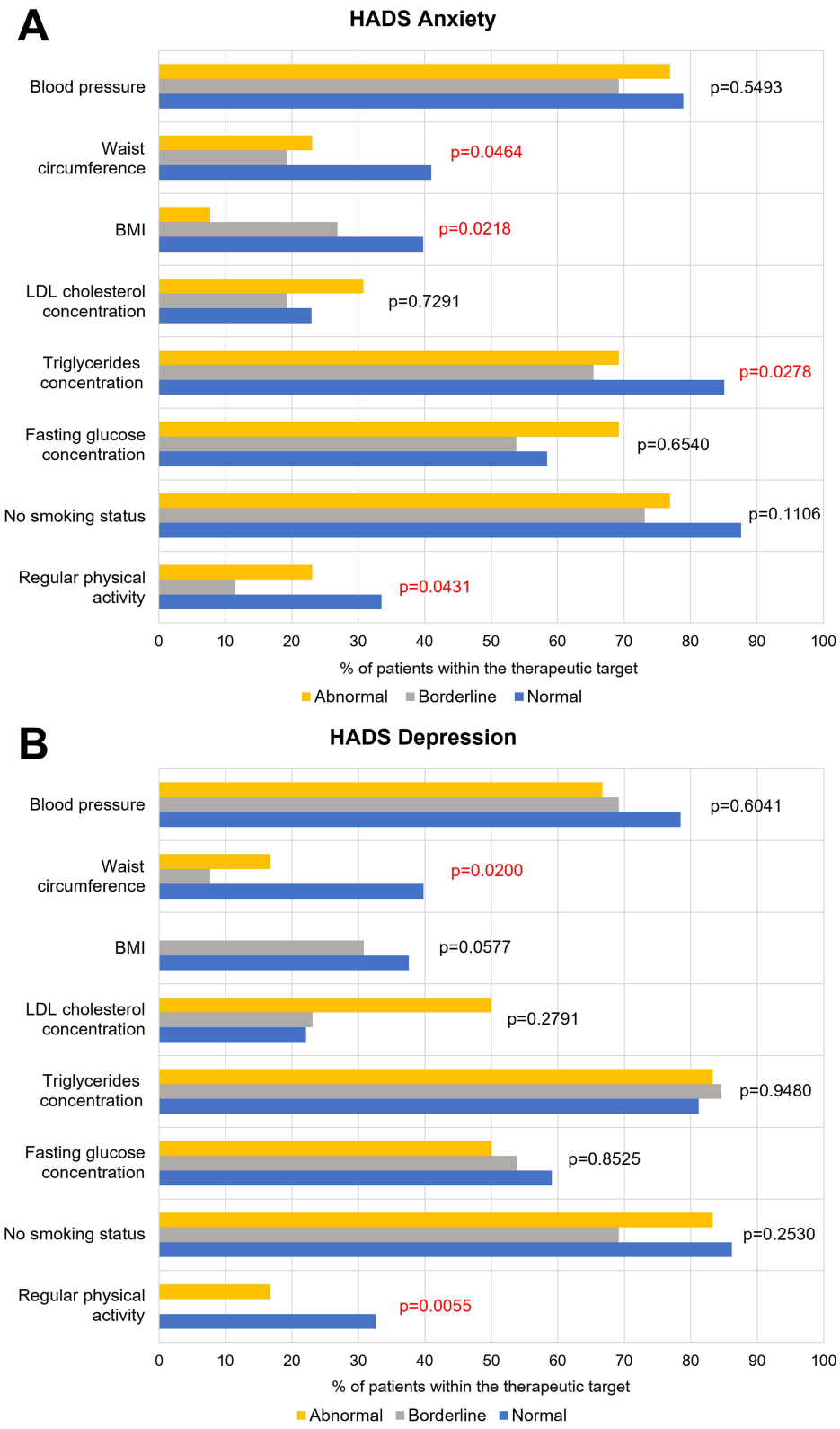

Figure 1 The percentage of patients within the therapeutic target in terms of studied CV risk factors according to the level of anxiety (**A**) and depression (**B**) symptoms by Hads scale.

triglycerides shown to be statistically significant in our analysis) are one of the basic components of adherence assessment, apart from the assessment of completeness of pharmacotherapy, physical activity, and self-control.[52–54]

The INTERHEART and INTERSTROKE studies have shown that 9 and 10 risk factors, respectively, account for more than 90% of the incidence of heart attack and stroke. Effective control of these risk factors (lowering blood pressure and glucose levels to correct values, implementation of lipid-lowering therapy) has been demonstrated to reduce subsequent morbidity and mortality.[55] Identification of risk factors and actions to achieve therapeutic goals in primary prevention are key to reducing the incidence of CVD. It appears that the assessment of anxiety and depression symptoms should complement a comprehensive risk assessment also in people without clinically evident CVD.

Given the practical implications of our study, to help people at increased risk of CVD, we suggest a comprehensive approach involving psychological and health interventions. Behavioral therapy, psychological support, and programs promoting a healthy lifestyle can improve risk factor control.[5–7] Health education, altering eating habits, and increasing physical activity are key elements to improving health.[9,12–14,24]

Limitations of the study include a relatively small number of included patients and a lack of long-term follow-up. An important limitation of the study is also the adopted imprecise definitions of physical activity. Another limitation of the study is the wide age range of participants. The influence of age on the incidence of CVD risk factors is obvious. Older patients tend to have a higher risk of CVD and a higher incidence of depression and anxiety symptoms. In elderly people, depression and anxiety often co-exist with other chronic diseases, making it more difficult to control CVD risk factors.[1,3,8] Younger people, on the other hand, may experience other stressors, such as work and social pressure, which also affect mental and physical health.[2,4]

The lack of complete data to perform the SCORE2-Diabetes algorithm in diabetic patients is another limitation of the study. One of the limitations of this study is the absence of instrumental screening for asymptomatic CVD. Therefore our patients, even if asymptomatic, could present atherosclerotic lesions.[56] However, it should be noted that the objective of the study was not to diagnose atherosclerotic disease in patients without CVD symptoms.

Conclusion

The presence of anxiety and depression may affect the achievement of therapeutic goals in terms of controlling the basic CVD risk factors in individuals without a history of atherosclerotic CVD. Therefore, assessment of anxiety and depression symptoms should be part of a comprehensive examination not only of patients with CVD but also those with high CVD risk.

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Disclosure

The authors report no conflicts of interest in this work.

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