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ABSTRACT

Objective: this study aimed to evaluate the relationship between adherence to the Mediterranean diet, quality of life, anthropometric measurements, and biochemical parameters in patients with coronary artery disease (CAD).

Methods: a total of 316 adults (≥ 19-91 years-old), 139 (44 %) female and 177 (56 %) male, participated in the study. Three groups were created: the group with normal coronary arteries, the low-medium risk group with 1-69 % stenosis in coronary arteries, and the high-risk group with ≥ 70 % stenosis. In the study, anthropometric and some biochemical parameters were examined. The

"Mediterranean Diet Adherence Screener (MEDAS)" and the "Quality of Life Questionnaire (SF-36)" were used.

Results: the maximum mean age of the participants was 61.72 ± 11.03 years in the high CAD risk group, the prevalence of obesity was 58.6% in the low-medium CAD risk group.

In the group with normal arteries, MEDAS ($p_1 < 0.05$, $p2 < 0.05$) and SF-36 scores (physical function, pain, vitality sub-dimensions) were found to be higher ($p_1 < 0.05$). A significant correlation was found between MEDAS and total cholesterol (r = -0.235, p = 0.013), LDL cholesterol (r = 0.212, p = 0.025), social function (r = -0.273, p = 0.006), general health (r = -0.223, p = 0.023), and mental health (r = -0.120, p = 0.033) parameters, but not with other parameters ($p >$ 0.05).

Conclusions: disseminating Mediterranean diet as a health policy may be effective in both reducing CAD risk and improving quality of life.

Keywords: Coronary artery disease. Mediterranean diet. Quality of life. Mental health. Obesity.

RESUMEN

Objetivo: el objetivo de este estudio evaluar la adherencia a la dieta mediterránea, la calidad de vida, las mediciones antropométricas y algunos parámetros bioquímicos en pacientes con enfermedad arterial coronaria (EAC).

Métodos: en el estudio se incluyeron un total de 316 personas adultas (≥ 19-91 años), de las cuales 139 (44 %) eran mujeres y 177 (56 %) hombres. Se establecieron tres grupos: el grupo con arterias coronarias normales, el grupo de bajo-moderado riesgo con un estrechamiento del 1-69 % en sus arterias coronarias y el grupo de alto riesgo con un estrechamiento ≥ 70 %. En la investigación se examinaron parámetros antropométricos y algunos parámetros

bioquímicos, además de utilizarse la “Escala de Adherencia a la Dieta Mediterránea (EADM)” y la “Escala de Calidad de Vida (SF-36)”.

Resultados: la edad promedio más alta se observó en el grupo de alto riesgo de enfermedad arterial coronaria (EAC), con 61,72 ± 11,03 años; la prevalencia de la obesidad en el grupo de riesgo bajo-moderado de EAC fue del 58,6 %. En el grupo con arterias normales se encontraron valores elevados de EADM ($p_1 < 0,05$, $p_2 < 0,05$) y de puntuación SF-36 (en las dimensiones de función física, dolor y vitalidad) ($p_1 < 0,05$). Se encontró una correlación significativa entre la EADM y el colesterol total ($r = -0,235$, $p = 0,013$) y el colesterol LDL ($r = 0,212$, $p = 0,025$), la función social ($r = -0,273$, $p = 0,006$), la salud general ($r = -0,223$, $p = 0,023$) y la salud mental ($r = -0,120$, $p = 0,033$), mientras que no se hallaron correlaciones significativas con otros parámetros ($p > 0,05$).

Conclusiones: la promoción de la dieta mediterránea como una política de salud podría contribuir a la reducción del riesgo de EAC y, además, mejorar la calidad de vida.

Palabras clave: Enfermedad arterial coronaria. Dieta mediterránea. Calidad de vida. Salud mental. Obesidad.

INTRODUCTION

CAD is the most common type of cardiovascular diseases and occurs due to the partial or complete interruption of myocardial blood flow with the narrowing or occlusion of the coronary arteries feeding the myocardium (1).

The Mediterranean diet (MED) is described globally as a continuous dietary pattern that promotes cardioprotective mechanisms and reduces risk factors associated with atherosclerosis and cardiovascular disease (CVD) (2). MED is a dietary model with a rich variety of nutrients, characterized by a high intake of vegetables and

fruits, whole grains, legumes, oilseeds, and extra virgin olive oil; a moderate intake of fatty milk and dairy products, egg, fish, and moderate wine; and a low intake of red meat, saturated fat, and sugary products. The protective effects of MED against CVD are associated with the positive effects of nutrients and nutrient components such as omega 3 (*n*-3), omega 9 (*n*-9) fatty acids, dietary fiber, vitamins, minerals, polyphenols, and phytochemicals, etc., found in the foods MED is characterized with, on biological mechanisms (3).

These nutrients and components are thought to have positive effects on vascular functions thanks to their potential anti-obesity, anti-hypertensive, anti-dyslipidemic, antioxidant, and anti-inflammatory effects (4). It is also known that MED improves lipid profiles by reducing LDL-cholesterol levels and increasing HDL-cholesterol levels, prevents atherosclerosis, and has multifaceted effects on blood pressure, endothelial function, inflammation markers, and insulin sensitivity (5).

The main purpose of CAD treatment is to maximize the quality of life and reduce morbidity and mortality rates with lifestyle changes (6).

Although there are several studies showing the benefits of MED on CVD, this is one of the first studies to examine the relationship between adherence to MED, quality of life, anthropometric measurements, and biochemical parameters in patients with coronary artery disease in the Turkish Republic of Northern Cyprus (TRNC), a Mediterranean island. In this context, our study provides important data that may contribute to the development of regional health policies.

MATERIAL AND METHODS

Study population and design

This cross-sectional study was conducted in the cardiology department of TRNC “Dr. Burhan Nalbantoğlu State Hospital” between

October 2021 and May 2022. A total of 16 adults (≥ 19-91 years old), 139 (44 %) female and 177 (56 %) male, selected using a simple random sampling method, were included in this study.

The sample size of this study was determined by power analysis. Using G*Power 3.1.9.2, the effect size was determined as 0.55 by referencing studies showing clinically significant change (7,8) and the sample size required for 85 % power (1-β) was calculated as 300 people. Assuming that 10 % of the identified participants would not be able to participate in the study or would withdraw from the study at later stages, the total number of participants was determined as 330 and the study was completed with a total of 316 participants.

All individuals, regardless of age, who were volunteers and open to communication, were included in the study. Patients with mental disabilities or any psychiatric disorder, pregnant or breastfeeding women, and patients with pacemakers were excluded from the study.

Coronary angiography (CAG)

CAG is the method used in the diagnosis of CAD patients in order to anatomically evaluate the location, severity, and shape of stenosis in the coronary artery (9).

In the study, the coronary angiograms obtained were evaluated by interventional cardiologists and as a result of the evaluation, the participants were divided into groups according to the classical CAD classification (10).

Coronary angiography was performed on:

1) The group with no stenosis in coronary arteries and no CAD diagnosis (n = 100, 31.65 %),
2) Low-medium CAD risk group with 1-69 % stenosis in coronary arteries (n = 104, 32.91 %),
3) High-risk CAD risk group with severe stenosis of ≥ 70 % and above in coronary arteries (n = 112, 35.44 %).

Data collection

The researcher applied a questionnaire form to the participants using the “face-to-face interview” method. In the questionnaire form, demographic information (age, gender, educational level, smoking status, family history of CAD, physical activity levels), anthropometric measurements, some biochemical parameters, blood pressures were questioned, and the Mediterranean Diet Adherence Screener (MEDAS) and the “Quality of Life Questionnaire (SF-36) were used.

Anthropometric measurements, body composition, biochemical results, and blood pressure

The participants' body weight (kg) was measured using a portable “Tanita® BC 730” body analysis device, and anthropometric measurements such as waist circumference, hip circumference, and neck circumference were measured with a non-flexible tape measure by the researcher before angiography in accordance with WHO techniques (11).

Body mass index (BMI) was calculated with the formula (kg/m^2) = Body weight (kg) / Height (m^2) and was defined according to the WHO’s BMI classification (12).

The biochemical parameters used in the study and routinely requested by the physician before angiography [(total cholesterol (Total-C), triglyceride (TG), low-density lipoprotein-cholesterol (LDL-C), high-density lipoprotein-cholesterol (HDL-C), and C-reactive protein (CRP)] were recorded retrospectively from the hospital records.

The systolic (SBP) and diastolic (DBP) blood pressures were measured by the nurse and notes were taken from the patient's hand files.

Mediterranean Diet Adherence Screener (MEDAS)

The participants' adherence to MED was assessed with a screener consisting of 14 questions, whose Turkish validity and reliability study was conducted by Pehlivanoğlu et al. (13).

Each question was scored 1 or 0 according to the amount of consumption, and the total score was calculated. A total score of < 7

is categorized as no adherence, 7-9 as acceptable adherence, and 9 and above as strict adherence. Those with higher scores were considered to be eating more in line with the Mediterranean diet.

Quality of Life Scale — 36-Item Short Form (SF-36)

In order to evaluate the quality of life of the participants, the SF-36 scale, the Turkish validity and reliability study of which was conducted by Koçyiğit et al. (14), was used. The Cronbach alpha internal consistency coefficient of SF-36 was 0.92, and the test-retest and test reliability coefficients ranged between 0.73 and 0.90.

The last four weeks of the participants were taken as basis in the evaluation of the scale. The SF-36 questionnaire contains 36 items consisting of eight multiple items: physical function, physical role restriction, bodily pain, general health, vitality, social function, emotional role restriction, and mental health. The first four items are evaluated as the physical component summary (PCS) and the last four items are evaluated as the mental component summary (MCS).

The scale is scored out of 100 points, and the scores for each component range from 0 to 100. High scores on the scale indicate better health functioning, while low scores indicate deterioration in health (14).

Statistical analysis

The IBM Statistical Package for Social Sciences (SPSS) 27.0 software was used for statistical evaluation of data. The frequency analysis was applied to the distribution of the socio-demographic characteristics of the participants. The “chi-square” test was used to compare categorical variables according to the groups. The “Kolmogorov-Smirnov” test was used to examine whether the data set was normally distributed for the participants’ results of anthropometric measurements, biochemical findings, quality of life, and adherence to the Mediterranean diet. Square root and logarithmic transformation were used to convert nonparametric data to parametric data, and

then the “one-way ANOVA” test was used to compare multiple groups, and the “Pearson” test was used for correlation analyses. The correlation coefficient was classified as “weak” between 0.10 and 0.39, “moderate level” between 0.40 and 0.69, “strong level” between 0.70 and 0.89, and “very strong” between 0.90 and 1.00 (15). The results were evaluated at a 95 % confidence interval and the probability of error was taken as $p < 0.05$).

RESULTS

The mean age was found to be (51.34 ± 11.96) years in the group without CAD diagnosis, (59.65 ± 12.51) in the low-medium, and (61.72 ± 11.03) in the high CAD risk groups and the mean age of the group without CAD diagnosis was found to be significantly lower compared to the other groups ($p < 0.05$) (data not shown).

SBP values were found to be (116.56 ± 14.97 mmHg) in the group without CAD diagnosis, (122.29 ± 17.32 mmHg) in the low-medium, and (126.32 ± 18.79 mmHg) in the high CAD risk groups. While the SBP values were found to be significantly higher in the high CAD risk group ($p < 0.05$), there was no significant difference between the groups in terms of the DBP values ($p > 0.05$) (data not shown).

The results of the Chi-square analysis performed to compare the participants' gender, age groups, educational status, BMI categories, family history of CAD, smoking status, and physical activity levels by groups are given in table I.

It was found that 79.5 % of the patients in the high CAD risk group were male, 54.4 % were 61 years of age and above, which was higher than other groups ($p_2 < 0.05$, $p_3 < 0.005$).

It was found that 36.6% of the patients in the high CAD risk group were primary school graduates, which was significantly lower than the other groups ($p_2 < 0.05$, $p_3 < 0.05$).

It was found that 31% of the group without CAD diagnosis, 58.6 % of the low-medium and 50.9 % of the high CAD risk groups were obese,

and BMI values in the group without CAD diagnosis were lower than in the other groups ($p_1 < 0.05$, $p_2 < 0.05$).

It was found that 41 % of the group without CAD diagnosis had a family history of CAD, which was lower than the other groups ($p_1 < 0.05$, $p_2 < 0.05$).

It was found that 78.7 % of the patients in the high CAD risk group were smokers, which was significantly higher than the other groups ($p_2 < 0.05$, $p_3 < 0.005$).

On the other hand, it was found that there were no statistically significant differences between the physical activity levels of the participants by their groups ($p_1 > 0.05$, $p_2 > 0.05$, $p_3 > 0.05$) (Table I).

The results of one-way ANOVA analysis comparing BMI and anthropometric measurements of the participants by the groups are given in table II.

While body weight, waist circumference, waist-hip ratio, waist-height ratio, and neck circumference measurements were lower in the group without CAD diagnosis compared to the other groups ($p_1 < 0.05$, $p_2 < 0.05$), no significant difference was found between the low-medium and high CAD risk groups ($p_3 > 0.05$). It was determined that there were no significant differences between the groups in terms of hip circumference measurement results ($p_1 > 0.05$, $p_2 > 0.05$, $p_3 > 0.05$).

While BMI values were found to be lower in the group without CAD diagnosis compared to the low-medium CAD risk group ($p_1 < 0.05$), no significant difference was found between the other groups and the high CAD risk group ($p_2 > 0.05$, $p_3 > 0.05$) (Table II).

The results of one-way ANOVA analysis comparing biochemical parameters of the participants by the groups are given in table III.

It was found that there were no significant differences between the groups in terms of Total-C and LDL-C values ($p_1 > 0.05$, $p_2 > 0.05$, $p_3 > 0.05$).

While CRP values were found to be significantly lower in the group without CAD diagnosis compared to the low-medium CAD risk group

($p_1 < 0.05$), no significant differences were found between the other groups and the high CAD risk group ($p_2 > 0.05$, $p_3 > 0.05$) (Table III).

The results of the chi-square analysis comparing the MEDAS scores of the participants by the groups are given in table IV.

While no significant difference was found between the group without CAD diagnosis and the low-medium CAD risk group in terms of total MEDAS score results ($p_1 > 0.05$), the group without CAD diagnosis (8.23 ± 1.67) and the low-medium CAD risk group (7.90 ± 1.77) had significantly higher total MEDAS scores compared to the high CAD risk group (6.82 ± 1.87) ($p_2 < 0.05$, $p_3 < 0.05$) (data not shown).

Those who showed high adherence to MEDAS were listed as 52 % in the group without CAD diagnosis, 34.6 % in the low-medium, and 22.3 % in the high CAD risk groups, respectively.

The MEDAS scores were found to be higher in the group without CAD diagnosis than in the other groups ($p_1 < 0.05$, $p_2 < 0.05$), while they were found to be higher in the low-medium CAD risk group than in the high CAD risk group ($p_3 < 0.05$) (Table IV).

The results of the One-Way ANOVA analysis performed to compare the SF-36 questionnaire results of the participants by the groups are given in table V.

While no significant difference was found in terms of physical function sub-dimension between the group without CAD diagnosis and the low-medium CAD risk group ($p_1 > 0.05$), it was found to be significantly higher in the other groups compared to the high CAD risk group ($p_2 < 0.05$, $p_3 < 0.05$).

It was found that there were no significant differences between the groups in terms of physical role restriction, general health, social function, emotional role restriction, and mental health sub-dimensions ($p_1 > 0.05$, $p_2 > 0.05$, $p_3 > 0.05$).

While the pain and vitality sub-dimensions were found to be significantly higher in the group without CAD diagnosis compared to the other groups ($p_1 > 0.05$, $p_2 > 0.05$), no significant differences

were found between the low-medium and high CAD risk groups ($p_3 > 0.05$) (Table V).

The Pearson test results conducted to determine the correlations between the MEDAS results and anthropometric measurements, biochemical findings, blood pressure, and quality of life results of the participants by their groups are given in table VI.

Negative low-level significant relationships ($p < 0.05$) were found between Total-C and LDL-C and the total MEDAS score in the high CAD risk group ($p < 0.05$).

Negative low-level significant relationships ($p < 0.05$) were found between social function and the total MEDAS score in the group without CAD diagnosis; positive low-level significant relationships ($p < 0.05$) were found between general health and the total MEDAS score in the low-medium CAD risk group; and positive low-level significant relationships ($p < 0.05$) were found between mental health and the total MEDAS score in the total number.

On the other hand, no significant relationships were found in all three groups and in the total number in terms of BMI, waist circumference, hip circumference, waist-hip ratio, waist-height ratio, neck circumference, SBP and DBP, HDL-C, TG, CRP, physical function, physical role restriction, pain, vitality, and emotional role restriction sub-dimensions ($p > 0.05$) (Table VI).

DISCUSSION

To prevent the development of CVD and reduce the risk of death, patients' exposure to risk factors should be reduced. However, some risk factors such as age, male gender, presence of family history of CAD cannot be changed (16).

In a study conducted on patients who underwent CAG, it was found that the mean age of individuals diagnosed with CAD was 59.9 ± 9.11 years, higher than that of individuals with normal coronary arteries,

and that individuals diagnosed with CAD were mostly in the 60-69 age group (17).

In our study, similar to the study conducted by Bektaş et al. (17), it was found that the mean age of those with the highest CAD risk was 61.72 ± 11.03 years, which was significantly higher than that of the normal group ($p < 0.05$), and that the individuals in the high CAD risk group (54.4 %) were 61 years of age or older. This finding can be explained by the fact that the risk of CAD may increase with increasing age._

In the study conducted by Kyprianidou et al. (18), it was observed that one quarter of the adult population in Cyprus had CVD and that it was more common in men, and in the TRNC, deaths due to cardiovascular diseases were in the first place with 46.4 % and this rate was higher in men (19).

In this study, it was found that men were in a higher risk group for CAD and had a higher prevalence of CVD. This may be due to males being more exposed to environmental or lifestyle factors (20). They may contribute to gender differences in the prevalence of CVD because they interact with proteins and genes involved in CVD pathogenesis (21).

MED is effective in reducing the risk of hypertension (HT) because it contains rich nutrients (22). In this study, SBP values (116.56 ± 14.97 mmHg) were found lower in the group without CAD diagnosis ($p < 0.05$). This was found to be consistent with the DIMERICA study in Spain, where the prevalence of HT was lower ($p = 0.009$) in participants with good adherence to MED (≥ 7) (23). The fact that the individuals in the group without CAD diagnosis had high adherence to MED is associated with a lower prevalence of HT and thus a reduced cardiovascular risk.

In their study, Trudel et al. (24) found that low educational level was associated with higher aortic stiffness. In this study, it was found that those in the high CAD risk group (36.6 %) were primary school graduates ($p < 0.05$). In this case, it was found that those in the high

CAD risk group had a higher CVD prevalence than those with higher educational levels. Moreover, this inverse relationship between educational level and CVD prevalence was also found to be consistent with the studies conducted in Northeastern Spain (25) and Cyprus (18).

A family history of CAD not only increases the risk of disease but also increases the severity of the disease (26). In a study examining cardiovascular risk factors, family history of CVD was found in 91.4 % of individuals (16). In the INTEHEART study, only 12 % of the control group reported a history of myocardial infarction in their parents (27). In this study, the presence of CAD was found in the family of those in the high CAD risk group (59.8 %) ($p < 0.05$). This may be due to the role that genetic factors play in disease risk and severity in high-risk individuals.

Smoking is the main changeable risk factor for CAD and has many adverse effects on the cardiovascular system, including endothelial dysfunction in coronary circulation (28). Studies (17,18) found that smoking was more common in the CAD group compared to the normal group. Additionally, smoking was also found to be higher in individuals with CVD.

The results of this study are consistent with the results of other studies, and smoking was more common in the high CAD risk group ($n = 112$, 78.7 %) ($p < 0.05$). This may be due to socioeconomic differences, lifestyle factors, lower educational level, cardio-metabolic diseases, smoking habits (29) and reduced quality of life of participants at high risk of CAD.

Obese individuals have an increased risk of developing CVD as a result of the increase and dysfunction of adipose tissue (30). In a study (31), it was determined that individuals with CVD had significantly higher BMI ($p < 0.01$), and overweight and obese individuals had a higher prevalence of CVD ($p < 0.01$).

In this study, it was found that the individuals in the low-medium CAD risk group (58.6 %) were obese and had the highest mean BMI (30.02

± 4.88 kg/m²). This suggests that obese individuals are characterized by higher BMI and, consequently, a higher prevalence of CVD.

Studies found that android type obesity was more significant in the development of CVD risk (32,33). It was reported that BMI was related to waist circumference and waist-hip ratio in the assessment of CAD risk status (34,35). Moreover, it was reported that MED represented good nutritional therapy for various parameters such as reducing body fat mass, BMI, waist circumference, waist-hip ratio, and CVD risk indices (36-38).

In this study, anthropometric measurements such as body weight, waist circumference, waist-hip ratio, waist-height ratio, and neck circumference were found to be significantly lower in the group without CAD diagnosis compared to the other groups ($p1 < 0.05$, $p2 < 0.05$).

In this study, it was found that the individuals in the group without CAD had a higher adherence to MED, and it is thought that high adherence to MED may positively affect the sustainability of anthropometric measurements within normal values.

Diet continues to be a focus for cardiovascular health studies. It is thought that one in five premature deaths worldwide could be prevented with an optimal, balanced diet (39).

In their study, Cangemi et al. (40) examined the adherence levels of their patients to MED according to their coronary angiographic features, but they did not find a significant difference. In this study, the mean MEDAS values differed between the groups and were found to be higher in the group without CAD diagnosis (8.23 ± 1.67) and the low-medium CAD risk group (7.90 ± 1.77), respectively ($p_2 < 0.05$, $p_3 < 0.05$). This situation can be interpreted as the severity of the disease decreases as the level of adherence of individuals to MED increases, and as the severity of the disease decreases, the level of adherence to MED increases.

It was found that for every 2-point increase in MED adherence score, there was a 10 % decrease in CVD events and CVD risks are lower in

societies following a MED-compliant diet in countries where MED is common (41,42).

In a study conducted on the Cyprus population (18), AD scores were found to be low and far from the traditional AD model. In this study, the fact that the group without CAD diagnosis showed higher adherence to MEDAS (52 %) compared to the other groups ($p_1 < 0.05$, $p_2 < 0.05$) suggested that they were closer to the traditional MED model and thus had a low level of mortality and CVD risk.

Atherogenic dyslipidemia, which is associated with an increased risk of CVD, is characterized by high TG and low HDL-C concentrations and normal plasma LDL-C values, emphasizing the importance of these parameters in the etiopathology of CVD (43). A number of studies showed that TG, T-Chol, and LDL-Chol were positively associated with the risk of CAD, while HDL-Chol was inversely associated with the risk of CAD (44,45).

In this study, no significant difference was found between the groups in terms of T-Chol and LDL-Chol values ($p1 > 0.05$, $p2 > 0.05$, $p3 > 0.05$). In this study, TG values (126.81 ± 75.47 mg/dL) were found to be lower in the group without CAD diagnosis ($p_1 < 0.05$, $p_2 < 0.05$), while HDL-Chol (45.62 ± 14.36 mg/dL) was found to be lower in the high CAD group ($p_2 < 0.05$, $p_3 < 0.05$). This inverse relationship is consistent with the studies (44,45), and the differences in blood lipid levels among risk groups and the low adherence of individuals with high CVD risk to MED suggest that it does not positively affect cardiometabolic health.

A relationship between CRP and the risk of future cardiovascular morbidity and mortality was reported in individuals at high risk or with documented CAD (46). In one study, serum CRP levels were found to increase in CAD patients compared to the control group (45). In this study, it was seen that the CRP values (0.52 ± 1.17 mg/dL) were significantly lower in the group without CAD diagnosis compared to the low-medium CAD risk group ($p_1 < 0.05$). While no signs of acute inflammation were observed in the group without CAD diagnosis, this

may be due to the fact that CRP is an important biomarker of cardiovascular events in CAD patients.

It is emphasized that CVD negatively affects individuals' quality of life in many ways and that these effects increase in parallel with the severity of the disease (47), and that the quality of life of patients who undergo coronary angiography is low (48).

In this study, the physical function sub-dimension score was found to be significant in the group without CAD diagnosis and the low-medium CAD risk group ($p_2 < 0.05$, $p_3 < 0.05$). This can be interpreted as individuals having no restrictions on all their physical activities as the severity of their disease decreased. Moreover, the pain and mental vitality sub-dimension scores were found to be significant in the group without CAD diagnosis compared to the other groups ($p_1 < 0.05$, $p_2 < 0.05$). This can be evaluated as a constant feeling of liveliness and energy, with no pain or pain-related limitations, thanks to an increase in the quality of life.

In studies examining the relationship between MED and CAD severity, in addition to the healing effects of adherence to MED on disease severity, its positive effects on quality-of-life levels, anthropometric measurements, and biochemical parameters are mentioned (49,50). In a study, body weight and anthropometric measurements showed a statistically negative relationship with MED compliance groups (51).

In this study, no significant relationships were found between BMI and anthropometric measurements and MED in all three groups and in total ($p > 0.05$), while significant relationships were found between some biochemical parameters and AD ($p < 0.05$).

In a study emphasizing the importance of the Mediterranean diet and exercise in CVD, a significant decrease in TG, a significant increase in HDL, and positive effects on T-Chol and LDL-Chol variables were observed (52).

In this study, it was found that as the adherence to MED score increased in the high CAD risk group, T-Chol ($r = -0.235$, $p = 0.013$) and LDL-Chol ($r = -0.212$, $p = 0.025$) values decreased. This result

shows that MED provides improvement in biochemical parameters and can be used as an effective nutritional strategy to reduce the risk of CAD.

In one study, the participants' adherence to MED was found to be positively correlated with PCS (all sub-scales) and many MCS (except emotional role, social health sub-scales) ($p < 0.05$) (53). In another study, a significant relationship was observed between high compliance with the MED model and MCS (vitality, social functioning, and emotional role), and improvements in pain, general health, and physical functioning scores were also observed (54).

In this study, a positive correlation was found between the total MEDAS score and the PCS-general health sub-dimension ($r = -0.223$, $p = 0.023$) in the group with low-medium CAD risk and the MCS-mental health sub-dimension ($r = -0.120$, $p = 0.033$) ($p < 0.05$) in the total score, while a negative correlation was found with the social function sub-dimension in the group without CAD diagnosis ($p < 0.05$).

This may be related to the fact that the group without CAD increased their adherence to MED while compromising on social activities. Further studies are needed to prove the long-term effectiveness of this nutritional model on the quality of life and social life of coronary artery patients.

CONCLUSIONS

In line with these results, our study showed that adherence to MED in participants with CAD can improve general health and mental health, and that Mediterranean diet interventions can have positive effects not only on biochemical parameters but also on the quality of life. Therefore, promoting MED may be an effective public health intervention to reduce the prevalence of CAD in Mediterranean countries.

Further long-term research is needed to understand the specific mechanisms underlying the protective effects of MED and to better

assess the role of group differences. Furthermore, encouraging the adoption of MED may be an effective strategy to globally alleviate the burden of CVD.

Limitations

The data obtained from the results of this study are limited to volunteer patients who underwent angiography in the hospital where the study was conducted. It does not reflect the whole of TRNC and therefore cannot be generalized.

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Table I. Comparison of gender, age group, educational status, BMI categories, family history of CAD, smoking, and physical activity status of participants according to risk groups

	No Diagnosis of CAD (*n* = 100)		**Low-Medium Risk of CAD (*n* = 104)**		**High Risk of CAD (*n* = 112)**		**Total (*n* = 316)**		***p*₁**	***p*₂**	***p*₃**
	n	**%**	***n***	**%**	***n***	**%**	***n***	**%**			
Gender											
Female	67	67.0	49	47.1	23	20.5	139	44.0	*0.005**	*0.001**	*0.001**
Male	33	33.0	55	52.9	89	79.5	177	56.0			
Age group											
19-40	18	18.0	8	7.7	6	5.4	32	10.1	*0.001**	*0.001**	0.511
41-60	59	59.0	47	45.2	45	40.2	151	47.8			
61+	23	23.0	49	47.1	61	54.4	133	42.1			
Educational status											
Illiterate	1	1.0	0	0	2	1.8	3	0.9	*0.012**	*0.038**	0.367
Primary school	22	22.0	37	35.6	41	36.6	100	31.6			
Secondary school	13	13.0	27	26.0	22	19.6	62	19.6			
High school	34	34.0	26	25.0	30	26.8	90	28.5			
University	30	30.0	14	13.4	17	15.2	61	19.4			
BMI categories											
Underweight (< 18.5)	0	0	1	1.0	0	0	1	0.3	*0.001**	*0.012**	0.307
Normal (18.5-24.9)	33	33.0	16	15.4	17	15.2	66	20.9			
Overweight	36	36.	26	25.	3	33.	10	31.			

(25.0-29.9)		0		0	8	9	0	6			
Obese (> 30)	31	31.0	61	58.6	57	50.9	149	47.2			
Family history of CAD											
Yes	41	41.0	61	58.7	67	59.8	169	53.5	*0.001**	*0.001**	0.365
No	59	59.0	43	41.3	45	40.2	147	46.5			
Smoking status											
Smoker	34	34.0	56	53.8	83	78.7	173	54.8	*0.045**	*0.002**	0.277
Non-smoker	66	66.0	48	46.2	29	21.3	143	45.2			
Physical activity status											
Physically active	33	33.0	35	33.7	43	38.4	111	35.1	0.520	0.474	0.280
Not physically active	67	67.0	69	66.3	69	61.6	205	64.9			
Physical activity level											
< 150 minutes/week	20	60.6	17	48.6	21	48.8	58	52.3	0.464	0.358	0.551
> 150 minutes/week	13	39.4	18	51.4	22	51.2	53	47.7			

χ^2: chi-square analysis; *$p < 0.05$; *n*: frequency; %: percent; CAD: coronary artery disease; p_1: no diagnosis of CAD vs low-medium risk of CAD; p_2: no diagnosis of CAD vs high risk of CAD; p_3: low-medium risk of CAD vs high risk of CAD; BMI: body mass index.

Table II. Results of body compositions and anthropometric measurements of participants according to risk groups

Anthropometric measurements	**No Diagnosis of CAD (*n* = 100)**	**Low-Medium Risk of CAD (*n* = 104)**	**High Risk of CAD (*n* = 112)**				
	X̄ ± SD	**X̄ ± SD**	**X̄ ± SD**	**F**	***p₁***	***p₂***	***p₃***
Height (cm)	165.47 ± 7.60	165.65 ± 8.29	168.91 ± 7.33	6.776	0.985	*0.003**	*0.007**
Body weight (kg)	76.40 ± 14.90	82.38 ± 14.71	83.37 ± 14.94	6.635	*0.012**	*0.002**	0.876
BMI (kg/m²)	27.87 ± 5.26	30.02 ± 4.88	29.15 ± 4.49	5.032	*0.008**	0.145	0.357
Waist C (cm)	89.20 ± 12.38	96.88 ± 12.34	98.38 ± 11.84	16.900	*0.001**	*0.001**	0.631
Hip C (cm)	105.45 ± 9.52	108.48 ± 9.25	107.65 ± 8.17	3.099	0.058	0.174	0.766
Waist/Hip R (cm)	0.84 ± 0.08	0.89 ± 0.07	0.91 ± 0.08	20.885	*0.001**	*0.001**	0.114
Waist/Height R (cm)	0.54 ± 0.08	0.58 ± 0.07	0.8 ± 0.07	12.804	*0.001**	*0.001**	0.796
Neck C (cm)	36.58 ± 4.16	39.38 ± 3.58	40.18 ± 5.16	19.414	*0.001**	*0.001**	0.379

F: one-way ANOVA; *$p < 0.05$; CAD: coronary artery disease; p_1: no diagnosis of CAD vs low-medium risk of CAD; p_2: no diagnosis of CAD vs high risk of CAD; p_3: low-medium risk of CAD vs high risk of CAD; BMI: body mass index; Waist C: waist circumference; Hip C: hip circumference; Waist/Hip R: waist-to-hip ratio; Waist/Height R: waist-to-height ratio; Neck C: neck circumference.

Table III. Results of biochemical parameters of participants according to risk groups

Biochemical parameters	**No diagnosis of CAD (*n* = 100)**	**Low-medium Risk of CAD (*n* = 104)**	**High risk of CAD (*n* = 112)**				
	$\bar{X}$ ± SD	**$\bar{X}$ ± SD**	**$\bar{X}$ ± SD**	**F**	***p₁***	***p₂***	***p₃***
T-Col (mg/dL)	186.19 ± 49.91	197.68 ± 53.85	191.31 ± 46.70	1.346	0.256	0.722	0.625
HDL-Col (mg/dL)	52.73 ± 20.70	53.24 ± 22.61	45.62 ± 14.36	5.228	0.984	*0.013**	*0.011**
LDL-Col (mg/dL)	117.33 ± 39.40	130.18 ± 47.82	121.30 ± 45.43	2.254	0.093	0.774	0.344
TG (mg/dL)	126.81 ± 75.47	159.45 ± 80.28	180.86 ± 86.36	11.841	*0.009**	*0.001**	0.145
CRP (mg/L)	0.52 ± 1.17	1.51 ± 3.08	0.85 ± 1.44	6.026	*0.008**	0.159	0.121

F: one-way ANOVA; *$p < 0.05$; CAD: coronary artery disease; p_1: no diagnosis of CAD vs low-medium risk of CAD; p_2: no diagnosis of CAD vs high risk of CAD; p_3: low-medium risk of CAD vs high risk of CAD; T-Col: total cholesterol; LDL-C: low-density lipoprotein cholesterol; HDL-C: high-density lipoprotein cholesterol; TG: triglycerides; CRP: C-reactive protein.

Table IV. Results of the Mediterranean Diet Adherence Screener of participants according to risk groups

MEDAS	**No diagnosis of CAD (*n* = 100)**		**Low-medium risk of CAD (*n* = 104)**		**High risk of CAD (*n* = 112)**		**Total (*n* = 316)**		***p*₁**	***p*₂**	***p*₃**
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***			
Low adherence (< 7 points)	16	16.0	24	23.1	48	42.9	88	27.8	*0.021**	*0.001**	*0.007**
Medium adherence (7-9 points)	32	32.0	44	42.3	39	34.8	115	36.4			
High adherence (≥ 9 points)	**52**	**52.0**	**36**	**34.6**	**25**	**22.3**	**113**	**35.8**			

χ^2: chi-square analysis: **p* < 0.05; *n*: frequency; %: percent; CAD: coronary artery disease; p_1: no diagnosis of CAD vs low-medium risk of CAD; p_2: no diagnosis of CAD vs high risk of CAD; *p3*: low-medium risk of CAD vs high risk of CAD; MEDAS: Mediterranean Diet Adherence Screener.

Table V. Results of the SF-36 scores of participants according to risk groups

SF-36 Score	**No Diagnosis of CAD (*n* = 100)**	**Low-Medium Risk of CAD (*n* = 104)**	**High Risk of CAD (*n* = 112)**				
	$\bar{X}$ ± SD	**$\bar{X}$ ± SD**	**$\bar{X}$ ± SD**	**F**	***p1***	***p2***	***p3***
PCS							
Physical function	2.47 ± 0.47	2.40 ± 0.42	2.17 ± 0.59	10.898	0.494	*0.001**	*0.003**
Physical role restriction	1.54 ± 0.45	1.47 ± 0.47	1.41 ± 0.48	2.238	0.535	0.086	0.553
Pain	4.20 ± 1.35	3.71 ± 1.48	3.35 ± 1.52	9.080	*0.036**	*0.001**	0.186
General health	2.97 ± 0.35	2.99 ± 0.39	3.07 ± 0.51	1.883	0.886	0.170	0.370
MCS							
Vitality	3.42 ± 0.63	3.06 ± 0.71	3.21 ± 0.64	7.565	*0.001**	*0.038**	0.271
Social function	4.11 ± 1.00	4.30 ± 1.01	4.23 ± 0.98	0.881	0.398	0.666	0.878
Emotional role restriction	1.58 ± 0.47	1.45 ± 0.49	1.48 ± 0.49	2.060	0.127	0.277	0.893
Mental health	3.26 ± 0.56	3.13 ± 0.52	3.16 ± 0.49	1.893	0.175	0.316	0.899

F: one-way ANOVA; *$p < 0.05$; $\bar{X}$: mean: SD: standard deviation; CAD: coronary artery disease; p_1: no diagnosis of CAD vs low-medium risk of CAD; p_2: no diagnosis of CAD vs high risk of CAD; p_3: low-medium risk of CAD vs high risk of CAD; PCS: physical component summary; MCS: mental component summary.

Table VI. Correlations between the results of MEDAS and BMI, anthropometric measurements, biochemical parameters, blood pressure and SF-36 scores of participants according to risk groups

Parameters		**MEDAS total score**			
		No diagnosis of CAD (*n* = 100)	**Low-moderate risk of CAD (*n* = 104)**	**High risk of CAD (*n* = 112)**	**Total (*n* = 316)**
BMI (kg/m^2)	*r*	-0.042	-0.032	-0.112	-0.076
	p	0.676	0.748	0.241	0.178
Waist C. (cm)	*r*	0.032	0.016	-0.075	-0.091
	p	0.748	0.869	0.432	0.108
Hip C. (cm)	*r*	0.037	0.019	-0.033	-0.014
	p	0.713	0.844	0.730	0.806
Waist/Hip R. (cm)	*r*	-0.011	-0.007	0.001	-0.102
	p	0.912	0.942	0.996	0.069
Waist/Height R. (cm)	*r*	0.053	0.039	-0.062	-0.045
	p	0.599	0.691	0.519	0.430
Neck C. (cm)	*r*	-0.018	0.066	-0.045	-0.095
	p	0.859	0.507	0.639	0.091
SBP (mmHg)	*r*	0.143	0.048	-0.071	-0.047
	p	0.157	0.629	0.458	0.409
DBP (mmHg)	*r*	-0.032	-0.041	-0.076	-0.081
	p	0.753	0.683	0.426	0.149
T-Col (mg/dl)	*r*	0.005	-0.036	*-0.235*	-0.092
	p	0.957	0.714	*0.013 **	0.104
HDL-Col (mg/dl)	*r*	-0.169	0.130	-0.077	0.033
	p	0.093	0.189	0.420	0.562
LDL-Col (mg/dl)	*r*	0.080	0.079	*-0.212*	-0.029
	p	0.428	0.428	*0.025*	0.603

				*	
TG (mg/dl)	*r*	0.016	-0.017	-0.067	-0.104
	p	0.875	0.865	0.483	0.064
CRP (mg/dl)	*r*	-0.080	-0.005	-0.018	-0.020
	p	0.427	0.957	0.853	0.724
Physical function	*r*	-0.051	0.017	-0.103	0.033
	p	0.617	0.864	0.278	0.558
Physical role restriction	*r*	-0.050	0.032	-0.036	0.020
	p	0.621	0.748	0.704	0.720
Pain	*r*	-0.128	0.019	-0.079	0.015
	p	0.203	0.848	0.409	0.784
General health	*r*	-0.181	*0.223*	-0.184	-0.091
	p	0.071	*0.023**	0.052	0.107
Vitality	*r*	0.093	0.059	0.126	0.108
	p	0.359	0.555	0.186	0.056
Social function	*r*	*-0.273*	0.073	0.001	-0.063
	p	*0.006**	0.459	0.994	0.268
Emotional role restriction	*r*	-0.181	-0.084	-0.148	-0.109
	p	0.071	0.398	0.120	0.052
Mental health	*r*	0.119	0.143	0.069	*0.120*
	p	0.240	0.147	0.470	*0.033**

*$p < 0.05$; *r*: Pearson's correlation coefficient; CAD: coronary artery disease; p_1: no diagnosis of CAD vs low-moderate risk of CAD; p_2: no diagnosis of CAD vs high risk of CAD; p_3: low-moderate risk of CAD vs high risk of CAD; MEDAS: Mediterranean Diet Adherence Screener; BMI: body mass index; Waist C: Waist circumference; Hip C: Hip circumference; Waist/Hip R: Waist-to-hip ratio; Waist/Height R: waist-to-height ratio; Neck C: neck circumference; SBP: systolic blood pressure; DBP: diastolic blood pressure; T-Col: total cholesterol; LDL-C: Low-density lipoprotein-cholesterol; HDL-C: high-density lipoprotein-cholesterol; TG: triglycerides; CRP: C-reactive protein.