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Healthy Lifestyle Behaviors and Metabolic Control in Individuals with Myocardial Infarction

Miyokard İnfarktüsü Geçiren Bireylerde Sağlıklı Yaşam Biçimi Davranışları ve Metabolik Kontrol

ABSTRACT

Objective: The study aimed to determine the relationship between healthy lifestyle behaviors (HLB) and metabolic control in individuals with myocardial infarction (MI).

Methods: This descriptive and cross-sectional study collected data between January 2023 and June 2023 using a questionnaire. The questionnaire included the sociodemographic and clinical characteristics of the participants and the Health Promoting Lifestyle Profile II (HPLP II). The questionnaire was administered via face-to-face interviews. The study sample consisted of 251 individuals diagnosed with MI who were treated in the coronary intensive care unit of a training and research hospital.

Results: The total mean score of the patients on the HPLP II was 120.16 ± 17.61. When examining the relationship between HLB and metabolic findings of individuals with MI, the total HPLP II score showed a statistically significant negative correlation with HbA1c ($r = -0.290$, $P < .0001$), fasting blood glucose ($r = -0.174$, $P = .006$), total cholesterol ($r = -0.261$, $P < .0001$), triglycerides ($r = -0.216$, $P < .0001$), and low-density lipoprotein ($r = -0.247$, $P < .0001$), while there was a statistically significant positive correlation with high-density lipoprotein ($r = 0.375$, $P < .0001$).

Conclusion: This study found that the HLB of individuals with MI were at a moderate level and were associated with metabolic control. Individuals who adopted HLB had better metabolic control. These findings suggest that individuals need more support and guidance in adopting HLB. In this context, health professionals should support and educate individuals with MI about lifestyle changes such as health responsibility, physical activity, nutrition, spiritual development, interpersonal relationships, and stress management.

Keywords: Cardiovascular disease, glycemic control, healthy lifestyle, lipid metabolism, myocardial infarction

ÖZ

Amaç: Bu araştırmanın amacı miyokard infarktüsü (MI) geçiren bireylerde sağlıklı yaşam biçimi davranışları ve metabolik kontrol arasındaki ilişkiyi belirlemektir.

Yöntem: Tanımlayıcı ve kesitsel türde yapılan araştırmanın verileri, katılımcıların sosyodemografik ve klinik özellikleri ile Sağlıklı Yaşam Biçimi Davranışları Ölçeği II'yi (SYBDÖ II) içeren anket formu aracılığıyla, yüz-yüze görüşme yöntemi ile Ocak 2023 ve Haziran 2023 arasında toplandı. Araştırmanın örneklemini bir eğitim ve araştırma hastanesinin koroner yoğun bakım ünitesinde tedavi gören MI tanısı almış 251 birey oluşturdu.

Bulgular: Hastaların toplam SYBDÖ II puan ortalaması 120.16 ± 17.61 olarak saptandı. MI geçiren bireylerin sağlıklı yaşam biçimi davranışları ve metabolik bulguları arasında ilişki incelendiğinde; toplam HPLP II puanı ile HbA1c ($r=-0.290$, $P > .0001$), açlık kan glikozu ($r=-.174$, $P = .0.006$), total kolestrol ($r=-0.261$, $P > .0001$), trigliserid ($r=-0.216$, $P > .0001$) ve düşük yoğunluklu lipoprotein ($r=-0.247$, $P > .0001$) arasında istatistiksel olarak negatif yönde ilişki bulunurken, yüksek yoğunluklu lipoprotein ($r=0.375$, $P > .0001$) ile istatistiksel olarak pozitif yönde ilişki olduğu belirlendi.

Sonuç: Bu çalışmada MI geçiren bireylerin sağlıklı yaşam biçimi davranışlarının orta düzeyde olduğu ve metabolik kontrol ile ilişkili olduğu bulundu. Sağlıklı yaşam biçimi davranışlarını benimseyen bireylerin daha iyi metabolik kontrole sahip olduğu görüldü. Bu bulgular, bireylerin sağlıklı yaşam biçimi davranışlarını benimseme konusunda daha fazla destek ve rehberliğe ihtiyaç duyduklarını göstermektedir. Bu bağlamda, sağlık profesyonelleri, MI geçiren bireyleri sağlık sorumluluğu, fiziksel aktivite, beslenme, manevi gelişim, kişilerarası ilişkiler ve stres yönetimi gibi yaşam biçimi değişiklikleri konusunda desteklemelidir.

Anahtar Kelimeler: Kardiyovasküler hastalık, glisemik kontrol, sağlıklı yaşam tarzı, lipid metabolizması, miyokardiyal infarktüs

ORIGINAL ARTICLE

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Introduction

Cardiovascular disease (CVD) is the leading cause of death worldwide, responsible for 32% of global deaths. In 2019, it was estimated to have claimed the lives of 17.9 million people. Of these deaths, 85% were due to myocardial infarction (MI) and stroke.[1-3]

Myocardial infarction (MI) is an event triggered by unstable ischemic syndrome leading to myocardial necrosis and is influenced by cardiovascular risk factors.[4] To minimize these risk factors, it is necessary to focus on modifiable cardiovascular risk factors. These include dyslipidemia, diabetes mellitus (DM), increased waist circumference, inadequate fruit and vegetable consumption, alcohol consumption, smoking, inadequate physical activity, hypertension, and psychosocial factors. Adopting healthy lifestyle habits is of great importance among primary prevention methods for these risk factors.[5-9]

Healthy lifestyle behaviors (HLB) are a fundamental approach to improving the well-being of individuals and reducing health risks associated with morbidity and mortality.[5,6] Adoption of HLB and associated metabolic control may influence the course of the disease and reduce the risk of complications. Therefore, it is important to assess HLB and metabolic control in MI patients.[7,8]

When the literature was examined, studies reporting different levels of HLB in MI patients were found.[10-12] However, no study has examined the relationship between HLB and metabolic control in individuals with MI. Studies with different groups suggest that the adoption of HLB may play a role in maintaining metabolic health.[13-16] This study aimed to determine the relationship between HLB and metabolic control in individuals with MI.

Material and Methods

Design

The study was descriptive and cross-sectional.

Participants and Setting

The study population consisted of patients diagnosed with MI who were treated in the coronary intensive care unit of Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training Research Hospital in Istanbul. The sample size was determined to be 232 patients, calculated using the population unknown sampling method (using the formula $n = t^2pq/d^2$). Within the scope of the study, 251 patients were reached. Patients who agreed to participate in the study were selected from the population by a non-probability random sampling method. Individuals included in the study were those diagnosed with MI, aged 18 years or older, who agreed to participate, and completed the data form entirely. Patients without time and place orientation or with communication barriers were excluded.

Data Collection and Instruments

Research data were collected between January 2023 and June 2023 through a questionnaire administered via face-to-face interviews. The duration of answering the questions was approximately 15 minutes. The questionnaire consisted of sociodemographic and clinical characteristics of the individuals (age, gender, presence of additional chronic diseases, duration of intensive care unit stay, metabolic findings, etc.) and the Health Promoting Lifestyle Profile II to measure health-promoting behaviors related to a healthy lifestyle. No invasive interventions were performed during the data collection process. Metabolic findings were obtained from electronic medical records.

Health Promoting Lifestyle Profile

Health Promoting Lifestyle Profile (HPLP II) was developed by Walker et al. in 1987 and revised in 1996.[17,18] It aims to measure health-improving behaviors related to an individual's healthy lifestyle. The Turkish validity and reliability of the scale was conducted by Bahar et al., and the Cronbach's alpha value was found to be 0.94.[19] In this study, Cronbach's alpha value was determined to be 0.96. The scale consists of 52 items and 6 sub-dimensions and is a 4-point Likert type. These sub-dimensions are health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management. The sum of the scores of the items in each sub-dimension gives the total HPLP score. Health responsibility means caring about one's health, being informed about one's health, and receiving support when necessary. Physical activity includes activity at the recommended level and as part of daily life. Nutrition refers to individuals' healthy eating habits. Spiritual growth reflects individuals' inner peace and harmony with the universe. Interpersonal relations include the relationships in which individuals mutually transfer their feelings to others through verbal or non-verbal communication. Stress management is the ability of individuals to identify and effectively control their sources of stress. The score that can be obtained from the scale is between 52 and 208. Higher mean scores indicate lifestyle behaviors that promote positive health. The total HPLP II score can be divided into four categories: poor (52–90), moderate (91–129), good (130–168), and excellent (169–208).[20]

Data Analysis

The study data were analyzed using SPSS 28.0 (Statistical Package of Social Sciences, Chicago, IL, USA). Variables were expressed as mean, standard deviation, median, minimum, maximum, and percentage. The normality of distribution was analyzed using the Kolmogorov-Smirnov test. Comparisons between groups were made using Mann-Whitney U and Kruskal-Wallis tests. The relationships between numerical variables were evaluated by correlation analysis. Statistical significance was accepted as $P < .005$.

MAIN POINTS

- The HLB of individuals who had MI were moderate. This indicates that patients generally do not fully adopt healthy lifestyle habits.
- There is a relationship between HLB and metabolic control among individuals with MI. Patients who adopt HLB have more favorable outcomes in terms of metabolic control.
- Promoting HLB in individuals with MI may help regulate metabolic control. Therefore, health professionals should encourage patients to adopt healthy lifestyle changes.

Ethical Considerations

Ethical approval was obtained from the Ethics Committee of Istanbul Arel University (Approval Number: 2022/20; Date: 14.10.2022). Before data collection, the necessary written permissions were obtained from the İstanbul Arel University and the institution where the study was conducted. Permission to use the HPLP was obtained from the author. The administration of the survey took approximately 15 minutes. This study was performed in line with the principles of the Declaration of Helsinki.

Results

The mean age of the patients included in the study was 62.09 ± 12.61 years, and the mean duration of intensive care unit stay was 3.82 ± 1.80 days. Among the participants, 155 individuals (61.8%) had an additional chronic disease. The most common additional chronic disease was DM (82 patients). Other common chronic diseases included chronic heart failure (36 patients), hypertension (23 patients), chronic renal failure (9 patients), and asthma (8 patients). While 129 (51.4%) of the participants were discharged from the intensive care unit with recovery, 112 (44.6%) left the intensive care unit due to transfer (96 to a different clinic, 13 to a different intensive care unit, 3 to a different hospital), 9 (3.6%) due to treatment refusal, and 1 (0.4%) due to exitus. Other socio-demographic and clinical characteristics of the participants are given in Table 1.

There was a statistically significant difference between age, education level, employment status, body mass index (BMI), presence of additional chronic disease, and reason for leaving the intensive care unit, and the mean total HPLP II score ($P < .005$, Table 1). The mean total HPLP II score was higher in patients who were younger than 65 years of age, had 5 or more years of education, were employed, had a normal BMI, had no additional chronic disease, and were discharged from the intensive care unit with recovery.

The mean total HPLP II score was 120.16 ± 17.61. The mean scores, median, minimum, and maximum values of the subscales are shown in Table 2. The median, minimum, maximum, and mean scores of the participants' metabolic findings are shown in Table 3.

When the relationship between HLB and metabolic findings of MI patients was examined, the total HPLP II score showed a statistically significant negative correlation with HbA1c ($r = -0.290$, $P < .0001$), FPG ($r = -0.174$, $p = .006$), total cholesterol ($r = -0.261$, $P < .0001$), triglycerides ($r = -0.216$, $P < .0001$), and LDL ($r = -0.247$, $P < .0001$), while there was a statistically significant positive correlation with HDL ($r = 0.375$, $P < .0001$) (Table 4).

Discussion

Health promotion is gaining importance nowadays with the increasing burden of chronic diseases. Therefore, assessing and promoting patients' healthy lifestyle behaviors (HLB) is of utmost importance. This study examines the relationship between HLB and metabolic control in individuals with myocardial infarction (MI).

In the study, the healthy lifestyle behaviors (HLB) of individuals with MI were found to be at a moderate level. When other studies in the literature are examined, there are studies evaluating the HLB of individuals in different groups. In Küçük and Kahraman's study, it was found that the HLB of individuals with MI were at a moderate level.[11] In a study conducted by Mohsenipouya and colleagues, it was found that HLB of individuals with MI were at a good level.[12] In another study, it was reported that MI patients did not exhibit positive health-promoting behaviors, especially in the areas of physical activity and stress management.[10] Additionally, when examining studies that evaluated coronary artery disease patients to determine HLB, Gür and Sunal found these behaviors to be at a good level,[21] while Zou et al[22] reported that more than one-third of individuals exhibited these behaviors at a poor level. The varying findings in these studies may be due to individual differences in patients' behaviors, such as motivation level, knowledge level, and social support; socio-cultural factors, such as cultural norms and lifestyle preferences; research sample selection, such as sample size and sample characteristics; and differences in the region or country where the research was conducted. These differences may lead to variability in individuals' HLB and thus to different findings. Moreover, no study was found in which HLB were at an excellent level (total HPLP II score between 169-208). These findings suggest that patients need more support and guidance in adopting HLB. The follow-up and support of health professionals, especially nurses, in adopting HLB may positively affect these behaviors.[11]

In line with the literature, this study showed that HLB were at higher levels in individuals under 65 years of age.[11,22] It is thought that this result may be explained by the fact that younger individuals generally have easier access to health-related information, pay more attention to HLB, and incorporate them into their lives. When the relationship between education level and HPLP II was analyzed, it was observed that those with 5 years or more of education had higher HPLP II mean scores. Similar results are also found in the literature.[11,22] As the level of education, which is an important component of an individual's lifestyle, increases, individuals' awareness of their health may also increase. It can be thought that individuals with higher levels of education show more interest in health issues, understand health information better, and exhibit more conscious behaviors in protecting their health.

This study showed higher levels of HLB in employees. Promoting healthy lifestyles aims to improve health in the environments where individuals and communities live, work, and make decisions. Therefore, employees should be aware of programs that promote healthy living in the workplace. This awareness can motivate them to adopt HLB.[23] Additionally, individuals with higher total HPLP II scores may have understood the importance of HLB and may be more motivated to adopt these behaviors. This suggests that they are more likely to have a normal BMI, not have additional chronic diseases, and be more likely to be discharged from the intensive care unit with recovery.

The study reveals that the HLB of individuals with MI are associated with metabolic control. As the level of health-promoting behaviors increased in MI patients, HbA1c, FPG, total cholesterol, triglycerides, and LDL levels decreased,

Table 1. Distribution of Mean HPLP II Scores by Sociodemographic and Clinic Data of Participants

			Total HPLP II score			
	n	%	$\bar{x}$ (Min–Max)	$\bar{x}$ ± SD	Z/KW	*P*
Age, years						
<65 years	143	57.0	123 (93-162)	123.13 ± 18.43	-2.866[1]	**0.004**
≥65 years	108	43.0	115 (89-157)	116.22 ± 15.71		
Gender						
Female	93	37.1	115 (89-155)	117.91 ± 16.57	-1.495[1]	0.135
Male	158	62.9	119 (89-162)	121.47 ± 18.12		
Marital status						
Married	186	74.1	117.5 (89-162)	120.95 ± 17.27	-1.237[1]	0.216
Single	65	25.9	117 (89-157)	117.89 ± 18.50		
Education level						
≤ 5 years	123	49.0	115 (89-145)	116.90 ± 16.38	-2.849[1]	**0.004**
> 5 years	128	51.0	120.5 (90-162)	123.28 ± 18.24		
Employment status						
Employed	110	43.8	120.5 (90-162)	123.28 ± 18.24	-2.416[1]	**0.016**
Non-employed	141	56.2	115 (89-145)	116.90 ± 16.38		
Income status						
Income less than expenses	19	7.6	113 (97-141)	114.95 ± 13.74	-1.302[1]	0.193
Income equal to expenses	232	92.4	118 (89-162)	120.58 ± 17.85		
Smoking						
Yes	69	27.5	122 (90-162)	123.83 ± 19.54	-1.873[1]	0.061
No	182	72.5	117 (89-153)	118.76 ± 16.67		
Alcohol consumption						
Yes	16	6.4	131.5 (95-162)	126.31 ± 22.77	-1.159[1]	0.247
No	235	93.6	117 (89-157)	119.73 ± 17.19		
BMI (kg/m²)						
Normal (18.50-24.99)	59	23.5	128 (90-162)	128.90 ± 18.38[a]	14.731[2,3]	**<0.001**
Pre-obesity (25.00-29.9)	101	40.2	118 (90-53)	120.40 ± 16.91[b]		
Obesity (≥30.00)	91	36.3	111 (89-150)	115.52 ± 16.57[c]		
Additional chronic disease						
Yes	155	61.8	114 (89-154)	117.58 ± 16.52	-2.826[1]	**0.005**
No	96	38.2	125 (89-162)	124.31 ± 18.59		
DM						
Yes	82	32.7	114 (89-154)	117.22 ± 16.53	-1.783[1]	0.075
No	169	67.3	120 (89-162)	121.63 ± 18.00		
Hospitalization in the last year						
Yes	45	17.9	117 (90-148)	118.53 ± 16.01	-0.567[1]	0.571
No	206	82.1	117 (89-162)	120.51 ± 17.96		
Duration of intensive care unit stay						
≤ 3 days	142	56.6	119 (89-162)	121.82 ± 17.29	-1.779[1]	0.075
> 3 days	109	43.4	114 (90-150)	117.98 ± 17.87		

(*Continued*)

Table 1. Distribution of Mean HPLP II Scores by Sociodemographic and Clinic Data of Participants (Continued)

			Total HPLP II score			
	n	%	$\bar{x}$ (Min–Max)	$\bar{x}$ ± SD	Z/KW	*P*
Reason for leaving intensive care						
Discharged with recovery	129	51.4	126 (94-162)	124.84 ± 17.25	-4.358[1]	**<0.001**
Other	122	48.6	111 (89-150)	115.20 ± 16.67		

BMI: Body Mass Index, DM: Diabetes Mellitus, HPLP II: Healthy Lifestyle Behaviors Scale II, Max: Maximum, Min: Minimum, SD: Standard Deviation.

[1] Z: Mann Whitney U test, [2] KW: Kruskall-Wallis test.

[3]Mann-Whitney U test corrected by Bonferroni was further used for comparison between any two groups.

[a-c]: There is no difference between groups with the same letter for each column.

Table 2. Health Promoting Lifestyle Profile Scores of the Participants

Dimension/Subscale	$\bar{x}$ ± SD	Median	Minimum Score Recorded	Maximum Score Recorded	Possible Score Range
Health responsibility	21.91 ± 3.53	22	14	29	09-36
Physical activity	13.29 ± 3.87	12	8	24	08-32
Nutrition	21.91 ± 2.54	22	16	29	09-36
Spiritual growth	21.92 ± 3.51	21	15	30	09-36
Interpersonal relations	23.33 ± 3.33	24	16	30	09-36
Stress management	17.80 ± 3.78	17	10	25	08-32
Total HPLP II score	120.16 ± 17.61	117	89	162	52-208

HPLP II: Healthy Lifestyle Behaviors Scale II, Max: Maximum, Min: Minimum, SD: Standard Deviation.

Table 3. Median, Minimum, Maximum, and Mean Scores of Participants' Metabolic Findings

	Median (Min-Max)	$\bar{x}$ ± SD
HbA1c (%) (n=172)	6.00 (4.60-7.60)	6.03 ± 0.74
FPG (mg/dl)	142 (66-417)	164.87 ± 78.07
Total cholesterol (mg/dl)	190.5 (83-371)	227.56 ± 33.77
Triglycerides (mg/dl)	192 (112-402)	204.05 ± 58.17
HDL (mg/dl)	52 (30-100)	55.09 ± 15.58
LDL (mg/dl)	156 (88-277)	154.83 ± 28.28

FPG: Fasting Plasma Glucose, HbA1c: Glycated hemoglobin, HDL: High Density Lipoprotein, LDL: Low Density Lipoprotein, Max: Maximum, Min: Minimum, SD: Standard Deviation.

Table 4. The Relationships Between Health Promoting Behaviors and Metabolic Findings

	Health Responsibility	Physical Activity	Nutrition	Spiritual Growth	Interpersonal Relations	Stress Management	Total HPLP II Score
HbA1c (%) (n=172)	-0.115	**-.275****	**-.278****	**-.309****	**-.223****	**-.367****	**-.290****
FPG (mg/dl)	-0.069	**-.162***	**-.128***	**-.172****	-0.114	**-.255****	**-.174****
Total cholesterol (mg/dl)	**-.143***	**-.368****	**-.166****	**-.214****	-0.109	**-.340****	**-.261****
Triglycerides (mg/dl)	-0.092	**-.310****	-0.112	**-.197****	-0.091	**-.270****	**-.216****
HDL (mg/dl)	**.234****	**.455****	**.213****	**.333****	**.242****	**.414****	**.375****
LDL (mg/dl)	**-.155***	**-.347****	**-.130***	**-.193****	-0.099	**-.322****	**-.247****

FPG: Fasting Plasma Glucose, HbA1c: Glycated hemoglobin, HDL: High Density Lipoprotein, HPLP II: Healthy Lifestyle Behaviors Scale II, LDL: Low Density Lipoprotein, Max: Maximum, Min: Minimum, SD: Standard Deviation.

r: Spearman correlation analysis.

*P<0.05, **P<0.01

while HDL levels increased. The adoption of HLB may lead to better outcomes in metabolic health maintenance and chronic disease management. Behaviors such as regular exercise and healthy eating can help regulate blood lipid levels and keep blood glucose levels stable.[13-16] Studies emphasize the importance of exercise, diet, and an active lifestyle in achieving a healthy metabolic profile.[13,15] In this study, in line with other studies in the literature, it can be concluded that the adoption of HLB may contribute to the protection of metabolic health.

Limitations

The use of a cross-sectional design, which is more appropriate for determining causal relationships, may be among the limitations of this study. Additionally, the data obtained based on patients' statements may be subjective and prone to reporting errors. Finally, the generalizability of the results is limited by the characteristics of the study sample.

Conclusion

The healthy lifestyle behaviors (HLB) of individuals with MI were found to be at a moderate level. These findings suggest that individuals with MI need more support and guidance in adopting HLB. Additionally, the study reveals that the HLB of individuals with MI are associated with metabolic control. Patients who adopted HLB were found to have better metabolic control. These findings suggest that promoting HLB in individuals with MI may help regulate metabolic control. In this context, health professionals should support and educate individuals with MI about lifestyle changes and help them maintain these behaviors.

Ethics Committee Approval: Ethical approval was obtained from the Ethics Committee of Istanbul Arel University (Approval Number: 2022/20; Date: 14.10.2022).

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