**Original Article**

# The Effect of Physical Activity Counseling Based on Health Promotion Model on Physical Activity Behaviors and Functional Capacity in Cardiovascular Patients

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**Abstract**

**Introduction**: Physical inactivity regarded as one of the risk factors for cardiovascular disease has been identified as the fourth leading risk factor for global mortality.
**Aims**: This study was conducted to investigate the effect of physical activity counseling based on Health Promotion Model on physical activity behaviors and functional capacity in individuals with cardiovascular disease. **Method**: Pretest–post-test and quasi-experimental study design was used. The research was carried out in the Cardiopulmonary Rehabilitation Unit of a university hospital. The study sample consisted of 56 patients who were cardiovascular disease. The control group (n=28) consisted of patients receiving routine clinical care, the intervention group (n=28) consisted of patients who received care based on the Health Promotion Model accompanied by individual physical activity counseling. Counseling for the intervention group was conducted in five sessions. Patient Information Form, Healthy Living Behaviors Scale II physical activity subscale, Exercise Benefits/Bariers Scale, body composition measurements and cardiopulmonary exercise test were used to collect data. **Results**: İt was found that there was a statistically significant difference in the repeated measurements of waist circumference, maximal oxygen uptake, metabolic equivalent, Healthy Lifestyle Behavior Scale II physical activity subscale and Exercise Benefit/Barrier Scale scores in favor of the intervention group; in weight, Body Mass Index and body fat percentage values positively among the intervention group ($p<0.05$).
**Conclusion**: It was found that benefit/barrier perceptions related to exercise, healthy lifestyle behaviors, body composition and functional capacity were positively affected in individuals with cardiovascular disease to whom Health Promotion Model was applied.

**Key words:** Health Promotion Model, physical activity counseling, cardiovascular disease.

## Introductıon

Of the non-communicable diseases, the ones leading to death most (48%) are the Cardiovascular Diseases (CVD) (World Health Organization Country Office in Turkey, 2018). The World Health Organization (WHO) has reported that most of the CVDs can be prevented through population-wide strategies drawing attention to behavioral risk factors such as tobacco use, unhealthy diet and obesity, physical inactivity and harmful use of alcohol (WHO 2017). Physical inactivity (PA) regarded as one of the risk factors for Cardiovascular Diseases (CVD) has been identified as the fourth leading risk factor for global mortality and is the cause of approximately 3.2 million deaths worldwide (WHO, 2015). In a study conducted in 2008, it

was reported that cardiovascular mortality was reduced by 30-50% and other mortality-causing diseases by 20-50% by increasing PA and thus functional capacity (Nocon et al., 2008). Maximal Oxygen Uptake ($VO_2$max), considered as one of the functional capacity indicators in recent years, is a strong and independent value for predicting mortality due to all causes and diseases, and is recommended by the American Heart Association to be routinely used in clinical evaluations (Harber et al., 2017; Theofanidis & Dikatpanidou, 2006).

The United States Preventive Services Task Force recommends that primary care health service should provide diet and PA counseling in order to reduce CVD risk factors in overweight or obese individuals (LeFevre, 2014). PA counseling is the basic element of all cardiac rehabilitation programs, an important determinant of quality of life (Uysal, 2014). A patient's non-adherence to the proposed treatment and care plan is the main problem faced in rehabilitation programs. To increase patient compliance, to establish a strong health team-patient relationship and to realize health behavior changes, there is a need for health models. Of these models, the one whose validity has been proved and is used most widely is the Health Promotion Model (HPM) (Uysal, 2014). The HPM developed by Pender (1982-1984) was designed as a complementary to the Health Prevention Model. According to the HPM, being aware of what meanings an individual attributes to his/her health, whether he/she perceives his/her health behaviors positively or negatively and how he/she manages his/her health behaviors are of importance in gaining him/her a new behavior. If an individual considers health as not having a disease, it is difficult for him/her to develop positive health behaviors (Uysal, 2014). The HPM was revised in 1996 by Pender et al. based on changing theoretical perspectives. Components that affect health-modifying behaviors in the final model were defined as “individual characteristics and experiences”, “behavior-specific cognitive processes” and “behavioral outcomes”. According to the model, demographic and social factors can also affect health (Pender, 2011).Several studies in which the HPM has been used to gain individuals healthy behaviors, and its results have been analyzed have reported that it is a suitable model in determining the factors that are effective in acquiring PA habits and increasing an individual’s motivation and that it can be used as guidance for nursing practices in this field (Han et al. 2005, Keegan et al. 2012, Shin et al. 2005). In the experimental studies in which the HPM was implemented, it was stated that the model had a positive effect on participants’ nutrition and PA habits (Dehdari et al., 2013, Theofanidis et al., 2012; Ho, Berggren and Dahlborg-Lyckhage 2010, Noorozi et al., 2011).

**Aim and Questions of This Study:** In this study, it was aimed to observe how much the HPM-based counseling program could influence PA, one of the healthy lifestyle behaviors, by using both subjective and objective measurement methods.

- How are body composition measurements of individuals who have received PA counseling based on HPM affected?
- How are the functional capacities of individuals who receive PA counseling based on HPM affected?
- How are PA perceptions of individuals who have received PA counseling based on HPM affected?

## Methods

**Design and Sample:** In the study, pretest–posttest and quasi-experimental study design was used. The study population included eighty-two patients who were planned to participate in the rehabilitation program in the cardiopulmonary rehabilitation unit between November 2015-November 2016 by a specialist physician, who suffered from myocardial infarction, who underwent coronary artery bypass grafting, percutaneous coronary intervention and/or heart valve surgery, who were diagnosed with peripheral arterial disease and hypertension, who didn’t do physical activities (exercises) regularly, who didn’t have contraindications to exercise and volunteered to participate in the study. Individuals with CVD undergo a thirty-session exercise program which lasts six weeks in the unit. In the clinic, the standard training based on no model is routinely given to patients by clinical nurses and physical therapy technicians before and after the PA-related program. The content of the training includes the rules to be considered during

exercising, types of exercises to be done according to the functional capacity and anamnesis, and how to do the exercises. In the present study, fifteen people didn't accept to participate in the six-week exercise program. Eight people, although they volunteered to participate in the rehabilitation program, withdrew from the program for personal reasons. Three people didn't come to the measurements in the twentieth week because they were out of town. Therefore the remaining patients with the same characteristics were randomly assigned to the intervention (n=28) and control (n=28) groups (Figure 1). When they were assigned, the first patient was assigned to the intervention group, the second patient to the control group and so on. With the values of $\alpha$=0.05, $\beta$=0.20, 1-$\beta$=0.80, the power of the study was found to be p=0.80429 for 28 participants in each group.

**Inclusion-exclusion criteria:** Patients aged 35-70 years who had not exercised for at least the past one year, were diagnosed with CVD, had no contraindications to exercise, and were to participate in the rehabilitation program in the unit for the first time were included in the study.

Individuals with any of the following criteria were excluded:

- CPET's contraindication (Ulubay, 2012),
- Having neurological or vascular problems that prevent the person from participating in even a six-minute walk test (6-MWT),
- Having psychiatric problems,
- Having a mental problem which impairs his/her learning,
- Being illiterate

*Data Collection Tools*

**Personal information form:** The form was developed by the researcher based on the pertinent literature (Han et al. 2005, Kemppainen, 2011). The form consists of 20 items, 12 of which question sociodemographic characteristics of the participants and 8 of which question their medical history.

**Physical activity subscale of the Healthy Promoting Lifestyle Profile II:** It was developed by Walker, Sechrist and Pender in 1987 to test the HPM (Walker, Sechrist and Pender 1995). It was revised by Walker and Hill-Polerecky in 1996[16], and developed as Health Promoting Lifestyle Profile II (HPLP-II) (Bahar and Açıl, 2014). The scale has 52 items and 6 subscales. PA subscale consists of 8 items rated on a 4-point Likert scale ranging from 1 to 4 (never=1, sometimes=2, often=3, regularly=4). The lowest and highest possible scores to be obtained from the scale were 8 and 32 respectively. The higher the score obtained from the PA subscale is the higher the PA level of the person is (Walker, Sechrist and Pender 1995). The scale was adapted to Turkish by Bahar et al. (2008). The Cronbach's alpha coefficient of the PA subscale of the Turkish version of the scale was 0.79 (Bahar et al. 2008). In the present study, the Cronbach's alpha coefficient was 0.77 at the initial measurement, 0.88 at the 6th week's measurement, and 0.90 at the 20th week's measurement.

**Exercise benefits/barriers scale**: Exercise Benefits/Barriers Scale (EBBS) was developed by Sechrist, Walker and Pender in 1987 and measures cognitive factors related to perceived benefits of and perceived barriers to exercise. The scale has two subscales: benefits (29 items) and barriers (14 items). The sum of the scores obtained from both of the subscales yields the score of the overall EBBS (Sechrist, Walker and Pender 1987).

The validity and reliability study of the EBBS for Turkey was conducted by Ortabağ et al. (2010). In Ortabağ et al.'s study, the Cronbach's Alpha value of the scale was determined as 0.87 (Ortabağ et al. 2010). The scale has a four-response, forced-choice Likert-type format. The scores for each item ranges from 4 (strongly agree) to 1 (strongly disagree). While the possible minimum total score to be obtained from the scale is 43, the highest possible score is 172. The higher the score is, the more the person believes in the benefit of the exercise (Sechrist, Walker and Pender 1987). In the present study, the Cronbach's Alpha values for the benefit and barrier subscales were 0.80 and 0.79 respectively at the initial measurement, 0.78 and 0.80 respectively at the 6th week's measurement, 0.90 and 0.80 respectively at the 20th week's measurement.

**How The Study Was Conducted:** The data on the participants' demographic characteristics and medical history were recorded in the

Personal Information Form. In both groups lengths and waist circumference were measured. The weights and body fat percentage was calculated with the bioelectrical impedance analyzer as the patient was fasting. The participants in both groups had the cardiopulmonary exercise test with the ergospirometry tester, and 6-MWT. While the Personal Information Form was filled in by the researcher, the participants in both groups were asked to fill in the EBBS and the PA subscale of the HPLP-II. In order to ensure that the participants in the control group weren't affected by the model in the clinic, counseling was given to them by other health personnel working in the clinic.

The participants in both groups were evaluated by the Physical Medicine and Rehabilitation physician in the clinic based on the results of the exercise tests, and they were assigned to the individualized aerobic exercise program. The program lasted 5 days per week for 6 weeks within the clinic routine applications. All the participants were given diet training by the hospital dietician within the scope of the program. At the end of the exercise program (6th weeks) and three months after the end of the exercise program (20th weeks), the participants both in the intervention and control groups underwent exercise tests, body composition measurements and waist circumference measurements. The EBBS and the PA subscale of the HPLP-II were re-administered to both groups. Measurements other than baseline measurements were performed by other health personnel in the clinic.

**Individual Counseling Program Based on the Health Promotion Model:** The day the participants started the exercise program was regarded as the first session of the individual counseling program. The sessions in the following weeks were performed on the days determined by the participants. The baseline, second week and last week sessions lasted approximately 60 minutes, and each of the other sessions lasted 30 minutes once a week during the exercises done in the hospital (Chart 1).

**Ethical Considerations :** Prior to the study, Ethics committee approval was obtained. Written permission to conduct the study was obtained from the hospital where the study was to be performed. The patients who accepted to participate in the study were informed about the purpose and the process of the study, and then their written and verbal informed consent was obtained. This study was carried out according to rules of the Helsinki Declaration.

**Statistical Analysis:** Data were analyzed by using the Statistical Package for Social Science 22.00 program. Whether the continuous data confirmed with the normal distribution was evaluated with the Kolmogorov-Smirnov test. Descriptive statistics were performed as mean±standard deviation and median. In order to test whether the participants in the intervention and control groups were similarly distributed in terms of variables such as age, gender, educational status, diagnosis, etc., the chi-squared test and the test for the significance of the difference between two means (student's t-test) were used and While the comparisons of the categorical variables were performed with the Chi-squared test, the comparisons of the variables with non-normal distribution were performed with the Mann-Whitney U test.

For the data with normal distribution in repeated measures, the "repeated measures analysis of variance analysis" and "Bonferroni test" were used. For the data with non-normal distribution in repeated measures, the "Friedman test" and "Wilcoxon signed rank test" were used. The results were evaluated at 95% confidence interval and $p<0.05$ significance level.

## Results

This experimental study included 56 people. They were randomly assigned to the intervention group (n=28) and to the control group (n=28). Table 1 shows the distribution of the individuals included in the study in terms of their sociodemographic characteristics and medical history. There was no statistically significant difference between the groups in terms of their sociodemographic characteristics and medical history, and both groups had similar characteristics (Table 1).

The results of the anthropometric measurements of the individuals participating in the study are shown in Table 2. In the intervention group, the weight and BMI measurements obtained at the 6th and 20th weeks were statistically significantly different from those obtained at the baseline (p=0.001, p=0.001, p=0.001, p=0.001). However, the differences between the weight and

BMI measurements obtained at the sixth and twentieth weeks weren't statistically significant (p=0.450, p=0.361). The weight and BMI measurements decreased at the 6th week and remained the same until the 20th week. Waist circumference and body fat percentage values gradually decreased at all measurements and the differences were statistically significant (p=0.023, p=0.004).In the control group, the weight and BMI measurements which decreased at the 6th week increased at the 20th week. The differences between the waist circumference measurements obtained at the sixth week were statistically significantly different from those obtained at the baseline (p=0.001). The waist circumference measurements obtained at the 20th week were close to those obtained at the 6th week, and the difference wasn't statistically significant (p=0.073). On the other hand, the waist circumference measurements obtained at the 20th week were statistically significantly different from those obtained at the baseline (p=0.004). The comparison of the intervention and control groups in terms of their waist circumference measurements revealed that there was a statistically significant difference in favor of the intervention group (p=0.044) and that differences for the other variables weren't statistically significant (p>0.05). Table 3 shows the functional capacity measurements of the participants and the scores they obtained from the EBBS and the PA subscale of the HPLP-II. The measurements of $VO_2$max, metabolic equivalent (MET), 6-MWT, and HPLP-II and EBBS scores at the baseline changed statistically significantly and positively at the sixth week and twentieth week (p<0.05). However, the HPLP-II scores obtained at the twentieth week were significantly lower than those obtained at the sixth week, but they were still higher than were those obtained at the baseline. In the control group, in all the parameters given in Table 3, all the post-exercise values were statistically significantly and positively different from the baseline values; however, the differences except for the EBBS scores at the twentieth week weren't statistically significant (p<0.05). Therefore, there were statistically significant differences between the groups at the twentieth week in terms of $VO_2$max values, MET values, 6-MWT results, and HPLP-II and EBBS scores (p=0.048, p=0.044, p=0.001, p=0.001, p=0.016).

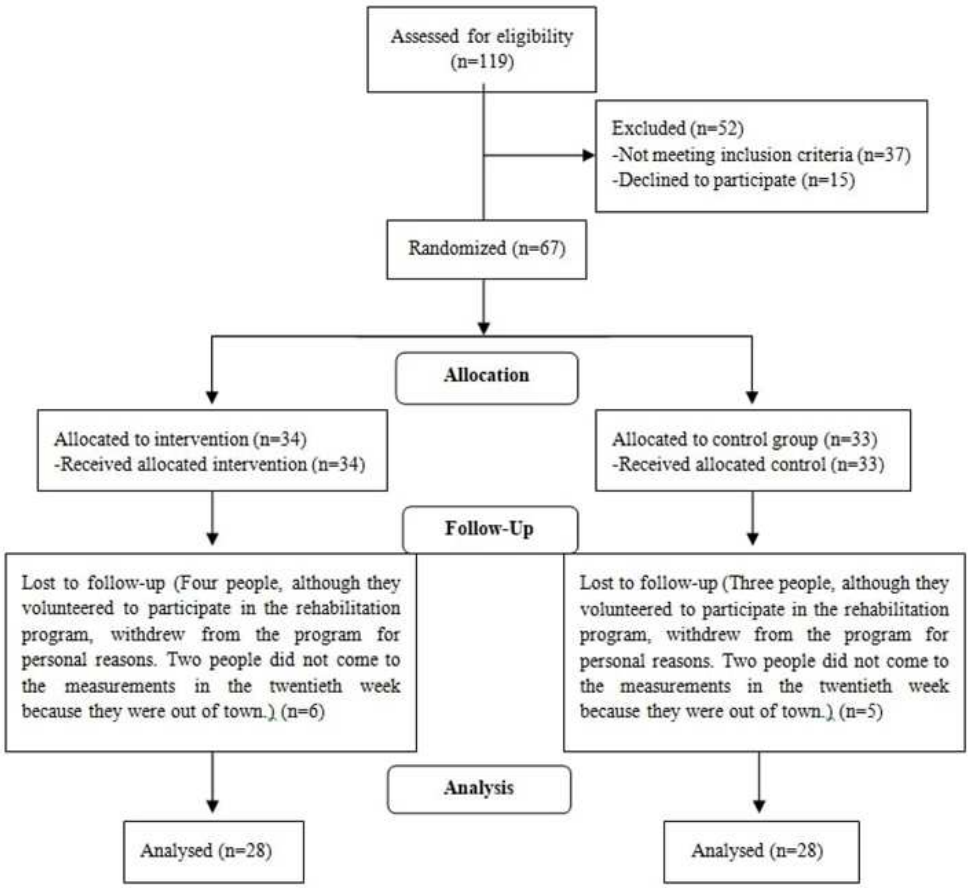


**Figure 1.** Flow diagram of study participants.

**Chart 1.** Health Promotion Model-Based Individual Counseling Program to be applied to the Intervention Group

| CONTENT OF THE COUNSELING PROGRAM | DOMAINS AFFECTED WITHIN THE SCOPE OF THE HPM |
|---|---|
| **1ST WEEK**<br><br>Getting acquainted and evaluation of the patient's functional capacity<br>Discussing physical activity-related experiences<br>Discussing physical activity-related fears<br>Discussing positive and negative thoughts about physical activity<br>Discussing the importance of physical activity in cardiovascular diseases<br>Improving the individual's strengths | Perceived benefits and barriers |
| **2ND WEEK**<br><br>Cardiovascular diseases risk factors<br>What is physical activity?<br>Disadvantages of inactivity and advantages physical activity<br>Physical activity types<br>Talking about alternatives to perceived barriers to physical activity<br>Theoretical and practical stages the exercise program<br>General rules on conducting physical activities<br>Increasing interaction with physically active people<br>Determining the risk related to the behavior of the person<br>Adapting the perceived risk to the real risk<br>Self-criticism of the risks and their consequences | Interpersonal interaction (training provided by the health personnel, meeting the people in the exercise group having the same disease)<br>Discussing feelings related to physical activity (discussing positive and negative feelings about exercise arising during the exercise sessions) |
| **3RD WEEK**<br><br>What are the problems likely to arise during exercise?<br>What should be done when such problems arise? | Interpersonal interaction (training provided by the health personnel, meeting the people in the exercise group having the same disease) |
| **4TH WEEK**<br><br>Sharing new experiences related to physical activity<br>Discussing physical activity-related plans<br>Evaluation of the perceived exercise self-efficacy<br>Reinforcing positive perceptions of development | Interpersonal interaction (Sharing physical activity-related experiences)<br>Assuming responsibility and creating plans (creation of a physical activity plan) |
| **LAST WEEK OF THE EXERCISE PROGRAM**<br><br>Reevaluating activities and making recommendations based on the results of the Cardiopulmonary Exercise Test | |

**Table 1.** Distribution of the Participants in Terms of Their Sociodemographic Characteristics and Medical History

| Variables | Intervention Group *n*=28 | | Control Group *n*=28 | | Total | | *P* Value |
|---|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % | |
| **Age (years)** | | | | | | | |
| 35-49 | 7 | 25 | 5 | 17.9 | 12 | 21.4 | |
| 50-60 | 16 | 57.1 | 17 | 60.7 | 33 | 58.9 | p=0.797 |
| 61-70 | 5 | 17.9 | 6 | 21.4 | 11 | 19.6 | |
| **Gender** | | | | | | | |
| Female | 21 | 75 | 20 | 71.4 | 41 | 73.2 | p=0.500 |
| Male | 7 | 25 | 8 | 28.6 | 15 | 26.8 | |
| **Employment status** | | | | | | | |
| Housewife | 17 | 60.7 | 17 | 60.7 | 34 | 60.7 | |
| Retired | 5 | 17.9 | 7 | 25.0 | 12 | 21.4 | p=0.693 |
| Employed | 6 | 21.4 | 4 | 14.3 | 10 | 17.9 | |
| **Education** | | | | | | | |
| Primary school | 14 | 50.0 | 15 | 53.6 | 29 | 51.8 | |
| Junior high school | 6 | 21.4 | 4 | 14.3 | 10 | 17.9 | p=0.781 |
| Senior high school and higher | 8 | 28.6 | 9 | 32.1 | 17 | 30.4 | |
| **Medical history** | | | | | | | |
| MI/PTCA/Stent/KABG | 7 | 25 | 3 | 10.7 | 10 | 17.9 | p=0.148 |
| HT | 21 | 75 | 25 | 89.3 | 46 | 82.1 | |
| **Family history of a cardiovascular disease** | | | | | | | |
| Yes | 10 | 35.7 | 13 | 46.4 | 23 | 41.1 | p=0.294 |
| No | 18 | 64.3 | 15 | 53.6 | 33 | 58.9 | |
| **Ejection fraction percentage** | Mdn (min-max) 55 (50-65) | | Mdn (min-max) 55 (30-60) | | | | p=0.101 |
| **Smoking** | | | | | | | |
| Never smoker | 17 | 60.7 | 19 | 67.9 | 36 | 64.3 | |
| Former smoker | 5 | 17.9 | 5 | 17.9 | 10 | 17.9 | p=0.774 |
| Smoker | 6 | 21.4 | 4 | 14.3 | 10 | 17.9 | |
| **Diet** | | | | | | | |
| Yes | 8 | 28.6 | 7 | 25 | 15 | 26.8 | p=0.500 |
| No | 20 | 71.4 | 21 | 75 | 41 | 73.2 | |
| **Cholesterol drug use** | | | | | | | |
| Yes | 4 | 14.3 | 4 | 14.3 | 8 | 14.3 | p=0.999[a] |
| No | 24 | 85.7 | 24 | 15.7 | 48 | 85.7 | |

[a] Fisher's Exact; CAGB, Coronary Artery Bypass Grafting; HT, Hypertension; Mdn: Median; MI, Myocardial Infarction; PTCA, Percutaneous Coronary İntervention

**Table 2.** Participants' Anthropometric Measurements Results

| Variables | Intervention group | | | Control group | | | Inter-group comparison |
|---|---|---|---|---|---|---|---|
| | **Baseline** | **6th week** | **20th week** | **Baseline** | **6th week** | **20th week** | |
| | ***mean±sd*** | ***mean±sd*** | ***mean±sd*** | ***mean±sd*** | ***mean±sd*** | ***mean±sd*** | ***P* Value** |
| Weight | 90.25±15.27 | 86.43±14.40 | 85.77±14.51 | 92.92±21.86 | 89.80±21.00 | 91.17±20.78 | p=0.598[a]<br>p=0.488[b]<br>p=0.264[c] |
| **Intra-group comparison *P* Value** | **p=0.001[a-b]** | **p=0.001[a-c]** | p=0.450[b-c] | **p=0.001[a-b]** | **p=0.032[a-c]** | | **p=0.015[b-c]** |
| Body Mass Index | 35.15±5.67 | 33.64±5.25 | 33.36±5.14 | 36.07±7.94 | 34.79±7.32 | 35.34±7.23 | p=0.631[a]<br>p=0.502[b]<br>p=0.241[c] |
| **Intra-group comparison *P* Value** | **p=0.001[a-b]**<br>**p=0.018[b-c]** | **p=0.001[a-c]** | p=0.361[b-c] | **p=0.001[a-b]** | | | **p=0.045[a-c]** |
| Waist Circumfe-rence | 107.96±11.86 | 103.17±9.34 | 101.14±9.61 | 110.50±14.98 | 105.96±12.92 | 107.60±13.51 | p=0.486[a]<br>p=0.359[b]<br>**p=0.044[c]** |
| **Intra-group comparison *P* Value** | **p=0.001[a-b]** | **p=0.001[a-c]** | **p=0.023[b-c]** | **p=0.001[a-b]** | **p=0.004[a-c]** | | p=0.073[b-c] |
| Body Fat Ratio | 39.65±7.21 | 38.06±7.20 | 37.03±7.01 | 39.83±9.67 | 38.95±8.97 | 38.92±9.00 | p=0.034[a]<br>p=0.678[b]<br>p=0.386[c] |
| **Intra-group Comparison *P* Value** | **p=0.001[a-b]** | **p=0.001[a-c]** | **p=0.004[b-c]** | F= 2.064 | p=0.137 | | |

a: Baseline results; b: 6th week results; c: 20th week results; a-b: Baseline and 6th week results compared; a-c: Baseline and 20th week results compared; b-c: 6th week and 20th week results compared.

**Table 3.** Participants' Functional Capacity Measurements, and EBBS and HPLP-II scores

| Variables | Intervention group | | | Control group | | | Inter-group comparison |
|---|---|---|---|---|---|---|---|
| | **Baseline** | **6th week** | **20th week** | **Baseline** | **6th week** | **20th week** | |
| | ***mean±sd*** | ***mean±sd*** | ***mean±sd*** | ***mean±sd*** | ***mean±sd*** | ***mean±sd*** | ***P* Value** |
| VO2max | 14.46±5.16 | 17.89±4.89 | 17.86±4.54 | 13.91±4.86 | 17.05±4.21 | 15.47±4.29 | p=0.827[a]<br>p=0.494[b]<br>**p=0.048[c]** |
| **Intra-group comparison *P* Value** | **p=0.001[a-b]** | **p=0.001[a-c]** | p=0.999[b-c] | **p=0.001[a-b]** | **p=0.002[a-c]** | **p=0.001[b-c]** | |
| MET | 4.13±1.48 | 5.11±1.39 | 5.09±1.28 | 3.97±1.38 | 4.86±1.20 | 4.40±1.22 | p=0.825[a]<br>p=0.484[b]<br>**p=0.044[c]** |
| **Intra-group Comparison *P* Value** | **p=0.001[a-b]** | **p=0.001[a-c]** | p=0.999[b-c] | **p=0.001[a-b]** | **p=0.002[a-c]** | **p=0.001[b-c]** | |
| 6-min. walk test | 431.60±74.62 | *Mdn (min-max)* 500(360-620) | *Mdn (min-max)* 500(380-620) | 406.07±53.37 | *Mdn (min-max)* 430(380-520) | *Mdn (min-max)* 420(350-520) | p=0.144[a]<br>**p=0.001[b]**<br>**p=0.001[c]** |
| **Intra-group Comparison *P* Value** | **p=0.001[a-b]**<br>**p=0.001[b-c]** | **p=0.001[a-c]** | | p=0.999[b-c] | **p=0.001[a-b]** | **p=0.001[a-c]** | |
| HPLP-II score | *Mdn (min-max)* 10(9-20) | *Mdn (min-max)* 24(14-30) | *Mdn (min-max)* 19(13-30) | *Mdn (min-max)* 10(8-15) | *Mdn (min-max)* 18.5(9-28) | *Mdn (min-max)* 14(10-26) | p=0.456[a]<br>**p=0.001[b]**<br>**p=0.001[c]** |
| **Intra-group Comparison *P* Value** | **p=0.001[a-b]**<br>**p=0.001[b-c]** | **p=0.001[a-c]** | | **p=0.001[b-c]** | **p=0.001[a-b]** | | **p=0.001[a-c]** |
| EBBS Score | 121.17±8.40 | 135.50±11.93 | 136.53±11.44 | 125.75±9.35 | 132.01±6.81 | 129.75±8.88 | p=0.060[a]<br>p=0.188[b]<br>**p=0.016[c]** |
| **Intra-group comparison *P* Value** | **p=0.001[a-b]**<br>p=0.372[b-c] | **p=0.001[a-c]** | | p=0.816[b-c] | **p=0.001[a-b]** | | p=0.057[a-c] |

a: Baseline results; b: 6th week results; c: 20th week results; a-b: Baseline and 6th week results compared; a-c: Baseline and 20th week results compared; b-c: 6th week and 20th week results compared

EBBS, Exercise Benefits/Barriers Scale; HPLP-II, Physical Activity Subscale of the Healthy Lifestyle Behaviors Scale II ; Mdn, Median; MET, Metabolic Equivalents; VO2max, Maximal Oxygen Uptake

**Discussion**

The results of the present study demonstrated that the participants both in the intervention group and in the control group were at risk of CVD (Table 1). The comparison of the changes in the anthropometric measurements of the participants revealed that there were statistically significant decreases in all the parameters at the 6th week. However, at the 20th week, while the values continued to decrease in the intervention group, they except for the body fat ratio started to increase in the control group. The body fat ratio remained almost the same. This decrease in the intervention group led to a statistically significant difference between the groups in terms of waist circumference measurements at the 20th week (Table 2).

In some studies including PA training within the scope of primary and secondary protection, as in the present study, while statistically significant decreases were observed in weight, BMI or body fat percentages in intervention groups, the differences between the groups weren't significant (Irmak and Fesci, 2010, Lin et al., 2010, Türkmen, 2011). In a study in which the HPM was implemented, while there were statistically significant differences between waist circumferences of patients with MI during the 3-month period, there weren't statistically significant differences between their BMI values (Sevinç and Argon 2018). In the present study, the weight, BMI, waist circumference and body fat percentages of the participants in the intervention group were determined to decrease gradually in 5 months, and there was a statistically difference between the groups in terms of their waist circumference measurements (Table 2).

Weight loss rates due to the increased PA may vary from person to person. Successful results also depend on energy intake levels (Donely et al., 2009). In a meta-analysis investigating weight loss among those having combined therapies (diet+PA), those performing only physical activities and those having only a diet, it was determined that weight loss in the short term (3-6 months) was similar in those who had combined treatments and those who had a diet. However, in the long-term (12-18 months), weight loss was higher in those who underwent combined therapies. On the other hand, weight loss was higher in those who underwent combined therapies than in those who only performed physical activities both in the short term and in the long term (Johns et al., 2014). In the present study, the majority of the participants (intervention group=71.4%, control group=75%) didn't diet. The mean weight loss in the 5-month period was 4.48 kg in the intervention group and 1.75 kg in the control group. These findings suggest that in order to achieve the expected goals in HPM-based cardiac rehabilitation and counseling programs, all the specialties should adopt and implement a systematic, multidisciplinary approach.

The results related to the functional capacity measurements obtained during the study demonstrated that the VO2max/MET values and 6-MWT results increased statistically significantly at the 6th week in both groups (Table 3). At the 20th week measurements, the participants in the intervention group retained the progress whereas those the control group didn't, which led to a statistically significant difference between the groups (Table 3).

A 1 MET/3.5 VO2 increase in functional capacity can reduce the risk of developing CVD by 15% and the overall risk of death by 13%, which suggests that increasing daily PA lowers the risk of developing a CVD (Cristi-Montero, 2016, Vasankari, 2017). In an HPM-based study, it was found that when women followed their PA guidelines, their cardiorespiratory compliance and flexibility improved significantly (Adıbelli and Kılıç, 2017, Sevinç and Argon 2018). In the present study, in the intervention group, $VO_2$max and MET values, and 6-minute walking distance which are the indicators the functional capacity increased significantly at the 6th week, and the participants retained these values until the 20th week. Within this context, HPM-based PA counseling can be said to improve the functional capacity of individuals with CVD.In both groups, after individual counseling and standard training, health behavior towards PA improved and their scores from EBBS increased, which can be considered inevitable during the sixth week as both groups were included in the exercise program. Although there was a decrease in PA behavior and EBBS scores in both groups at week 20, the decrease in the control group was statistically significantly higher (Table 3). In the literature, in several studies in which the HPM was used in various chronic diseases, successful results were obtained for improving PA behaviors and functional capacity (Adıbelli and

Kılıç, 2017, Noorozi et al., 2011, Sevinç and Argon 2018, Walker et al., 2009). In other studies on PA training based on the HPM, it was observed that in a three-month period, the PA level increased, that the perceived barriers decreased and that perceived benefits increased, the rates being higher in the intervention group (Lari et al., 2017, Rahimian et al., 2016). In this context, it can be said that the results of this study are consistent with the results in the literature, and that the PA program and individual counseling under HPM positively affect the perceived exercise benefits and exercise barriers in individuals with CVD and promote healthy lifestyle behaviors against PA.

**Limitations of the Research:** The results obtained from the present study are applicable only to the patients presented to the Cardiopulmonary Rehabilitation Unit and cannot be generalized to other patients. Because the scales were filled in by the participants in order to prevent them from not being influenced by the researcher, only the literate patients were included in the study, and because the duration of the study was 20 weeks, the size of the study sample was limited.

**Conclusions :** According to the results of the present study, the HPM-based individual PA counseling program led to significant improvements in developing healthy lifestyle behaviors related to functional capacity and PA and perceptions of exercise in the five-month period compared to the standard PA training. The program also improved, though at a lower level, anthropometric measurements likely to cause cardiac risk.

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