

Effects of the BeHaS Program on Physical Factors and Self-esteem of Elderly Women in a Senior Center: A Pilot Study

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베하스(BeHaS) 프로그램이 경로당 여성 노인의 신체적 요인과 자아존중감에 미치는 효과: 예비연구

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Abstract The purpose of this study was to investigate the effects of the BeHaS program on physical factors and self-esteem of the elderly women in a senior center. In this study, the BeHaS program for the elderly who had one or more risk factors for metabolic syndrome was conducted for 8 weeks, once a week, 1.5 hours a day. Data collection was measured 3 times at 8-week intervals. Physical factors were measured 3 times (Pretest1, Pretest2, posttest) and self-esteem were measured 2 times (Pretest2, posttest). Physical factors were analyzed using Repeated Measured ANOVA, and, self-esteem was analyzed using paired t-test. As the result of this study, it was confirmed that the BeHaS program is effective in managing obesity and blood glucose, reducing cholesterol, and improving self-esteem. Therefore, it is suggested that additional research is needed to improve the community health with metabolic syndrome.

Key Words : Metabolic syndrome, Aged, Physical factors, Self-esteem, Senior centers

요약 본 연구의 목적은 경로당 여성 노인의 신체적 요인과 자아존중감에 대한 베하스 프로그램의 효과를 알아보기 위함이다. 본 연구는 대사증후군 위험요인을 한 개 이상 가진 여성노인을 대상으로 베하스 프로그램을 8주간, 주 1회, 1일 1.5시간씩 실시하였다. 자료 수집은 8주 간격으로 총 3회 측정을 하였으며 신체적 요인은 3회(Pretest1, Pretest2, posttest), 자아존중감은 2회(Pretest2, posttest) 하였다. 신체적 요인은 Repeated Measured ANOVA, 자아존중감은 paired t-test를 이용하여 분석하였다. 본 연구 결과 대상자의 복부둘레, 당화혈색소, 총콜레스테롤, 저밀도지단백 콜레스테롤, 자아존중감에서 유의한 차이를 보여, 베하스 프로그램이 비만 및 혈당 관리, 콜레스테롤 감소, 자아존중감 향상에 효과가 있음을 확인하였다. 이를 바탕으로 대사증후군이 있는 지역사회 주민의 건강향상을 위한 추가적인 연구가 필요함을 제언한다.

주제어 : 대사증후군, 노인, 신체적 요인, 자아존중감, 경로당

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1. Introduction

1.1 The need of research

Metabolic syndrome refers to a condition in which cardiovascular risk factors such as abdominal obesity, dyslipidemia, hypertension, and diabetes are clustered in one person [1] and has a high effect on chronic diseases, such as cardiovascular disease, in adults. According to Korea's 2016 Health Examination Statistical Yearbook, people with three to five of the risk factors for metabolic syndrome (abdominal obesity, high blood pressure, high blood glucose, hypertriglyceridemia, and low high-density lipoprotein (HDL) cholesterol) include 37.7% individuals in their 60s, 45.3% in their 70s, and 45% in their 80s, and there appears to be an increase in such incidences with age [2]. Currently, the most commonly used diagnostic standard for metabolic syndrome is the National Cholesterol Education Program Adult Panel III (NCEP ATP III) standard, which has been published by the National Council for Cholesterol Education in the United States [1]. To reduce the risk factors for metabolic syndrome, it is essential to increase exercise and physical activity [3]. Further, it is also important to control one's diet, health education, improve lifestyle [4] and self management [5].

Elderly population is growing worldwide faster than other population segment; one in eight people worldwide was aged 60 or over in 2017, and by 2050 there will be one in five people globally [6]. In the future, the increase in medical costs due to chronic diseases in the elderly population will become a social problem [7]. Since the health problems of the elderly are based on the active improvement of the existing unhealthy lifestyle [8], it is very important that the elderly who are at risk of metabolic syndrome also practice continuous health behavior. In particular, elderly women have poor or insufficient nutritional intake than elderly

men, health screening rates and cancer screening rates are low, and subjective health status is also perceived to be poor [9]. Therefore, elderly women need education for health behavior.

Self-esteem makes an individual feel valued; the self-esteem of older adults is associated with their quality of life [10]. Moreover, self-esteem of older adults begins dropping at the age of 60 [11], or starts to decline at 50 [12]. Since self-esteem is closely correlated with health promotion behavior [13], efforts are needed to enhance self-esteem among elderly women living in senior center who have or are at risk of metabolic syndrome.

Most of the elderly in Korea use senior center to participate in activities, which has a great influence on elderly health care [14]. Also, the senior center is located in many places across the country, so it has a great advantage that it is highly accessible to elderly who have difficulty moving or moving around [14]. Therefore, if a health program for metabolic syndrome management is operated for many elderly people who use the senior center, the effect of metabolic syndrome prevention management can be enhanced.

At the time of development, the BeHaS (Be Happy and Strong) program was developed to educate arthritis and exercise, and promote self-esteem to maintain and improve the health of arthritis patients [15]. Since then, the BeHaS program was applied to various participants through various methods; elderly living in facilities, pain patients, and breast cancer patients, including education appropriate for each disease [16-18]. Recently, it has developed by changing into a complex program aimed at improving not only exercise for the elderly, but also disease management knowledge and self-respect [19]. For example, some studies have reported positive effects on psychological and physical factors of the BeHaS programs in the elderly with chronic diseases such as diabetes

[20] and hypertension [21]. Therefore, positive effects would be expected for the elderly with metabolic syndrome through BeHaS program.

At present, though education and research on metabolic syndrome management are increasing in Korea, the number of patients with metabolic syndrome continues to increase, especially among the elderly. Since the elderly may have difficulty in practicing and managing health behaviors[8], the BeHaS program, which includes metabolic syndrome management education, focuses on easily accessible places (senior centers) to increase metabolic syndrome management and self-esteem. Therefore, this study aims to examine the effects of an eight-week BeHaS program on physical factors and self-esteem of older adults with metabolic syndrome or risk factors in senior centers. Further, this study is meaningful because it is the first to conduct an intensive program of this nature with women at risk of metabolic syndrome to examine the program’s effectiveness.

1.2 Purpose

The purpose of this study was to investigate the effects of the BeHaS program on the physical factors and self-esteem of the elderly in a senior center.

2. Method

2.1 Study design

This study is a one group repeated measures design to investigate the effects of the BeHaS program on the physical factors and self-esteem of older adults in a senior center.

The study design is shown in Fig. 1.

2.2 Participants

This study included participants aged 79.74 ± 5.18 years who were registered in ‘A’ apartment senior center located in D City from August to September 2018, and who agreed to participate in the BeHaS program, including education for managing metabolic syndrome. The selection criteria included presence of at least one risk factor for metabolic syndrome, no physical and mental dysfunction, and being able to communicate with each other.

The sample size required for the Repeated Measured ANOVA was based on the effect size of the total cholesterol in the BeHaS program for the elderly with hypertension [21] and Cohen's Power analysis. Therefore, when the significance of .05, effect size =.4, power =.8 were calculated, the sample generated was 12. In addition, the sample size required for the paired t-test was based on the effect size of the self-esteem in the BeHaS program for the elderly [22] and Cohen's Power analysis. Therefore, when the significance of .05, effect size =.8, power =.8 were calculated, the sample generated was 15. 20 participants were selected considering the elimination rate, of those 19 were included in the analysis, since one participant dropped out of the study owing to

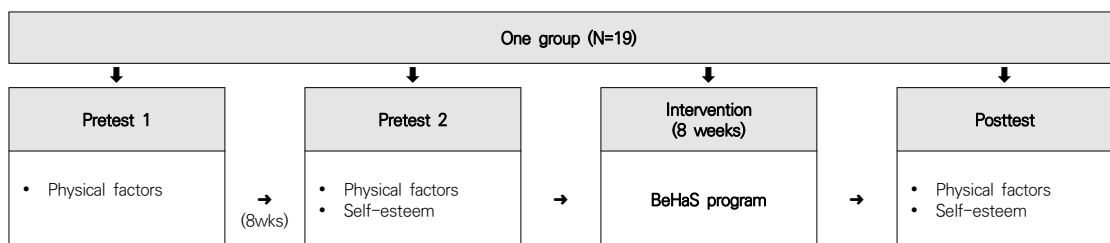


Fig. 1. Flow-chart of the research design

personal reasons.

2.3 Tools

2.3.1 Abdominal circumference

Participants were told to breathe lightly in a relaxed standing position and the most protruding part of the iliac crest was measured. The tape was held parallel to the floor, and one investigator continuously measured using the same measuring tape (ROLLFIX®, hoechstmass®, West-Germany) to ensure that the tape was measured with uniform tension. To ensure high accuracy, the measurements were taken on the skin surface and not over the participants' clothes.

2.3.2 Fasting blood glucose (FBS)

Blood was taken from peripheral blood vessels by stabbing the tip of the finger with a lancet after eight hours of fasting excluding water. It was measured using a blood glucose measuring device (Contour® Plus, Bayer Consumer Care AG, Switzerland) that has been verified for reliability and validity. The unit of measurement was mg/dL.

2.3.3 Glycated hemoglobin (HbA1c)

Blood was collected from peripheral blood vessels by stabbing the tip of fingers with a lancet and measured using a glycated hemoglobin measuring device (SD A1cCare™ System, SD Biosensor Co., Ltd., Chungbuk, Korea) that has been verified for reliability and validity. The unit of measurement was mg/dL.

2.3.4 Blood pressure (BP)

The patients were instructed to rest for at least 5 to 10 minutes before blood pressure was measured. Blood pressure was assessed using an automatic blood pressure meter (AKESO TMB-986, Guangdong TRANSTEK Medical Electronics Co., LTD, China); its reliability and

validity were confirmed, and the unit of measurement was mmHg.

2.3.5 Triglyceride (TG), total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C)

Blood was collected from peripheral blood vessels by puncturing the distal end, and measured using a cholesterol analyzer (Mission Cholesterol Meter, ACON Laboratories, Inc., San Diego, USA), which has been verified for reliability and validity. The unit of measurement was mg/dL.

2.3.6 Self-esteem

The Rosenberg Self Esteem Scale developed by Rosenberg [23] and translated by Jon [24], was used. This tool consists of a total of 10 questions, and is composed of a minimum of 10 to a maximum of 40 points on a Likert four-point scale, meaning that the higher the score, the higher the level of self-respect. At the time of measurement development, the reliability of the tool was Cronbach's $\alpha = .85$, and in this study, Cronbach's $\alpha = .76$.

2.4 Interventions

In this study, an intervention for the elderly who had one or more risk factors for metabolic syndrome was conducted for eight weeks, for 1.5 hours a day, from August to September 2018. This study was conducted by three doctoral students and one master's student who are nurses, graduate students, and currently conducting related research. The researchers themselves developed the education materials by referring to research and books on metabolic syndrome.

In addition, three certified instructors who were already researchers instructed the BeHaS program. Further, a researcher trained in the BeHaS program was an assistant instructor. After

20 minutes of metabolic syndrome management education, the self-esteem promotion strategy was followed for about 10 to 20 minutes and exercise for about 20 to 30 minutes. The BeHaS was conducted once a week, but the program was designed to further enhance the effectiveness of the program by giving the participants a "joyful homework" based on what they learned every week. The details about the intervention are presented in Table 1.

In order to increase self-esteem, affirmations such as "I love myself," "Caring back massage," "Greetings to each team member," "Floating balloons in small groups," and exercises such as "Group walking" were used. Self-esteem building consists of programs that make one feel relaxed and using expressive motion therapy and various cognitive behavioral techniques. The BeHaS exercise component consists of three phases: Warm-up exercise, Main exercise, and Cooling

down exercise. It consists of limb and body movements through folding and unfolding of body joints, including basic movements of traditional Korean martial arts.

2.5 Data collection

Before beginning this study, researchers obtained informed consent from the participants who were senior citizens registered in "A" apartment senior center in Daejeon. Data were collected by five researchers licensed as nurses.

2.5.1 Pretest 1

First, 'pretest 1' was conducted for participants' screening, and the measured variables were physical factors (abdominal circumference, FBS, HbA1c, BP, TG, TC, HDL-C, and LDL-C). Through this, participants with more than one risk factor for metabolic syndrome

Table 1. Contents of BeHaS Program including Metabolic Syndrome Management Education

| Wks | Metabolic Syndrome Education (20 min.) | Self-esteem Promotion Strategy (10-20 min.) | Exercise (20-30 min.) |
|-----|--|--|--|
| 1 | What is metabolic syndrome? | <ul style="list-style-type: none"> Noticing each other Caring back massage I love myself | <ul style="list-style-type: none"> ■ Warm-up exercise <ul style="list-style-type: none"> Breathing Neck strengthening Arm stretching Shoulder stretching Weight shift movement Group walking ■ Exercise <ul style="list-style-type: none"> Upper limb exercise Lower limb exercise Foot exercise Light hit the body Light hit the sole ■ Cooling-down exercise <ul style="list-style-type: none"> Breathing Neck strengthening Arm stretching Shoulder stretching |
| 2 | Abdominal obesity <ul style="list-style-type: none"> Health care Diet & Exercise | <ul style="list-style-type: none"> Participating program Caring back massage I love myself | |
| 3 | High blood pressure <ul style="list-style-type: none"> Health care Diet & Exercise | <ul style="list-style-type: none"> Complementing each other Caring back massage I love myself | |
| 4 | Diabetes <ul style="list-style-type: none"> Health care Diet & Exercise | <ul style="list-style-type: none"> Hoping each other Caring back massage I love myself | |
| 5 | hyperlipidemia <ul style="list-style-type: none"> Health care Diet & Exercise | <ul style="list-style-type: none"> Greetings to each team member Companioning others Caring back massage I love myself | |
| 6 | Explore nutritional facts | <ul style="list-style-type: none"> Floating balloons in small groups Blessing each other Caring back massage I love myself | |
| 7 | Low salt, Low fat and High protein diet | <ul style="list-style-type: none"> Comforting each other Caring back massage I love myself | |
| 8 | Presenting of personal experiences | <ul style="list-style-type: none"> Forgiving others Caring back massage I love myself | |

could be selected for this study. In addition, through the data of pretest 1, 2, and posttest were compared, more clearly compare the difference between when the BeHaS program, the intervention of this study, was not performed and when it was performed. However, self-esteem was not measured in pretest 1.

2.5.2 Pretest 2

Pretest 2 was measured 8 weeks after Pretest 1 and before the start of the BeHaS program. Measurement variables were physical factors (abdominal circumference, FBS, HbA1c, BP, TG, TC, HDL-C, and LDL-C) and self-esteem.

2.5.3 Posttest

Posttest was conducted to confirm the effect after the 8 weeks BeHaS program was over. Measured variables include physical factors (abdominal circumference, FBS, HbA1c, BP, TG, TC, HDL-C, and LDL-C) and self-esteem.

2.6 Data analysis

In this study, the collected data were analyzed using SPSS 24.0 version.

- 1) The general characteristics of the sample were calculated, including frequency, percentage, average, and standard deviation.
- 2) Physical factors of the sample were analyzed through a repeated measured ANOVA.
- 3) The self-esteem of the sample was analyzed using a paired t-test.

2.7 Ethical considerations

The Bioethics Review Committee of C University provided approval for the study (approved by 201806-SB-080-01). The researchers explained the purpose and method of the study, duration of participation, and risk factors of the study to the participants. In addition, participation in the study was voluntary and they could withdraw their consent at any

time during the research process, without any negative consequences.

3. Results

The general characteristics of the participants in this study are shown in Table 2. The study included 19 females, with an average age of 79.74 ± 5.18 years. Of the sample, ten were widowed (52.6%), and five were unmarried (26.3%). None of the participants smoked, and 18 of them (94.7%) did not drink. In addition, 14 of them (73.6%) said that their healthy living habit was relatively regular, while 7 people (36.8%) ate salty food, 9 people ate normal food (47.4%), and 3 people ate bland food (15.8%).

The results showed significant differences in the participants' abdominal circumference ($F=7.83$, $p=.002$), glycosylated hemoglobin ($F=5.77$, $p=.007$), total cholesterol ($F=12.42$, $p<.001$), low-density lipoprotein cholesterol ($F=14.89$, $p<.001$) and self-esteem ($t=-5.22$, $p<.001$) after

Table 2. General Characteristics of the Participants

(N=19)

| Characteristics | Categories | n (%) or M±SD |
|------------------|--------------------|---------------|
| Age | | 79.7±5.2 |
| Marriage status | Have a spouse | 4 (21.1) |
| | Bereaved spouse | 10 (52.6) |
| | No marriage | 5 (26.3) |
| Smoking | No | 19 (100) |
| Alcohol | Yes | 1 (5.3) |
| | No | 18 (94.7) |
| Lifestyle | Regular | 1 (5.3) |
| | Relatively regular | 14 (73.6) |
| | Irregular | 4 (21.1) |
| Dietary attitude | Low salt | 3 (15.8) |
| | moderate salt | 9 (47.4) |
| | High salt | 7 (36.8) |

M=mean; SD=standard deviation

Table 3. Comparison of Physical Factors and Self-esteem

(N=19)

| | | pre-test 1 | pre-test 2 | post-test | F / t | ρ |
|------------------------------|--------------|--------------------|--------------------|--------------------|--------|--------|
| | | M \pm SD | M \pm SD | M \pm SD | | |
| Abdominal circumference (cm) | | 95.37 \pm 6.68 | 95.21 \pm 6.88 | 92.40 \pm 6.82 | 7.832 | .002 |
| FBS (mg/dL) | | 108.42 \pm 14.06 | 116.32 \pm 20.20 | 109.68 \pm 11.48 | 2.012 | .148 |
| HbA1c (%) | | 6.01 \pm 0.59 | 5.95 \pm 0.50 | 5.60 \pm 0.38 | 5.772 | .007 |
| BP (mmHg) | Systolic BP | 140.42 \pm 20.66 | 135.37 \pm 14.96 | 133.63 \pm 13.03 | 1.717 | .194 |
| | Diastolic BP | 76.21 \pm 9.26 | 79.16 \pm 9.08 | 77.42 \pm 8.95 | .882 | .423 |
| Triglyceride (mg/dL) | | 112.79 \pm 49.46 | 112.21 \pm 48.08 | 125.79 \pm 51.98 | 1.096 | .345 |
| Total cholesterol (mg/dL) | | 187.16 \pm 50.05 | 192.11 \pm 41.89 | 157.00 \pm 35.24 | 12.422 | <.001 |
| HDL-C (mg/dL) | | 45.42 \pm 9.84 | 45.68 \pm 12.84 | 42.53 \pm 9.36 | 1.768 | .185 |
| LDL-C (mg/dL) | | 118.32 \pm 46.59 | 123.74 \pm 38.03 | 88.47 \pm 36.32 | 14.885 | <.001 |
| Self-esteem | | | 27.58 \pm 3.69 | 32.58 \pm 3.78 | -5.218 | <.001 |

FBS=Fasting blood glucose; BP=Blood pressure; HDL-C=High density lipoprotein cholesterol; LDL-C=Low density lipoprotein cholesterol

intervention when compared to the status before intervention (Table 3).

4. Discussion

This study was conducted to examine the effects of implementing the BeHaS program for managing metabolic syndrome for eight weeks on physical aspects like abdominal circumference, fasting blood glucose, glycated hemoglobin, blood pressure, triglycerides, total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, and self-esteem among females aged 70 years and older.

In the present study, three rounds of assessments (Pretest 1, Pretest 2, and Posttest) were conducted to examine the physical factors, and the results showed significant differences in abdominal circumference, glycated hemoglobin, total cholesterol, and low-density lipoprotein cholesterol after the intervention.

The reasons for significant decrease in abdominal circumference, one of the diagnostic criteria for metabolic syndrome, can be inferred as follows: The BeHaS program provides diet and nutrition education for 6 weeks during the 8 weeks intervention period, which showed similar result to the program including diet and exercise

for elderly people with metabolic syndrome for 12 weeks [25]. In addition, the exercise included in the BeHaS program was a low-intensity exercise, but the result was similar to the program including aerobic and resistance training program for 10 weeks [26]. Therefore, the eight-week BeHaS program, which includes diet education and exercise, is very effective in reducing abdominal circumference, so it is necessary to publicize the BeHaS program to the community for the elderly health.

Fasting blood glucose was not significantly different, but glycated hemoglobin showed a significant difference after the intervention. High fasting blood glucose is triggered by stress, sleep conditions, foods eaten before testing, and various environmental factors, while glycated hemoglobin shows an average value within the last three months [27]. Emphasis on nutrition and diet in the metabolic syndrome management education session, together with the BeHaS program, shows significant differences. The eight-week BeHaS program significantly reduced glycated hemoglobin, suggesting that it is effective in improving insulin resistance among those with risk factors of metabolic syndrome.

Further, diastolic blood pressure was higher in the second round of assessment and slightly lower in the third round of assessment, but not

significantly. However, systolic blood pressure had decreased steadily during the third round of assessment. The criterion of primary hypertension presented by the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [28] is more than 140mmHg systolic blood pressure or more than 90mmHg diastolic blood pressure. The participants' blood pressure was not significantly higher than the criteria for hypertension. Therefore, there was no significant decrease.

In this study, there were significant changes in total cholesterol and low-density lipoprotein cholesterol, but no significant changes were seen in triglycerides and high-density lipoprotein cholesterol. Compared to other chronic diseases such as hypertension and diabetes, dyslipidemia is difficult to recognize, and is difficult to treat and control [29]. Triglyceride and high-density lipoprotein cholesterol are included in the diagnostic criteria for metabolic syndrome, but the 8 weeks BeHaS program, which includes low-intensity exercise, does not appear to affect blood lipids. This is consistent with a study that applied an 8 weeks aquatic exercise program to women at risk for metabolic syndrome [30]. Therefore, it can be seen that it is necessary to adjust the exercise intensity or consider the number of proceeding weeks in the composition of the program.

Since its development, The BeHaS program has included Susie Kim's interpersonal care techniques (Noticing, Participating, Complementing, Hoping, Companionship, Comforting, Forgiving, etc.) based on self-esteem [15]. While conducting this study, participants expressed that 'Caring back massage' made them feel valuable through physical contact with each other, and that they were able to receive attention and consideration for themselves. They also said that 'I love myself' was able to think that they were a being loved by themselves. Self-esteem decreases with age [31]

and women are relatively lower with men [32]. Thus, the Behas program is suitable for improving the self-esteem of elderly women, which can be confirmed in several previous studies [17, 21, 22].

5. Conclusion

This one-group pre and posttest repeated measure design study was conducted to identify the physical factors and self-esteem of metabolic syndrome management education and a BeHaS program on the elderly, in order to aid the development of proper nursing interventions for promoting health among the elderly living in the community. The results of this study suggest that metabolic syndrome management education and the BeHaS program are effective for obesity management, blood glucose management, reducing cholesterol, and improving self-esteem. Therefore, they can be used effectively in preventing metabolic syndrome in the community.

The limitations of this study were that the participants were all women and that the study was conducted in a single group. Since the study included only female participants, findings may not be generalizable to men with metabolic syndrome risk factors. It was difficult to use a control group because the participants in that group did not have a health care program, so there was no motivation to come to the senior center. In addition, since self-esteem was only measured twice, a further study should be conducted to verify both physical and psychological factors, including various genders and more participants, in the study design section.

In the past, the BeHaS program has been applied to a wide range of participants with varied symptoms including osteoarthritis, breast cancer, stroke, and diabetes, as well as

participants living in collective facilities, elderly college students, obese women, and middle-aged women. Previous studies using the BeHaS program have shown no significant difference in glycated hemoglobin levels. However, since the study showed significant results, the BeHaS program can be applied to patients who are in the pre-diabetes stage or diagnosed with diabetes.

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