

The Effect of Breast Size on Physical Fitness, Body Image and Physical Activity Level in University Studentes

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Abstract

Background: The purpose of this study was to investigate the effect of breast size on upper extremity flexibility, back extensors strength, back extensors endurance, body image and physical activity level.

Method: A total of 80 female students (n=20 in each group; A, B, C, D bra cup size) between the ages of 18-25 years participated in this study. The physical fitness assessment was done by; Shoulder Reach Test (SRT) for upper extremity flexibility, back and leg dynamometer for back extensors strength, Sorensen Test (ST) for back extensors endurance and 3 Minute Step Test (3 MST) for cardiorespiratory fitness. The Body Image Scale (BIS) for assessing the body image and the International Physical Activity Questionnaires (IPAQ) for evaluating the physical activity level was also used.

Results: The right upper extremity flexibility of woman with B cup size were significantly less flexible than the A cup size ($p=0.004$). The cardiorespiratory fitness of the woman with A and B cup sizes were significantly different than the woman with D cup size ($p=0.001$ and $p=0.002$, respectively). The activity level of the woman with D cup size was significantly less than those with C cup size ($p=0.007$). The other parameters of physical fitness (i.e. back extensors strength, back extensors endurance) and body image were not significantly different when comparing woman with different cup sizes.

Conclusion: The results of this study showed that cardiorespiratory fitness and physical activity levels of the woman with D cup size were different when comparing to the woman's with smaller cup sizes. With the light of this study we could suggest for the woman with bigger cup sizes to increase their activity levels in order to prevent possible problems like reduced physical fitness and disturbed body image in the future.

Introduction

Anatomically the breast is located on the anterior thoracic wall which extends horizontally from the lateral border of the sternum to the mid-axillary line and vertically between the 2nd and 6th intercostal cartilages. Normally on both genders they are equally ectodermal developed as a double gland, the breast does not show further development in men after birth, whereas they continue to develop from the time of the puberty period in women [1].

The enlarged chest, which is disproportionate to the woman's biotype, is defined as "breast hypertrophy" and is classified according to the distance between xiphoid process and mamilla. Factors causing breast hypertrophy include pregnancy, trauma, bleeding, inflammation, and rogen receptor impairment, chronic diseases, and elevated estrogen levels [2]. Depending on breast hypertrophy, various physical problems may occur; breast pain, neck pain, shoulder pain, thoracic spine pain, headache, grooving pain caused by underwear hangers, ptotic breast, scapular protraction, static postural disturbance and ulnar nerve paresthesia [3-6]. The tension in the cervical extensor muscles may increase due to the weight difference between the upper and lower trunk [6]. In addition to this, changes in the location of the center of gravity may occur which may cause pain in the thoracic spine [7]. The physical problems may consequently affects the body image, lower the self-esteem, cause to depression and decreased sexual intercourse [8].

Many factors may cause a reduction of social activity of woman with breast hypertrophy and therefore they may avoid physical exercise due to the physical factors (e.g. back pain) or psychological factors (e.g. body shaming). Thus, the purpose of this study was to investigate the effect of breast size (A, B, C, D cup size) on flexibility, back extensors strength, back extensors endurance, body image and physical activity level.

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Materials& Methods

Participants

Sedentary (i.e. exercising at least 3 days / 20 minutes per week) female students between the age of 18-25 years and with BMI between 18-25kg/m² were included in this study. Individuals with breast reconstruction (mastopexy, reduction and augmentation mammoplasty), breast asymmetry, in their menstrual period, and with chronic illnesses were excluded. The evaluations were explained in detail to the individuals who met the study criteria and the voluntary consent form was signed if they accept to participate.

Outcome measures

Physical Fitness Assessment

Shoulder Reach Test (SRT) was used to assess upper extremity flexibility. During the test, individuals were firstly asked to bend their elbow and keep their palm on the back of their neck and slide it down their back and between their shoulder blades. Secondly they were asked to keep the other hand with the palm facing out and the back of their hand rests on the middle of their back, than to try touching

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the fingers of both hands together. The distance between the middle fingers was measured with a tape measure and recorded in centimeter (cm). The test was repeated for both arms [9].

Leg and back dynamometer was used to assess back extensor muscles strength. The patients were asked to stand on the dynamometer platform with their feet placed at shoulder width. Then they were asked to hold the dynamometer bar with both hands and to pull on the chain as hard as possible, the knees should be kept straight to applying maximum force. Three evaluations were made and the best value in kg was recorded [10].

Sorensen Test (ST) was used to evaluate the endurance of trunk extensor muscles. In the ST, the individual was placed in a prone position in the bed with the body hanging from the top of the iliac crest and the arms crossed on the chest. The lower extremity (from the hip, knee and ankle joints) should be stabilized by the therapist. The time during which the patient keeps the upper body straight and horizontal was recorded with a chronometer. The test was terminated when the patient was no longer able to maintain the horizontal position, became too fatigued to continue, or experienced pain [11].

3 Minute Step Test (3 MST) was used for the assessment of the cardiorespiratory fitness. Participants were asked to step on and off a step (12-inch and 30 cm height) to the metronome beat (up, up, down, down) set at 60 beats per minute for 3 consecutive minutes. At the beginning, the participants were asked to wear a polar watch to record the heart rate. At the end of 3 minutes, the test were stopped immediately, and the participants were asked to sit down and the heart rate at 1 minute after the individual was seated recorded [12].

Body Image

Body Image Scale (BIS) was used in the evaluation of the body image. The BIS consists of 40 items and each item is about an organ or body part or a function. Each item of the BIS is scored from 1 to 5 and example response options are "I like it very much" (1 point), "I like it a lot" (2 points), "I cannot decide" (3 points), "I do not like it" (4 points) and "I do not like at all" (5 points). The total score ranges from 40 to 200, higher scores indicating higher levels of dissatisfaction with various body parts and functions [13].

Physical Activity Level

The International Physical Activity Questionnaires (IPAQ) was used to determine the physical activity levels of the participants. IPAQ was developed to obtain valid and comparable information on the level of physical activity on a daily basis based on individual reports of physical activity [14].

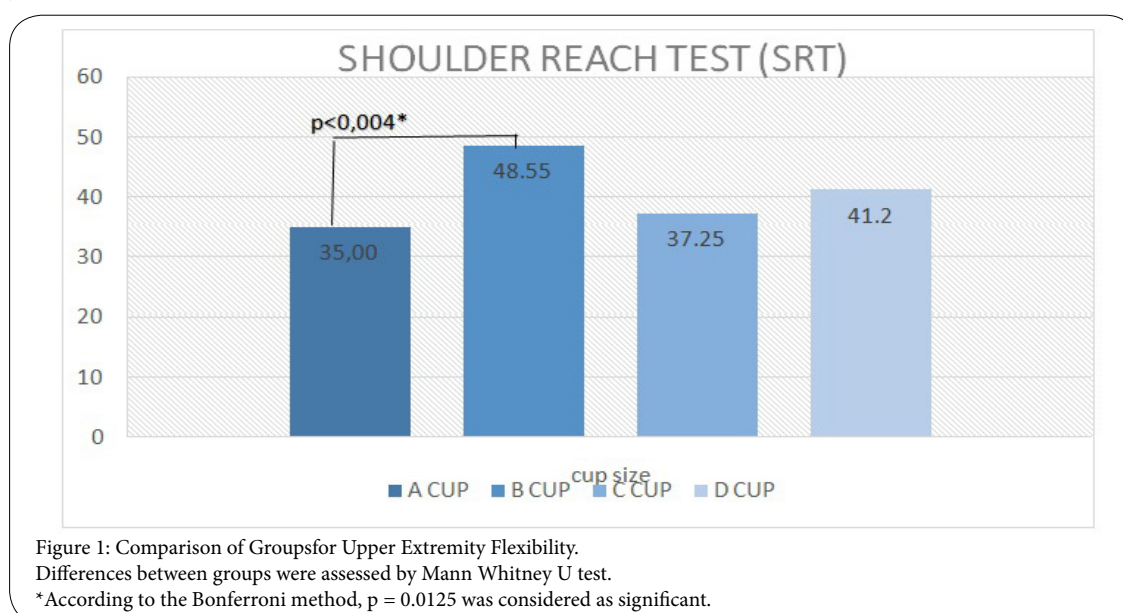
Statistical Analysis

In this study, the PAWS 18 software (release 18:00) were used for the statistical analyses. The demographic data of the participants was presented as; age (years), body weight (kg) and height (m), BMI (kg/m²) and the bra cup size (A, B, C or D). Study data were analyzed by Mann Whitney U test. The Mann-Whitney U test was used to compare differences between independent groups because the variables were not normally distributed. We corrected the significance level using Bonferroni method in order to reduce type I error, because we conducted multiple comparisons in this study. We had four different groups to compare, therefore the significance level "p" was determined as $0.05/4 = 0.0125$.

Results

A total of 80 women were included in this study, with 20 people in each group (bra cup size A, B, C, D). The demographic characteristics of the individuals were recorded. According to this, the ages of the individuals were between 18-25 years and the average age is 21 ± 1.5 years. The body weights were ranging from 40 to 90 (kg) and average weight was 59.7 ± 10.7 kg. The range of height were between 1.50 to 1.70 (m) and average height is 1.64 ± 2.41 m. BMIs ranged from 14.5 to 30.4 (kg/m²) with an average of 22.03 ± 3.2 kg/m².

The results of the analysis showed that the only statistically significant difference for the upper extremity flexibility were between the woman with cup size of A - B ($p=0.004$). There was no statistically significant difference between the other groups with a cup sizes; A-C ($p=0.317$), A-D ($p=0.076$), B-C ($p=0.029$), B-D ($p=0.219$) and C-D ($p=0.219$) (Figure 1).



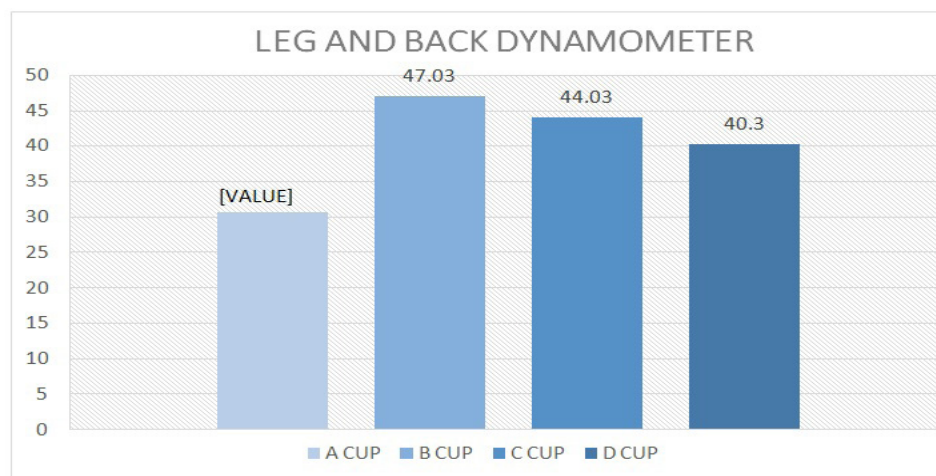


Figure 2: Comparison of Groups for Back Extensors Strength.
Differences between groups were assessed by Mann Whitney U test.
*According to the Bonferroni method, $p = 0.0125$ was considered as significant.

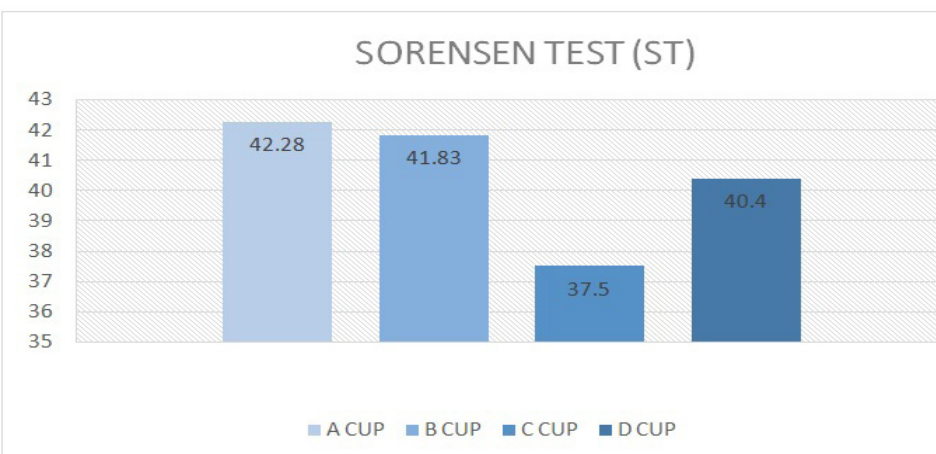


Figure 3: Comparison of Groups for Back Extensors Endurance.
Differences between groups were assessed by Mann Whitney U test.
*According to the Bonferroni method, $p = 0.0125$ was considered as significant.

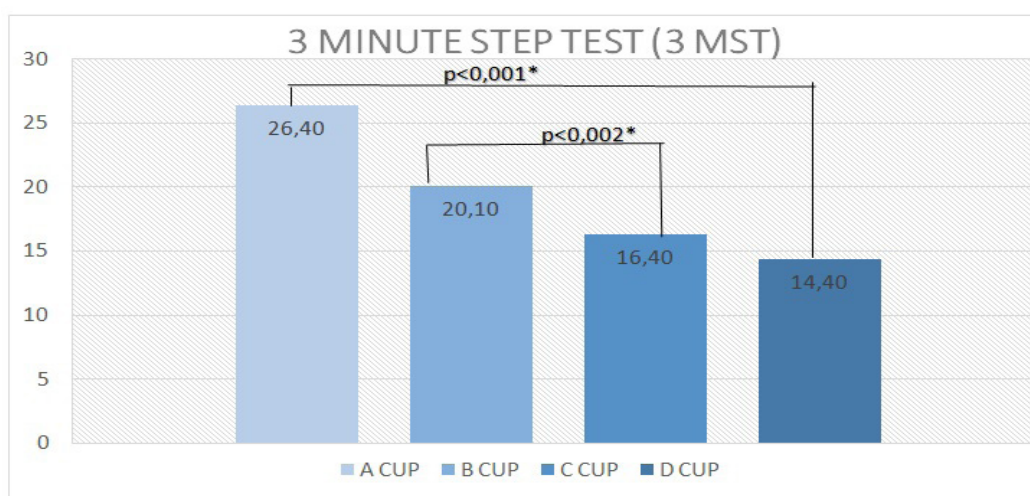


Figure 4: Comparison of Groups for Cardiorespiratory Fitness.
Differences between groups were assessed by Mann Whitney U test.
*According to the Bonferroni method, $p = 0.0125$ was considered as significant.

No significant difference were detectedfor back extensors muscle strength results when comparing the groups; A-B ($p=0.123$), A-C ($p=0.130$), A-D ($p=0.023$), B-C ($p=0.473$), B-D ($p=0.204$) and C-D ($p=0.029$) cup sizes (Figure 2).

There were no difference between any of the groups;A-B ($p=0.787$), A-C ($p=0.797$), A-D ($p=0.665$), B-C ($p=0.409$), B-D ($p=0.871$) and C-D ($p=0.588$) (Figure 3).

It was found that there was a statistically significant difference between the groups with A-D ($p=0.001$) and B-D ($p=0.002$) cup sizes. However, no statistically significant differences were found between the woman with cup size of; A-B ($p=0.828$), A-C ($p=0.291$), B-C ($p=0.273$) and C-D ($p=0.029$) (Figure 4).

No significant difference were detectedfor back extensors muscle strength results when comparing the groups; A-B ($p=0.291$), A-C ($p=0.432$), A-D ($p=0.449$), B-C ($p=0.776$), B-D ($p=0.756$) and C-D ($p=0.935$) cup sizes (Figure 5).

It was found that there was a statistically significant difference between the woman with C-D ($p=0.007$) cup size, however no statistically significant difference were found for the other groups; A-B ($p=0.736$), A-C ($p=0.201$), A-D ($p=0.279$), B-C ($p=0.234$) (Figure 6).

Discussion

Avoidance of physical exercise due to the physical factors (e.g. postural problems) or psychological factors (e.g. embarrassment) are amongst the most common problems in women with breast hypertrophy. Women may have difficulties during exercising due to neck, shoulder and back pain, depending on the breast size ratio [8-9]. The results of our study showed that the upper extremity flexibility were lower in women with B cup size than women with A cup size, while those with D cup size were found to have the lowest cardiorespiratory fitness level and physical activity level.

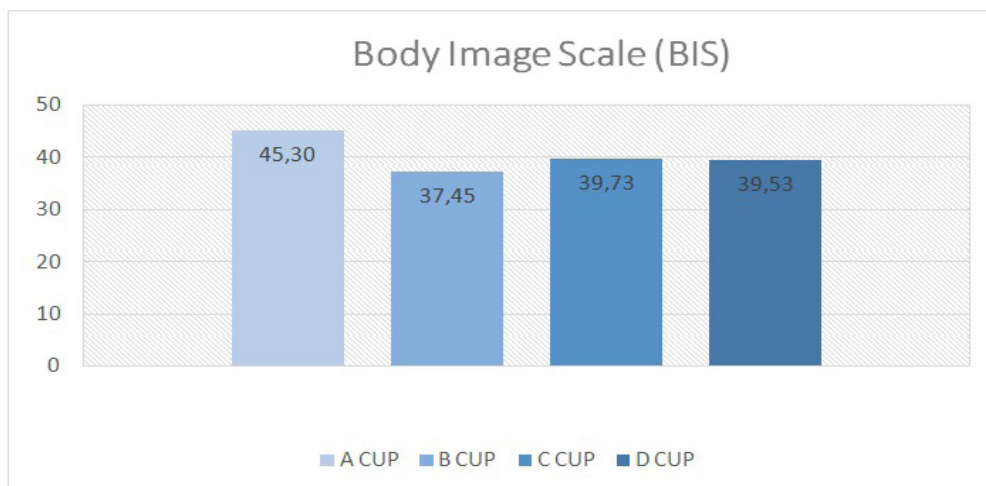


Figure 5: Comparison of Groups for Body Image.
Differences between groups were assessed by Mann Whitney U test.
*According to the Bonferroni method, $p = 0.0125$ was considered as significant.

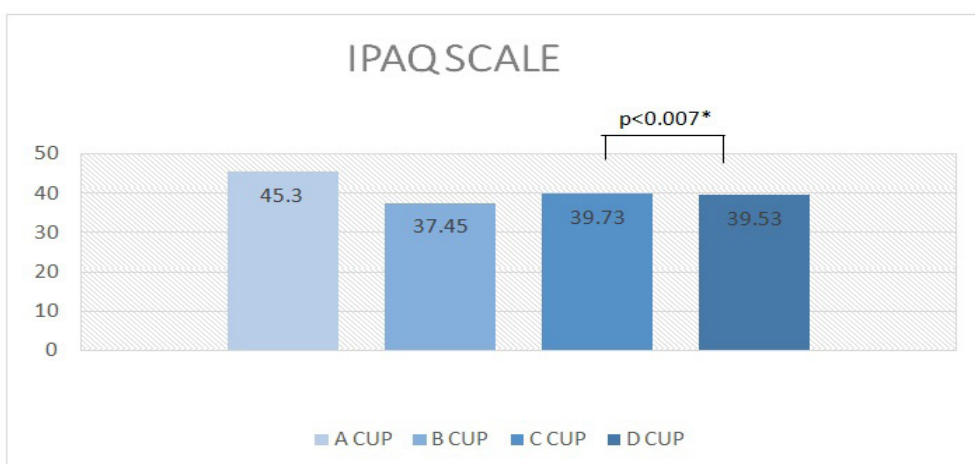


Figure 6: Comparison of Groups for Physical Activity Level.
Differences between groups were assessed by Mann Whitney U test.
*According to the Bonferroni method, $p = 0.0125$ was considered as significant.

Flexibility can vary according to various factors such as age, sex, inactivity, elasticity of connective tissue and body type [15]. Measurement results for women with breast hypertrophy showed that women with B cup size had lower upper extremity flexibility than women with A cup size. The weight difference between the upper and lower trunk in women with breast hypertrophy may cause an increase in tension in the cervical extensor muscles. In addition, the kyphosis may increase due to breast hypertrophy, and the back extensor muscles may lengthen and weaken. In our study, there were no differences between the groups in terms of back muscle strength and endurance related to breast size. The individuals participated in our study were between the ages of 18-25 years which may indicate that we had included a young and dynamic woman. Therefore, it is possible that physical fitness level of our participants may not affect by the breast size yet.

The body image is a combination of environmental, social and psychological factors that represent the physical appearance of the individual. It is the image that a person has of their physical self and the thoughts and feelings that result from that image. The body image is known to be related with the anthropometric measurements. It is also stated that women have a sense of low self-esteem about their bodies due to a factor that breast hypertrophy causes difficulty of finding clothes [8-10,16]. In our study, there was no difference for body image between the women with different cup sizes. This may be due to the relatively normal physical fitness levels of our participants.

A study conducted between 2011- 2014 showed that in a group of women who underwent breast reduction surgery due to breast hypertrophy the physical activity levels were found to be increased [8,17]. In our study, it was determined that the women with D cup size had less cardiorespiratory fitness and activity level than the other cup sizes. Due to reduced cardiorespiratory fitness and activity level of the woman with bigger cup size it is possible that the physical fitness and body image of this population may be affected in the following years. Based on these findings, increasing the physical activity for the woman with bigger cup sizes can be suggested in the younger ages in order to prevent the possible negative effects on the physical fitness and body image due to larger breast size. The limitation of our study was including only the young aged woman, we already know that breast hypertrophy during later stages of women's life may occur due to gaining weight, gestational and postmenopausal factors. Therefore, including young woman population this may hamper to generalize our findings to woman in all ages.

Conclusion

The results of our study demonstrated that cardiorespiratory fitness and physical activity levels of the woman with bigger cup size were different when comparing to the woman's to smaller cup sizes, however no significant difference was found on the other physical fitness parameters and body image between women with different cup sizes. On the basis of these findings increasing the physical activity for the woman with bigger cup sizes can be suggested for the women in their younger ages in order to prevent possible problems like reduced physical fitness and disturbed body image in the future.

Competing Interests

The authors declare that they have no competing interests.

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