

## **EFFECTS OF EXPERIMENTAL BODYBUILDING TRAINING PROGRAMME ON TRANSFORMATION OF SOMATOMETRIC CHARACTERISTICS IN WOMEN**

*(Research note)*

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### **Abstract**

*The aim of this study was to determine the effects of four-month implementation of the experimental programme of bodybuilding training on transformation of somatometric characteristics in women, and was conducted on a sample of 26 selected trainees of chronological age 19-29 years ( $\pm 6$  months). The results of applied discriminative analysis indicated that there were no statistically significant differences in the studied somatometric area with subjects between the initial and final measurements, so one can conclude that, generally speaking, the experimental programme of bodybuilding training did not affect the transformation, i.e. positive changes in the entire somatometric area within the studied sample of women. Individually the largest contribution to discrimination, had variables of body mass and skin fold of the back. Viewed separately, these data can only indicatively point out to the trend and disposition of the effect of bodybuilding programme to reduction of body mass and subcutaneous fatty tissue in women. It can be assumed that greater and more important effects of such programme could be achieved by adjusting the applied programme, and in such way to make future possible researches by training increased scope, intensity and duration time.*

**Keywords:** *body height, legs length, upper arm and chest size, body mass, triceps and stomach skin wrinkle, discriminative canonical analysis*

### **INTRODUCTION**

It has been presumed within this present study as well, that the implementation of bodybuilding training programme could result by positive transformational effects on somatometric characteristics in women.

With modern living and working conditions of people, lack of leisure time and consequence of an increasingly present hypokinesia, the basis of recreational exercises in the gym derives primarily for health reasons. When women are motivated and concerned about their body fit, the aesthetic motives could be also the basic starter for the programmed physical activity with the use of different apparatuses, equipment and weights, and all with the aim of decreasing the circular dimensionality and subcutaneous fatty tissue.

The objective of this research referred to determination of the effects of the experimental bodybuilding training programme on transformation of somatometric characteristics in women.

We suggested the hypothesis based on given subject and the research problem, and the defined objec-

tives and tasks:

H1 experimental programme of bodybuilding training has statistically significant effects on improvement of somatometric characteristics in women.

### **METHODS**

The research was carried out on the sample of 26 selected bodybuilding trainees of chronological age 19 – 29 (+ 6 months). Selected trainees were chosen from the „Club of strength sports“ from Leskovac – „Body-fitness“ 1 and 2, as well as the „Club of weight-lifters“ (KDT) „Miodrag Perović“, from Leskovac too. Among the anthropometric variables, the following were measured: body height in cm (AVIST), length of legs in cm (ADUNO), length of arms in cm (ADURU), chest size in cm (AOGKS), size of upper arm in stretched state in cm (AONAD), thigh size in cm (AOBUT), body mass in gr (AMAST), thickness of skin wrinkle in the part of triceps of the upper arm in mm (AKNNA), thickness of skin wrinkle in the part of back in mm (AKNLE), thickness of skin wrinkle in the part of stomach in mm

(AKNTR) and the total fat, expressed as percentage (UKUPM). All anthropometrical measurements were realized by standard instruments, following the methodology recommended by International biological programme (Weiner & Lourie, 1968.).

For the purpose of calculation of subcutaneous fatty tissue, an instrument for the estimation of body fat volume, of the brand »OMRON«, type BF 300, was used, within the laboratory of the Centre for multidisciplinary research work of the »Faculty of Sport and Physical Education«, University of Niš.

Obtained data were processed by statistical package for data processing SPSS 12.0. Determination of the effects of experimental bodybuilding training programme on transformation of somatometric characteristics with researched sample was realized by methodological procedure of discriminative canonical analysis.

**RESULTS WITH DICUSSION**

Basic statistical parameters of the exercisers were shown for each variable on the Table 1. For each vari-

able, the values of arithmetic mean are given (Mean), minimum (Min) and maximum (Max) result, standard deviation (Std. Dev.), standard error (Standard Error) Skewness and Kurtosis.

Table 1. shows the results of subjects at the initial measuring. Obtained values of the results indicate that there are not any significant deviations from normal distribution, taking into consideration that the values of the coefficient of curvature do not exceed 1.00, except with the variables length of the legs (ADUNO = 1.20), size of the upper arm (AONAD = 1.31) and skin wrinkle of upper arm (AKNNA = 1.97), which more significantly deviate from the normal distribution.

Values of the coefficient of roundness range below normal values of distribution 2.75, which makes the distribution platykurtic or rambling, except with the variable: skin wrinkle of upper arm (AKNNA = 4.71), pointing out to increased concentration of results around arithmetic mean (decreased discrimination).

Table 2. shows the results of the subjects at the final measuring. Obtained values of the results point

*Table 1. Basic statistical indicators of somatometric characteristics of the exercisers at initial measuring*

| Variables | Mean   | Min    | Max    | Range | Std Dev. | Stand. Error | Skew  | Kurt  |
|-----------|--------|--------|--------|-------|----------|--------------|-------|-------|
| 1.AVIST   | 166.12 | 155.00 | 182.00 | 27.00 | 7.41     | 1.45         | 0.86  | -0.18 |
| 2.ADUNO   | 88.73  | 80.00  | 105.00 | 25.00 | 6.49     | 1.27         | 1.20  | 1.38  |
| 3.ADURU   | 74.88  | 69.00  | 79.00  | 10.00 | 2.97     | 0.58         | -0.77 | -0.30 |
| 4.AOGKS   | 85.63  | 69.00  | 103.00 | 34.00 | 8.11     | 1.59         | -0.47 | 0.31  |
| 5.AONAD   | 25.77  | 21.00  | 37.00  | 16.00 | 3.61     | 0.71         | 1.31  | 2.45  |
| 6.AOBUT   | 54.75  | 49.00  | 62.00  | 13.00 | 3.78     | 0.74         | 0.42  | -0.94 |
| 7.AMAST   | 61.92  | 49.50  | 83.50  | 34.00 | 8.25     | 1.62         | 0.76  | 0.56  |
| 8.AKNNA   | 12.98  | 7.00   | 31.00  | 24.00 | 5.31     | 1.04         | 1.97  | 4.71  |
| 9.AKNLE   | 13.64  | 7.90   | 19.00  | 11.10 | 2.95     | 0.58         | 0.00  | -0.71 |
| 10.AKNTR  | 16.34  | 8.80   | 23.00  | 14.20 | 3.45     | 0.68         | -0.26 | -0.07 |
| 11.UKUPM  | 19.12  | 11.90  | 29.20  | 17.30 | 4.67     | 0.92         | 0.42  | -0.63 |

*Table 2. Basic statistical indicators of somatometric characteristics of the exercisers at final measuring*

| Variables | Mean   | Min    | Max    | Range | Std. Dev. | Std Error | Skew  | Kurt  |
|-----------|--------|--------|--------|-------|-----------|-----------|-------|-------|
| 1.AVIST   | 166.50 | 155.00 | 182.00 | 27.00 | 7.48      | 1.47      | 0.83  | -0.13 |
| 2.ADUNO   | 88.73  | 80.00  | 105.00 | 25.00 | 6.49      | 1.27      | 1.20  | 1.38  |
| 3.ADURU   | 74.96  | 69.00  | 79.00  | 10.00 | 3.00      | 0.59      | -0.82 | -0.31 |
| 4.AOGKS   | 84.88  | 69.00  | 102.00 | 33.00 | 8.01      | 1.57      | -0.41 | -0.04 |
| 5.AONAD   | 25.42  | 20.00  | 31.50  | 11.50 | 2.67      | 0.52      | 0.50  | 0.63  |
| 6.AOBUT   | 54.19  | 50.00  | 61.00  | 11.00 | 3.31      | 0.65      | 0.79  | -0.22 |
| 7.AMAST   | 60.33  | 50.00  | 80.00  | 30.00 | 7.54      | 1.48      | 0.91  | 0.74  |
| 8.AKNNA   | 12.49  | 7.10   | 30.00  | 22.90 | 5.00      | 0.98      | 2.10  | 5.40  |
| 9.AKNLE   | 12.99  | 7.00   | 18.70  | 11.70 | 2.96      | 0.58      | 0.13  | -0.54 |
| 10.AKNTR  | 15.48  | 7.60   | 23.00  | 15.40 | 3.19      | 0.63      | -0.20 | 1.01  |
| 11.UKUPM  | 17.72  | 10.00  | 27.20  | 17.20 | 4.29      | 0.84      | 0.29  | -0.27 |

Table 3. Discriminative analysis of somatometric characteristics between initial and final measurements

|   | Eigen-Value | Canonical R | Wilks' Lambda | Chi-Sqr. | Df    | p-level    |
|---|-------------|-------------|---------------|----------|-------|------------|
| 0 | .10         | .31         | .90           | 4.58     | 10.00 | <b>.91</b> |

out that there are not any significant deviations from the normal distribution, taking into consideration that the values of the coefficient of curvature do not exceed 1.00, except with the variables: length of leg (ADUNO = 1.20), and skin wrinkle of upper arm (AKNNA = 2.10), which more significantly deviate from the normal distribution.

Values of the coefficient of roundness ranges below the normal values of distribution 2.75, which makes the distribution platykurtic or rambling, except with the variable skin wrinkle of upper arm (AKNNA = 5.40).

A discriminative analysis has been applied for determination of quantitative differences between the initial and final measuring with subjects toward manifesting the space of somatometric variables. Both values of the coefficient of discrimination and the coefficient of canonical correlation were calculated. Discriminative vigour of the applied system of variables was determined by Wilks' lambda, and the significance of discriminative vigour was tested by Bartlett  $\chi^2$  test. The probability of error was calculated, on eliminating the hypothesis that the function has not been significant (p) with corresponding number of the degrees of freedom (df).

Table 3. shows one isolated function from which it can be seen that in the entire system of the applied variables, between the initial and final measuring with subjects, there is no any statistically significant difference (p = .91), pointing out that the experimental programme had no influence on changes of anthropometrical measures. Isolated discriminative function had no statistical significance. Thus, it can be stated that there were no more significant quantitative differences found between the initial and final measurements of the applied variables with the subjects.

Table 4 shows a factor structure of the isolated discriminative function of investigated anthropometrical variables of the subjects. According to both the position of centroid groups and coordinates of variables on discriminative function, we can state that the obtained function was primarily determined by better values of body mass measures, as well as skin wrinkles of the back (Tables 4. and 5.).

Table 5. shows the centroid of groups that represent arithmetic mean at initial and final measurements with the subjects of the control group. Results point out that the discrimination was not that high and significant, since it ranges from -.32 to .32. Separated values characterize the results between initial and final measurements, without pointing out that their discrimination was significant.

Table 4. Projections of variables on isolated discriminative function

| Varijable | Function 1 |
|-----------|------------|
| 1.AVIST   | -1.23      |
| 2.ADUNO   | .14        |
| 3.ADURU   | .52        |
| 4.AOGKS   | -10        |
| 5.AONAD   | .05        |
| 6.AOBUT   | .63        |
| 7.AMAST   | 1.08       |
| 8.AKNNA   | -.81       |
| 9.AKNLE   | 1.07       |
| 10.AKNTR  | .37        |
| 11.UKUP   | .78        |

Table 5. Centroid of Groups

| Measure | Function 1 |
|---------|------------|
| 1       | .32        |
| 2       | -.32       |

**CONCLUSION**

According to the results of research, which was carried out on the sample of 26 selected trainees of chronological age 19 – 29 (+ 6 months), members of the „Club of strength sports“ from Leskovac – „Body-fitness“ 1 and 2 and „Club of weight-lifters“ (KDT) „Miodrag Perović“, from Leskovac as well, a conclusion could be made that with the subjects within investigated functional space there were not found any statistically significant differences between initial and the final measurements.

Based on the results of canonical discriminative analysis, it can be concluded that with the subjects in the experimental group within the investigated somatometric characteristics, there were no any statistically significant differences between the initial and final measurements.

Although in the entire system of somatometric variables there were not found any significant differences, and thereby it can be, generally, concluded that the experimental programme of bodybuilding training did not affect the transformation, i.e. changes in the overall

somathometric area with the tested sample of women, while individually the largest contribution to the discrimination hierarchically, had variables of body mass (AMAST) and skin fold back (AKNLE), and thus, such data can only indicatively point out to the trend and the disposition of the effects of bodybuilding programme to reduce body mass and subcutaneous fatty tissue in women. This statement refers to the fact that the larger and more significant effects of such a programme could be expected together with its correction, in terms of increasing its duration and estimated volume and intensity.

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