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Original article

EFFECT OF „INSANITY" WORKOUT ON THE ANTHROPOMETRICAL INDICES OF THE MILITARY STUDENTS

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Abstract

Aim. The purpose of this research is to emphasize the effect of "Insanity" workout adapted by us and applied in physical education classes from the military upper education on students' anthropometrical indices.

Methods. For this research, we chose 20 students as the experiment group (intelligence studies) from "Mihai Viteazul" National Intelligence Academy of Bucharest. The research consisted of the use of a workout (*Insanity*) adapted by us, which was applied to the experiment group twice a week in the 6th stage of the physical education and sport class. The application of "Insanity" Workout during the class represents the independent variable of the experiment and was chosen both for the need to vary the content of the class and because of the novelty element.

The exact assessment of weight is possible only based on the study of body composition. Therefore, we used the direct method for weighing with an Omron BF-508 weight scale, a clinically valid apparatus offering an analysis of the whole body. We determined by this weight scale: body weight; body mass index (BMI) and body fat percentage.

Results. The subjects of the experimental group had improved anthropometrical indices: the average body weight of the subjects decreased by 1.35 kg (2.2%), the average value of the body mass index decreased by 0.48 kg/m^2 (2.2%), and the percentage of body fat decreased by 1.24 % (4.4%).

Conclusions. We can say that the results obtained by the students of the experimental group are better than those obtained from the control group in the tests and measurements.

Keywords: insanity workout, anthropometrical indices, body weight, body mass index (BMI), military education.

Introduction

The interest in this topic also derives from the desire to always increase the quality of the activity carried out by us when preparing military students. Physical activity practiced regularly improves physical and mental health considerably. Physical movement helps an individual develop physically, prevents emotional lability, shapes temperament and attitudes, and provides a solid basis for forming personality.

Thus, from the system of subject matter acting at an age in which growth processes are still ongoing, including in the academic years, the formation and training of the young generations cannot be conceived without physical education.

"The military physical education provides the quantity and quality bio-psycho-metrical support expressed by speed physiological indices, skill, resistance and force, plus a varied system of principles and motor skills" (Ceașcai, 2009).

With the increase in the level of awareness, more and more young people realize the benefits on the physical and mental health of practicing a form of movement. Thus, they become aware of the role played by it in regulating body weight, improving the immune system and of its social role (acceptance).

In physical education (PE) lessons in military education, general physical training has an important weight, which is why new training programs that have novelty elements and challenge the student from several points of view are always welcome (Tudor, Smîdu, Frăţilă & Smîdu, 2020).

More than this, the studies showed the importance of physical exercise and the powerful influence that it has both on self-esteem as it concerns the physical aspect and on general self-esteem.

Physical education from the military system, due to its characteristics, creates an inter-conditioning relationship between motricity and the human psychic, of mutual determination.

According to Cracană, Tudor & Smîdu (2022), military physical education aims at improving the overall physical development, exercise capacity and health status of military students, all of this leading to the formation of a well-trained military person able to withstand the stress and tensions existing in this profession.

In 2020, the World Health Organization (WHO) published "*Health and Development through Physical Education and Sport*", stating that "an investment of USD 1 (time and equipment) leads to USD 3.2 in medical cost savings." This document also reveals that practicing sports daily for 30 minutes by adults and 60 minutes by children significantly reduces the risk of cardiovascular diseases, cerebral accidents, obesity, and even of certain forms of cancer".

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The aspects previously mentioned created the premises of a scientific research that will demonstrate the effects that a certain workout has on the anthropometrical indices if practiced regularly during physical education and sport classes from the military upper education.

"Insanity" is a recently appeared program, developed by Shaun T. and the US company Beachbody, with high intensity. This program may be used by a healthy person with previous medium physical preparation. The insanity Program is an extremely difficult combination of cardio, force and stretching, forcing and testing the limits.

Adyrkhaev & Ilchenko (2016), in their scientific research work, proposed the introduction of new teaching styles in higher education institutions. The success of implementing new programs in optimizing students' training has been proven by local and foreign specialists. They note that the new teaching styles allow students to actively participate in the educational process and achieve the set objectives with high efficiency (Osipov et al., 2016, p. 4; p.33). The use of audio and visual support contributes to saving time, increasing the knowledge, understanding and interest of students (Al-Haliq, Oudat & Al-Taieb, 2014, p. 21). Visual aid arouses the interest of students and helps teachers to easily explain concepts (Ghulam, Khuram, Naqvi & Nadeem, 2015, p.26).

The training is based on a fitness method called "training with maximum interval". Thus, this workout replaces the traditional exercise of moderate intensity with the exercise of high intensity for 3 minutes with a short rest and relaxation for 30 seconds. Adding high-intensity exercise forces the body to use the fast muscular fibers that are not involved in the cardio exercises. This implies that a person may impede himself/herself in his/her response to adaptation to stress, which happens when the body gets used to a certain level of effort.

The exercises of this training vary from cardio exercises to plyometric exercises (when exercised intensely, with fast movements to increase the muscular force) and stretching and abdominal exercises. It also uses jumping exercises from various sports, such: basketball, ski and boxing, to tonify the muscles of the inferior limbs.

The personal contribution to this program is represented by the exercises performed in the last 15 minutes of the class, keeping the same pattern of the workout. Thus, we tried to adapt this workout to the requirements and training needs of the military students from the point of view of their need to learn certain self-defense and attack procedures.

Objectives

Objectives established within the research:

- General objectives*:* - the main objective of the research is to improve the anthropometrical indices: body weight; body mass index (BMI) and body fat percentage.

- Specific objectives*:* - by weight and assessment scales, we will also determine the progress level of the subjects submitted to this research after applying the workout:

  - improving effort capacity;
  - harmonious physical development.

Methods

Research methods and techniques used: studying the specialty bibliography, observation method, graphical method, test method – Anthropometrical assessment test, statistical-mathematical method.

The research-type experiment with one variable was carried out in the gym of "Mihai Viteazul" National Intelligence Academy of Bucharest.

The initial test was conducted at the beginning of the 2nd semester, and the final test was conducted at the end of the semester, both for the experiment group and the control group. For research, we chose as experimental group the students from the 2nd year, major intelligence studies (20 students). The research consisted of the use of the workout (*Insanity*) adapted by us, which was applied to the experiment group twice a week, in the 6th stage of the physical education class. While the subjects from the experimental group were performing the workout, the subjects from the control group were performing a general physical training program, individually, in the gym/fitness room.

The application of "Insanity" workout adapted by us during the class represents the independent variable of the experiment and was chosen both from the need to vary the content of the class and due to the novelty element.

"Insanity" workout is performed frontally by the whole group of students, the latter making exercises projected on the wall (by projector), with the same speed, intensity and in the same direction, with no need for any kind of special equipment. The content of the training is composed of simple exercises, with few direction changes, without complicated twists or choreography.

The exercises of this training vary from cardio exercises to plyometric exercises (when performed intensely, with quick movements to increase the muscular force) and stretching and abdominal exercises. There are also jumping exercises from various sports, such as: basketball, skiing and boxing to notify the inferior limbs.

Although they include various exercises, many of the training sessions have the same format: 3 up to 5 high-intensity exercises in a row for 3 minutes, followed by 30 seconds of rest, and then the cycle is repeated twice, with increased speed and intensity from a cycle to another.

The calendar of the workout for 11 weeks is presented in the following table:

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Table 1. Insanity Calendar

WEEK	CLASS 1	CLASS 2
1	Plyometric cardio circuit	Cardio: power and resistance
2	Cardio recovery	Pure cardio
3	Plyometric cardio circuit	Cardio: power and resistance
4	Pure cardio	Plyometric cardio circuit
5	Cardio recovery	Cardio: power and resistance
6	Pure cardio/Cardio abdominals	Plyometric cardio circuit
7	Pure cardio/Cardio abdominals	Cardio recovery
8	Cardio: power and resistance	Plyometric cardio circuit
9	Pure cardio/Cardio abdominals	Cardio: power and resistance
10	Plyometric cardio circuit	Cardio recovery
11	Pure cardio/Abdominals	Plyometric cardio circuit

Anthropometric assessment – test

The exact assessment of body weight is possible only based on the study of body composition. To this end, we used the direct method of weighing with an Omron BF-508 weight scale (fig. 1), a clinically valid apparatus, both for measuring weights and for determining body composition, offering an analysis of the whole body.

Figure 1. Omron BF-508 scale

We determined by the *Omron BF-508* scale:

- Body fat percentage;
- Body mass index (BMI);
- Level of visceral fat.

By weighing with BF-508 due to bioelectrical impedance (BI), we also measured the body fat percentage.

Table 2. Values of body fat

Body fat %	Interpretation
10 – 18 %	Normal

The ideal body weight related to the height of a person is represented by the body mass index (BMI), also called Quetelet's index.

The BMI assessment is made by using the following formula:

BMI = actual weight / Height^2

(where weight is expressed in kilograms (kg) and height is expressed in meters (m)).

Tabel 3. Interpretation of body mass (National Institutes of Health USA)

BMI kg/m^2	Interpretation
< 16	Severe underweight
16 - 17	Serious underweight
17 - 18,5	Pondered underweight
18,5 - 25	NORMAL
25 - 30	Moderate overweight (overweight)

30 - 35	Serious overweight (1st grade obesity)
35 - 40	Severe overweight (2nd grade obesity)
> 40	Mobid, monstruous obesity (3rd grade)

Visceral fat – is the fat found inside the abdominal cavity and surrounding the vital organs in the abdominal area (table 4).

Table 4. Interpretation of visceral fat

Visceral fat	Interpretation
1-12	Normal
13 - 59	Excessive visceral fat

After inserting the data about age, height and sex of the subjects, by sending a very weak electric current, 50 kHz and under 500 µA, due to the different conductibility of the tissues and organs, it is established the body composition of the measured persons.

Tabel 5. Summary table with the results obtained by the students – the experimental group concerning the anthropometric assessment:

No.	Subjects	Anthropometrical assessment					
		Weight		**BMI**		**Fat**	
		Kg.				**%**	
		I.T.	**F.T.**	**I.T.**	**T.F.**	**I.T.**	**T.F.**
1	P.M.	57.5	55.2	22.8	21.9	31.2	29.8
2	P.M.	57.3	56	19.8	19.3	29.7	28.1
3	C.A.	57	55.2	18.6	18	26.6	24.8
4	L.B.	61.2	58.9	21.1	20.3	30.4	28.1
5	P.D.	60.1	58.4	23.8	23.1	34.3	32.1
6	H.A.	52.5	51.1	19.1	18.5	23	19.4
7	S.A.	56.4	57.3	19.7	20.1	19.4	19.5
8	S.N.	63.5	62.2	21.9	21.5	20	19.7
9	C.T.	63.8	63.1	22.3	22.1	30.5	29.7
10	I.I.	53.4	54.6	18.7	19.1	21.1	21.8
11	Ș.C.	49.6	47.7	18.2	17.5	22.5	21.8
12	M.D.	67,8	65.3	22.6	21.8	33.9	32.1
13	S.A.	61.5	59.8	21	20.4	23.6	22.3
14	C.A.	56.9	55.1	20.1	19.5	28	27.2
15	C.L.	69,9	67.7	26	25.2	38.6	36.4
16	M.A.	65.2	63.7	21.3	20.8	21.6	21.2
17	G.A.	61.1	60.4	21.6	21.4	31.5	29.8
18	S.D.	66.1	65.1	21.1	20.7	28.1	25.6
19	G.M.	64.5	62.2	21.5	20.8	33.7	32.1
20	N.M.	58.6	58	20.7	20.5	33.5	34.8

Table 6. Summary table with the results obtained by the students – the control group concerning the anthropometrical assessment:

No.	Subjects	Anthropometrical assessment antropometrică					
		Weight		BMI		Fat	
		Kg.				%	
		I.T.	F.T.	I.T.	F.T.	I.T.	F.T.
1	P.I.	68.4	68.1	21.1	21	26.9	27.2
2	B.I.	53.2	53.8	20.7	21	28.9	29.1
3	C.A.	50.4	50.6	18.1	18.2	25.7	26.1
4	C.M.	65.5	66.9	22.4	22.9	28.7	28.9
5	B.S.	54	53.8	19.1	19	25.7	25
6	R.N.	51.1	52	16.9	17.2	18.9	19
7	G.M.	66.9	67.5	23.4	23.6	35	35.2
8	M.A.	57.9	57.1	20	19.7	26.8	26.5
9	B.C.	62.9	62.5	21.7	21.6	30.8	29.9
10	B.D.	50.6	51.1	17.9	18.1	26.4	26.5
11	M.M.	65.3	65.9	22.5	22.8	35.7	36.1
12	S.M.	55.7	56.2	23.2	23.4	36.1	36.6
13	T.M.	70.3	72.8	23.8	24.6	37.9	38.8
14	B.C.	55.1	53	22.3	21.5	31.8	31.3
15	G.A.	82.6	83	24.7	24.8	26.8	27
16	T.A.	63.2	62.7	23.8	23.6	34	33.6
17	K.I.	65.3	64	23.4	23	29	28.3
18	O.D.	62.7	63.5	23.6	23.9	37.4	37.9
19	P.B.	61.6	59.5	22.6	21.8	34.5	31.4
20	P.R.	72.9	73.1	29.2	29.3	44.7	44.9

Results

Comparative analysis of the results: experiment group vs. control group:

1. Body weight

Table 7. Comparative statistical indicators of body weight

Statistical indicators	**Experiment**	**Control**	**Average difference (E-C)**		**-3.01**
Average	58.85	61.86	Average difference (%)		5.1%
Midline	58.65	62.60	STATISTICAL TESTS		
Standard deviation	5.03	8.65	Levene Test	Sig.	Dispersions
Minimum	47.7	50.6		0.025	equal
Maximum	67.7	83.0	Independent bilateral test t	t	p
Amplitude	20.0	32.4		1.343	0.187
Variation percentage	8.5%	6.8%	Effect measure		0.42

The average weight of the experimental group at the final test was lower than 3.01 kg (5.1%) compared with the control group. The averages of the two groups were 58.85 in the experiment, respectively 61.86 kg in the control. The two groups have equal dispersions according to the Levene Test, where Sig=0.025<0.05. The independent t test for equal dispersions shows that the difference in the averages is statistically insignificant, p=0.187>0.05 for t=1.343 and df=38. The effect measurement index shows that the difference of the averages is small to medium. The averages and the results of the students from the two groups at the final tests are graphically presented in fig. 2.

Table 8. Synthesis of the results obtained by the two groups at the body weight

Average difference (E-C)	The average difference is	Size of the effect	Null hypothesis
-3.01 (5.1%)	Statistically insignificant	small to medium	Accepted.

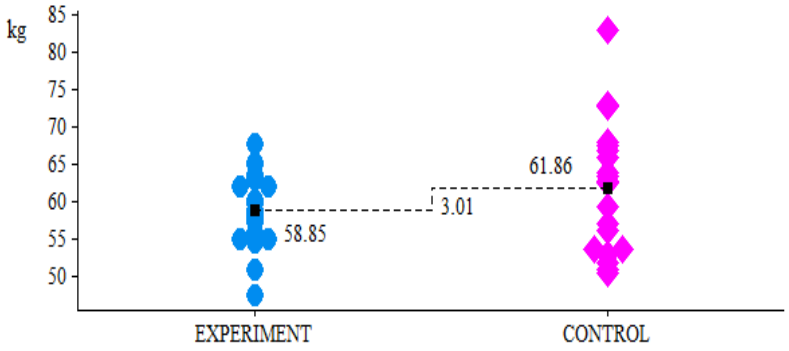

Figure 2. Comparative analysis of the results for body weight: experiment group vs. control group

2. *Body mass index*

Table 9. Comparative statistical indicators of body mass index

Statistical indicators	Experiment	Control
Average	20.64	22.05
Midline	20.66	22.30
Standard deviation	1.77	2.81
Minimum	17.5	17.2
Maximum	25.2	29.3
Amplitude	7.7	12.1
Variation percentage	8.6%	6.8%

Average difference (E-C)		-1.41
Average difference (%)		6.8%
STATISTICAL TESTS		
Levene Test	Sig.	Dispersions
	0.080	unequal
Independent bilateral T test	t	p
	1.894	0.067
Size of the effect		0.60

The medium body mass index for the experimental group, at the final test, was lower than that of the control group at 1.41 kg/m^2 (6.8%). The averages of the two groups were 20.64 in the experiment, respectively 22.05 kg/m^2 in the control. The two groups have unequal dispersions according to the Levene test, where Sig=0.080>0.05. The independent t test for unequal dispersions shows that the difference in the averages is statistically insignificant, p=0.067>0.05 for t=1.894 and df=32. The size of the effect shows an average difference from medium to high.

The graphic from fig. 3 contains the individual averages and results obtained by the students of the two groups at the final tests.

Table 10. Synthesis of the results obtained from the two groups for body mass index

Average difference (E-C)	The average difference is	Size of the effect	Null hypothesis
-1.41 (6.8%)	Statistically insignificant	Medium to high	Accepted.

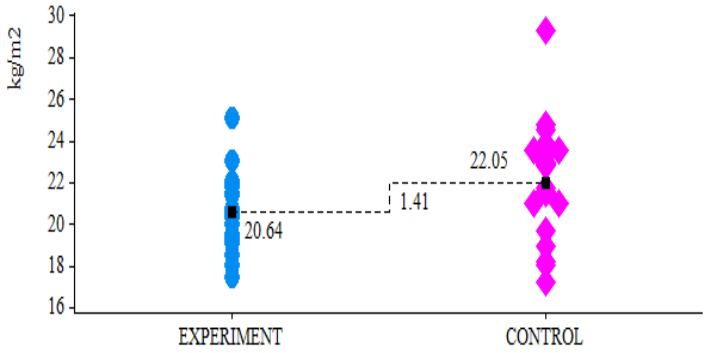

Figure 3. Comparative analysis of the results for body mass index: experiment group vs. control group

3. *Body fat*

Table 11. Comparative statistical indicators of body fat

Statistical indicators	Experiment	Control
Average	26.82	30.97
Midline	27.65	29.50
Standard deviation	5.31	5.96
Minimum	19.4	19.0
Maximum	36.4	44.9
Amplitude	17.0	25.9
Variation percentage	19.8%	6.8%

Average difference (E-C)		-4.15
Average difference (%)		15.5%
STATISTICAL TESTS		
Levene Test	Sig.	Dispersions
	0.847	unequal
Independent bilateral t test	t	p
	2.325	0.026
Size of the effect		0.74

The medium fat index was smaller in the experimental group with 4.15 % (15.5%). The averages of the two groups were 26.82 in the experiment, and 30.97 % in the control. The two groups have unequal dispersions according to the Levene test, where Sig=0.847>0.05. The independent t test for unequal dispersions showed that the average difference was statistically significant, p=0.026<0.05 for t=2.325 and df=38. The effect size index shows that the difference is medium to high. The averages and results obtained by the students of the two groups in the final tests are graphically represented in fig. 4.

Table 12. Synthesis of the results obtained from the two groups for body fat

Average difference (E-C)	**The average difference is**	**Size of the effect**	**Null hypothesis**
-4.15 (15.5%)	statistically significant	Medium to high	Rejected.

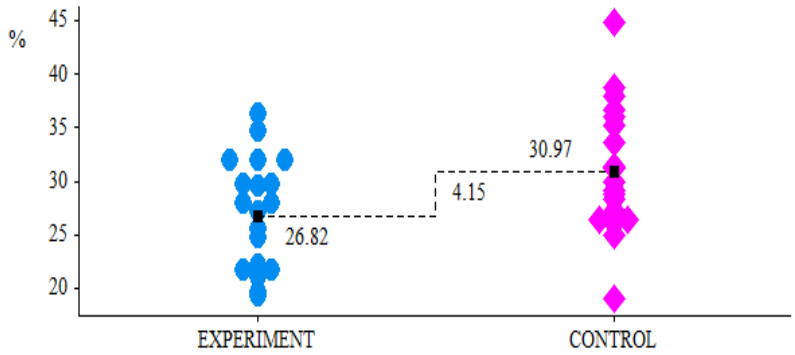

Figure 4. Comparative analysis of the results for body fat: experiment group vs. control group

Discussions

In specialized literature, the measurement of anthropometric indices is often found, in order to validate or invalidate the influence of the applied programs.

Thus from the work „Evaluation of anthropometric and developmental indices at the primary education level" developed and published under the auspices of the Quality of Life Research Institute as well as from the article „Correlation between physical effort and anthropometric indices in high-achieving athletes" published in the magazine „Sport. Olympism. Health" (Erhan & Deleu, 2017) means that the anthropometric evaluation is a method of quantifying growth and physical development based on the measurement of the body, somatic indices regarding different segments or even the whole body.

The advantage of the present method of the results gives more objectivity and accuracy to the research.

Conclusions

Following the interpretation of the results of the research obtained by the experiment group, we can present the following conclusions: the anthropometrical indices showed an improvement:

- the average of the subjects' body weight decreased with 1.35 kg (2.2%), from 60.20 at the initial test, to 58.85 kg at the final test:
- the average of the body mass index decreased with 0.48 kg/m^2 (2.2%), from 21.12 at the initial test to 20.64 kg/m^2 at the final test;
- the body fat percentage decreased with 1.24 % (4.4%), from 28.06 at the initial test to 26.82 % at the final test.

In conclusion, we can state without doubt that the subjects of the experiment group improved their anthropometrical parameters: body weight, BMI and fat percentage.

The above-mentioned aspects created the premises for possible scientific research in the field by the application of „INSANITY" workout adapted by us during physical education and sport classes from military university education.

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