Impact of Military Training Sports Facilities on Qualitative Changes of Morphological Features for AF BIH Recruits

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Abstract

This research was conducted with the aim of determining the effects of the sports elements of the military training on qualitative changes of morphological characteristics, in soldiers - conscripts of the Armed Forces, and which is not only designed to achieve scientific results that would be academically defended, but also it should represent a way of controlling the results achieved by applying the scientific methods, critical reviewing and correcting any noticed weaknesses.

The population from which the sample was derived were soldiers-conscripts who were on a quarterly training at the training centre in Pazarić. The total sample consisted of 435 conscripts-soldiers (men) from all over Bosnia and Herzegovina, aged 19-26 years.

The variables chosen for this scientific work hypothetically covered spaces of morphological characteristics (10), and included spaces: longitudinal dimensionality of the skeleton, subcutaneous fat and circular dimensionality of the skeleton and body mass in soldiers conscripts who were on a quarterly training in training centre for basic training in Pazarić.

The gained results of the factor analysis in the area of morphological characteristics show that the two main components (factors) were isolated (extracted) on the initial and final measurements, which tells us that the Plan and the program of physical training, greatly contributed to the qualitative transformation of morphological characteristics with conscripts of Armed Forces conditioned by sports content of military training for a period of three months.

Keywords: Morphological characteristics, qualitative changes, recruits, AF BIH

Introduction

In order to achieve harmony in the proportions of the body of the soldiers in training, and adjustments of the ratio of morphological characteristics of the needs of their activities, tells us that the morphological characteristics of conscripts must be such as to enable the performance of the tasks faced by soldiers. We have an example where there has been no significant changes in the structure of the area affected by the program of the military physical exercise for reasons as explained, and that is that the growth and development of a defined sample of individuals aged 18-27 years in the morphological area, in certain variables is completed and possibility of influencing the qualitative changes is minimal (Arnaut, 2010). On the other hand, we have examples where the Beta coefficients showed that there has been a restructuring of fat in to the muscle tissue, so that in the second survey on the implementation of short distances recorded positive impact on the volume of the upper leg, and negative to the extent of the stomach volume as well as lower leg and stomach skin folds. When running shares in 1500 and 3200 m, ie. on aerobic endurance positive impact it has had the weight of the body, and negative had volume of the stomach and skin folds on the stomach and lower leg (Maleš, et al., 2002).

Looking at the results, analysis of the difference between the initial and each individual condition, it has been obvious that the treatment, which were the dominant features of endurance and repetitive strength, had a significant effect on the reduction of all measures of body fat, especially the skin folds of the stomach and thighs. Although there was no significant increase in the muscle volume, it is evident that there has been some increase in muscle mass at the expense of reduction of adipose tissue (Maleš, et al., 1997). The gained results in research indicates us to statistically significant differences in morphological characteristics between the initial, control and final measurement, after the first, second, third and fourth years of schooling. It can be said that the general hypothesis, which determines the dynamics of the development and growth of the Military Academy during the four year study - accepted. The positive effect appears especially relating to the results after the second year (Maric, 2010). Completed a project which included anthropological research on the factors of military activities, the amount of morphological characteristics of Croatian soldiers in order to determine the standard reference values of the Croatian military population that will serve the needs of the Croatian Army.

The results showed a certain reference value in basic anthropometric significance with recruits and soldiers. It was also found that there are significant differences between the anthropometric indicators in getting into the army after the end of military service (Ostrunić, 1997). The research were sent to collect anthropometric data are necessary to determine the anthropometric measures and the creation of classification criteria, selection and system deployment of soldiers and military employees on the appropriate military duty and choice of standardizing procedures and treatment regimens of specific categories of soldiers in the establishment and maintenance of the system optimal level of their biological system. The obtained results are of interest in measures of body volume and subcutaneous fat. The mean weight and body height of recruits in training centers for soldiers of Karlovac, Koprivnica, Pula, Sinj and Požega indicates the interpopulation variability. The lowest values of body mass were respondents who had served the army in Požega - 70.0 kg; in other places sizes ranging between 72.4 kg (Koprivnica) and 74.0 kg (Sinj). Distribution of average body mass between 5 Croatian regions corresponds to the distribution of the average height of the body. Population boys measured in Sinj is the highest and heaviest. They are followed by the

population of Karlovac, and Pula, which are in terms of both variables are very similar. Even lower the value of body weight and height were measured in Koprivnica, and the lightest and lowest measured the boys in Požega (Drenovac, 1995).

Method

The aim of the work was to measure the impact of sports elements of the military training on qualitative changes of morphological characteristics in conscripts of the Armed Forces. The research problem is a question of how much sports elements of the military training affect the qualitative changes in the morphological characteristics of the conscripts of the Armed Forces of BiH.

The sample

The population from which the sample was derived are soldiers-recruits who are on a quarterly training at the training centre in Pazarić. The total sample consisted of 435 soldiers-conscripts (men) from all over Bosnia and Herzegovina, aged 19-26 years, and they have passed the detailed medical examinations at the University Clinical Centre in Sarajevo.

The sample of variables

The samples of variables of this scientific work are variables from three latent dimensions of morphological characteristics, namely:

1. Variable to assess longitudinal dimensionality of the skeleton
   - Body height..AVISTL
2. Variables to estimate the body fat
   - Back skin fold ....AKNL
   - Forearm skin fold..AKNNL
   - Stomach skin fold..AKNST
   - Shin skin fold..AKNP
3. Variables to assess circular dimensionality of the skeleton and body mass
   - Body weight ....ATTEZ
   - Stomach volume..AOTRB
   - Average thorax volume...ASROGK
   - Upper arm volume...AONL
   - Lower leg volume ....AOPK

Measuring morphological characteristics (Mikić, 1999; Šoše and Rađo, 1998) was done in the morning, in the classroom, "CPD Pazarić". At each checkpoint were one timekeeper and one scorekeeper. At one measuring point at the same time were a maximum of two subjects. When measuring morphological characteristics, the subjects were barefoot and minimally dressed. Air temperature in the room where the measurement was carried out was around 25 degrees. Steam segments were measured on the left side of the body. Instruments were standard designed and calibrated each day prior to measurements. The tests were attended by the timekeepers (doctors and masters of sport science, professors of sport and physical education as well as instructors in training) and leader of testing (the author himself).

Results

The analysis of latent structure of morphological characteristics in Table 1 by using the KMO and Bartlett's test, we were proving whether there is a connection and whether the matrix of morphological characteristics can be subjected to the factor analysis. At the initial and final measurements at Bartlett's test significant Sig = 0.01 shows us that we can engage in a factor analysis. Also, at the Kaiser-Meyer-Olkin test shows that the initial measurement the point (.877) and on the final measuring point (.844) are very high and with a very high level of reliability can be observed and conclude that we can engage in a factor analysis.

Table 1. KMO and Bartlett's Test of morphological characteristics

		INITIAL	FINAL
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.877	.844
Bartlett's Test of Sphericity	Approx. Chi-Square	3380.472	3380.472
	Df	45	45
	Sig.	.000	.000

In the table 2 the isolated factors in morphologic characteristics are presented, where out of ten, two factors were isolated from each in the initial as well as in the final measurements. This means that the isolated factor should have a total characteristic root greater than one (T> 1). In the initial measurement the two factors were isolated as the characteristic roots, out of which the first root was (6009), and the second root was (1266). The extent of explained cumulative amounts (72,746). The explained variability is divided as follows, at the first factor goes (60 090%) and on the second goes (12.656%). In the final measurement, there was a reduction of the explained cumulative at (70 577%). The first isolated factor is (56 487%), and the second isolated factor is (14.089%) of the explained variability. Also, in the final measurement the two factors were isolated as the characteristic roots, out of which the first root was (5649), and the root was (1409).

Table 2. Isolated factors of the morphological characteristics

Component	Initial values			Extract of the sum of square load			
	total	% Coefficient of variation	Cumulatively %	Total	% Coefficient of variation	Cumulatively %	
1	6.009	60.090	60.090	6.009	60.090	60.090	INITIAL
2	1.266	12.656	72.746	1.266	12.656	72.746	
1	5.649	56.487	56.487	5.649	56.487	56.487	FINAL
2	1.409	14.089	70.577	1.409	14.089	70.577	

Table 3 shows the pattern matrix of isolated factors morphological characteristics where the degree of explained cumulative in components in the initial measurement was (72 746%). On the first factor goes (60 090%), and those are variable: back skinfold AKNL (.901), stomach skinfold AKNST (.891), lower leg skin fold AKNPK (.695), body weight ATTEZ (776); the abdomen AOTRB (.841); average thorax volume ASROGK (.733); the upper arm volume AONL (.761) and the volume of the lower leg AOPK (.693), this factor we may call a factor of subcutaneous fat, circular dimensionality of the skeleton and body mass. At the second factor (12.656%) we have an explained variability, two variables were distinguished: forearm skin fold AKNNL (.887) and body height AVISTL (-.271). which is low and generally negative, this factor can we call, a factor of subcutaneous fat of the upper arm. At the components in the final measuring the degree of explained cumulative amounts to (70,577%). At the first factor goes (56 487%), and those are variables: back skinfold AKNL (.874); forearm skin fold AKNNL (.887); stomach skinfold AKNST (.820) and shin skinfold AKNPK (.655), as well as the variables: the abdomen volume AOTRB (656); the upper arm volume AONL (.632) and the volume of the lower leg AOPK (.492), this factor we can also call, a factor of subcutaneous fat and circular dimensionality of the skeleton. At the second isolated factor (14.089%) we have an explained variability, and two variables were determined: the body height AVISTL (.884) and the body weight ATTEZ (.716), while for the variable average thorax volume ASROGK (.573), we can say it wandered into the area of the second factor, and this means that this factor may be called the factor of body height and weight.

Table 3. Matrix of the assembly of isolated morphological characteristics factors

	Component Initial		Component Final	
	1	2	1	2
AVISTL	.000	-.271	-.271	.884
AKNL	.901	.874	.874	-.071
AKNNL	.833	.887	.887	-.200
AKNST	.891	.820	.820	.029
AKNPK	.695	.655	.655	-.081
ATTEZ	.776	.483	.483	.716
AOTRB	.841	.656	.656	.424
ASROGK	.733	.496	.496	.573
AONL	.761	.632	.632	.387
AOPK	.693	.492	.492	.482

Table 4 shows the matrix of inter-correlations of isolated factors, where we can see that the initial measurement is very low, because it is the point of correlation (.177), while the final measurement we have a point correlation (.308). Although it is low, however, shows us that there is correlation between these two areas.

Table 4. The matrix of inter-correlations of isolated factors

	Initial		Final	
Component	1	2	1	2
1	1.000	.177	1.000	.308
2	.177	1.000	.308	1.000

Discussion

Most of the researches conducted in the area of morphological characteristics show a large impact of the programmed exercise focused on morphological characteristics variables of subcutaneous fat and circular dimensionality of the skeleton. In a survey conducted by Males, et al. (1997), the result showed that the activities in which features of endurance and repetitive strength were the dominant one, it was visible the significant affect on the reduction of all measures of body fat, especially skin folds of the stomach and thigh skin folds. Although there was no significant increase in the volume, it is evident that there has been some increase in muscle mass at the expense of reduction of the body fat. In a study conducted by Males B, et al. (2002), it was established that there has been a restructuring of fat into muscle tissue. The qualitative changes were recorded in the research conducted by Arnaut Z (2010), where it was found that the changes of morphological characteristics, in the area of subcutaneous fat and circular dimensionality of the skeleton. In our study, the results of the factor analysis in the area of morphological characteristics show that the two main components (factors) were isolated (extracted) on the initial and final measurements. Based on the performed statistical indicators, we see that thanks to the existing plan and program of physical training, as well as planned and regular diet (in accordance with the prescribed norms) we have achieved significant statistical change in the areas of morphological characteristics in soldiers-conscripts during the three-month training.

Conclusion

Determining the qualitative difference morphological characteristics after the three-month training plan soldiers-recruits was a primary goal of this study. Taking into the consideration the sample of respondents and their age, we could expect a positive transformation in the space of subcutaneous fat and circular dimensionality of the skeleton, which has been confirmed, but not in the latent space of longitudinal dimension of the skeleton, where there was a small increase of height in the sample of this age. The reasons for increase of the height of the body in a conscripts can be found in the fact that the growth of human ends at 25 years old, and our subjects were aged 19-25 years. The fact that there has been a reduction in mass and subcutaneous fat tissue can lead to a correction of the body posture and that can also be one of the reasons for the increase of body height. The reasons for the increase of the body height can also be looked within the measurement procedure, meaning possible fault, although the timekeepers were professionals employed in the physical training of recruits (professors of Sports and Physical Education and Masters of Science of Sport and Physical Education).We can conclude that with the reduction of subcutaneous adipose tissue and circular dimensionality of the skeleton under the influence of recreational elements, there was

harmony in the proportions of the body of soldiers in training, and therefore the ratio of morphological characteristics adapted to the needs of their activities, because the morphological characteristics of recruits of Armed Forces of BIH, must be such that they have execute tasks that are put in front of them, thus this study has showed a reduction of body fat at the expense of muscle mass.

REFERENCES

Arnaut Z (2010). "Impact of the program of physical exercise on morphological characteristics and basic motor skills of candidates in training for admition in the professional military service AF BiH", Master's thesis, Sarajevo.

Drenovac M (1995). The research of anthropometric status of recruits of the Croatian Army, Center for Strategic Research of Defence Ministry of Defence, Zagreb

Maleš B, Hofman E, Žuvela F (2002). Research on efficiencies in running soldier-sailor in order to assess the basic motoric and functional abilities

Maleš B, R Katić, D Poklepović (1997). The impact of especially programmed treatment for developing aerobic endurance and repetitive strength on the morphological changes. School News, 46 (2): 139-144

Maric L (2010). "The development of motor skills and their relationship with the motor efficiency of the Military Academy", PhD thesis, Novi Sad

Mikić B (1999). Testing & Measurements in Sports, Faculty of Philosophy, University of Tuzla, Tuzla

Mrković R (2013). Determining of the effects of sports elements of the military training on qualitative and quantitative changes of selected anthropological characteristics in recruits of AF BIH. Doctoral dissertation, Sarajevo

Ostrunić D (1997). Anthropometric characteristics of Croatian Army recruits - a reference value for the assessment of physical development, strength and endurance, PhD Thesis, School of Medicine, University of Zagreb, Zagreb

Šoše H, Rađo I (1998). Measurement in kinesiology. Sarajevo: Faculty of Physical Education

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