DISCRIMINANT ANALYSIS OF MORPHOLOGIC AND MOTOR PARAMETERS OF ATHLETE AND NON ATHLETE GIRL PUPILS OF PRIMARY SCHOOL ON AGE 14 TO 15 YEARS

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Abstract

A sample of 105 pupil girls from primary schools of Pristine at age of 14 to 15 was separated into two groups on which 18 tests were applied, from which 11 tests for morphologic characteristic evaluation and 7 tests for evaluation of motor abilities. Group (A) consisted of 40 sport pupil girls and group (B) from 65 non sport pupil girls. Purpose of this study is to verify the changes between sport pupil girls and no sport pupil girls in their morphologic characteristic and motor abilities. Problem of the study was to investigate if there are changes between sport and non sport girls in morphologic characteristic that represent longitudinal circular proportions, proportions of body measures and proportions of adipose tissue, as well as in motor abilities (explosive force of jumping, speed of sprint run and speed of stable run). For a global analysis of some value and variable system value changes (which contribute in changes between short and non sport girls) a t-test for small independent sample was applied as well as canonic discriminant analysis. A result of this investigation shows that girls which were active in sport, comparing with girls that were not active in sport exists statistically significant difference in all morphologic and motor variables.

Keywords: *motor tests, skeletal longitudinal proportions, body mass and volume, subcutaneous adipose tissue, explosive force, running speed, speed of stable run, discriminant analysis*

INTRODUCTION

The problem of choice of methods, content and organization of training process is of continuing interest in research, and in recent years carried out extensive research at home and abroad, toward organized physical activity contributed to the optimal development of anthropological characteristics of both sexes at all ages, regardless of their ability and quality. Human abilities and qualities can be developed most successfully in the so-called. "Sensible stages." With this agrees a number of authors (Stojanovic 1987, Metvejev 2000, Spamer et al. In 2002, Visnjic et al. 2004) indicating that there were periods of ontogenesis based on natural laws achieving the most significant rate of development of certain abilities and characteristics of individuals, increasing the adaptive capabilities and creating particularly favorable preconditions for the formation of certain motor skills. That is why in recent years the present interest is increasing for including children and adolescents in sport activity, because the process of growing up, according to some researchers (Aoron, 1995; Drabik, 1996; Markus, 2000; Malacko, 2002), is particularly sensitive to the possibility of expressing negative impacts. The problem of this study was to examine whether there are significant differences in motor and functional abilities among the athletes and non-athletes girls and then to determine which variables are the biggest contribution to the determined difference.

The purpose of this investigation is to verify the changes between results of morphologic characteristic and physical abilities changes of sport girls and non sport girls at primary schools in Pristine on age of 14 to 15.

METHODS

The sample in this study consisted of 105 elementary school students in Pristina, aged 14 to 15 years, divided into two groups. Group (A) constitute a group of 40 athletes (B) consists of 65 non-athlete girls, which at the time of study meet all health and other criteria. The obtained results can be drawn appropriate conclusions, which can be generalized to the entire population.   Sample measurement tools to assess anthropometric characteristics:

• Anthropometric measures to assess the longitudinal dimensionality:
1. Body height (BOHE)

• Anthropometric measure for body volume assessment:
2. Body weight (BOWE)
3. Medium perimeter of chest (MPCH)
4. Arm perimeter (ARPE)
5. Stomach perimeter (STPE)
6. Thigh perimeter (THIPE)
7. Leg perimeter (LEPE)

• Anthropometric measures for assessment of subcutaneous adipose tissue:
8. Adipose tissue subcutaneous of arm (ATSA)
9. Adipose tissue subcutaneous of stomach (ATSS)
10. Adipose tissue subcutaneous of thigh (ATSTH)
11. Adipose tissue subcutaneous of back (ATSB)

• Motor tests for assessment of dimensions of explosive power:
12. Length jump from place with right leg (LJRL)
13. Length jump from place with left leg (LJLL)
14. Length jump from place (LEJU)

• Motor tests for assessment of dimensions of sprint speed
15. Run in 20 meter from high start (R20M)
16. Run in 40 meter from high start (R40M)
17. Run in 60 meter from high start (R60M)
18. Run in 100 meter from low start (R100M)

Sample measurement tools to assess the anthropometric characteristics and motor abilities in this study were taken from research of Kurelić et al. 1975. Analyzes were performed using the t-test for independent samples and small canonical discriminant analysis. Data were analyzed by statistical program Statistica 6.0.

RESULT AND DISCUSSION

Analysis of differences of anthropometric characteristics and motor abilities between groups of students studied with the T-test.

By analyzing the results of T-test in Table 1, we can conclude that there is a statistically significant difference in the tests for the evaluation of body height (AUT.004),

Table 1. *The significance of differences between groups anthropometrical tests student athletes (A) and non athlete students (B), tested with the t-test for independent samples*

	Variables	Sport girls Mean A	Non sport girls Mean B	t- test	Sig.
1	BOHE	1.6415	1.6145	3.100	.004
2	BOWE	56.3750	57.7846	-.764	.449
3	MPCH	87.6500	85.8462	1.145	.259
4	ARPE	25.5692	25.8500	-.226	.823
5	STPE	81.1000	82.3692	-.519	.606
6	THIPE	48.1500	48.6000	-.969	.338
7	LEPE	35.2500	35.3231	-.619	.540
8	ATSA	17.4923	18.6250	-.094	.925
9	ATSS	13.0500	15.1846	-3.036	.004
10	ATSTH	21.7500	26.9231	-3.228	.003
11	ATSB	24.1500	27.5231	-2.368	.023

abdominal skin fold (ATSS.004), thigh skin fold (ATSTH.003), and back skin fold (ATSB.023). In tests to assess the dimensionality of a circular body and tests for the assessment of body weight showed no statistically significant differences between male and female non athletes.

By analyzing the results of t-test in Table 2, it can be concluded that there was a statistically significant difference in the tests for the evaluation of the vertical jump explosive power

Table 2. The significance of the differences between groups of female athletes (A) and non athlete students (B), tested with t-test for independent samples

	Variables	Sport girls Mean A	Non sport girls Mean B	t-test	Sig.
12	LJRL	130.1750	125.4462	2.090	.043
13	LJLL	136.1500	124.9231	3.848	.000
14	LEJU	142.6500	133.8923	2.475	.018
15	R20M	3.8415	4.2303	-3.115	.003
16	R40M	6.8928	7.3149	-3.396	.002
17	R60M	9.2403	10.1123	-22.125	.000
18	R100M	15.9830	16.7731	-6.239	.000

Table 3.Significance of isolated discriminant function of anthropometric characteristics

Function	Eigenvalue	Wilks' Lambda	Chi-square	Canonical Corelation	Df	Sig.
1	.678	.596	50.485	.636	11	.000

(long jump from the right foot (JPRL.043), long jump from the left foot (JPLL.000), long jump referred to places (JEJU.018), sprint speed motor skills were found statistically significant differences between male and female athlete non athletes.

The results in Table 3, indicates that the discriminant power of anthropometrical tests shown by test Wilks'-Lambda is very high (.596), indicating that the differences between subjects and female non athletes is significant (Sig. = .000). The canonical correlation coefficient indicates that the 63% explained the significance of canonical functions, or discriminant function. Explained the correlation coefficient of the whole set of anthropometrical tests has a high value (chi-sqr = 50 485). Analysis of differences between the anthropometrical characteristics of the group

(A) female athlete of the group (B) non athlete students examined by canonical discriminant

Table 4. Factor structure of the isolated discriminant function of the anthropometric characteristics

Variables	Function 1
ATSB	.665
ATSTH	.453
ATSS	.412
BOHE	-.272
ATSA	-.233
MPCH	-.176
BOWE	.113
STPE	.090
ARPE	-.074
THIPE	.068
LEPE	.018

Table 5. Isolated discriminant motor skills function significance

Function	Eigenvalue	Wilks' Lambda	Chi-square	Canonical Corelation	Df	Sig.
1	1.291	.437	82.470	.751	7	.000

analysis.

Results shown in Table 4 indicate that the largest contribution to the discriminant function have anthropometrical tests for evaluation of arm subcutaneous adipose tissue (AKNNK.665), back skin folds (AKNL.A53) and subcutaneous stomach adipose tissue (AKNL.453). Tests for the assessment of body mass and circular dimensions of the body showed no significant contribution to the discriminant function anthropometrical characteristics.

The results in Table 5, indicates that the discriminative power motor tests shown on the test Wilks' medium-high Lambda (.437), indicate that the differences between subjects and female non athletes is significant (Sig. = .000). The canonical correlation coefficient indicates that a 75% explained the significance of canonical functions, or discriminant function. The correlation coefficient explained of the whole set of motor tests has a high value (chi-sqr = 82 470). Analysis of the differences between groups of subjects and students non athlete was tested by canonical discriminant analysis.

Table. 6.Factorial structure of isolated discriminant function of motor abilities

Variables	Function 1
MT60	.615
MT100	.449
MT20	.418
MSDL	-.381
MT40	.368
MSD	-.249
MSDD	-.162

Results shown in Table 6, indicates that the largest contribution to the discriminant function have the tests for assess the motor speed endurance, running at 60 meters (R60M.615). Other motor tests as running the 100 meters (R100M.449), running at 20 meters (R20M.418), long jump from place with left foot (LEJU - .381), running at 40 meters (R40M.368), jump from place (LEJU - .249),

and jump from place with the right foot (LJRL -.162), no significant contribution because of their correlation with the discriminant function have a significant contribution to motor skills. Higher level of motor abilities of female athletes compared to non athlete girls, can be attributed to endogenous factors in addition to, and largely exogenous, i.e. the transformation processes in sports clubs and physical education in relation to non athlete girls, which were covered only by physical education. It is known that the training work with the athletes typically gradually is increasing the load to the upper boundaries of the organism. This is normally one of the primary reaction the organism to which they are based adaptive processes of the organism, the effects of development and trainings.

CONCLUSION

In a sample of 105 respondents aged 14 to 15 years were divided into two groups (athletes and non athlete girls), applied anthropometrical eleven and seven motor tests. The aim of this study was to determine the differences in anthropometrical characteristics and motor abilities between athlete student girls and non athlete student girls. Toward determination of the difference between the subsamples the t-test was used for a small independent samples as well as the method of canonical discriminant analysis. Results showed that student athletes are significantly different from non athlete student girls in most tests and anthropometrical characteristics within all the applied tests for assessing motor skills.

According to this study we can conclude that athlete student higher body girls and with smaller subcutaneous adipose tissue have better physical abilities, comparing with non athlete student girls, which means that regular physical activity has positive influence to athlete student girls to have different motor abilities comparing with their coeval girls that were not active within the sport.

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ДИСКРИМИНАТИВНА АНАЛИЗА НА МОРФОЛОШКИТЕ И МОТОРНИТЕ ПАРАМЕТРИ КАЈ УЧЕНИЧКИТЕ СПОРТИСТКИ И НЕСПОРТИСТКИ ОД ОСНОВНИТЕ УЧИЛИШТА НА ВОЗРАСТ ОД 14 ДО 15 ГОДИНИ

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Апстрак

На примерок од 105 ученици од основните училишта во Приштина, на возраст од 14-15 години кои беа поделени во две групи, применети се 11 тестови за проценување на морфолошките карактеристики и 7 тестови за проценување на моторните способности. Групата (А) ја сочинуваа 40 спортистки, а групата (В), 65 неспортистки. Целта на истражувањето беше да се утврди разликата во морфолошкиот и моторниот простор меѓу ученичките спортистки и неспортистки. Проблем на истражувањето беше да се испита дали постои статистички значајна разлика меѓу нивните морфолошки карактеристики кои ја претставуваат лонгитудиналната димензионалност на скелетот, циркуларната димензионалност и масата на телото, поткожното масно ткиво, како и моторните способности (експлозивната снага на отскокот, спринтерската брзина и брзинската изджливост). За анализа на глобалните квантитативни вредности на секоја варијабла и системот на варијаблите, нивните односи и хиерархијата (кои придонесуваат за разликата меѓу спортистките и неспортистките), применет е t-тест за мали независни примероци и каноничка дискриминативна анализа. Резултатите на истражувањето покажаа дека спортистките значајно се разликуваат од неспортистките

во лонгитудиналната димензионалност на скелетот, поткожното масно ткиво и во сите применети моторни вааријабли.

Клучни зборови: *моторички тестови, лонгитудинална димензионалност на скелетот, маса и волумен на телото, поткожно масно ткиво, експлозивна снага, спринтерска брзина, брзинска издржливост, дискриминативна анализа.*

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