Original scientific paper

THE DIFFERENCES IN CERTAIN MOTORIC ABILITIES, MORPHOLOGIC CHARACTERISTICS AND THE MENSTRUAL PERIOD COMMENCEMENT IN EXAMINEES DIFFERENTLY TREATED WITH KINESIOLOGIC ACTIVITIES

Mirjana Milić[1], Nebojša Zagorac[2] and Dajana Jašić[3]

[1]Bijaći Elementary school, Kaštel Novi, Croatia
[2]Faculty of Kinesiology in Split, Croatia
[3]Faculty of Philosophy in Zadar, Croatia

Abstract *- The main aim of this research is determining the differences between some anthropometric and motoric dimensions in young volleyball players and girls of the same age who are not included in the process of active sport exercise. Also, one of the aims was determining the differences of the first menstrual period commencement in these two groups, that is, determining the impact of different intensity of the kinesiologic activity on its commencement. Eighty young volleyball players aged 12-14 were measured, and they were equally included in the process of active training process, while on the other side, a group of 80 students who were not included in the organized form of sport exercise were also measured. A discriminative analysis was applied, and the results show that the groups of examinees defined by the different intensity of kinesiologic activity separate in the area of some anthropometric and motoric dimensions, and in the timing of the first menstruation period.*

The young athletes are characterised by greater longitudinal dimensionality measure values, by lesser body volume and weight measure values and by lesser subcutaneous adipose tissue values.

The space of the motor dimensions is also defined by the domination of the young athletes. Further on, based on the poll executed, it is possible to conclude that physical activity greatly influences the commencement of the first menstrual period; girls who play volleyball in average get their first period five months later.

Key words: *girls, morphology, motor, menstruation*

INTRODUCTION

The number of women participating in sport activities is increasing daily, and their results show that we are dealing not just with quantity but also with quality. The positive values of the kinesiological activities caused its transformation in something that became a daily need, so children are included in the process of active bodily exercise very early.

Prior to age of 12 to 14 years, there are no relevant differences in the bodily activity, growth and development in boys and girls. But precisely in that period of early puberty, the specificity in the development of a woman`s organism and specificity in the work with female children appears, as a result of the establishment of the endocrine glands function. In the real sense of the word, puberty means the moment when full sexual maturity is achieved. However, the word is usually used to denote the period of the sexual maturation. Numerous researches show that there are relevant differences in the anthropometric motor characteristics between girls who are involved in kinesiological activities and girls who are not included in the process of active bodily exercise. These differences also exist in the physiologic (functional) sense, because the organism is a unique whole and what happens to one part, affects the whole.

The problem and the aim of this research is defining the differences in some anthropometric and motor dimensions between girls who are involved in intensive kinesiology activity (volleyball) and girls who are not athletic, and further on, the influence of the organised kinesiology activities (volleyball practice) on the physiologic appearance of getting the first menstrual period in puberty girls.

WORK METHODS

The research and measurement was conducted on the selective t sample. From the population used in forming a sample of entities, a group was formed, consisting of 80 young volleyball players aged 12-14 years from Split, Kaštela and Dubrovnik, equally included in the process of active bodily exercise. In contrast to this selective sample, a group consisting of 80 girls of the same age, but who are not included in the system of kinesiology activities, was also subjected to the measuring, in order to serve as a control sample.

The sample of the variables is represented by the group of 15 measurements used in the evaluation of the morphologic characteristics. The choice of the anthropometric measurements was relatively simple, since the measurements chosen

were those which according to the previous research on volleyball players showed the best metric characteristics.

In evaluating the longitudinal dimensionality of the skeleton the following measurements were chosen:

AVIS – body height
ADN – leg length
ADR – arm length
ADST – foot length
ADSA – fist length
AVDO – reach length
ARR – arm span

In evaluating the transversal dimensionality of the skeleton:

ASST – foot width
ASS1 – fist width

In evaluating the body volume and weight:

AMAS– body mass
AOGK – volume of the thorax
AON1 – upper arm volume

In evaluating subcutaneous adipose tissue:

ANN1 – skin fold of the upper arm
ANT – abdominal skin fold
ANNK – upper leg skin fold

Motor variables

The battery of the motor tests was chosen by covering the space of the motor capabilities of the volleyball players with the minimal number of the representative measuring instruments, which proved as a reliable source of information in previous research (Strahonja, Ilić, and Tomić). Eight motor tests were chosen:

M60 V – running 60 m high start
MTAP– hand tapping
MSDM – standing long jump
MVOM – standing high jump
MVOZ – running high jump
MBL – medicine ball throwing
MRC1 – body lifting 1
MRC2 – body lift 2

Description of the motor tests:

1. M60V – running 60 meters from high start. The task of the examinee is to run the distance of 60 meters as fast as possible. Two examinees run at the same time starting from the high start position. The task is repeated three times and the result is registered with an accuracy of 0.1 sec.
2. MTAP – hand tapping. The task of the examinee is to put the weaker arm in the middle between two round plates (20 cm in diameter) which are 60 cm apart from each other. In the period of 15 seconds the examinee tries to touch both plates with her fingers, one at the time. Two touches make one point. The task is performed three times.
3. MFDM – standing long jump. The examinee is behind the bounce line, and she tries to jump as far as possible. The result is measured with an accuracy of 1 cm. The task is performed three times.
4. MVOM – standing high jump. The difference between the height of the maximum standing reach and maximum standing jump reach is measured. The examinee jumps as high as possible with both legs, touching the measuring scale with the maximally stretched arm. Its height is adjusted depending on the height of the arm reach when the examinee is on the floor with full feet. The task is performed three times.
5. MVOZ – running high jump. It is measured in the same way as the MVMO with the difference that the examinee takes the running start of maximally three meters, jumps up with both feet, and touches the scale with maximally stretched arms. The task is performed three times.
6. MBL – throwing medicine ball from lying position. The examinee is lying on her back and throws 1 kilogram medicine ball with both arms stretched, without lifting the body. The task is performed three times.
7. MRC 1 – body lifting. The examinee is lying on her back, with her arms on her nape and her legs bent at an angle of 90°. A partner holds her feet while the examinee does 30 seconds of body lifting. The task is performed one time.
8. MRC 2 – body lifting in the period of 30 seconds with both legs stretched.

Methods of data processing

In concordance with the aim of this research, the processing will be executed by calculating the basic statistic parameters of the morphologic and motor variables,

and further on, by applying the canonical discriminative analysis and invariant analysis of the variance.

RESULTS AND DISCUSSION

Analysis of the anthropometric variables

The applied system, consisting of 15 anthropometric variables, discriminates the control group of students from the girls that are not involved in sport activities (volleyball). These groups were defined by the .59 square canonical discrimination coefficient, what equals the .77 canonical discrimination coefficient.

Table 1: Wilks test of significancy of vector means and Bartlett test

TRACE =1.44
DF1 =15
DF2=144
F=13.840
P=.00

Disc.variable	Rc2	Rc	ROOT	L	Hi2	DF	P
1	590	.768	1.442	.409	134.352	15	.00

Table 2: Centroids of groups with discr. variables

Grupa	discr. variables
	1
1.grupa (E)	.23
2.grupa (K)	-23

Depending on the affiliation to a group, girls differ greatly in anthropometric features. Considering the values of the arithmetic mean and the relation of the standard deviations, alongside with the orientation of the group centroids, it can be concluded that the experimental group of young athletes is characterised by greater body height, greater maximum reach, greater arm span, longer legs, feet and arms, greater body weight, but lesser abdominal and upper leg skin fold. When considering volleyball players as athletes, a unique whole and organisation of the morphological frame is understood, alongside with certain functional abilities, such as body height and jumping ability, which serve as parameters defining a volleyball player. Due to the

need to play ball at maximum height, except for the body height, some other factors are important in selecting children for this sport, such as: reach height in standing position and in jump, and reach height with one or both arms. Also, the variables defining the longitudinality of the skeleton contribute considerably to the definition of the discriminative functions that separate the examinees. Variables of the abdominal and upper leg skin fold and body weight are considerable on the p=.00 level. This can be explained by the fact that puberty girls are prone to body weight increase and body fat accumulation precisely in the area of hips and abdomen. However, from the analysis of table 4, it can be observed that the examinees of both groups do not considerably differ in AOGK and AON1 variables. Due to the sudden hormonal impact, caused by the function of the endocrine glands, puberty girls suddenly gain weight and body fat as well. First signs of secondary sexual maturation appear (breast growth, voice change, hairiness, the first menstrual period), so that the changes must have effect on the anthropometric characteristics of the girls of this age, because the organism is an unique whole, and what happens in one part, will have effect on the other.

Based on the complete analysis of the anthropometric characteristics and the results gained, it can be concluded that the experimental group of young volleyball players is in concordance with the modern volleyball demands, which tends towards average body height increase, subcutaneous adipose tissue and body fat reduction, and muscle bulk increase, factors that undoubtedly cause greater success in this sport.

Table 3: Corelations of antromometric variables with discr. variables

		H2
AVIS	.75	.56
ADUN	.66	.44
ADUR	.53	.28
ADST	.63	.40
ADS1	.14	.02
ASST	-.18	.03
ARR1	.65	.43
AVD1	.67	.46
AOGK	-.10	.01
AON1	-.04	.00
AMAS	.39	.15
ANN1	-.19	.03
ANT1	-.58	.33
ANNK	-.47	.23

Table 4: Aritmetička sredina (X), standardna devijacija (S), vrijednost univarijantnog F testa I nivo značajnosti (P)

Variable	X(K)	X(E)	S(K)	S(E)	F	P
AVIS	1578.75	1674.81	67.88	68.46	78.431	.00
ADUN	847.81	910.50	55.42	50.89	54.841	.00
ADUR	693.62	732.06	45.59	39.57	32.023	.00
ADST	238.87	253.62	16.16	9.39	49.199	.00
ADS1	187.25	190.06	15.22	9.79	1.907	.17
ASS1	79.82	84.50	6.69	4.97	24.827	.00
ASST	92.12	90.31	6.88	5.72	3.241	.07
ARR1	1576.0	1650.50	59.35	68.33	53.438	.00
AVD1	2059.87	2151.75	66.72	83.61	58.277	.00
AOGK	70.92	70.41	4.36	1.94	0.910	.67
AON1	21.24	21.14	1.93	0.93	0.172	.68
AMAS	471.06	514.31	78.61	59.34	15.234	.00
ANN1	137.75	124.81	52.07	35.56	3.325	.07
ANT1	123.25	79.87	55.50	27.96	38.480	.00
ANNK	193.06	148.56	59.00	54.27	24.342	.00
					DF1=	11
					DF2=	158

Analysis of the motor variables

The vectors of the arithmetic means of the groups defined by the system of eight motor variables (table 5.) differ considerably, as the results of the Wilks test show (table 6.).

Table 5: Means(X), standard deviation (S), F test and level of significance (P).

Variable	X(k)	X(e)	S(k)	S(e)	F	P
MVOM	310.56	478.13	59.51	54.29	341.792	.00
MVOZ	315.38	533.50	61.75	51.89	577.697	.00
MTAP	30.98	31.51	2.80	1.23	2.448	.12
MFDM	170.46	199.15	18.65	14.46	116.781	.00
MBML	450.06	509.00	78.09	40.91	35.311	.00
M60V	104.03	96.11	8.07	3.09	66.301	.00
MRC1	23.49	31.21	4.99	1.52	173.532	.00
MRC2	29.74	33.56	3.32	1.90	79.086	.00
					DF1=	8
					DF2=	151

Table 6: Wilks test of significancy of vector means and Bartlett test

TRAG = 4.891	
DF1 = 8	DF2 = 151
F = 92.3153	P = .0000

Disc.variable	Rc2	Rc	ROOT	L	Hi2	DF	P
1	.911	.830	4.891	.170	273.104	9	.0000

Arithmetic means of the groups in the discriminative variable differ considerably, as can be seen from Bartlett tests in table 6. The discriminative variable of the difference between groups with square discriminative coefficient of .83, what is equal to the coefficient of the canonical discriminative of .91, what fulfils over 90% of the intergroup variance. The canonical discrimination is considerable.

The Wilks test of the significance of the differences of arithmetic means vectors and Bartlett tests of significance of the root of the discriminative equation.

Hi – square is the only characteristic square of the discriminative matrix above 273.104, what is eight degrees free and significant on P=0.00 level, table 6.

Table 7:.Centroids of group of discr.variable

Group	Discr.variable
	1
1.(E)	.135
2.(K)	.135

Table 8: Corelations motor variables with discr. variable and communality (h2)

MNOM	.91	.82
MVOZ	.97	.95
MTAP	.14	.02
MFDM	.72	.51
MBML	.47	.22
M60V	-.60	.36
MRC1	.71	.63
MRC2	.63	.40
Limit (160) = 0.20 - 1% significance		

As can be seen from table 8, the first and only discriminative variable is defined positively firstly by the explosive and repetitive strength evaluation tests,

while it is considerably defined on the negative pole by the movement speed evaluation variable. The positive direction of the dimension is oriented towards the experimental group, the young volleyball players, while the negative direction is oriented towards the control group students. In the analysed system of the variables the MBFTAP test can be noticed, the test that defines the factor of the move frequency, but which is not responsible for the separation of the groups of examinees. This is somewhat unexpected, if the importance of the movement frequency and fast action of the hand joint and hands in global is analysed. This can be evaluated in the attack phase, when it is necessary to change the direction of the ball orbit to deceive the opponent defence. The partial explanation is brought into relation with the small possibility of influence and a great degree of genetic predisposition. Considerable differences are shown in the explosive leg power variables (MVOM, MVOZ, MFDM), further on in repetitive body strength variables (MRC1 and MRC2), and variables that define the explosive hand power factor. The MVOM and MVOZ variables, which define explosive leg power, that is, a player`s standing jump height and running spike jump height, represent one of the basic needs demanded by the contemporary volleyball. A volleyball player's jumping ability is a complex motor feature and it is expressed by lifting the body above the play court level. By jumping high, the player tries to catch the ball above the net as high as possible. The movement is executed at the right time in relation to the ball trajectory, team mates' and opponent players' game. The results of the greater number of researches have confirmed that inborn factors are at the basis of jumping ability. The training process research has shown that jumping ability can be developed by applying certain bodily exercises in special volleyball training.

The arithmetic mean of the MVOM variable defining the standing high jump factor is quantitatively defined with 47.81 cm, representing a high level of jumping ability according to the special physical readiness evaluation tables (E. K. Ahmerov 1995).

The results gained for the arithmetic middle of the MVOZ variable in our experimental group also are in concordance with the demands of the contemporary volleyball, because their value outreaches the 52 centimetres set in the mentioned tables. From the aforesaid, it can be supposed that the experimental group of girls is in a great state of overall readiness, especially when it comes to explosive leg power, and that the training process is well organised and planned.

Considering the results gained by the analysis of the motor variables, it is possible to conclude that the experimental group of examinees relatively differs from the control group by the motor capabilities as well, what is brought into relation with the different treatment of the kinesiology activity, with genetic predestination, a

successful selection, and well organised and planned program of cadet volleyball school.

In this contingency table the difference in number of girls that got their first menstrual period is noticeable, in total, 44 athletes and 62 non-athletes have got their first menstrual period.

The only characteristic root hi square is 9.0566 with 1 degree free and significance level P=0.00.

The greater values of athletic girls that did not start menstruating and the greater value of non-athletic girls that started menstruating, point towards a conclusion that it is possible to separate the girls that were treated differently with kinesiology activities, according to the presence or absence of menstrual period. In other words, the intensity and the durance of the kinesiology activity considerably affect its commencement. These results were expected because all previous research about the commencement of the menstrual period show its connection with organised kinesiology activity.

The hypothesis on the difference in the number of days from birth until commencement of the menstrual period

Bartlett approximation of the Wilks test is 5.6284 with P=.02 significance level.

From data stated above, it is possible to conclude that the girls involved in kinesiology activities (volleyball) start menstruating 163 days later than girls not involved in organised kinesiology activities. The medium value in the control group is 12.4 years, that is, the menstrual period begins 5.4 months earlier than in non-athletic girls. In the experimental group of young volleyball players the medium value of the menstrual period commencement is 13.1 years. The results gained are in concordance with previous results, which point at the fact of young athletes` menstruation period commencement at the age of 13 years.

REFERENCES

1. Buzina R., Z.Grgić, M.Kovačević, H.Maver, K. Momirović i P.Rudan: Praktikum biološke anteopologije – Antropologija, Zagreb, 1975.
2. Časlav V.: U interesu odbojke. Odbojka, Svezak 3, Izbor radova iz strane literature, Beograd, 1981. Str.96 – 108.
3. Čornij E.Z., Hajkova M., Hornijak E., Breznen G.: Izbor i lekarska kontrola mladih odbojkašica, Odbojka, Svezak 2, Izbor radova iz strane literature, Beograd, 1978., str.62 -66.

4. Ilić S.: Metodika rada u odbojci, Zavod za fizičku kulturu Vojvodine, Novi Sad, 1979.
5. Kostić R., Đurašković R.: Neki antropometrijski i fiziološko-funkcionalni parametri djevojčica selekcionisani za košarku i odbojku, II jugoslavenski simpozij "Žena u fizičkoj kulturi", Novi Sad, 1983., br.3., str. 234-236.
6. Medved R.: Sportska medicina, JUMENA, Zagreb, 1980.
7. Momirović K.: faktorska struktura antropometrijskih varijabli. Institut za kineziologiju, Zagreb, 1969.
8. Šoše H.: Morfološke karakteristike mladih odbojkašica Europe, Mostar, 1981.
9. Strahonja A.: Relacije situaciono – motoričkih faktora i ocjena uspješnosti u odbojci, Kineziologija, Zagreb, 1983. VO.15, br.2, str.93-102.
10. Tomić D., Glavović S.: Principi i primjeri procjene perspektivnosti odbojkašica i odbojkaša, Svjetlost, 1983.
11. Tomić D.: Skočnost u odbojci. Sportska praksa, Beograd, 1966., br.10.

RAZLIKA U NEKIM MOTORIČKIM SPOSOBNOSTIMA I MORFOLOŠKIM KARAKTERISTIKAMA TE POJAVI MENARHE KOD ISPITANICA RAZLIČITO TRETIRANIH KINEZIOLOŠKIM AKTIVNOSTIMA

Sažetak *- Glavni cilj ovog istraživanja bio je da se utvrde razlike između nekih antropometrijskih i motoričkih dimenzija kod mladih odbojkašica I djevojčica istog uzrasta koje nisu uključene u proces aktivnog sportskog vježbanja. Također jedan od ciljeva je bio utvrđivanje razlika pojave menarhe između ovih dviju skupina, odnosno da li različiti intenzitet kineziološke aktivnosti utječe na njenu pojavu. Izmjereno je 80 mladih odbojkašica od 12-14 godina koje su vremenski podjednako uključene u process aktivnog trenažnog procesa, a s druge strane grupa od 80 učenica koje nisu bile uključene u organizirani oblik sportskog vježbanja. Primjenjena je diskriminativna analiza I rezultati pokazuju da se skupine ispitanica definirane različitim intenzitetom kineziološke aktivnosti bitno separiraju u prostoru nekih antropometrijskih I motoričkih dimenzija, te u vremenu nastanka prve mjesečnice.*

Mlade odbojkašice karakteriziraju veće vrijednosti mjera longitudinalne dimenzionalnosti, odnosno manje vrijednosti mjera za procjenu volumena I mase tijela kao I varijabli potkožnog masnog tkiva.

Prostor motoričkih dimenzija također je definiran dominacijom mladih odbojkašica. Također na temelju anketnog ispitivanja da se zaključiti da kineziološka aktivnost bitno utječe na vremensku pojavu menarhe, odnosno djevojčice koje se bave odbojkom u prosjeku dobivaju prvu mjesečnicu pet mjeseci kasnije.

Ključne riječi: *djevojčice, morfologija, motorika, menarha*