TECHNICAL-METHODICAL ISSUE REGARDING BALANCE MANAGEMENT IN PUBERTY AGE

Florentina-Petruța MARTINAȘ[1], Iulian-Marius DUMITRU[1]
"Alexandru Ioan Cuza" University of Iasi, Faculty of Physical Education and Sports, Iasi, Romania.
Corresponding author: *petrutapetruta60@gmail.com,*

ABSTRACT
One of the factors that has to be „controlled" and underlying superior manifestation of the body in executing a motor task is balance. He owns an essential role in any postural attitude, form of movement and motor manifestation. Through this writing desires highlighting the importance of coordination capacities an aims by used specific means , to form a correct and harmonious posture, educating the rhythm, correcting movements and developing general and specific skills. Extremely rapid and profound modifications of the puberty as well as the possibility to develop or educate some functions, capacities and biological processes at this age, were the reason for which the subjects have been chosen to be part of the research. This work is proposing to highlight to what extend using specific basic gymnastics means and the ballet bar could lead to an improvement of coordinative capacities, at puberty age.
In this experiment I intervened in the training of the circle of "Gymnastics and modern dance" of Children's Palace from Piatra Neamt, during three months of effective working. The subject are divided into an experiment group that is made up of ten fifth and sixth grade students, and control group, made of also ten students, with the same age, that performs the same number of trainings. Both groups are being instructed by the same teacher and are on the same performance level. To evaluate the static equilibrium I have applied the Test standing on a tip of one foot, and to evaluate dynamic balance I have applied the Bass Test. These have been used to both groups in initial and final testing and I have concluded that after the program, the experiment group had a significant progress.

KEYWORDS: *balance; coordinative capacity; puberty; harmonious physical development*

INTRODUCTION

Through this work it is desired to highlight the issue of balance, as a key component of the harmonious physical development process and improving coordination capacity at puberty age. Extremely rapid and profound modifications from puberty, as well as the possibility to educate some functions, capacities and biological processes at this age, have constituted the reason to choose the study subjects on age of adolescence.

"Physical education pursues complex development of the children's personality reflected in formulating the next objectives: stimulating general motricity, forming a correct posture; cultivating interest in practicing physical exercises; forming the sense of balance; developing space orientation capacity; learning new individual or collective movement games; initiation and familiarization with elementary rules on practicing a sport branch accessible for the age" [9].

The issue of balance and involvement of superior nerve structures in achieving practical tasks, interests the physical education, medicine, biomechanics, physiology, specialists controversy in opinion being numerous in literature. Even if a theoretical approach of balance, determined appearance of some theories, to which scientists subscribed.

In some's opinion, balance is a self-contained capacity, in other's is a coordination capacity component, being authors that include it, amongst muscle control and coordination, in motor control [5].

Balance is the „complex process that interests the reception and organising the sensory input as well as the program and executing movements, elements to assure a correct posture, meaning to a permanent maintaining of the center of gravity in the support base" [10].

In some specialists opinion, balance represents the „aptitude of a person to maintain, a controlled position, using compensatory movements, it's own body or another body or object, in a stable position", meaning permitting awareness and control the corporal position in space [2].

Physical education and sports specialists addresses this concept as being "a resting state characterized through equalizing internal and external forces that acts on the body"[6].

From a physiological perspective, controlling the body's position is being assured by sensorial systems: vestibular, visual, proprioceptive and cutaneous. These send the information to nervous centers in the brain, cerebral trunk and cerebellum, that analyses them and as a response elaborates the commands. The effector system is represented by

muscles, that requires from each body part an adequate position.

Balance is being realized by a plurality of anatomical parts of the human body, as an essential function to behavioral manifestation and as an interaction of the men with the surroundings.

"The main anatomical parts involved in manifesting control and balance are:

- The central nervous system (cerebral trunk, cerebellum, cerebral hemispheres, corpus callosum, basal ganglia);
- Analyzers (vestibular, visual, kinesthetic, tactile);
- Muscle ligament system (by kinematic muscle chains);
- Bone and joint system (by leverages made)" [1].

Educating and reeducating of balance and orientation of movements in space is being realized with success only to extend that is taken into account the entire complex of proprioceptive and exteroceptive sensations, tactile, visual as well as internal factors that commands the control of the movement.

Balance adjustment is a basic condition of human beings to initiate, continue and control the movements that need a high accuracy of each segments movement and of the whole body. The effects of balance and imbalance on people's activities were and still are the subject for many interdisciplinary researches, which have targeted the role the central nervous system has an absolute control of integrating the man in the environment.

An individual capacity to maintain its balance is due to peripheral sensory receptors that bring permanent information on the environment, of the body position towards that, and the parts of the body to the whole body.

In T. Sbenghe's opinion "there are three primary sources of peripheral inputs that contribute to postural control, that came from somatosensory, visual and auricular receptors" [10].

Peripheral somatosensory system: is represented by receptors from joints, muscles, tendons, ligaments, skin that inform the central system about the length of the muscles, contraction state and muscular tension, position of segments, temperature, paint, pressure.

Visual receptors: provides central information, within is being realized the orientation in the environment, is perceived the vertical state of the body, and peripheral information, in which the sight informs about own movements in relation to the surroundings that are being made with body gestures.

Aural receptors-internal ear: detects and informs on the position of the body to the gravitational line in relation to the head movements.

In the absence of a correspondence, a synchronization between the received information, it is created a sensory conflict. Upper centers must combine all the data provided by the receptors and create the correct response in order to obtain balance.

"Puberty is not a critical period in which the child must be spared, but on the contrary, represents the beginning of an all level development. In this period the child is very sensitive both at motor stimuli and lack of exercise"[1]. Educating coordinative capacities is a complex process that extends on a long period of time and is being realized at the same time with the evolution of the cerebral cortex and the muscle system.

At school age, due to the maturity of the nervous system, especially on the cortex and its actions, as a result of a great number of propellant skills obtained organized and in a controlled way, the level of coordination is improving.

Balance amongst the other coordinative capacities are addressed successfully at small ages. The optimal age to develop these capacities fits in the period 6-18 years, with a tip of efficiency in the interval of 6-12 years [1].

"There is no inferior age limit to start developing propellant capacities. There are only adequate methods and means and also periods of developing with higher intensity or stagnation" [8].

"Dance, like any other physical activity, develops important psycho-motor qualities. Systematic and organized practice of dancing influences in a positive way a harmonious development of the body, improves litheness and coordinative capacity, education of artistic imagination and creativity, influences the human mind" [4].

Barre study implies attention, discipline and seriousness, this modeling the main features of the children and educating them towards rightness, precision and beautiful.

"Well systematized exercises of classic dance develop muscle's strength and flexibility, develops agility and coordination of movements, contributes to obtaining harmonious and expressive gestures and lay the foundations of a correct and well balanced position of the body. Movements of the dancers, usually, are more secure, more conscious, more elegant and at the same time, more natural" [7].

"Without studying barres exercises, the precision, stability and balance will be lost that only this type of study helps them to obtain these" [3].

The present work propound itself to highlight to what extend using specific gymnastics means and barre studying could lead to improving coordinative capacities, with emphasis to optimize balance. The aim of the research was to obtain improved balance results at puberty age.

The purpose of the work is to highlight to what extend using specific basic gymnastics means and barre study could lead to an improvement of coordinative capacities at puberty age, especially optimization of balance.

In the experiment I have intervened in the trainings of the circle of "Gymnastics and modern dance" of Children's Palace from Piatra Neamt. The experiment group is made up of ten fifth and sixth grade students, and the control group, is made of also ten students, with the same age, that performs the same number of trainings.

Both groups are being instructed by the same teacher and are on the same performance level.

The exercises that I have used in the training program of the subjects are systematized as follows:

Balance exercises using ballet barres: demi plie, grand plie; battement tandu; battement jete; battement soutenu par terre et en l'air; battement fondu; passé developpe; grand battement; adagio; sauté, maintaining on one foot with the other held at 90 degrees on each direction, across the sole and on the toe.

Exercises on the ground in the center:

- maintaining the foot in passé on the sole and on the toe;
- pirouettes at 180, 360 and 540 degrees;
- jumpbacks at 180, 360 and 540 degrees;
- maintained with the foot stretched forward, laterally, in the back, on the sole and on the toe;
- walking on peaks on the turned gymnastics bench.

There have been performed two initial and final tests in which took part both groups. To test the dynamic balance I have applied Bass Test, and to evaluate static balance I have used stand maintaining one foot on the toe test.

RESULTS

In the following charts are being presented statistical indicators for each one of the two test at initial and final testing for the two groups.

Initial testing have been realized before beginning the specific training program (according Table 1,2), both groups being at the same level in what concerns coordinative capacities.

Table 1. Initial testing in the experiment group

Name and surname	Bass test (pct)	Standing on the tip of the foot test (sec)	
		Right	Left
S.A.	55	13	10
I.D.	35	8	7
G.A.	40	11	14
V.L.	50	9	8
Ş.G.	45	7	9
A.Ş.	55	12	10
I.I.	65	10	15
B.M.	55	8	10
F.M.	60	12	8
G.R.	50	9	7

Table 2. Initial testing-control group

Name and surname	Bass test (pct)	Standing on the tip of the foot test (sec)	
		Right	Left
E. E.	65	11	20
M.A.	55	8	7
C.P.	55	13	10
T.C.	35	7	6
L.B.	60	12	14
I.R.	40	8	9
A.M.	50	12	13
A.S.	45	8	7
V.L.	65	13	10
C.A.	50	9	7

After applying the specific training program, during three effective months, I have obtained (according Table 3,4) the following results:

Table 3. Final testing-experiment group

Name and surname	Bass test (pct)	Standing on the tip of the foot test (sec)	
		Right	Left
E. E.	70	24	26
M.A.	66	14	13
C.P.	66	18	18
T.C.	56	15	10
L.B.	68	25	20
I.R.	56	16	18
A.M.	60	24	26
A.S.	56	16	15
V.L.	70	19	18
C.A.	68	15	13

Table 4. Final testing-control group

Name and surname	Bass test (pct)	Standing on the tip of the foot test (sec)	
		Right	Left
S.A.	60	20	15
I.D.	45	10	9
G.A.	48	14	16

V.L.	55	10	10
Ş.G.	54	9	12
A.Ş.	64	14	13
I.I.	72	15	18
B.M.	60	9	11
F.M.	65	16	10
G.R.	58	11	9

So, I processed and analised the data from the charts above, making a comparative analysis between the two groups, control and experiment, by calculating the three statistical indicators: arithmetic mean, standard deviation and coefficient of variability.

Table 5. Bass test, progress and average results of the two groups

Group	EXPERIMENT			CONTROL		
Testing	Arithmetic mean	Standard deviation	Coefficient of variability	Arithmetic mean	Standard deviation	Coefficient of variability
T. I.	52	10,05	19,32 %	51	9,06	17,7%
T. F.	63,6	5,94	9,33%	58,1	8,04	13,8%
Progres	11,6	4,11	9,99%	7,1	1,02	3,9%

Bass test highlights a 52 points average on initial testing and on the final one it has been obtained 63,3 points which shows us a progress of 11,6 seconds compared to the control group that have obtained a progress of 7,1 seconds, the split between these two being of 4,5 seconds. (according Fig. 1)

The coefficient of variation in initial testing is of 19%, highlighting a team with average homogeneity for the experiment group, while in the final testing the value being of 9% which shows the homogeneity of the group. The progress of the control group is insignificant, having a progress of only 3,9%

Standard deviation has values on the initial testing as well as in the final testing of 9,06 and 8,04 for the control group, and for the experiment group we have a progress of 4,11 points.

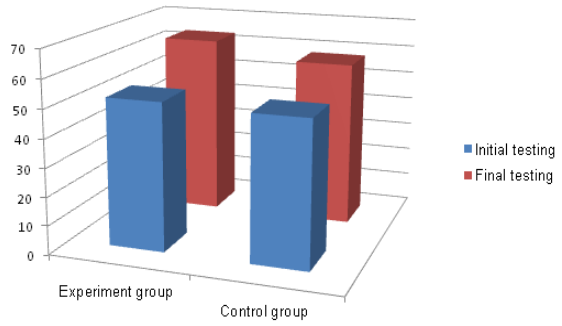

Fig. 1. Bass test-arithmetic mean of the two groups in initial and final testing

Table 6. Stand on the top of the feet test progress and average results of the two groups

Grup	EXPERIMENT						CONTROL					
Testing	Arithmetic mean		Standard deviation		Coefficient of variability		Arithmetic mean		Standard deviation		Coefficient of variability	
Foot	Rt	L.	Rt.	L.	Rt.	L.	Rt.	L.	Rt.	L.	Rt.	L.
T. I.	10,1	10,3	2,33	4,32	23,06 %	41,9 %	9,9	9,8	2,02	2,74	20,4 %	27,9 %
T. F.	18,6	17,7	4,22	5,31	22,6%	30%	12,8	12,3	4,22	5,31	22,6 %	30 %
Progress	8,5	7,4	1,89	0,99	0,46%	11,9 %	2,9	2,5	2,2	2,57	2,2%	2,1 %

The values of arithmetic mean in initial testing on the left and right foot are approximately identical of 10,1 and 10,3 for the experiment group, and in the final testing it is highlighted a progress of 8,5 seconds on the right foot and 7,4 seconds on the left foot. (according Fig. 2)

The control group has similar results and the average has a progress of only 2,9 seconds on the right foot and 2,5 seconds on the left foot.

The coefficient of variation has approximately equal values for both tests on the right foot, of 23-22%, this indicating an average homogeneity of the team, while the values of this parameter are grow very much in maintaining the balance on the left foot's toe where reaches values of 41-30%, this indicates lack of group homogeneity.

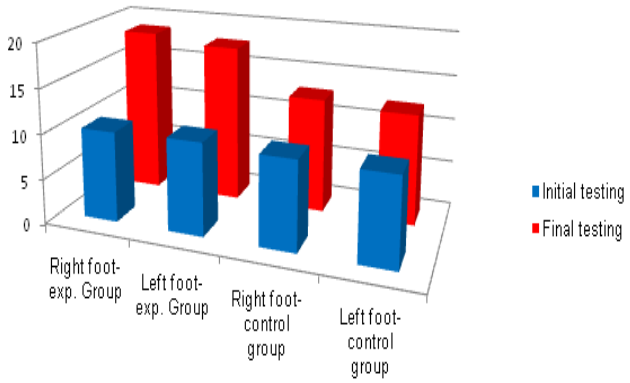

Fig. 2. Standing on the top of one foot test- arithmetic mean of both groups at initial and final testing

CONCLUSIONS

The values of the coefficient of variability at all applied tests shows us a group with average homogeneity, towards the lack of it, situation in which we can say that from the studied sample there are subjects with a different development of balance. The test used to highlight the static balance shows us a significant progress, this aspect could be explained by the fact that among the proposed exercises there were some of them that develop postural muscles which carry a great importance in maintaining balance. In the test used to evaluate the dynamic balance are to be seen really high progresses, the differences between the experiment and control groups in final testing being noticeable.

Overall, the results of the applied tests indicate that at this age can be developed with obvious results the indices of balance capacity.

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