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SPECIFIC PHYSICAL PREPARATION OF FEMALE STUDENTS FROM SPECIALIZED BASKETBALL GROUPS

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ABSTRACT

The ***purpose*** of this study is to increase the level of specific working capacity of the students from the basketball groups of high schools by optimizing the work for the development of the special motor qualities. The ***subject*** of the study is the training in the groups "Sport of choice - basketball". The ***object*** of the research is the signs of special physical preparedness and their development during the training in the higher school. In the study participate 50 students from the University of National and World Economy, divided into two equivalent groups (experimental and control). For the needs of the study a sports-pedagogical experiment is conducted. During the working period, the experimental group is subjected to the impacts, included in the developed own training program and the control group – to these in the standard program. To solve the purpose and tasks of the study, the following methods of research are used: theoretical analysis, sports-pedagogical testing. The results of the conducted sports-pedagogical testing are processed using the following mathematical and statistical methods: variational analysis and verification of hypotheses, using the comparative t-criterion of Student. The analysis of the results proves the effectiveness of the developed training program for physical fitness.

Key words: *high school, training, basketball, sports and pedagogical experiment*

INTRODUCTION

The gaps in the state policy in relation to sport, low managerial engagement and public negligence provoke the need of a new vision for the activities and organization of the physical education and sport in view of the new requirements of the dynamic global economy and challenges before man in the new technological century. Lack of material base, insufficient rational use of the available material-technical equipment, bad conditions for the teaching-training process, insufficient forms of manifestation contribute to the negative attitude towards sports activities (1). Purposeful studies by a range of scientific institutes and organization have proved the high importance of sport as one of the most dynamic social phenomena of the century (2).

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The optimization of the training process in basketball is closely related to studying the game in its development. That imposes to perform researches periodically and disclose the basic factors and tendencies of that development which on its side is an objective prerequisite for further invasion in the essence of the phenomenon with the purpose of optimization of the competitors' and teams' preparation and increasing the effectiveness of the training work done (3). The process of optimization of the forthcoming educational and training work with the students is in the competences of the sports teachers at the higher schools (4). Teaching process effectiveness at the higher schools can be increased by the implementation of novelties in the contents and good organization of the teaching process. Methodological expedience in that case is reduced to the selection of physical exercises directed to sport, which are characterized by higher intensity and allover impact on the morph-functional status of the higher students (5).

Training load directed to separate sides of the sport preparation (technical, tactical, physical,

psychological) should be in optimal correlation in order to reach the highest sport form needed. Conditional preparation is closely related to basketball game. Successful application of the technical skills depends on the physical qualities level and vice versa (6). That refers to football too – "the physical preparation of the football players decides two important tasks: 1.
All over development of the motive system and 2. Perfection of the specific motive abilities" (7). Team work of coaches and competitors contribute to that; it should be at exceptionally high level to reach quality of the training process (8).

The introduction of high technology in the activities of the coaches in the modern world help their work but in certain extend hamper it. More of the coaches count on specific apparatuses for establishing the functional state level; greater part of the training sessions time is spend in the fitness, other part is used for deep tactical preparation (9).

The purpose of the study is the increase of the specific workability level of the female students-basketball players at the higher schools in Bulgaria, non-specialized in sport, by optimization of the work for developing specific motive qualities.

METHODS

Subject of the study is basketball education in the "Sport by choice" groups at the higher schools in Bulgaria, non-specialized in sport.

Object of the study are the signs of the specific physical preparedness and their development during the education at the higher schools.

Contingent of the study are 50 female students from the National and world economy university (NWEU) in Sofia, members of the "Sport by choice - basketball" groups, distributed on the base of a preliminary sport-pedagogical tests into two equivalent groups (experimental and control ones).

The following ***methods of research*** have been applied for solving the purpose and the tasks of the study: *theoretical analysis of the specific literature, sport-pedagogical experiment, sport-pedagogical testing*.

The sport-pedagogical experiment lasted 3½ months. During the working period, the experimental group is subjected to training impacts envisaged in the experimental training program developed on the base of the personal experience and consultations held with leading basketball experts in the country; the control group is subjected to impacts envisaged in the standard program applied in the long year practice at the high schools.

The training program developed by us covers complex establishment of specific physical qualities and specific technical-tactical skills by the help of preliminary prepared speed-strength complexes. Each of them contain 10-12 exercises of various number of repetitions depending on the particularities of the quality trained (speed strength, rapidity, strength endurance or strength dexterity). A form of interval training is applied.

Control group trains according to the teaching program approved by the Ministry of education and science, divided to develop 1-2 physical qualities and a certain number of technical-tactical skills by smaller number of methodological units. The repetition method of training is predominantly used.

At the beginning and the end of the female students' education at the high school, sport-technical test is held (twice) according to 11 indicators characterizing the specific physical preparedness in order to exercise control on the results of the training sessions (**Table 1**).

Table 1. *List of the studied specific physical preparedness signs*

№	Indicators	Measurement units	Exactness of measurement	Direction of increase
1.	*20 m sprint from standing position start*	s	0,01	-
2.	*Penny cup test*	s	0,01	-
3.	*Illinois test – without a ball*	s	0,01	-
4.	*Throwing compact ball –forward*	m	0,02	+
5.	*Passing by using a wall*	number	1,0	+
6.	*Vertical jump from static position*	cm	1,0	+
7.	*Pushing strength*	kg	0,01	+
8.	*Pushing speed*	m / s	0,1	+
9.	*"Shuttle" run (168 m)*	s	0,01	-
10.	*Flexibility*	cm	1,0	+
11.	*"Flamingo"*	number	1,0	-

The results of the sport-pedagogical tests are processed by the help of appropriate ***mathematic-statistic methods***: *variation analysis and a check of hypothesis by the help of Student's comparative t-criterion at high level of statistic reliability* $P_t \geq 95\%$.

RESULTS

As pointed out in the Methodology, the initial data from the sport-pedagogical tests are processed by variation analysis which allows disclosing the average levels and variety of the studied specific physical preparedness signs.

At the beginning of the education at the high school, the female students trained according to the program actual now (control group) run the 20 m distance for average 4,00 s, covered the Penny cup test for 2,22 s and threw the compact ball at average 3,96 m, etc. – as the analysis in **Table 2** points out.

Table 2. *Average values and variety of the studied signs of the control group female students at the beginning of their education at the high school*

№	Indicators	$\bar{X}$	S	V	min	max
1.	*20 m sprint from standing position start*	4,00	0,49	12,30	5,09	3,16
2.	*Penny cup test*	2,22	0,33	14,85	2,87	1,61
3.	*Illinois test – without a ball*	22,55	2,44	10,82	27,27	17,94
4.	*Throwing compact ball – forward*	3,96	1,57	39,63	2,4	9,6
5.	*Passing by using a wall*	45,76	8,82	19,28	31	64
6.	*Vertical jump from static position*	37,05	9,35	25,22	23,5	52,4
7.	*Pushing strength*	0,62	0,19	31,59	0,31	1,05
8.	*Pushing speed*	2,22	0,42	18,73	1,33	2,93
9.	*"Shuttle" run (168 m)*	50,52	4,55	9,00	59,39	43,16
10.	*Flexibility*	126,64	6,21	4,90	110	138
11.	*"Flamingo"*	4,40	3,12	70,97	13	0

Analyzing the data of the female basketball players in the control group, impressive is the fact that they have very high result – average for the group (126,64 cm) for indicator 10 (***Flexibility),*** which bears information about the development level of the body dexterity when bowing forward.

Anyway, it is seen in the last two columns of **Table 2** that there exist certain differences between the results of the various girls. For example, there is a female student in the group who has run 20 m for 5,09 s (X_{min}) and another one who was exceptionally quick X_{max} = 3,16 s). The achievements for the vertical jump are between 23,5 cm and 52,4 cm, while the flexibility is between 110 cm and 138 cm, etc. The dispersal observed round the average level is expressed in the values of the variation coefficient V (**Figure 1**).

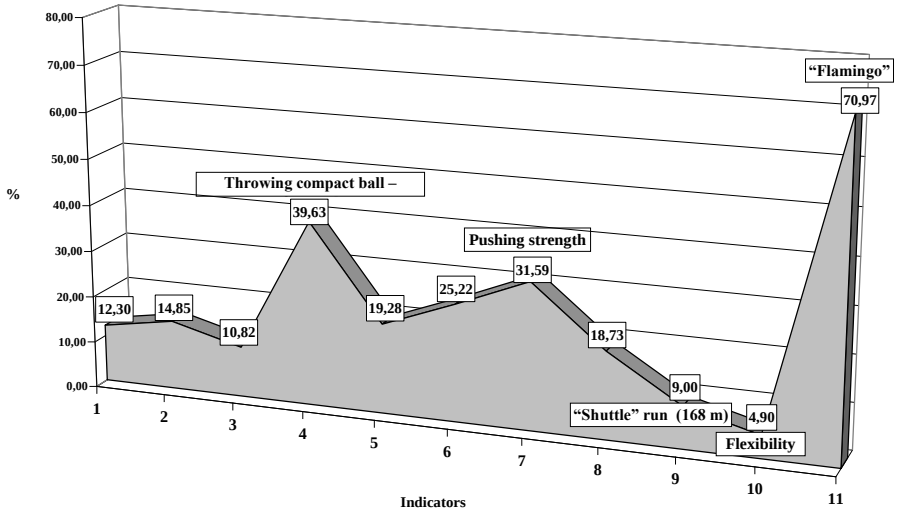

Figure 1. Dispersal of the specific physical preparedness signs of the control group female students at the beginning of their education at the high school

The figure analysis shows that for the greater part of the indicators, the values of the variation coefficient are within the frame of 10 and 30%. According to the sport statistics norms, it means that the respective indicators are relatively stable and the control group has been, at the beginning of their education at the high school, relatively homogeneous in relation to the signs about which these indicators bear information. Anyway, the V values are higher than 30% for indicators 4, 9 and 11. The highest (70,97%) is the variation coefficient for the last indicator (Flamingo) by the help of which the equilibrium stability of the participants in the sport-pedagogical experiment is measured.

What is the experimental group status at the start of the sport-pedagogical experiment?
The primary processing results of the starting data of the initial sport-pedagogical testing of the students in that group by the help of the variation analysis are presented in **Table 3**.

Table 3. ***Average values and variety of the signs under study for the students from the experimental group at the beginning of their education at the high school***

№	Indicators	$\bar{X}$	S	V	min	max
1.	*20 m sprint from standing position start*	3,53	0,62	17,57	4,77	2,48
2.	*Penny cup test*	2,15	0,27	12,34	2,87	1,72
3.	*Illinois test – without a ball*	22,10	1,91	8,63	25,1	18,4
4.	*Throwing compact ball – forward*	3,91	1,04	26,70	2	6,1
5.	*Passing by using a wall*	49,04	9,39	19,15	32	66
6.	*Vertical jump from static position*	37,34	11,68	31,29	19,3	64,4
7.	*Pushing strength*	0,71	0,39	55,40	0,14	2
8.	*Pushing speed*	2,36	0,65	27,50	1,47	3,82
9.	*"Shuttle" run (168 m)*	50,33	3,71	7,37	56,12	42,60
10.	*Flexibility*	123,88	4,03	3,26	115	130
11.	*"Flamingo"*	1,64	1,80	109,76	7	0

It is seen from the table that as a whole, at the beginning of the observation period, the results of the girls from the experimental group are very similar to those of their women colleagues from the control group. There are some exceptions of course. For instance, test 19 (Flamingo) results show that the girls from the experimental group have higher level of equilibrium stability – there were much less mistakes during the execution of the test. As seen in **Table 3**, the number of mistakes made by the various female basketball players varies in between 0 and 7. Much greater (13 mistakes) is the scope R of the control group. Most naturally, all that impacts the variety of indicator 19 (V_{19} = 109,76%) and the homogeneity of the totality under study (**Figure 2**).

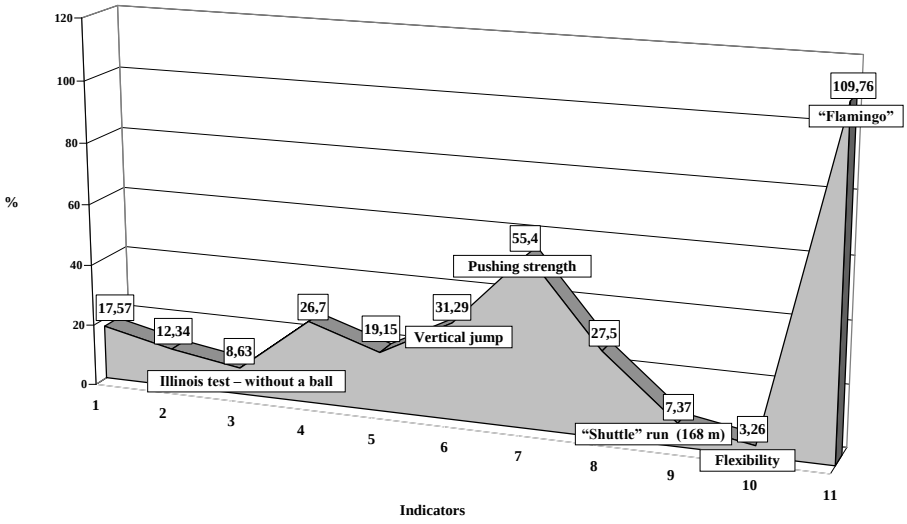

Figure 2. Dispersal of the specific physical preparedness signs for the female students from the experimental group at the beginning of their education at the high school

As it becomes clear from **Figure 2**, three indicators are as well observed where the values of the variation coefficient are within the zone of instability – two of them coincide with those mentioned for the control group (flamingo – V_{11} = 109,76% and pushing strength – V_7 = 55,40%), while the third (vertical jump – V_6 = 31,29%) appear here at the place of indicator 4 (throwing compact ball).

Homogeneity is observed in relation to already mentioned indicators 10 and 9 for the control group, respectively "flexibility" and "shuttle" run and still for indicator 3 (Illinois test – without a ball).

The analysis up to here shows that at the beginning of the sport-pedagogical experiment there exist some differences in the development level of the signs under study for the experimental and control groups. The availability of differences between the average-arithmetic values anyway does not give us a reason to make serious conclusions prior checking their importance. Student's comparative t-criterion is applied for the purpose at high level of statistic reliability $P_t \geq$ 95%.

That is exceptionally important as it allows checking up the zero hypotheses, related to the differences observed between the average levels of both groups as to the signs under investigation at the start of the experiment. According to the sport statistics norms, the rejection of the zero hypotheses and the acceptance of the alternative one raise suspicions for the correctness of the planned experiment as both groups should start at relatively equal conditions.

As seen in **Figure 3**, the girls from the experimental group have higher average results than those of the control group for greater part of the signs under observation.

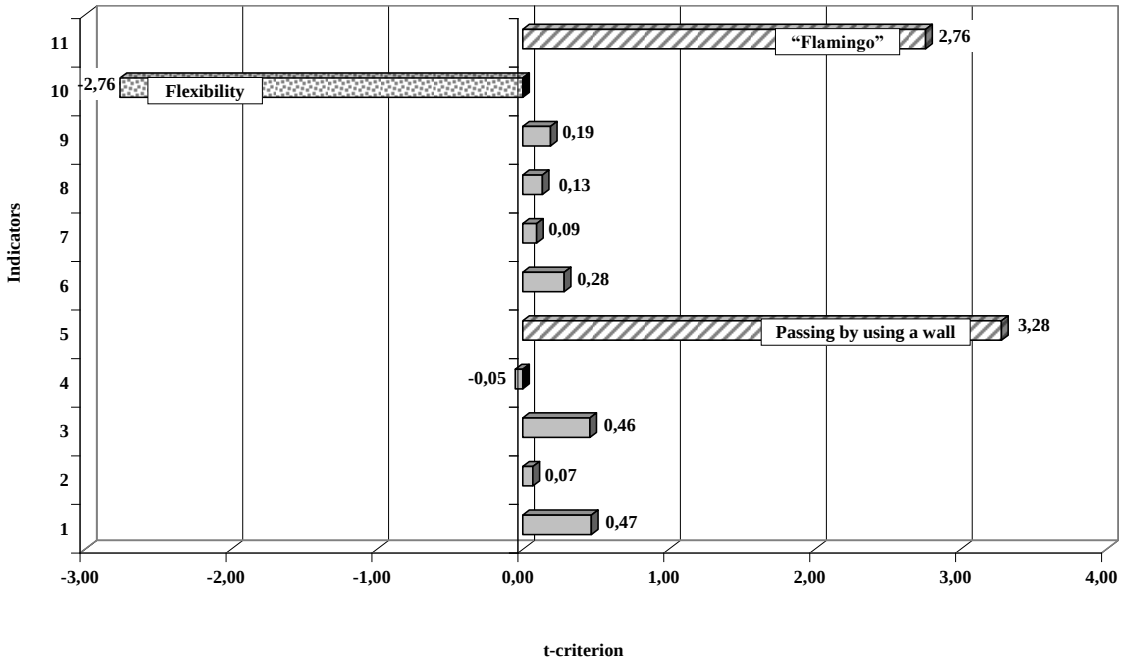

Figure 3. Importance of the differences between the average levels of the signs under study at the beginning of the education at the high school

Anyway, at the same time it becomes clear that, as a whole, the values of the comparative t-criterion are lower than the critical (t_{tabl} = 2,01) and are between -0,05 and 0,47. Exceptions are observed for three of the indicators only:

- Indicator 5 (passing by using a wall) – t_5 = 3,28;
- Indicator 11 (flamingo) – t_{11} = 2,76 и
- Indicator 10 (flexibility) - t_{10} = - 2,76.

Zero hypotheses is valid for all the rest of the signs and consequently, the differences observed here between the average levels of the experimental and control groups are insignificant and can be explained by occasional causes. That is one more prove for correctness at the start of the sport-pedagogical experiment.

Positive changes occur in the average levels of all signs for the experimental group under the influence of the specific work by the basketball means during the sport-pedagogical experiment. Anyway, that fact in itself does not allow making serious conclusions. Therefore, Student's comparative t-criterion is applied for checking the reliability of the growths observed under dependent extracts.

The analysis of **Figure 4** shows that for 6 of the indicators (Penny Cup Test, Illinois test without a ball, passing by using a wall, speed of pushing off, "Shuttle" run and flexibility) under observation, the t values are higher than the critical (t_{tabl} = 2,01).

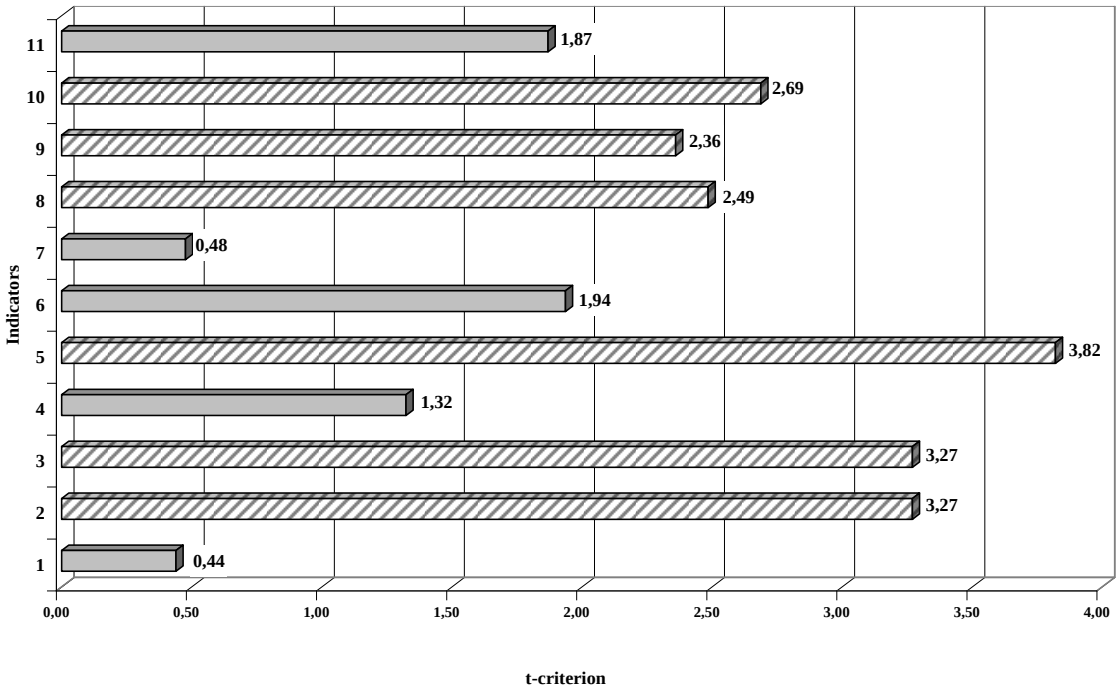

Figure 4. Importance of the growth in the average levels of the signs under study for the experimental group

That gives a reason, with high guarantee probability ($P_t \geq 95\%$), which satisfies the needs of the sport practice, to reject the zero hypotheses and accept as correct the alternative in relation to the signs about which the respective indicators bear information.

As seen in **Figure 4**, the t-criterion values for 5 of the indicators (20 m sprint, throwing compact ball, vertical jump, speed of pushing off and "flamingo") are lower than the critical and consequently, in relation to the signs, about which these indicators bear information, there is no reason to reject the zero hypotheses, i.e. although positive, the change in the development level of these of the physical preparedness signs for the female basketball players from the experimental group, is occasional.

The second group participating in the sport-pedagogical experiment (the control one) was subjected to the impact of the training mean provided for in the current physical education and sport teaching program in the profiled basketball groups at the high school. Therefore, most naturally, changes also occur for the female basketball players during the experimental period in the development level of the signs under investigation established during the second (final) sport-pedagogical testing. The checkup of the zero hypothesis related to the differences between the levels of the signs under study for the control group (**Figure 5**) shows that the changes which occur during the experiment are, as a whole, negligible and can be explained by occasional reasons.

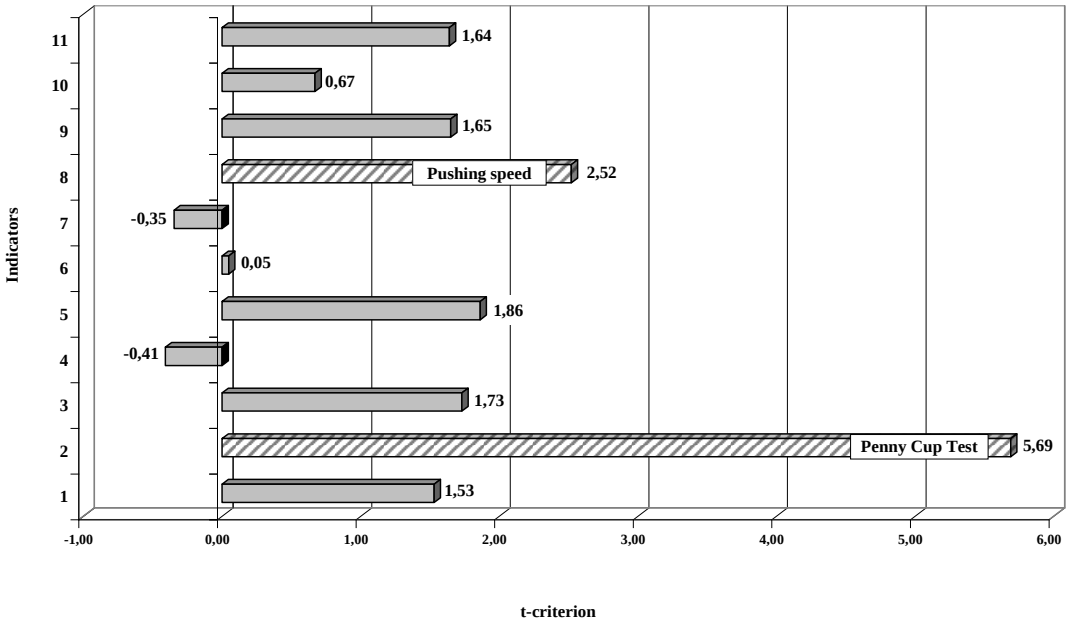

Figure 5. Importance of the growth in the average levels of the signs under study for the control group

Prove about that is the Student's t-criterion values which for the greater part of the indicators are lower than the critical and provide full reason, with high guarantee probability, to confirm the zero hypotheses. Exception is observed for the following indicators:

- № 2 (Penny Cup Test) – $t_2 = 5,69$ and
- № 9 (speed of pushing off the support) –. $T_9 = 2,52$.

The results from the comparison of the average levels of the signs under study for both groups at the end of the sport-pedagogical experiment are of interest for the investigation. The analysis of **Figure 6** shows that at the end of their studies at the higher school, the female basketball students, who were subjected to the impact of the experimental methodology outperformed those trained according to the traditional methodology in terms to the physical preparedness signs under study.

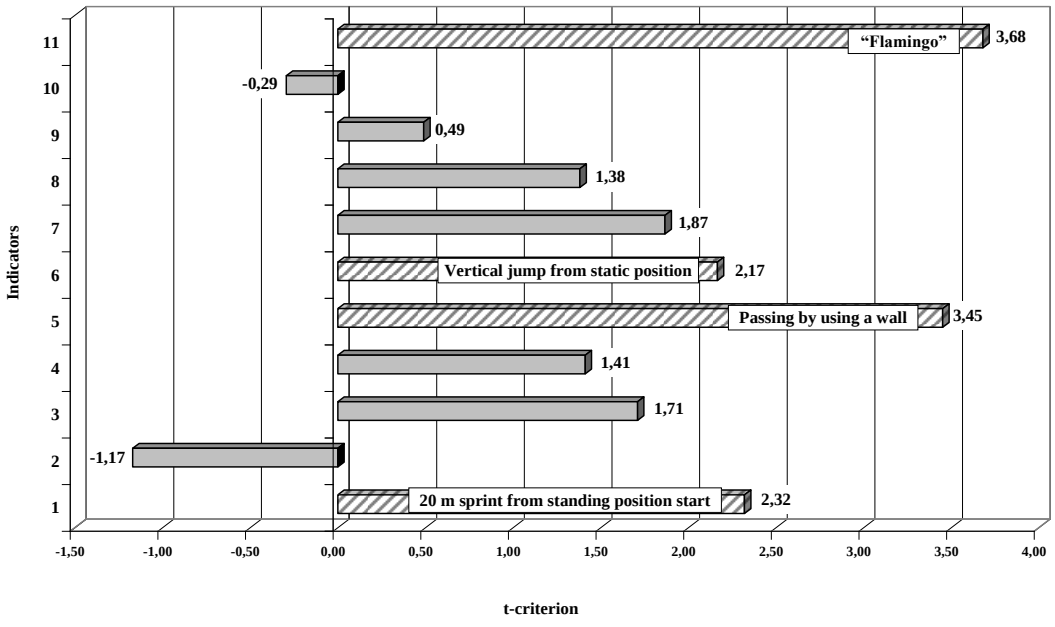

Figure 6. Importance of the differences between the average levels of the signs under study at the end of the education at the high school

CONCLUSION

Under the influence of the training means applied according to the physical education and sport current teaching programme, which is not appropriate for the characteristic particularities of the students and the training process applied at the high schools (10), some changes occur during the time of education but they, as a whole, are unimportant and can be explained by occasional reasons. Exception for the totality studied by us is observed in relation to the motive reactions speed, orientation in space, flexibility of attention and speed of pushing off a support.

The development and implementation in practice of scientifically reasoned programme for the preparation of the female students of the specific basketball groups, based on adequate systematization of the training means and methods for specific physical preparedness and answering to the abilities of the students, shall enrich the theory and methodology of the specific preparation in basketball in the high schools not specialized in sport (11). That thesis is supported by a range of lecturers at high schools in Bulgaria of other disciplines (12-14).

At the beginning of the physical education and sport teaching, the control group was non-homogeneous in relation to the equilibrium stability, explosive strength of the upper limbs and the shoulders and the maximum strength of the lower limbs upon pushing off. Body dexterity and speed endurance are the only motive qualities, homogeneous at the initial testing. The reason for the availability of some nonstable indicators for the female students from the specific basketball groups is the fact that they come from various regions in Bulgaria and their preparedness level is different (15-17).

Analysis shows that the experimental group is also non-homogeneous in relation to the equilibrium stability and the maximum strength of the lower limbs upon pushing off, but instead of the explosive strength of the upper limbs and the shoulders, here non-homogeneity is observed as well in relation to the explosive strength of the lower limbs upon muscle efforts in vertical plane. Homogeneity is observed in relation to the body dexterity and speed endurance, same with the already mentioned control group, and yet – speed of moving along the terrain by changing the direction.

Under the effect of the specific training impact during the sport-pedagogical experiment, the girls in the experimental group underwent positive changes in the development level of:

- Speed endurance both of the lower and upper limbs;
- Specific speed and skill to move along the playground without a ball;
- Speed of the complicated motive reaction, specific dexterity and attention qualities (concentration, distribution and dexterity);
- Body dexterity; and
- Ability of quick push off the support while jumping.

Anyway, for some of the indicators, the t-criterion values are lower than the critical and consequently, in relation to the signs about which these indicators bear information, there is no reason to reject the zero hypothesis, i.e., although positive, the change of the development level of some of the physical preparedness signs is occasional for the female basketball players from the experimental group. That refers to:

- the explosive strength of the lower limbs under vertical muscle efforts;
- equilibrium abilities;
- explosive strength of the upper limbs under horizontal muscle efforts;
- strength of pushing off the support under vertical jump;
- speed abilities.

It can be stated with high statistic reliability ($P_t \geq 95\%$) that at the beginning of the physical education and sport teaching at the high school, the experimental group considerably surpasses the control one in relation to the equilibrium stability of the girls, the development level of the explosive strength under vertical muscle efforts and the skill to pass the ball right to the goal only. On its side, the control group has visibly higher results in relation to the dexterity of the female basketball players only.

Zero hypothesis is valid for all the rest of the signs and consequently, the differences observed between the average levels of the experimental and control groups are negligible and can be explained by occasional reasons. That is one more prove for correctness at the start of the sport-pedagogical experiment.

1. Under the influence of the specific training impacts during the sport-pedagogical experiment, considerable positive changes have occurred for the girls from the experimental group in the development level of:
   - speed endurance both of the lower and upper limbs;
   - specific speed and skill to move along the playground without a ball;
   - quickness of the complicated motive reaction, specific dexterity and attention qualities (concentration, distribution and dexterity);
   - body dexterity and
   - ability for quick push off the support under jumping.

   1. For some of the physical preparedness signs related to the female basketball players from the experimental group, at the end of the education, increase of the average group level is observed, insignificant from statistic point, which can be explained by occasional reasons That refers to: за:
   - explosive strength of the lower limbs under vertical muscle efforts;
   - equilibrium abilities;
   - explosive strength of the upper limbs under horizontal muscle efforts;
   - strength of pushing off the support under vertical jump and
   - speed abilities.

   2. The checkup of the zero hypothesis in relation to the differences between the levels of the signs under study for the control group shows as well that the changes having occurred during the experiment are, as a whole, insignificant and can be explained by occasional reasons.

   That is an evidence for the effectiveness of the specific teaching-training programme developed for increasing the technical-tactical skills level of the female students from the profiled basketball groups at the high schools on the base of the additionally applied training impacts by the means of specific physical preparedness.

   3. Nevertheless, in the spirit of correctness, it should be mentioned that for some of the indicators, the t-criterion values are lower than the critical which provides the reason to accept the zero hypothesis as true in relation to the signs about which these indicators bear information. That on its side requires, prior the final completion and dispatch for application at the high schools in practice, the teaching programme to be corrected in some aspects which most generally refer to the increase of the training impacts directed to:
   - increasing the strength and speed of pushing off the support under vertical jumps;
   - increasing the speed of the complicated motive reaction, specific dexterity and attention parameters;
   - increasing the development level of the specific speed of moving along the playground without a ball and the coordination abilities of the female basketball players;
   - increasing the development level of the explosive strength of the upper limbs;
   - improving the speed endurance and
   - specific dexterity.

The implementation of the corrections proposed indisputably shall increase the effectiveness and practical contribution of the experimental programme.

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