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Functional readiness of teen-agers with intellectual disabilities involved into paracheer

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Abstract: The education and upbringing of mentally retarded children at a correctional school are closely connected with the process of their physical education improvement, searching for more advanced methodologies of motor sphere development, their correction and the level of physical qualities development increase. The aim of the research is to analyze the results of the diagnostic stage of functional readiness study among the teen-agers with intellectual disabilities. ***Research methods.*** Information sources analysis, pedagogical testing, experiment, methods of mathematical statistics, the received results analysis and summarizing. The respondents were the teen-agers with intellectual disabilities, who study at State Public Educational Establishment of Astrakhan Region "Boarding school № 1 for students with disabilities" in Astrakhan. In order to define the initial level of functional readiness of teen-agers with intellectual disabilities we organized two groups: group 1- the control group and group 2 – the experimental group. We carried out the following tests: Cooper test, Ruffier test, Genchi test, Stange test, Serkin test, knee-heel test, Romberg test, PWC170, maximum oxygen consumption (MOC), step-ergometry and spirography. ***Results.*** The organized testing helped to define more significant changes among teen-agers of the experimental group. Educational-training process included the methodology with the use of "Para Cheer" sport. The results among the teen-agers from the experimental group validly (P<0,01) improved. ***Conclusion.*** At a diagnostic stage we defined that the level of functional readiness development among teen-agers of the control group are insignificantly higher, than among their coevals from the experimental group.

Keywords: functional readiness, intellectual disabilities, teen-agers with intellectual disabilities, mental retardation, Para Cheer, physiological indices, functional development, anthropometric indices.

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Introduction

Psychomotor underdevelopment of children with intellectual disabilities is reflected in slow locomotor functions development, movements non-productivity [1,2].

Motor skills formation among the students with mental retardation is one of the most important mechanisms. It provides the leading defect correction and the base for their socialization in the future [3,5].

On the basis of the carried out research works we revealed that adaptive physical culture and adaptive sport are effective in the existing disorders correction and compensation among teen-agers with mental retardation [6]. They have physical and psycho-emotional load. Physical exercises, including Para Cheer lessons, are effective [4].

Materials and methods

The research work was held on the base of the State Public Educational Establishment of Astrakhan Region, Russia "Boarding school № 1 for students with disabilities". The main directions of the establishment activity include the following: educational, correction-developing, health-improving, physical, functional and psychomotor development level increasing among teen-agers with intellectual disabilities. They are involved into

Para Cheer.

In order to organize the research we created two groups: the control group (CG) and the experimental group (EG). Each group included 25 people (50 students from the State Public Educational Establishment of Astrakhan Region "Boarding school № 1 for students with disabilities") at the age of 13-15. They all had F70 diagnosis (mental retardation of mild degree) and fulfilled the following tests: Cooper test, Ruffier test, Genchi test, Stange test, Serkin test, knee-heel test, Romberg test, PWC170, maximum oxygen consumption (MOC), step-ergometry and spirography. The respondents had almost the same level of physical and intellectual development and the same motor skills.

Results and discussion

At the beginning of the research we analyzed medical cards of the teen-agers with intellectual disabilities. They took part in the research. Apart from anthropometric indices and blood indices, we also defined blood pressure, heart rate and vital capacity (VC) (table 1).

Table 1

Results of physiological and anthropometric indices of mentally retarded teen-agers from the CG and the EG at a diagnostic stage

№	Height (cm)	Weight (kg)	HR (heart rate) (beats/ min)	AP(arterial pressure)/ SD (systolic pressure)	Erythrocytes (10 (12) l)	Hemoglobin	VC(l)
(g/l)	VC(l)	43,8±0,7	78±1,4	114/72±1,2	4,5±0,45	136±10,8	2,3±0,43

During anthropometric indices comparison in the control and experimental groups with the norm of coevals we didn't reveal deviations in anthropometric indices (height, weight) among the respondents. The received results show valid differences (in terms of p≥0,01). They can prove that physical development of mentally retarded teen-agers doesn't differ from physical development of healthy coevals of the same age group.

During physiological indices analysis (HR, AP/ SP, erythrocytes, hemoglobin, VC) we revealed that the respondents had lower results in the mentioned tests, than the age-related norm. HR was higher than the norm in both groups: in the control group – by 20%, in the experimental group- by 15%. AP indices, erythrocytes and hemoglobin correspond with age norms. VC indices in the control group were 13% lower than the norm, in the experimental group 18% lower than the norm.

In order to define the initial indices of functional readiness we organized control tests of physiological parameters in the control and experimental groups (Cooper test, Ruffier test, Genchi test, Stange test, Serkin test, knee-heel test, Romberg test, PWC170, maximum oxygen consumption (MOC), step-ergometry and spirography). Table 2 presents comparative results.

Table 2

Comparative results of the control tests at a diagnostic stage (Cooper test, Ruffier test)

CG		EG	
Cooper test (км)	"Ruffier" index	Cooper test (км)	"Ruffier" index
1,4±0,4	7,0±1,0	1,1±0,3	8,0±1,1

Fig. 1 presents graphically the comparative results of the control tests at a diagnostic stage

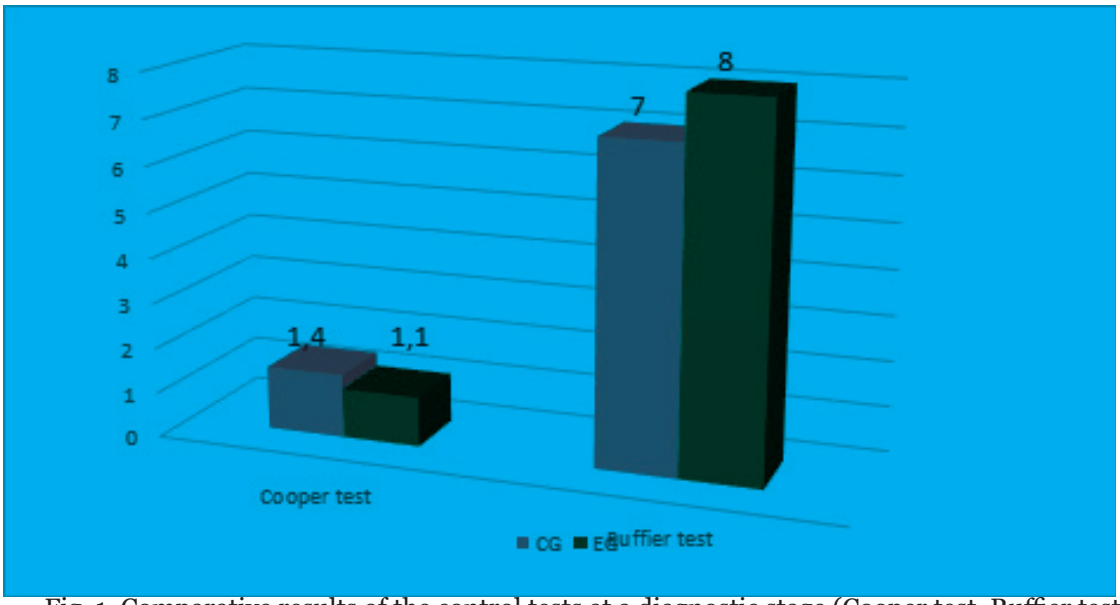

Fig. 1. Comparative results of the control tests at a diagnostic stage (Cooper test, Ruffier test)

According to Cooper test we revealed that the respondents from the control and experimental groups in the average have a low level. Cooper test helps to estimate the state of cardiovascular and respiratory systems of an organism. The average result of the respondents from the control group was 1,4±0,4 km in terms of p≥0,01, in the experimental group - 1,1±0,3 km in terms of p≥0,01. In a norm the indices lower than 1.5 km are considered very low. Testing showed a low level of respiratory and cardiovascular systems development of the respondents from both groups. It proves weak physical readiness.

Ruffier test results analysis, which helps to estimate working capacity of a heart and the state of cardiovascular system, showed that the indices were satisfactory (limits – 6-8). It should be noted that the indices of the experimental group (8,0±1,04) were at an "upper limit of normal" in contrast to the control group. There the indices were 7,0±0,98 in terms of p≥0,05. It means that working capacity of heart among the respondents is at a low level, as the norm for the presented age group is within the limits of 3-6.

Table 3

Comparative results of the control tests (Genchi test, Stange test, Serkin test) at a diagnostic stage

CG			EG		
Genchi test (sec)	Stange test (sec)	Serkin test (sec III phase)	Genchi test (sec)	Stange test (sec)	Serkin test (sec III phase)
22±1,4	34±1,8	38±1,3	21±1,7	29±1,0	36±1,1

Fig. 2 presents the results of the control tests for the comparison of the initial level of functional readiness development among the respondents at a diagnostic stage.

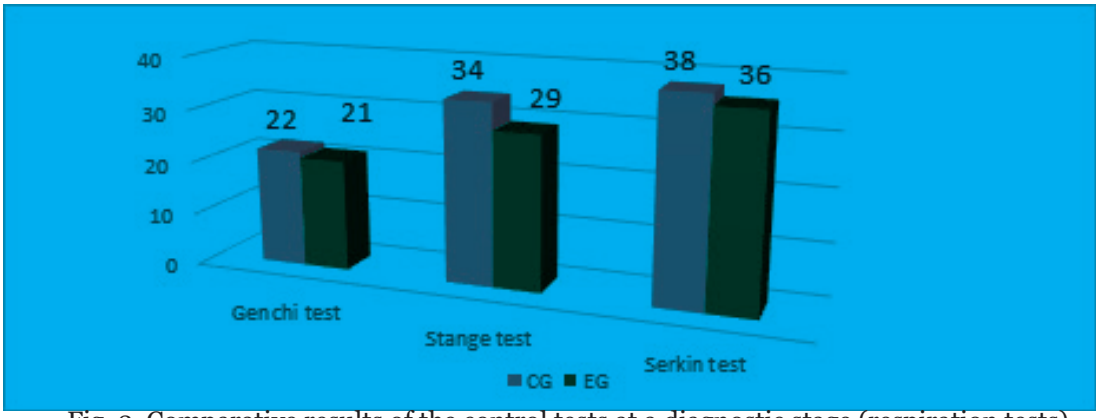

Fig. 2. Comparative results of the control tests at a diagnostic stage (respiration tests)

Respiratory tests, in particular Genchi test, Stange test, Serkin test, characterize organism resistance in terms of oxygen lack. The longer is the time of breath holding, the higher is the ability of cardiovascular and respiratory systems to get rid of carbon dioxide.

During each test consideration we revealed that Genchi test indices were 22±1,4 sec. among the respondents from the control group, and 21±1,7 sec. among the respondents from the experimental group, in terms of the norm 25 sec. in terms of p≥0,05.

Stange test results in the control group were 34±1,8 sec, in the experimental group – 29±1,0 sec., with the norm 30 sec. in terms of p≥0,01

The indices in Serkin test with the norm 35 sec. (the 3rd phase) were the following: in the control group– 38±1,3 sec, in the experimental group – 36±1,1 sec. in terms of p≥0,05. It proves insufficient level of respiratory and cardiovascular systems development and shows a low functional readiness of an organism.

Table 4

Comparative results of the control tests at a diagnostic stage (knee-heel test, Romberg test)

CG		EG	
Romberg test (sec)	Knee-heel test (sec)	Romberg test (sec)	Knee-heel test (sec)
16±0,9	23±1,1	13±0,8	21±0,9

Fig. 3 presents the results of the control tests for the initial level of functional readiness development estimation among the respondents at a diagnostic stage.

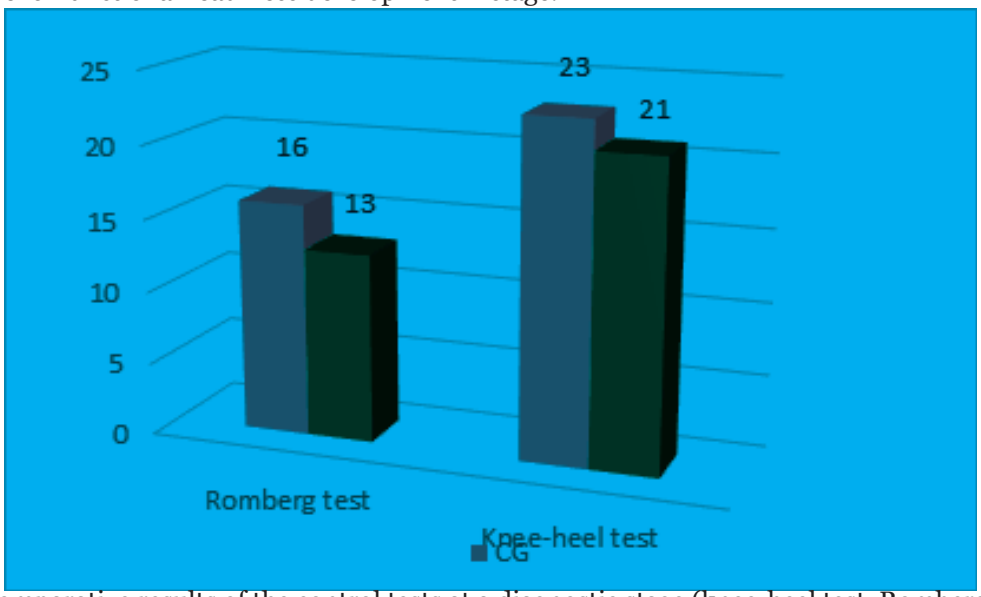

Fig. 3. Comparative results of the control tests at a diagnostic stage (knee-heel test, Romberg test)

In order to estimate the functional state of nervous system we used knee-heel test and Romberg test. The average indices of Romberg test in the control group - 16±0,9 sec., in the experimental group – 13±0,8 sec., with the norm 16 sec. in terms of p≥0,01.

The average indices in knee-heel test in the control group were 23±1.1 sec., in the experimental group– 21±0,9 sec., with the norm 30 sec. in terms of p≥0,05. It should be noted that we didn't reveal eyelids, fingers, hands, body and legs tremor. Taking into account the received results we come to the conclusion that the functional state of nervous system is at a low level, which in our opinion, influences functional readiness of the respondents.

Table 5

Comparative results of the control tests at a diagnostic stage (PWC170, MOC)

CG		EG	
PWC170 (kg/min X kg)	MOC(ml/min. Kg)	PWC170 (kg/min X kg)	MOC(ml/min. Kg)
9.7 ±0,6	31 ±1,3	9.5 ±0,7	33 ±1,5

Fig. 4 presents the results of control tests for the comparison of the initial level of functional readiness development among the respondents at a diagnostic stage.

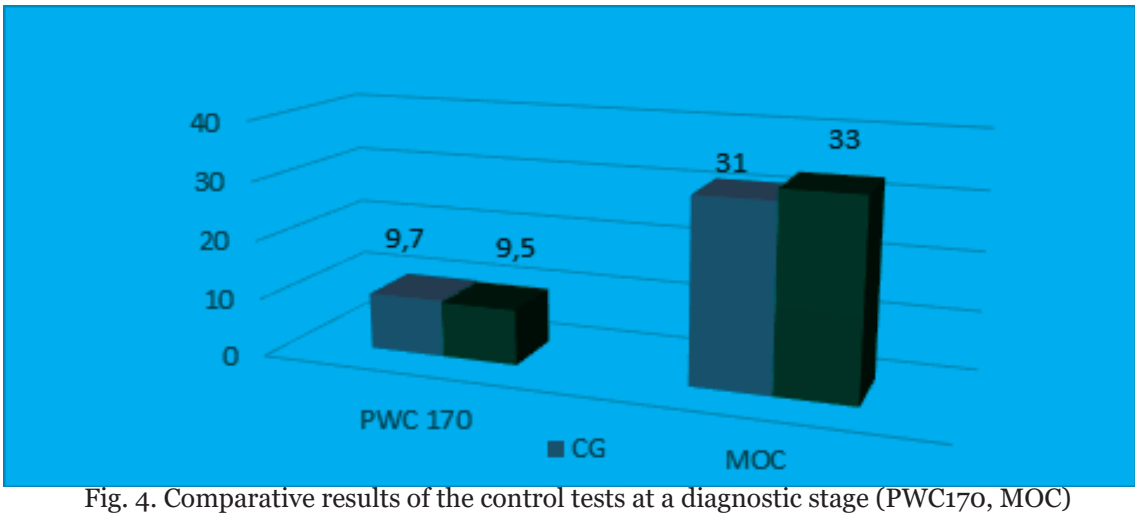

Fig. 4. Comparative results of the control tests at a diagnostic stage (PWC170, MOC)

According to PWC170 test results (helps to define general physical working capacity) were the following: in the control group - 9,7±0,6 kg/min X kg in terms of p≥0,01; in the experimental group– 9,5±0,7 kg/min X kg in terms of p≥0,01. The indices lower than 11 kg/min X kg are estimated as 1 point, the average index starts from 12,5 kg/min X kg. The test showed that general physical working capacity of the respondents decreased. It means low physical working capacity.

MOC is a test, which defines the amount of oxygen. It an organism uses from the inhaled air and transforms into energy during maximal loads. The results analysis showed that the level of the respondents was lower than the norm (40 ml/min. Kg) in the control group (31±1,3 ml/min. Kg in terms of p≥0,05) and experimental group (33 ±1,5 in terms of p≥0,05).

Table 6

Comparative results of the control tests at a diagnostic stage (step-ergometry and spirography)

CG		EG	
Spirography (VC, %)	Step-ergometry index	Spirography (VC, %)	Step-ergometry index
75 ±1,6	46 ±1,1	78 ±1,3	45 ±1,3

Fig. 5 presents the results of control tests among the respondents from the control and experimental groups at a diagnostic stage.

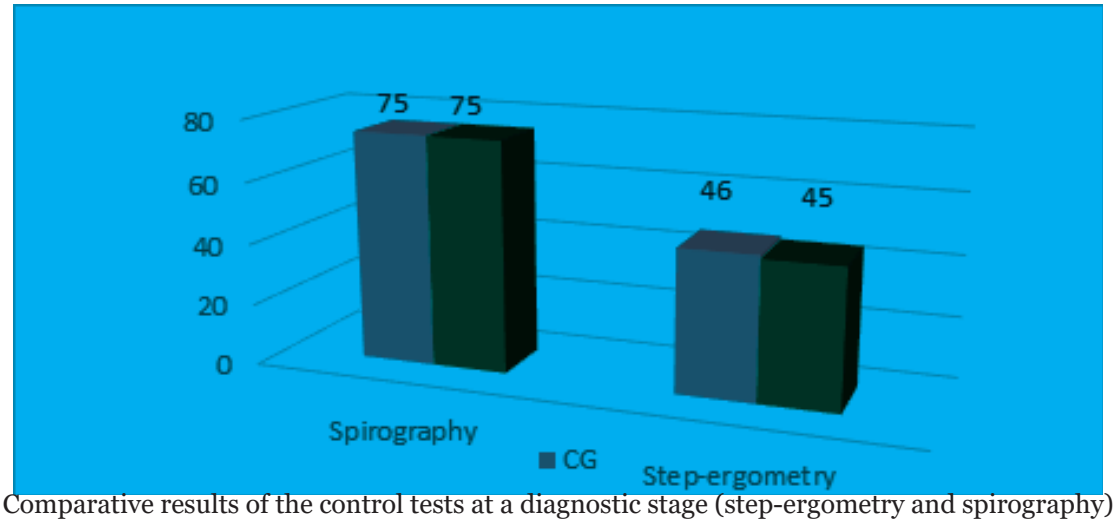

Fig. 5. Comparative results of the control tests at a diagnostic stage (step-ergometry and spirography)

Spirography was used in order to estimate a functional state of respiratory system. During the results analysis in the control (75 ±1,6 VC, % in terms of p≥0,01) and experimental (78 ±1,3 VC, % in terms of p≥0,05) group we revealed that the results were lower than the norm (VC 80%). The results of the test show the functional state of respiratory system among teen-agers with intellectual disabilities. They are involved into Para Cheer. It is indirect index of a low level of working capacity.

Step-ergometry, the same as PWC170, estimates general physical working capacity. The indices of the control group were in the average 46±1,1 in terms of p≥0,05, in the experimental group – 45±1,3 in terms of p≥0,01, with the norm of index 55. It shows a low level of physical working capacity of the respondents.

Conclusion

Control and experimental groups were identical according to age, gender and functional indices and the level of physical readiness. If we analyze the held tests at a diagnostic stage, we would see that 100% of tests show insufficient level of physical readiness and low working capacity of the respondents from both groups.

In the average the results of the tests (Cooper test, Ruffier test, Genchi test, Stange test, Serkin test, knee-heel test, Romberg test, PWC170, maximum oxygen consumption (MOC), step-ergometry and spirography) in the control group turned out to be better than the results of the experimental group by 10%. In such tests as Ruffier test, MOC and spirography the experimental group showed better result, than the control group, in the average by 5%. At a diagnostic stage we revealed that the level of functional readiness development in the control group in insignificantly higher, than the level of the experimental group.

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