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RESEARCH OF MOTOR DEFECT ON ICP EFFECT ON THE INTELLECTUAL SPHERE IN ADOLESCENTS

In the article there are considered the questions concerned with the problem of development of adolescents with congenital and acquired abnormalities. This problem is imperishable for psychological science and practice. At the present stage of social evolution occur significant changes in relation to persons with developmental disabilities, which reflect a new world community's comprehension of such question as a respect for people with abnormalities in development and parity of their rights with other members of society.

Infantile cerebral palsies represent a large group of diseases of the Central nervous system that clinically are manifested as variety of dyskinesiae, voice and mental disorders. Cerebral palsy is characterized by residual status. The severity of upper and lower extremities motor functions disturbances as a result of which occurs the disparity of sensory and carrying out movements inhibits adequate intellectual sphere development in adolescents with ICP and negatively effects the quality of world perception. Thus, cognition of the world in the dynamic activity is disrupted.

Adolescents without deviations in Intellectual development occur rarely. The uneven nature of intellectual insufficiency is determined by retardation of some mental functions formation and the relative safety of others. But as an adolescent's maturation his intellectual sphere acquires properties due to psyche flexibility that enable to decrease considerably effect of defective brain parts which are responsible for the locomotor apparatus on intellectual development in General.

Key words: adolescents with congenital and acquired defects, mental retardation, motor defect, intellectual function level, verbal intelligence, nonverbal intelligence and intelligence quotients.

Problem statement. On ICP especially are damaged brain parts with a help of which the voluntary movements are performing. Therefore it is clear that the injury of these parts can adversely affect the intellectual sphere maturation.

In the basis of having a place in ICP motor defect underlies not so much «injury» of already performed intellectual potential as its retarded or anomalous development. In all these cases the interaction of voluntary movements' regulatory systems disturbs. This single mechanism of general locomotor sphere and intelligence disorders determines the necessity to speak about intellectual sphere disturbances and the ways (methods) of its correction in adolescents with ICP.

The last researches and publications analysis. Motor defect structure in ICP includes specific deviations in mental development [1]. For adolescents

with cerebral palsy it is characteristic a peculiar anomaly mental development, that is determined by early organic brain injuries and different locomotor, voice and sensory abnormalities [3].

The mechanism of psyche development disturbances is complex and it is determined by the time and degree, as well as the localization of brain injury [8].

Chronological maturation of the adolescents' mental activity with cerebral palsy abruptly retards and on this background there are identified various forms of mental disorder and, first of all, cognitive activity [4].

According to state of intelligence adolescents with cerebral palsy constitute extremely diverse group: some of them have normal or near-normal intelligence, others experience a retardation of mental development, and in another ones has place a mental deficiency [6].

Adolescents without deviations in mental (in particular, intellectual) development are to be found relatively rare. A fundamental disturbance of cognitive activity is the retardation of mental development [5].

The purpose of the article. To identify the motor defect on ICP effect on the intellectual sphere in adolescents.

Exposition of basic material. Unformedness of higher cortical functions is an important link of cognitive activity disturbances of children with cerebral palsy. Most often suffer individual cortical functions, and in General there take place partial of their disturbances. First of it is noted an insufficiency of spatial and temporal representations. Adolescents have expressed the body scheme disturbances. Many spatial concepts (in front, behind, between, on the top, at the bottom) are difficultly assimilated. A significant part of the adolescents hardly perceive the spatial interposition. They have disrupted holistic image of items (can't lay the parts of a whole — to collect cut picture, to design the model from sticks or cubes). There are often noted optical spatial disturbances. In this case it is difficult for adolescents to copy geometric shapes, to draw, to write.

There is often expressed a phonemic sense failure, stereognosys, all kinds of praxis, realization of purposeful automatic movements. In mane of them there are expressed formations of mental activity disturbances. In some adolescents develop mainly visual forms of thinking, in others — on the contrary, there is particularly affected visual-active thinking on better development of verbal-logical thinking. For the ICP mental development it is characteristic the psychoorganic manifestations severity, some of like slowness and exhaustion of mental processes. There are noted difficulties with the changing-over other activities, deficiency of concentration, slowness of perception, reduction of mechanical memory. A lot of adolescents are notable with low cognitive activity, what manifests itself in reduced interest in tasks, poor concentration, slowness and low mental processes changing-over. Low mental performance is partly connected with cerebroasthenical syndrome, which is characterized by abruptly growing fatigue while performing intellectual tasks. The most distinctly it is manifested at school age during various intellectual exertions. At the same time usually affects purposeful activity

The major cognitive activity abnormality is mental retardation, which is associated with both the early organic brain damage, and with the living conditions. Mental retardation at ICP is often compensated with the further children's mental development favorable dynamic. They are easy to use help from adults while studying and they have enough, but a few slow learn of new material. With adequate correctional-pedagogical work children often catch up their peers in mental development. In adolescents with mental retardation mental functions defects are often total. To the forefront advances the higher cognitive activity forms insufficiency — abstract logical thinking and higher, especially Gnostic functions. Severe mental retardation degree prevails in double hemiplegic and atonic-astatic forms of ICP. The cases of mental retardation in adolescents with severe locomotor disorders aren't rare. A number of cognitive activity disturbances are characteristic for certain clinical forms of the disease. At spastic diplegia it is observed satisfactory development of verbal-logical thinking with the spatial gnosis and praxis severe deficiency.

Performance of tasks that require the participation of logical thinking and verbal answer present no difficulty for adolescents with this ICP form. At the same time they experience significant difficulties in performing tasks on spatial orientation, cannot correctly copy the shape of the object, often depict mirror asymmetric shape and hardly master the body scheme and direction. In these teens are often found counting function disturbances that express difficulties of the global amount perception, a whole and parts of a whole comparison, the number structure mastering, digit order number perception and the arithmetic signs mastering.

It is worth noting that some local higher cortical functions defects, such as spatial gnosis and praxis, counting function (the last one sometimes takes the form of severe dyscalculia) can be observed in other ICP forms, but undoubtedly these disorders are the most often observed at spastic diplegia. In adolescents with dexter hemiparesis there is often noted optical-spatial dysgraphia. Optical-spatial defects express while reading and writing: reading is difficult and slowed, as the children confuse similar in shape letters, while reading there are noted mirror elements. They later than their peers form the body scheme concept, they don't differ right and left hand for a long time.

The intellectual defects structure at hyperkinetic ICP form differs with its peculiarity. In the majority of adolescents with a primary subcortical brain parts injury the intelligence is potentially saved. The key place in the defect structure takes insufficiency of aural perception and voice disturbances (hyperkinetic dysarthria). Adolescents experience difficulties while performing tasks, which require verbal clearance and easier perform visual instructions. For the hyperkinetic ICP form it is characteristic the satisfactory of a spatial praxis and gnosis development and learning difficulties are more often associated with voice and hearing disturbances. [7]

With the purpose of realizing set research goals we were taken as a basis the Russian-language version of the WISC test adaptation under the direction

of H. Gilbuh and members of the Department of psychodiagnostics Institute of Psychology in Ukraine (Kiev). Manual «Measuring the intelligence of children,» ed. Yu. Z. Gilbuh [2] and the attached test WISC is produced and distributed by scientific-practical center «Psychodiagnostics and differentiated education» (Kiev) [2].

The research was carrying in small-size groups (3 to 5 adolescents) and individually on the base of children's specialized clinical sanatorium «Hadzhibey». Time of research: the first half of the day from 11.00 to 12.30. Individual examination of adolescents is determined by having some of them spastic diplegia. And, as a result, they had needed more time for explanation the task itself and its further performance. In the first part of David Wechsler test (the study of verbal intelligence), practically every of respondents allowed repeated performing some tasks because of certain question misunderstanding in the subtests 1, 2, 3, 6 (knowledge, comprehension, count and the repetition of numbers).

In the course of verbal intelligence examination it had been revealed that adolescents who regularly visit the children's sanatorium «Hadzhibey» had higher rates than adolescents, who attend the resort extremely rarely. The results of the first part of the test are the evidence of the fact, that respondent's potential for intellectual development of the subjects is not fully used. In our opinion it is worth to mark out the next characteristics in the verbal intelligence structure:

- the intellectual functions degree in the present, that determines the normal intellectual activity realization
- the state of these functions in the past, in the maturation and formation of individual intelligence.

The results analysis shows that intellectual functions degree in the present is hardly disturbed and may be increased with getting of high-quality knowledge during the educational process. And the individual intelligence maturing and formation do not differ from the norm. In the second part of the examination (of a nonverbal intelligence subtests) the tasks did not cause significant mistakes while performance. The time of tasks performance did not exceed the established norm for adolescents in all age groups.

From adolescents (boys) worth to chooser two age groups: 13-years-olds ($n = 18$) and 15-years-olds ($n = 30$), which showed the highest results in our research. In quantitative terms it is 48 adolescents. The lowest rates on the used test revealed a group of 17-year-old adolescents. In adolescents girls the highest result revealed in the group of 13 ($n = 5$), 14 ($n = 8$) and 17-year-old ($n = 9$). In quantitative terms it is 22 adolescents that constitute more than half of all the respondents, in contrast to adolescent boys, where this index constitutes only one-third of all respondents with development disturbances. Reaction to performance of a research is positive in general. During the performance of the first part of the test D. Wechsler it have been noted some test questions misunderstanding that has been revealed at the repeated explaining of job. The interests in performance of research have showed all adolescents with development disturbances.

Table 1

Results of the Wechsler test (n=201 withICP)

Age (completed years)	Number (n) of respondents								
	Boys			Girls			Total		
	N	score <i>x</i>	IQ	n	score <i>x</i>	IQ	n	score <i>x</i>	IQ
12	10	94	94	–	–	–	10	94	94
13	18	106	102	5	110	104	23	108	103
14	25	99	97	8	106	102	33	103	100
15	30	103	100	11	99	97	41	101	99
16	34	92	93	9	95	95	43	93	94
17	42	91	93	9	101	99	51	96	96
Total	159	97,5	96,5	42	102,2	99,4	201	99,2	97,7

Notes: N — number of respondents;

x — arithmetic mean scores for each age group;

IQ — intelligence quotient

$\chi = \frac{\sum_{i=1}^n x_i}{n}$ — the formula for finding the mean measure.

Table 1 shows that the IQ of girls with the psycho-physical development disabilities onICP isto a very slight degree (5 points) higher than in boys with the same diagnosis. The maximal level of intelligence value (max.) in adolescent girls was reveledin the age group of 13-year-olds (n = 5). The minimal IQ value (min.) in adolescent girls is in the age group of 16-year-olds (n = 9). It is also worth to be noted that the highest IQ (max.) in boys with developmental abnormalities on ICP is in the age group of 13-years-olds (n = 18). The minimal IQ measure (min.) in adolescent boys is in the group of 17-year-olds (n = 42). The average IQ measure in adolescents with ICP is in the average rate (90–109 points) what is adequate to the average rate.

According to received result we can make following conclusions:

– in girls group with development abnormalities there is higher IQ than that of boys. The maximalmeasures are in the group of 13-year-olds (n = 5) and the minimal measures are in a group of 16-year-old adolescents (n = 9). This fact may be evidence of that theorganic Cerebral and central nervous system injuries in adolescent boys with ICP are more expressed than in girls with the same diagnosis

–the maximal adolescent boys IQ with development abnormalities are in a group of 13-year-olds (n = 18), and the minimal measures in this group were revealed in 17-year-olds (n = 42);

– in group of 13-year-olds both girls and boys there are the most severe disorders of locomotor apparatus.

The second technique we used for researching of the intellectual sphere is John Raven’s Progressive Matrices. According to John Raven it is test of abilities to perceive certain forms, to comprehend their features, character, the mutual relations or the ensemble, a set of relations, and that’s why some tasks require usage of the logical reasoning. To perform our research we had chosen the black and white version of the test John Raven. Research has been

performed in small-size groups (from 3 to 5 teenagers) on the base of children’s specialized clinical sanatorium «Hadzhibey.» Time of performance: the first half of the day from 11.00 to 12.30.

In the «A» series (the principle of the correlation in the matrix structure) almost all respondents showed a high level of attention and a high level of visual differences.

The series «B» (the analogy between the pairs of shapes) also caused no difficulties while its performance. It is evidence of a good linear differentiation in the linear correlation structure.

In the series «C» (the principle of progressive changes in the shapes of matrices) in abilities to dynamic (fast) continuous observation and tracking of changes adolescent boys’ results had been significantly lower than in adolescent girls’. Most likely cerebral areas that are competent for instantaneous attention switching in adolescent are more injured than in adolescent girls.

In the series «D» (the principle of figures’ regrouping) where the performance depends on the ability to comprehend the quantitative and qualitative changes in the ordering (composing) figures according to the used changes rule about 50 % of the task had been left without a solution. From this example we can make a following conclusion: quantitative and qualitative changes in the spatial arrangement of objects and their dynamics cause big difficulties in adolescents with development abnormalities.

At the last task of John Raven’s test the «E» series (the principle of the pieces decomposition on the elements) adolescents with development abnormalities showed the lowest test results. It is an evidence of that the highest form of abstract and dynamic synthesis function is seriously disturbed. The exceptions had constituted adolescents with development abnormalities who have the mild form of ICP.

Table 2

Results of the test Raven’s Matrices (n=201 with ICP)

Age (completed years)	Number (n) of respondents								
	Boys			Girls			Total		
	N	score x	IQ	n	score x	IQ	n	score x	IQ
12	10	30	87	–	–	–	10	30	87
13	18	38	93	5	39	95	23	38,5	94
14	25	36	90	8	38	93	33	37	91,5
15	30	37	91	11	36	90	41	36,5	90,5
16	34	29	81	9	34	87	43	31,5	84
17	42	28	80	9	38	92	51	33	86
Total	159	33	87	42	37	91,4	201	34,4	88,8

Notes: N – number of respondents;
 x – arithmetic mean scores for each age group;
 IQ – intelligence quotient

$$x = \frac{\sum_{i=1}^n x_i}{n} \text{ — the formula for finding the mean measure.}$$

In the group of 13-year-olds (n = 18) adolescent boys there is the highest IQ. And the lowest measure of intellectual development was noted in the group of 17-year-olds (n = 42). In adolescent girls with ICP the highest IQ measures were revealed in the group of a 13-year-olds (n = 5). And the lowest was in the group of 16-year-olds (n = 9). Thus we can make a conclusion that the level of general educational attainment is average.

The intellectual sphere dynamics (positive) in adolescent girls is slightly higher in comparison to adolescent boys with ICP and is in the mean area of intellectual development. In adolescent boys this measure is in area of a «poor, below average intellectual development.»

Research with adolescents in the norm performed individually on the base of two Odessa secondary schools № 13 and № 73. Time of research : from 14.00 to 16.00. All respondents were informed about the purposes and objectives of the research research of the intellectual sphere using the techniques: D. Wechsler test and progressive Raven’s Matrices). The attitude to the testing process was completely positive.

Table 3

Summary table of the D. Wechsler test results
(n=200, without development deviations)

Age (completed years)	Number (n) of respondents								
	Boys			Girls			Total		
	N	score x	IQ	n	score x	IQ	n	score x	IQ
12	5	110	104	2	112	105	7	111	105
13	10	107	102	6	120	110	18	114	106
14	18	108	103	10	116	108	28	112	105
15	27	114	106	7	124	112	32	119	109
16	40	116	108	11	116	108	51	116	108
17	60	120	110	4	120	110	64	120	110
Total	160	112	105	40	118	109	200	115,3	107

Notes: N — number of respondents;
x — arithmetic mean scores for each age group;
IQ — intelligence quotient

$$x = \frac{\sum_{i=1}^n x_i}{n} \text{ — the formula for finding the mean measure.}$$

From table 3 it follows that IQ of adolescents without development disabilities (in norm) is above average measures and is within the range good standards (110–119 points).

Also it has been noted that the IQ of girls without development disabilities is in average on 6 points higher than that of boys of the same group. The maximal IQ (max.) in girls revealed in the age group of 15-year-olds (n=7) and it conforms to a value higher than the average-statistical norm. In adolescent boys the highest IQ measures (max.) corresponds to the age group of 17-year-olds (n=60). The IQ (min.) revealed in a group of 13-year-old adolescent boys (n=10).

Table 4

**Results of the test Raven's Matrices
(n=200, without development deviations)**

Age (completed years)	Number (n) of respondents								
	Boys			Girls			Total		
	N	score <i>x</i>	IQ	n	score <i>x</i>	IQ	n	score <i>x</i>	IQ
12	5	45	102	2	40	98	7	42,5	100
13	10	43	100	6	48	110	18	45,5	105
14	18	44	101	10	47	106	28	45,5	103,5
15	27	48	105	7	51	114	32	49	109,5
16	40	48	108	11	46	104	51	47	106
17	60	49	110	4	49	110	64	49	110
Total	160	46,2	104,3	40	46,8	107	200	46,4	105,7

Notes: N — number of respondents;

x — arithmetic mean scores for each age group;

IQ — intelligence quotient

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$
 — the formula for finding the mean measure.

From table 4 it follows that IQ of adolescents without development disabilities (in norm) is above average measures and is within the range of high standards (100–110 points).

We also have been noted that the IQ of girls without development disabilities is in average on 3 points higher than that of boys of the same group. The maximal IQ (max.) in girls revealed in the following age groups: 13-years-olds (n=5); 15-year-olds (n=11) and 17-years-olds (n=9), which conform to a value above average standarts. In quantitative terms it is n=25 adolescents that constitute more than half of all the respondents, that have took part in the research. The lowest IQ (min.) revealed in a group of 12-year-olds girls (n=2). In adolescent boys the highest IQ measures (max.) corresponds to the age group of 17-year-olds (n=60). The IQ (min.) revealed in a group of 13-year-old boys (n=10).

Conclusions

1. In adolescents with ICP has been revealed the features of the intellectual sphere in IQ indices terms, as well as the nature of the correlation between them. In younger adolescents (12–13 years) with various ICP forms IQ measure in research with usage both David Wechsler and John Raven's matrices tests were higher than in other age groups. At the same time in these groups there are adolescents with a severe degree of locomotor apparatus disorders.

2. Results' distinctions in groups of adolescents with ICP revealed significant differences in the intelligence quotient characteristics that represent the sphere of non-verbal and verbal intelligence, while in the ability to think logically (by a specific method and thinking system there were revealed no significant differences. In adolescents with ICP the intellectual sphere were compensated by improving the quality of education. 3. Both the specifics of

the intellectual sphere disturbances in adolescents with ICP and compensating resource are on the level of formation and on interaction of thinking kinds, cognitive processes and the knowledge educational system.

4. Adolescents with ICP have mean or below mean IQ measure. Apparently at the same time in this group (of 17-years-old) as a specific resource appears the ability to involuntary intellectual control.

5. A group of adolescents without development deviations has measures above average values and is within the range of high standards. At the same time adolescents with development disabilities have measures below average level of the intellectual sphere development and are outside the norm limits.

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ДОСЛІДЖЕННЯ ВПЛИВУ РУХОВОГО ДЕФЕКТУ ПРИ ДЦП НА ІНТЕЛЕКТУАЛЬНУ СФЕРУ У ПІДЛІТКІВ

Резюме

У статті розглядаються питання, пов'язані з проблемою розвитку підлітків, які мають вроджені та набуті дефекти. Ця проблема є неминущою для психологічної науки і практики. На сучасному етапі розвитку суспільства відбуваються суттєві зміни стосовно осіб з відхиленнями у розвитку, що відображають нове розуміння світовим співтовариством питань: повага до людей з проблемами в розвитку і рівність їх прав з іншими громадянами.

Дитячі церебральні паралічі являють собою велику групу захворювань центральної нервової системи, що клінічно виявляються різноманітними руховими, мовними і психічними розладами. Дитячий церебральний параліч характеризується резидуальним станом. Але, у міру розвитку підлітка, його інтелектуальна сфера набуває за рахунок пластичності психіки властивості, що дозволяють значно знизити вплив ушкоджених відділів головного мозку, що відповідають за опорно-руховий апарат, на розвиток інтелекту в цілому.

Ключові слова: підлітки з вродженими і набутими дефектами, затримка психічного розвитку, руховий дефект, рівень інтелектуальних функцій, вербальний інтелект, невербальний інтелект і коефіцієнти інтелекту.

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ИССЛЕДОВАНИЕ ВЛИЯНИЯ ДВИГАТЕЛЬНОГО ДЕФЕКТА ПРИ ДЦП НА ИНТЕЛЛЕКТУАЛЬНУЮ СФЕРУ У ПОДРОСТКОВ

Резюме

В статье рассматриваются вопросы, связанные с проблемой развития подростков, имеющих врожденные и приобретенные дефекты. Эта проблема является непреходящей для психологической науки и практики. На современном этапе развития общества происходят существенные изменения по отношению к лицам с отклонениями в развитии, отражающие новое понимание мировым сообществом вопросов: уважение к людям с проблемами в развитии и равенство их прав с другими гражданами.

Детские церебральные параличи представляют собой обширную группу заболеваний центральной нервной системы, клинически проявляющихся разнообразными двигательными, речевыми и психическими расстройствами. Детский церебральный паралич характеризуется резидуальным состоянием. Но, по мере развития подростка, его интеллектуальная сфера приобретает за счет пластичности психики свойства, позволяющие значительно снизить влияние поврежденных отделов головного мозга, отвечающих за опорно-двигательный аппарат, на развитие интеллекта в целом.

Ключевые слова: подростки с врожденными и приобретенными дефектами, задержка психического развития, двигательный дефект, уровень интеллектуальных функций, вербальный интеллект, невербальный интеллект и коэффициенты интеллекта.

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