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DYNAMICS OF LIFE QUALITY OF CHILDREN WITH CEREBRAL PALCY BY INFLUENCE OF OCCUPATIONAL THERAPY AND PHYSICAL THERAPY

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Abstract

The level and potential of improving life quality of children with cerebral palsy (CP), as well as the impact of occupational therapy and physical therapy on them, is an actual subject of the study. The quality of life of children with CP is a complicated social problem, the value of which does not decrease in the adult age of patients. *The purpose:* to assess the dynamics of life quality of children with CP under the influence of rehabilitation programs. *Material and methods:* 106 patients (54 with spastic hemiplegia - HP and 52 with spastic diplegia - DP) aged from 4 to 6 years were examined in accordance with CPQOL-Child, GMFCS and MACS. Examined children of HP and DP groups have been divided into main and control subgroups each. Control subgroups passed the standard program of occupational therapy and physical therapy. *Results:* among the children with CP in HP group in accordance with GMFCS the level II was 25% of children, the level III - 50%, IV – 25 %; and in DP group - 11,1 %, 33,3 % and 57,2 % children respectively. Among the children in HP group in accordance with MACS the level II was 7,1 % of children, the level III – 57,2%, IV – 35,7 %; %; and in DP group - 22,2 %, 66,7 % and 11,1 % children respectively.

Under the influence of rehabilitation course in groups of children there were significant improvements in most of the domains of life quality. Only "Social well-being and acceptance", "Family health" have not changed in all groups ($p > 0,05$). In addition, the most reliable results in the main groups were identified by the "Functioning" domain ($p < 0,05$).

Conclusions: means of occupational therapy and physical therapy are effective in improving the life quality of children with CP. Their rational choice, combination and proper organizational and methodological support can improve program outcomes.

Key words: self-service, domestic and social skills, physical exercises, therapy.

Formulation of scientific problem and its significance. The issue of life quality and its improvement among children with various diseases remains important [13]. The urgency of need for long-term care, occupational and physical therapy for children with cerebral palsy (CP), which should take into account the stage of development of children and their physical, psychological, social development and living conditions, increases with each year both at the state and family levels. The growth in the number of children with CP strongly affects national health systems, which need to expand the network of services for such children, causes reduction of life quality at the family level and brings a need for its substantial reorganization [11]. The life quality of children with CP is a complicated social problem, the value of which does not decrease in the adult age of patients [7].

Among children with CP who are able to fill out an application form independently, the quality of life is much lower than among healthy children. According to the study by Varni J. W. and co-authors [12] the average score of the Pediatric Quality of Life Inventory Version 4.0 (PedsQL 4.0) Generic Core Scales in the group of children with CP was 65.9 items, and in the group of healthy children – 83.8 items. It is emphasized that such low score is observed in pediatric patients with cancer who receive treatment (in average 68.9). In addition, it was noted that children with a diagnosis of quadriplegia received an average of 49.4 items, and children with diplegia (in average 69.1) and hemiplegia (in average 72.4) had better scores. The worst correspondence of life quality between the child's form and the parent was in the sphere of emotional functioning.

The presence of significant differences in the assessment of life quality by the children and their parents is emphasized in other studies [18]. It is noted that parents report lower scores (more than half). It can be explained by the influence on the perception of parents of high levels of stress.

Also, there is a link between the level of the development of high motor skills with limitation in activity, the need for help, and the use of auxiliary devices. And the level of development of high motor skills is a good predictor of day to day functioning, self-service and social function [9].

Restorative treatment and rehabilitation of children is very important [15, 16], they also have a number of peculiarities with different pathologies [14]. Rehabilitation in CP is recognized as a complex process aimed at ensuring the best possible participation, quality of life for the child and the family. Through direct and indirect actions, it is focused on a person in all its dimensions, physical, mental, emotional, communicative, holistic, and it includes the family, social and environmental context [4].

Link of the study with the scientific plans and themes. The work was carried out in accordance with the "Plan of research work of NUPESU for 2016-2020" on theme 4.2. "Organizational and theoretical-methodical bases of physical rehabilitation of persons of different nosological, professional and age groups" (state registration number 0116U001609).

The purpose of the article – to assess the dynamics of life quality of life in children with CP under the influence of rehabilitation programs.

Material and methods. *Participants.* 106 patients with the diagnosis of children CP took part in the study, who passed the course of occupational and physical therapy in the children establishment "Kyiv City Rehabilitation Center for Children with Disabilities" (main groups) and the Special Education and Training Complex "Mriya", Kyiv (control groups). Among these participants 54 (50,9%) children were with spastic hemiplegia (HP) and 52 (49,1%) with spastic diplegia - DP). The examined children of the HP and DP groups were separated by blind sampling for the main (MG) and control (CG) subgroups each: HP at MG1 (n = 28) and KG1 (n = 26); DP on MG2 (n = 27) and CG2 (n = 25). Groups MG1 and CG1, MG2 and CG2 statistically did not differ among themselves on the considered parameters ($p > 0,05$).

Organization of the study. Cerebral Palsy Quality of Life (CPQOL-Child) [17], Gross Motor Function Classification System (GMFCS) [8], Manual Ability Classification System (MACS) have been used to solve the issue [6]. The children of the main groups passed the rehabilitation course on the basis of occupational therapy (targeted therapy) and physical therapy (induced by limitation of motor therapy, bimanual training and complex therapeutic exercises) for 30 days (22 classes, 6 hours each day). The methodological basis of the program for major groups was the methodological approach of the international classification of functioning; the form and features of clinical manifestations; family and child-center, multi-, inter- and transdisciplinary approaches; results of the analysis of the child's environment; the principles of physical rehabilitation and didactic; motor training; method for identifying individual SMART goals. The control groups passed the standard program of

occupational and physical therapy. The number of classes in the control and main groups was the same.

Statistical analysis. The materials of the study were processed in the program of statistical analysis – IBM SPSS 21. Mathematical processing of numerical data was carried out using methods of variation statistics. For the studied parameters, the average value (\bar{x}) and the square deviation (S) were determined. The Man-Whitney U-criterion was used to assess the significance of the difference.

Presentation of the main material and justification of the results of the study. In the HP group according to GMFCS classification at the beginning of the study 25% of children had level II, 50% - level III, 25% - level IV, and in the DP group –11,1 %, 33,3 % and 55,6 % children respectively. Among the HP group according to MACS 7,1% of children had level II, 57,2% - level III and 35,7% level IV, and the DP group - 22,2 %, 66,7 %, and 11,1 % children.

Conducting an assessment of life quality after passing the course of therapy by the parent questionnaire Cerebral Palsy Quality of Life revealed a significant change in the groups of children with hemiplegia (Table 1).

According to the "Social Welfare and Adoption" domain, the indicators in the MG1 and CG1 children groups did not change and amounted for 71.2 ± 8.10 items and 70.6 ± 6.62 items respectively ($p > 0.05$). In addition, the differences between the initial and final data in the groups were not reliable ($p > 0.05$).

The domain "Feeling of Functioning", which was responsible for the ability to play, communicate, sleep, use of the upper extremities and palms, the ability to dress, eat, drink, use the toilet independently, had a more significant dynamics ($p < 0.01$). Differences between MG1 and CG1 were reliable ($p < 0.05$). The average score in MG1 increased by 10.49 items, and in CG1 - by 4.69 items. Thus, the developed program was more effective in improving the child's abilities, in spite of the reliabilities and effectiveness of standard program.

The changes in the "Participation and Physical Health" domain were reliable ($p < 0.01$) and equal in groups with HP (Table 1). It confirmed the equal opportunities of used programs in improving the child's ability to play with friends, participate in recreational activities, sporting and social events, in communities, their physical health, movement and use of their legs, ability to do what they want. The average increase was 7.54 items in MG1 and 5.38 points in CG1.

Table 1

The average indicators of quality of life of children with hemiplegia in accordance with Cerebral Palsy Quality of Life after the course of therapy

Domains	$\bar{x} \pm S$		p
	MG1	CG1	
Social well-being and acceptance	71,2±8,10	70,6±6,62	>0,05
Feeling about functioning	67,5±7,66**	63,1±7,75**	<0,05
Participation and physical health	50,4±13,78**	49,5±12,92**	>0,05
Emotional well-being and self-esteem	68,1±6,23**	65,6±6,90**	>0,05
Access to services	57,6±12,19**	57,8±12,51**	>0,05
Pain and disability	48,5±9,49	50,6±9,02*	>0,05
Family health	59,6±10,13	58,1±8,89	>0,05

Note. * – the difference between the indicator is statistically significant compared to the indicator during the entering $p < 0,05$; ** – $p < 0,01$.

Changes in the domain "Emotional well-being and self-esteem" amounted to 7.14 items and 3.29 items in MG1 and CG1 respectively ($p < 0.01$). The average score increase of the "Access to services" domain was 6.01 items and 5.68 items in MG1 and CG1 respectively ($p < 0.01$). The average score of "Pain and disability" domain in MG1 increased by 2,18 items ($p > 0,05$), and in CG1 the increased was 2,22 items ($p < 0,05$). Differences between groups according to this indicator remained unreliable ($p > 0,05$). The "Family Health" domain has not changed in MG1 and CG1 ($p > 0,05$).

Dynamics in groups of children with diplegia had similar characteristics (Table 2). After passing the course of rehabilitation under the domain "Social well-being and acceptance" MG2 and CG2 statistically did not differ in the received scores ($p > 0,05$). In addition, the differences between the initial and final data in groups with diplegia were not reliable ($p > 0,05$).

In the "Feeling of Functioning" domain, the final score for MG2 and CG2 were set at 67.4 ± 8.73 items and 61.4 ± 9.57 items respectively. Differences between the groups on this indicator were statistically significant ($p < 0,05$). In addition, both groups showed a significant ($p < 0.01$) increase compared to initial results. The average score in MG2 increased by 11.92 items and in CG2 by 4.37 items. Thus, the developed program was more effective. The results of the "Participation and Physical Health" domain have significantly improved by 5.46 items

in MG2 and 5.05 items in CG2 ($p < 0.01$). Differences between the groups on this indicator were statistically not reliable ($p > 0,05$).

Table 2

The average indicators of quality of life of children with diplegia in accordance with Cerebral Palsy Quality of Life after the course of therapy

Domains	$\bar{x} \pm S$		p
	MG2	CG2	
Social well-being and acceptance	72,9±7,46	73,6±7,28	>0,05
Feeling about functioning	67,4±8,73**	61,4±9,57**	<0,05
Participation and physical health	43,9±13,81**	44,5±13,49**	>0,05
Emotional well-being and self-esteem	67,6±9,48**	65,6±8,82**	>0,05
Access to services	58,5±11,02**	59,9±11,03**	>0,05
Pain and disability	44,6±10,18*	45,4±12,24*	>0,05
Family health	56,7±10,53	56,6±11,52	>0,05

Note. * – the difference between the indicator is statistically significant compared to the indicator during the entering $p < 0,05$; ** – $p < 0,01$.

"Emotional well-being and self-esteem" has improved statistically in comparison with the initial results ($p < 0,01$). And the increase in average scores was 7.18 items and 4.92 items in MG1 and CG1, respectively. Benefits in MG2 have not been established ($p > 0,05$).

The average score of the "Access to services" domain indicators obtained during reevaluation increased by 6.10 items and 5.55 items in MG2 and CG2 respectively ($p < 0,01$). The developed program had no advantages ($p > 0,05$). In the "Pain and Impact of Disability" domain, the average MG2 increased by 2.31 items, while in the CG2 group it was 2.31 items. Growth in both groups was reliable ($p < 0,05$). Differences between the groups on this indicator were statistically not reliable ($p > 0,05$). The domain "Family Health" has not changed in MG2 and CG2 ($p > 0,05$).

Discussion. Cerebral palsy is one of the most common chronic disorder of childhood, which has a huge impact on the ability of the child to perform daily activities. Reducing the level of activity and limitation of participation due to multiple disorders lead to a decrease in life quality compared to healthy individuals. [1]. According to the literature, among the groups of people with cerebral palsy there is a decrease in independence, autonomy and level of social life [2, 5].

Our study complemented the data on life quality of children with cerebral palsy. In particular, the study of E. Davis and co-authors [3] indicates the following results of the assessment of life quality in accordance with the questionnaire CPQÎL-Child (form for parents): "Social well-being and acceptance" domain – 78 items; «Feeling about functioning» domain - 68 items; «Participation and physical health» domain - 62 items; «Emotional well-being and self-esteem» domain - 77 items; «Access to services» domain - 60 items; «Pain and» domain - 32 items, «Family health» domain - 67 items.

It should be noted that in general, the data which we received, were lower, but according to GMFCS in the study by E. Davis and co-authors [3] the children had better levels in general, the groups had fairly identical shares in the I, II and III levels (28-35%), and children from IV level did not get to the sample. It should be stressed that the biggest difference in scores between studies was found in the "Participation and Physical Health" domain. In addition, changes of life quality indicators have not modified in the study (10 classes with therapeutic horse riding for 30-40 minutes within 10 weeks).

Also in the study L. Sakzewski [10] the results of assessing life quality of children (average age of 10 years) with spastic forms of cerebral palsy in parental and children form CPQÎL were presented. No differences were found. Thus, according to the parental form, the results were: 79 items under the domain "Social Wellbeing and Adoption", 69 items under the "Feeling of Functioning" domain, 68 items - "Participation and Physical Health" domain, 78 items - "Emotional Well-being and Self-esteem" domain, "Access to services" domain - 64 items, domain "Pain and disability" - 27 items, and for the domain "Family health" - 68 items. It should be noted that according to GMFCS, in the L. Sakzewski [10] study, 75% of children with level II and 25% with level I; and according to MACS: 73% with level II and 24% with level I.

Conclusions

Most of the domains of quality of life have improved significantly, only "Social well-being and acceptance", "Family health" have not changed in all groups ($p > 0,05$). In addition, the most reliable results in main groups were identified in the "Feeling of Functioning" domain ($p < 0,05$): MG1 - $67,5 \pm 7,66$ бали, CG1 - $63,1 \pm 7,75$; MG2 - $67,4 \pm 8,73$, CG2 - $61,4 \pm 9,57$.

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