Evolution of Sports-medical Team Management in the Program of Posture Correction in Children

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ABSTRACT

Goals: The goal of this study was to determine the effectiveness of the organization and coordination of multidisciplinary team consisted of health and kinesiology professionals at the correction of posture among girls in the period of the second phase of intense growth and development. **Material and methods:** Testing was conducted on a sample of 70 girls, aged 11.9 ± 2.3 years, in which by the expert evaluation is recorded weakness of individual muscle groups, but also of the whole musculature. For the assessment of posture we applied the method of Napoleon Wolanski. Used are 9 variables that included the observed region of the body and an overall assessment of posture. The subjects were included in the program of kinesiology treatment with duration of 28 weeks. For all the parameters have been applied statistical procedures at univariate and multivariate level.

Results: Data on subjects were obtained by measuring the same variables at two time points, i.e. before and after the application of kinesiology treatments. Analyses of differences arithmetic mean and mean values were done with the t-test for paired samples. In order to determine global quantitative differences of tested variables tested discriminant analysis was applied. The results showed that the models which complement the experience and practical application of expert health professionals and kinesiology knowledge is a very effective tool for improving posture of girls in the second phase of intensive growth and development. In this way can be prevented health problems that might arise later in life.

Key words: organization and management, sports and medical management, corrective gymnastics, aqua-gymnastics.

1. INTRODUCTION

The process of multiplying new multidisciplinary management knowledge and skills is a dynamic process that provides a significant development of project-program activities that are of general interest to the wider community. Human resource is an entity that is always at the beginning and end of each story, because it certainly has tested, the consequences of such a system (1). Definition of man as a complex dynamic and organized integrated system stems from the fact that this system is composed of certain subsystems that are the subject of interest in different scientific fields (biological, medical, psychological, anthropological, sociological, etc.). Changing the development of such systems takes place under the influence of appropriate stimuli from the environment that are focused on the transformation of individual subsystems, each subsystem is the area considered by professional scientific disciplines. Kinesiology as a science that is primarily focused on the transformation processes in the field of anthropological dimension aims to improve health, optimal development of human qualities, abilities and motor skills and preserve them as long as possible at the high level (2,3). Consequently, movement and various kinesiology activities greatly

affect the overall anthropological status of the man and its quality of life (4). In early childhood physical activity level is low, primarily because of the relatively low intensity of movement (5). Based on the results of previous studies (6), conclusion is reached that after approximately six years of age, level of physical activity significantly increases. In this period 80% of the activity was moderate and 93% of high-intensity activities and occur at intervals of less than 10 seconds. As the start of sexual maturation occurs earlier in girls than in boys, so in girls earlier records and reduce the level of physical activity. Also, the decline in the level of physical activity in adolescence is somewhat more expressed in girls than in boys (7). Gender differences in muscle size in children are small until mid-puberty, but progressively increase from the end of puberty and adolescence, to the significant differences in adulthood (8). It is a known fact that the periods of pre-adolescence and adolescence is one of the most important stage of phylogenetic development of the child. In these periods there is a sudden change caused by the processes of growth and development of the entire anthropological status. Modern lifestyle has a very negative impact on psychological status of the child's body, especially in the period of its rapid growth and

development. This applies particularly to postural disorders and deformities of the musculoskeletal apparatus as a result all the more pronounced hypokinesis. Series of previous researches (9, 10, 11), came to the conclusion that the age of 13 years is a critical period for correct posture, so permanent disorders (deformities) of the posture can be expected in children during puberty and early adolescence, and that during this period of growth and development special attention should be given to prevent postural disorders and their progression. During the period when growth is slower, the presentation of postural problems is somewhat lower in children, but entering puberty can be expected sudden worsening of postural condition, as well as the detection of new cases (12). Based on the analysis of the habits of children aged 12-14 years (13) it was found that the children in sitting position spend 56% of time and that they then bent back at a ratio higher than 20° and/or rotated more than 45°. Kinesiology treatments include exercises to strengthen and stretch the muscles, particularly postural antigravity, and should help in the prevention of health problems that may arise later in life. Bearing in mind that in the younger age representation of poor posture is almost equal between both genders, and later is more common in girls because of their previous average period of rapid growth (14).

2. GOAL

The goal of this study was to determine the effectiveness of the organization and coordination of multidisciplinary team consisted of health and kinesiology professionals at the posture of girls in their period of intense growth and development.

3. MATERIAL AND METHODS

Respondent sample

Testing was conducted on a sample of seventy (70) girls, aged 11.9 ± 2.3 years, which enter the study voluntarily (with parental consent). The selected sample was related to the girls in which by the expert examination were diagnosed (poor posture) or some of the elements of the spine and the locomotor apparatus deformity. In the final processing results of the research included respondents who participated in the initial and final measurements and regularly attend a planned program of combined kinesiology activities for a period of 28 weeks.

Variables sample

Total 9 variables were applied to estimate posture. Diagnosing the state of the posture was performed by scoring the modified method of Napoleon Wolanski (15,16). This method determines the deviations in keeping body parts from normal (regular) posture. Scoring was done using expert judgment. For general assessment were used aggregate estimates of observed regions: head posture, shoulders, shoulder blades, chest, spinal column, belly, leg and foot condition. Deviations from the posture of the body are classified according to their size, and evaluated by model of negative points. Rating of posture depended on the regularity of the structure of the skeleton, but also the regularity of muscle distribution, weight, strength and the symmetry of paired body parts.

Exercise program

For the implementation of the project-program activities organized is multidisciplinary team (Project Management) composed of health professionals (physician specialists in physical therapy, two graduate physiotherapists, two physiotherapists)

and kinesiology specialist (four professors of sports specialist programs in aqua fitness and swimming). After diagnosis (posture assessment), defined is plan and exercise program of corrective gymnastics, aqua gymnastics and swimming, which was conducted in small groups, sometimes individually. The program of corrective gymnastics (with and without equipment) was realized in the sports hall with adequate surface. The most common props that were used in the implementation of these programs were pilates balls, sticks, planks, ladders, etc. The Swedish aqua gymnastics was realized in the gently sloping pool with depth of 40-90 cm, with an average water temperature of 29.4°C which corresponds recommendations of authors who conducted similar studies (17). Swimming program is realized in swimming pool measuring 25x50 meters, with an average water temperature of 26.8°C. The professional staff led and supervised the implementation of the program, on the basis of kinetic exercises for stretching and strengthening of the muscles. The experimental program combined motion activities on the floor and in water is realized over a period of 28 weeks (90 hours). During the first 4 weeks (20 hours), exercise program was carried out intensely every working day (60 minutes), after which the program was implemented three times a week for 60 minutes. In order to exercise be as effective as possible, to respondents was emphasized to take care about several factors of which the most important are: the starting position, the nature of the exercise, the assessment of muscle strength during the performance of motion, load dosage, number of repetitions, etc. In teaching treatments are performed correction and motivation of respondents (gymnast), with a permanent reminder that the exercises performed are dosed and customized to each individual.

Methods of results processing

For all the parameters have been applied statistical procedures at univariate and multivariate level. Data on subjects were obtained by measuring the same variables at two time points, or before and after the implementation of kinesiology treatment program. For the analysis of the results of research is used software SPSS 13.0 for Window. Analyses of differences between mean values were done with the t-test for paired samples. Thus, the ratio presented differences between the two arithmetic means and the error of the difference. As is known from the above-dependent pattern refers to the pattern of the results of the same subjects in two or more different measurement situations. Data is the value of the standard errors and confidence intervals in which occurs likely value differences. In order to determine global quantitative differences variables before and after program implementation was applied discriminant analysis.

4. RESULTS

Insight in the descriptive statistics of posture condition of the respondents (Table 1), can be noticed a significant correlation with the variables score of shoulders posture (ODRA), score of shoulder blades (ODLO), score of the thorax (OGRK), rating of the spine (OKIS), rating of the stomach (ODST), rating of the legs (ONOG), while there was lower correlation with the variables of head posture (ODGL), feet (OSTO) and overall posture (UODTW). Before the implementation of the program of exercise, the mean score of the posture (UODTW) among girls was 2.01. Based on this data, the posture in girls was in the zone of poor body posture. Discriminatory procedures determined improvement, as observed in individual regions

of the body, and in the overall assessment of body posture. At the final evaluation of posture (Figure 1), the mean score was significantly improved posture, and was 3.5 which are ranked in the zone between good and very good posture.

Variable		Mean	N	Std. Deviation	Std. Error
Initial	ODGL1	1.3571	70	.48262	.05768
Final	ODGL2	1.0143	70	.11952	.01429
Initial	ODRA1	2.9143	70	.28196	.03370
Final	ODRA2	1.8714	70	.33714	.04030
Initial	ODLO1	2.8571	70	.35245	.04213
	ODLO2	1.8286	70	.37960	.04537
Initial	OGRK1	1.2857	70	.45502	.05438
	OGRK2	1.1000	70	.30217	.03612
Initial	OKIS1	2.7143	70	.54221	.06481
	OKIS2	1.7429	70	.47199	.05641
Initial	ODST1	1.5571	70	.67321	.08046
	ODST2	1.1429	70	.35245	.04213
Initial	ONOG1	1.7286	70	.53626	.06410
	ONOG2	1.5000	70	.50361	.06019
Initial	OSTO1	2.7571	70	.43191	.05162
	OSTO2	2.1286	70	.41429	.04952
Initial	UODTW1	2.0143	70	.11952	.01429
	UODTW2	3.5000	70	.50361	.06019

Table 1. Descriptive statistics of posture

T-test for paired samples (Table 2) showed clearly high statistical significance in all variables of posture status. In fact, there have been significant changes in the values of (improvement) each the variables for posture score. This refers to the variable score of head posture (ODGL $p=0.000$), score for shoulders posture (ODRA $p=0.000$); scapulae (ODLO $p=0.000$); thorax (OGRK $p=0.000$); posture of the spine (OKIS $p=0.000$); abdomen (ODST $p=0.000$), feet (ONOG $p=0.000$), foot (OSTO $p=0.000$) and overall posture of the body (UODTW $p=0.000$).

In order to determine global quantitative differences in pos-

Overall Body Posture by Wolanski

Figure 1. Comparison of the total initial and final assessment of body posture (Wolanski method)

ture, discriminant analysis was applied. Discriminative model represents a special type of factor analysis in which are isolated orthogonal factors in the area of applied variables to show where the correlation of data set on which the discriminant analysis was performed and the results of the discriminant function (18). The results of discriminant analysis score posture in girls (Table 3), isolated one important function.

Function	Eugene value	% of Variance	Cumulative %	Canonical Correlation
1	9.820	100.0	100.0	0.953

Table 3. Discriminant analysis

The value of the coefficient of canonical correlation of the discriminant function is extremely high (.953). Table 4 shows the results of the Bartlett test (Wilks Lambda), the degree of freedom (DF) and the probability of error in rejecting hypothesis that the actual value of the canonical correlation is zero (p -level). The displayed parameters indicate the significance of the whole model of discrimination on the basis of the values of all the variables involved in the assessment of posture in women.

Test of Function(s)	Wilks' Lambda	Chi-square	DF	p-level
1	0.092	317.917	9	0.000

Table 4. Value of Wilks' Lambda, degree of freedom and p-level

The largest contribution to the discriminative function (Table 5) has a variable that provides an overall assessment of the

GENDER	Variable	Mean	Std. Deviation	Std. Error	95% Confidence interval		t-test	DF	p
					Upper	Lower			
Girls	ODGL1	0.34286	0.47809	0.05714	0.22886	0.45685	6.000	69	0.000 **
	ODGL2								
	ODRA1	1.04286	0.26571	0.03176	0.97950	1.10621	32.838	69	0.000 **
	ODRA2								
	ODLO1	1.02857	0.23905	0.02857	0.97157	1.08557	36.000	69	0.000 **
	ODLO2								
	OGRK1	0.18571	0.39168	0.04682	0.09232	0.27911	3.967	69	0.000 **
	OGRK2								
	OKIS1 OKIS2	0.97143	0.33928	0.04055	0.89053	1.05233	23.955	69	0.000 **
	ODST1								
	ODST2	0.41429	0.52455	0.06270	0.28921	0.53936	6.608	69	0.000 **
	ONOG1								
	ONOG2	0.22857	0.42294	0.05055	0.12772	.032942	4.522	69	0.000 **
	OSTO1								
	OSTO2	0.62857	0.51560	0.06163	0.50563	0.75151	10.200	69	0.000 **
	UODTW1								
	UODTW2	-1.48571	0.50340	0.06017	-1.60575	-1.36568	-24.693	69	0.000 **

Table 2. T-test for dependent samples of posture scores before and after program in girls

posture (UODTW). This is followed by assessment of specific regions posture, namely: shoulders (ODRA), shoulder blades (ODLO), spine (OKIS), feet (OSTO), head (ODGL), stomach (ODST), chest (OGRK) and legs (ONOG).

	Function
	1
UODTW	-.652
ODRA	.539
ODLO	.451
OKIS	.307
OSTO	.239
ODGL	.157
ODST	.124
OGRK	.077
ONOG	.071
Cluster centroids	
GROUP	Function
	1
Ini	3.111
Fin	-3.111

5. DISCUSSION

Specifically in initial testing in all subjects was noticeable muscle weakness of the shoulder belt, back and abdominal wall. Such a state of muscle tone (muscles relaxed) is one of the main reasons for the diagnosis of poor posture in patients at initial testing (19, 20). According to the above mentioned facts are definitely confirmed the conclusions of similar studies (21,22), irregular exercise that leaves a trace on weakening of muscle tone and that continuously and adequately dosed physical exercise is one of the most effective means of maintaining the correct posture of children. Based on these results, it can be clearly seen the positive impact of the application of combined exercises of corrective gymnastics, hydro gymnastics and swimming in the (re)habilitation of girl with noticeable deviation from the correct posture. Bearing in mind the results of discriminant analysis and the high value of the canonical correlation coefficient, it is clear that after the program has been a significant shift in the global assessment scores of observed variables. These conclusions are stated in previous similar studies (23, 24), where it was stated that separate programs, both in water and land, have positive effects on the correct posture of children. Results of this study support those conclusions noting that just a combined program with adequate kinesiotherapeutic hydrotherapy treatment on the floor, is one of the most effective methods in the treatment of posture correction, particularly of the spinal column and thorax. In support of corrective exercises and hydro gymnastics, a program of learning and training in swimming technique crawl, back crawl and breaststroke had a significant impact on the muscles that are located on the back side of the shoulder belt and who is most likely involved in stabilization and initiation of the shoulder blades to the upward and downward, as well as toward the spinal column. Movements that were performed during swimming or stroke in freestyle technique, in which the subjects performed an active thrust of the hands through the water, there was an engagement of extensor muscle groups of the spine which has evident influence on this part of the posture correction. Exercises that were performed during learning and training techniques of swimming back crawl, contributed to strengthening the stabilizer muscles of the pelvis and trunk.

Performing a rotating motion that occur at backstroke, led to a pronounced involvement of external and internal oblique abdominal muscles. When performing exercises with the aim of learning and training breaststroke swimming techniques, significantly were engaged to the abdominal muscles and hip flexor muscles. Swimming in such a position respondents are partly relax the tension of paravertebral back muscles, but also strengthened the region muscle troops. Based on the above data, it is evident that different styles of swimming (especially backstroke) and versatile enough to put load on lower limbs and therefore pelvic belt. Consequently, continuous exercise had effect to increase the strength and stretching, with an emphasis on postural antigravity muscles that actually play a major role in improving posture. Balanced movement activities were affected by the intensification of postural reflexes which the body strives to maintain a relatively static position. This confirms the findings of other studies (17, 25, 26, 27) where they presented similar effects of program activities and the impact of the coordinated work of the expert team to improve muscle tone and posture of the respondents. Consequently, the results clearly demonstrate the efficiency and necessity of the multidisciplinary team on the success of physical therapy in this population. Practical experience clearly defined efficacy in the treatment and treatment of children with poor posture, deformities of the spinal column and the locomotor apparatus, and point to the need coordinated action multidisciplinary professional team.

6. CONCLUSION

In today's competitive environment, in which the expertise and leadership skills held high position in achieving set objectives, it is necessary to find a model of coordination and management of human resources that would have multidisciplinary effect in increasing productivity. Based on the analysis results to the univariate, and the multivariate level, it can be concluded that the experimental training program, had a significant effect on transforming it muscle tone, which led to improvements in individual score posture, and overall ratings of girls posture. The results showed that the combined model of kinesiology therapy (corrective gymnastics and swimming) is a very effective tool for improving posture girl in the second phase of intensive growth and development. In this way we can help prevent health problems that might arise later in life. In practice, it proved an important fact that the exercise should be carried out properly under the supervision of professional and educated physiotherapists and swimming instructor, what specifically should be emphasized as an essential segment in application of these treatments. Based on the presented results, we can conclude and recommend expansion in number team members in a similar project-program activities, which would be composed of health professionals (physician specialist in pupils medicine, specialist pediatrician, an orthopedic specialist, a specialist physiotherapist, sports medicine specialist, therapist, nurse, orthotist, psychologist), professor of physical education and sport, the patient (child) and family members of the patient. This would with the reallocation of tasks, in accordance with the specialized segments of the team as well as their constant coordination, ensure optimal conditions for successful implementation of the sports medical treatments.

Conflict of interest: NONE DECLARED.

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