

**RATIONAL FOR THE USE OF CHILDREN'S MOTOR ACTIVITY AS A CRITERION FOR THE EFFECTIVENESS OF REHABILITATION AND RECREATION**Platonova A.G.<sup>1</sup>, Podrigalo L.V.<sup>2</sup>, Sokol K.M.<sup>3</sup>Institute for Hygiene and Medical Ecology<sup>1</sup>Kharkov State Academy of Physical Culture<sup>2</sup>Kharkiv National Medical University<sup>3</sup>

**Annotation.** *Purpose* – justified the use of physical activity for children as a criterion for recreation. Studied the relationship of this index with morphological and functional features of development and the level of hygiene knowledge. The study involved 54 pupils aged 10-14 years. *Results:* It is shown that the level of physical activity ( $1282,37 \pm 289,20$ ) locomotion per day. The value of basal metabolism reaches ( $1350,51 \pm 33,69$ ) kcal. Established direct correlation with the main motor activity exchange ( $r = 0,81$ ); body weight ( $r = 0,80$ ); circumference of the chest in the pause / inspiratory / expiratory ( $r = 0,70-0,71$ ); vital capacity ( $r = 0,37$ ); hand muscular strength ( $r = 0,51-0,58$ ). The estimation of the physical development of children by Quetelet index: mass deficit is set at 12.96%, 29.63% obese, normal physical development at 51.85% overweight at 5.56%. *Conclusions:* The recommended value of physical activity as a criterion for recreation and health of school children. Its definition reflects the functional state of the school, as one of the criteria for defining the health, predicts its changes, which is especially valuable in monitoring.

**Key words:** rehabilitation, recreation, motor, activity, functional, physical, schoolchildren.

**Introduction**

The trend to children's health worsening, existing at the present time, conditions demand in solution of a number of important tasks. First of all it is organization of social-medical monitoring, which, on the base of available information, would permit not only to prognosticate changes of health but to determine required health related and rehabilitation measures. In the present situation children's rest and recreation, which permit to effectively neutralize influence of every day life risk factors, connected with organization of educational process, acquire special importance [1,2]. In this context, the most important is ensuring of proper physical load, which would strengthen potential of adaptation systems and potential of resistance by optimizing of endurance, satiation of organism with required biological substances [3,4,5].

Unfortunately, changes in social-economic situation in Ukraine resulted in certain transformation of rest and health improvement (RHI). First of all it concerns reducing of countryside health related establishments and shortening of health improvement periods [6] that, in its turn, influence on adaptation processes and, accordingly, reflects their effectiveness. Application of traditional criteria of RHI effectiveness often becomes inefficient, because they just are not suitable for short periods of RHI. In this connection it is urgent now to determine and test new RHI criteria, to study their interconnections with indicators, characterizing children's health. Main requirements to these criteria are easiness of application, validity, objective character, possibility of application as screening.

**Purpose, tasks of the work, material and methods**

*The purpose of the present work* is hygienic grounding of children's motion functioning (MF) as RHI criteria, analysis of interconnection of this indicator with morpho-functional specificities of children's development and level of hygienic knowledge.

*Material and methods.* In field research, which was fulfilled in summer period in conditions of countryside health related establishment, 54 pupils of 10-14 years old (mean age was  $10.67 \pm 0,21$  years old) took part. We used a number of tests and complex of physical condition indicators: length and mass of body, chest circumference (at inhale, exhale and in rest), VCL, dynamometry of both hands. For evaluation of quickness we used "relay race" test with both arms [7]. MF level was determined by actual quantity of locomotion during day with the help of mechanical step-meters "Zaria". With the help of recommended by FAO/WHO equations we determined the value of main energy consumption (EC) in rest, considering sex, age and mass of body [8]. Peculiarities of way of life and level of hygienic knowledge were estimated by pupils' questioning: respondents could choose one answer from 2-3 available in questionnaire.

Statistical processing of the obtained data was fulfilled with the help of licensed package of electronic table Excel [9]. For indicators, which were measured quantitatively in scale of relations, we calculated coefficients of linear corrections - Pison's coefficients ( $r$ ) with determination of vector of their action; statistically significant differences were evaluated by Student's criterion ( $t$ ).

**Results and their discussion**

Using of MF as system-formation indicator is based on the fact that in modern conditions, for great number of children hypodynamia is characteristic and it is a risk factor of many diseases [10,11]. Determination of MF reflects level of physical workability, i.e. functional state of pupils; it permits not only to evaluate but also prognosticate changes of workability that ensures fulfillment of main tasks of health monitoring. This criterion a priori is connected

with indicators, characterizing pupils' morpho-functional state. Just this fact pre-determined our interest to comparative analysis depending of sex of children. The received results are presented in table 1.

Table 1.

*Morpho-functional indicators of school children in recreational period*

Indicator	Boys (n=29)	Girls (n=25)	Total (n=54)
Length of body, cm	145.12±0.42	144.02±.46	144.61±1.61
Mass of body, kg	42.80±0.51	39.60±0.49*	41.31±1.86
\Chest circumference in rest, cm	73.33±0.35	71.06±0.41*	72.28±1.38
Chest circumference at inhale, cm	77.02±0.34	74.98±0.43*	76.07±1.39
Chest circumference at exhale, cm	71.53±0.34	69.58±0.41*	70.63±1.36
Vital capacity of lungs, l	2.02±0.02	1.76±0.02*	1.90±0.08
Right hand dynamometry, kg	6.83±0.14	5.68±0.19*	6.30±0.61
Left hand dynamometry, kg	6.31±0.16	5.04±0.14*	5.72±0.58
Эстафетный тест правой руки, см	13.90±0.21	15.20±0.26*	14.50±0.85
“Relay race” test of left hand, cm	10.67±0.23	11.34±0.24*	10.98±0.86
Main energy consumption kcal.	1414.57±51.85	1270.44±33.86*	1350.51±33.69
Motion functioning, q-ty of locomotion	1449.55±145.02	1052.50±73.60*	1282.37±289.20

\* - statistically significant differences, comparing with boys (p<0.05)

The obtained data confirm the presence of sex dimorphism, which is manifested in larger body mass, chest circumference (in rest at inhale and exhale), in functional indicators of boys in comparison with girls (p<0/05). Screening – evaluation of physical condition (PC) by index of Kettle, showed that specific weight of children with body mass deficit is (12.96±4.57)%; of children with obesity - (29.63±6.21)% while specific weight of children with normal PC is (51.85±6.80)%. At the same time every twentieth child (5,56 ± 3.12%) excessive mass of body.

The registered MF level was (1282.37±289.20) locomotion per day that, in our opinion, is obviously insufficient for prevention from hypodynamia. However organization of regimen in health related establishment stipulates components, realization of which could not be fixed with the help of our devices. They are, for example, swimming in sea and swimming pool, morning exercises in the form of aqua aerobics and so on. In this connection the obtained results can not be regarded as final ones. It is necessary to carry out additional research with application of timing methodic.

Substantial boys' EC increasing also attracts attention that, in our opinion, can be conditioned by greater body mass values and by higher metabolism's intensity. Considering already existing ideas to use this value as adaptation criterion [12], it would be promising to continue researches in this direction, for studying of interconnections of energy consumption, eating and children's physical functioning in recreation period.

Interconnections between indicators, characterizing morpho-functional qualities, motivation levels and components of life style are widely used in monitoring of health and physical education [13,14]. Considering the fact that anthropometric indicators (length and mass of body, chest circumference and other) are traditionally used for evaluation of RHI effectiveness, it was interesting to look after possible interconnections between them and MF. We determined presence of direct and confident correlation of motion functioning with EC (r=0.81), length of body (r=0.33), mass of body (r=0.80), chest circumference in rest (r=0.71), at inhale (r=0.70) at exhale (r=0.71). Coefficient of correlation with VCL was 0.37, with right/left hand dynamometry– 0.51 – 0.58.

Studying of hierarchy of connections' values is also of interest. For example, maximal connection of MF was with EC and correlation with mass of body yields to it a little. In our opinion it proves possibility of MF application as RHI criterion, as far as mass of body is rather labile indicator, dynamic of which witnesses about RHI effectiveness. At the same time, interconnection MF and EC illustrates connection between two components of energy consumption: in rest and in physical functioning, correlation of which, finally, determines health state (in our context – recreational effect).

Further goes chest circumference, determined in different phases of breathing. Besides the fact, that these indicators characterize development of muscular system, they are rather controllable and change under influence of regular physical loads, i.e. can be corrected with MF.

Physio-metering indicators (VCL, dynamometry) were characterized by dependence of average strength that, probably, reflects less degree of MF influence on them. In this case influence is of not direct but rather of indirect character (increasing of locomotion's quantity – training of certain muscular groups – increasing of their strength and

etc.). In our opinion, in this context functional tests would be more illustrative (Stange's, Genchy's, Rosenblatt's tests), which reflect endurance and resistance for unfavorable impacts, because MF imposes direct influence on their results.

It is also interesting that correlation with results of "relay race" test was unconfident ( $r=-0.21$ ;  $-0.17$ ). This proved our assumptions about MF influence on morpho-functional indicators. As it is known, quickness is, mainly, an in-born quality, MG influence on it rather weakly and it conditions weak connection. The value of MF correlation connection with age was weak ( $r=0.28$ ), though it was higher than with results of "relay race" test. We think, it reflects peculiarities of development, critical period in physical development of the examined children.

Thus, determined interconnections permit to assume application of MF as criteria of organization of recreation. Especially interesting is that the highest values of connections were with indicators, reflecting level of muscular system's development (mass, chest circumference, dynamometry). In our opinion it not only illustrates positive influence of MF on morpho-functional state, but also underlines that worsening of physical condition reduces MF level. We think that main advantage of MF using as criterion of recreation is that its dynamic forestalls changes of morpho-functional indicators that is especially important in conditions of shortened periods of recreation.

We also obtained interesting data when studying possible interconnections between eating habits and MF value. We found the presence of middle level correlation with speed of eating food (slow -  $r=0.49$  and normal -  $r=0.43$ ). Probably they reflect balanced functioning of organism of those school children, who eat carefully. And presence of "bites" between eating was in reverse dependence with MF level ( $r=-0.32$ ); it can be understood as illustration of the fact that increasing of eating time facilitates restriction of periods, which could be used for recreation. Besides, "bites" between regular eating is a risk factor for progressing of excessive body mass and obesity [8,15]. It is a common knowledge that thick children are not mobile; in our context we illustrate just formation of such dependence (increasing of eating time – reduction of motion functioning – hypodynamia) that coincides with available information [4,5].

One block of questionnaire was devoted to evaluation of pupils' awareness about usefulness of certain food products and it permitted to judge about level of hygienic awareness of pupils and indirectly evaluate peculiarities of their eating. Children, who considered sugar, salted foods, fat meat and fish not to be useful, had direct connection of middle level with motion functioning, coefficients were, accordingly 0.40, 0.37 and 0.37. In our opinion it illustrates the fact that high MF is characteristic feature of healthy life style, which includes healthy eating. I.e. increasing of MF happens more often in parallel with optimization of eating at the cost of excluding of harmful products. Doubts in usefulness of sausages and smoked foods were connected with MF by negative link ( $r=-0.32$ ) while value of connection between usefulness of butter and sour cream and MF was  $-0.30$ . Thus, restrictions in taking of such products are in reverse dependence on increasing of pupils' MF; owing to it prevention of excessive mass body is achieved, which can be estimated as positive for health fact. Knowledge about usefulness of vegetable oils was in direct connection with MF of middle level ( $r=0.41$ ) that proved one more the made earlier assumptions.

Rather interesting facts were obtained, when studying interconnection between MF and level of hygienic awareness, which was evaluated by following rules of personal hygiene. It was stated that there is direct dependence on regular nails' cutting ( $r=0.56$ ), absence of habit to bite nails ( $r=0.52$ ), washing hands before eating ( $r=0.30$ ); reverse dependence on refusal to use alien comb or scissors ( $r=-0.70$ ). In our opinion these results can be understood from the point of view that sufficient for healthy life style MF coincides more often with high level of hygienic awareness and observation of personal hygiene rules. These results are also valuable because they prove presence of interconnection of MF and qualities, which are characteristic for healthy life-style, i.e. they again permit to recommend this criteria for evaluation of recreational effectiveness.

#### **Conclusions:**

Thus, the carried out analysis permits to recommend MF as a criterion of recreation and health improvement of school age children. Its determination reflects functional state of school age children as one of criteria, characterizing health; it permits to prognosticate changes of health that is especially valuable in case of monitoring. Screening estimation of physical condition of the tested by Kettle's index showed that about half of the tested had deviations form norm in body mass, with it most of those children had excessive body mass and obesity. The determined interconnections of MF and morpho-functional indicators permit to speak about potential possibility of its application for evaluation of recreation's organization; main advantage is that MF dynamic forestalls changes of morpho-functional indicators that is especially important in condition of restricted periods of recreation.

Analysis of MF dependence on eating preferences proved that prevention from hypodynamia coincides more often with sufficient level of hygienic awareness. We consider it necessary to continue researches in this direction in order to specify criteria of MF evaluation in conditions of summer recreation, in order to prognosticate health changes under its influence.

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