

# New idea of development movement coordination abilities in water of high level athletes practicing selected combat sports

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## Summary

**Introduction.** Achieving significant success in wrestling requires a high level of movement co-ordination abilities. In wrestling these abilities should be developed at the same time with strength abilities, because of them the success on the mat depends on. Reserves relating to the ways and means of developing movement coordination abilities become very quickly exhausted. Standard training conditions of wrestlers have been recently slightly changed, and water environment has been introduced. Hence, the aim of the investigations herewith was to: establish the effect of the special set of movement coordination complex exercises performed by wrestlers in natural and in water environment.

**Material and methods.** The experiment was carried out with 31 wrestling champions (athletes of master class), who were divided into two groups: the control group and experimental group. Training session of each of the groups comprised a set of exercises developing movement coordination. Wrestlers from the control group (n=16) performed a set of movement coordination complex exercises. In the experimental group (n=15) an analogical set was used but performed in water with three kinds of body submerging: at the water surface, under the water and on the bottom of the swimming-pool. Technical elements and fragments of fights were performed during the training. The ability to maintain balance was evaluated in two ways: in the vertical and horizontal body position. The balance keeping (s) was assessed on a decreased support surface, and with eyes closed. The attempts were affected in the natural environment and in water.

**Results.** The results of the researches showed an improved movement coordination as a consequence of the performed set of proposed exercises. The time of maintaining vertical position was longer than when performing attempts in horizontal position, and that applied both to attempts in natural conditions, as well as in water.

**Conclusions.** In order to develop movement coordination among those practicing combat sports, it is suggested that exercises in a swimming-pool with various kinds of body submerging should be applied during training sessions (e.g. with wrestlers). This specific and versatile environment enables competitors to obtain immediate information serving the evaluation of the results of future reactions.

## Introduction

The efficacy of the techniques applied by athletes practicing combat sports depend in large measure on the level of movement coordination abilities. The leading abilities are: the speed of adequate movement reaction, space and time orientation, and the ability to maintain balance. These abilities are, to a large extent, conditioned genetically, but they are also subject to evolution during the training process. The level of their development depends largely on the age at which the training was initiated, as well as on appropriately selected means and training methods. The overview of the literature reports a high standardization of those means and training methods irrespective of: the age, level of advancement, practice period, hierarchy of the leading abilities of the athletes,

and other significant conditions [1,2,3,4,5,6,7,8,9,10]. A considerably more comprehensive literature, though, involves martial art sports which are included in the program of the Olympic Games. These publications certainly do not cover the contemporary knowledge used in practice, since this one often outpaces the theory and constitutes the secret of the workshop of the coach. An increasing number of general theory publications indicate that the so far initiated reserves are gradually becoming exhausted. These included the applied training means, and particularly those directed at the development of coordination abilities.

Our own investigations [6,7,8,9,10] prove that non-specific physical load increases the level of kinesthetic sensations definitely more than a specific load. Similar effects may have been induced by the change in the standard environment. An

empirical confirmation of this thesis was obtained thanks to the Polish National Team of classical style wrestlers who, due to their training sessions conducted in water, were able to accelerate their bio-psychical regeneration, and as a result, to „refresh” kinesthetic sensations [11]. On such grounds the idea of changing the environment in order to rise the level of coordination abilities of those practicing martial art sports originated. Until now, swimming in the course of training athletes of such disciplines of sport has been solely used as a form of body regeneration. At the same time the idea surged, a number of questions arose: 1. Do changes from the standard environment to water environment affect, and to what extend, the development of movement coordination abilities? 2. Can one increase the favourable influence of water environment by applying a specially selected set of exercises with various degrees of body submersion? 3. Should exercises around the horizontal body axis, that is axis around which technical elements in combat sports are more rarely performed, be included in the set? 4. What exercises the set should include?

Obtaining answers to the questions above was of considerable theoretical importance, not only for athletes of combat sports, and it was of even greater practical importance. It concerned particularly the rising of the level of movement abilities which are decisive for the success in the combat sports. Thus, a pedagogical experiment was carried out whose purpose was to: 1. Define the effect of the special set of exercises applied in standard training conditions and in water on the level of movement coordination abilities of the athletes. 2. Establish the effect of the applied set of exercise on the level of the balance keeping ability.

## Material and methods

The experiment was carried out with 31 students from the university in Grodno, who were athletes of the champion – master class (aged 18-22), and who practiced various combat sports: classical and free style wrestling, sambo, judo. Those tested were divided into two groups: control (n=16) and experimental (n=15). The experiment involved one training micro cycle (12 two-hour sessions). Each of the training session included a special set consisting of 9 groups of exercises (motor tasks) which developed movement coordination abilities (Tab.1). Competitors from the control group performed the set in standard training conditions, that is on the mat. The experimental group performed the set in the water with three kinds of body submersion: on the surface, under the water, at the bottom of the pool. While performing the set, irrespective of the environment, the following methodical principles were applied: 1. Various forms of respiration was used in the exercises: free, with a halt, controlled, cyclical. 2. The exercises were performed at first in one spot, next with a translocation, and finally in a combination. 3. Each of the exercises was repeated from 10 to 20 times (depending on the capacities of the tested individual). The ability to maintain static balance was evaluated in two attempts: with the vertical and horizontal body position\*. The time of balance keeping was assessed on a smaller supporting surface, and with eyes closed (s). The attempts were carried out prior and after the execution of each of the motor tasks, in natural training conditions and in water.

## Results

The performance of various attempts (motor tasks), affected in a different way the ability to keep the balance in a verti-

Tab. 1. Special set of exercises (motor tasks) for developing the coordination ability of the control and experimental groups

No	Exercises	Means of execution	Starting position
1.	Head movements	Bows (forward, backwards, to the side - left, right) 1,2 Turns (left, right) 1,2 Circles (left, right) 1,2	Standing, standing with bent trunk, sitting, lying down
2.	Trunk movements	Bends (forward, backwards, to the side - left, right) 1,2 Turns (left, right) 1,2 Circles - rotations (left, right) 1,2	Standing, standing with bent trunk, sitting, lying down
3.	Quarter and half – turns	Left, right complete turn 1,2	Crawl position, back stroke position, side - left, right
4.	Circles – rotations	Forwards 2 (inclined forwards 1), backwards 2 (inclined backwards 1)	Crawl position, back stroke position, side - left, right
5.	Rolls	Forwards, backwards 1,2	Crawl position, back stroke position, side - left, right
6.	Cart – Wheel	Forwards, backwards 1,2	Sideways - left, right
7.	Somersaults	Forwards, backwards 1,2	Sideways - left, right
8.	Turns	Left, right (using legs and arms) 1,2 Left, right (using legs and arms) 1,2 Forwards, backwards (using legs and arms) 1	Vertical (upright, upside down, tuck position) Horizontal
9.	Jumps	On one leg, both legs (half turn) 2 Hops, falling forward, diving forward, half turn 1	Onto pedestal, of pedestal, out of the water Into the water

Note: 1. Executed in the water.

2. Executed in the gymnasium (gym hall).

Each exercise can be performed, either individually and in combination.

\* In the vertical position the tested athlete was standing on the toes of both of his feet, with feet close together, with arms alongside bent in the elbows, and palms turned inward. The horizontal position consisted of standing on the toes of both feet close together, with the body bent forward, with arms bent in the elbows, and palms turned inward.

cal body position of those tested from the control group (Fig. 1). A considerable deterioration in the performance of the attempts was noted when various rolls from squatting position, side rolls, or jumps were introduced. Those exercises which stimulated the balance apparatus lowered the ability of the athlete to maintain a vertical body position, and specifically when the supporting surface was limited (the attempt required standing on the toes). It is interesting that the performance of various forms of somersaults (forward, backward, sideways) favoured the lengthening of the balance keeping time. The curve representing the results of the average balance keeping time in vertical body position in the gym, and in the water was quite similar, but in all of the 10 tasks worse results were obtained when tasks were performed in water. A nearly analogous tendency of the results appeared when performing attempts in the horizontal body position, both in water and in the gym. A slightly different curve course of the

average results was observed among athletes of the experimental group (Fig. 2). Firstly, all the curves, therefore those concerning the vertical and the horizontal body position, both in the gym and water, showed a very similar course. Secondly, the curves presented higher values. Thirdly, the execution of motor tasks after turns, rolls from a squatting position and sideways, and after jumps caused a lesser decline in balance keeping time. Fourthly, similarly to the control group, the balance keeping time in the vertical and horizontal position in the gym was always longer in the water. It proves that the execution of exercises in the water, hence in the environment where training sessions are rather seldom carried out, and particularly with such a varied content, stimulated strongly the balance apparatus, thus extending the time of the vertical and horizontal body position maintaining.

The comparison of the average results of the control and experimental groups, separate for the values of balance

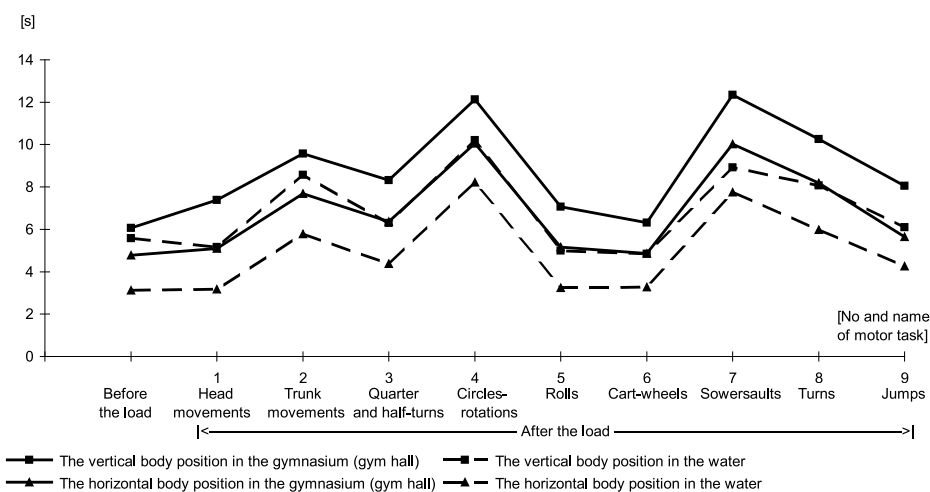


Figure 1. Results of the performance motor tasks by competitor of various martial art sports – control group (n=16)

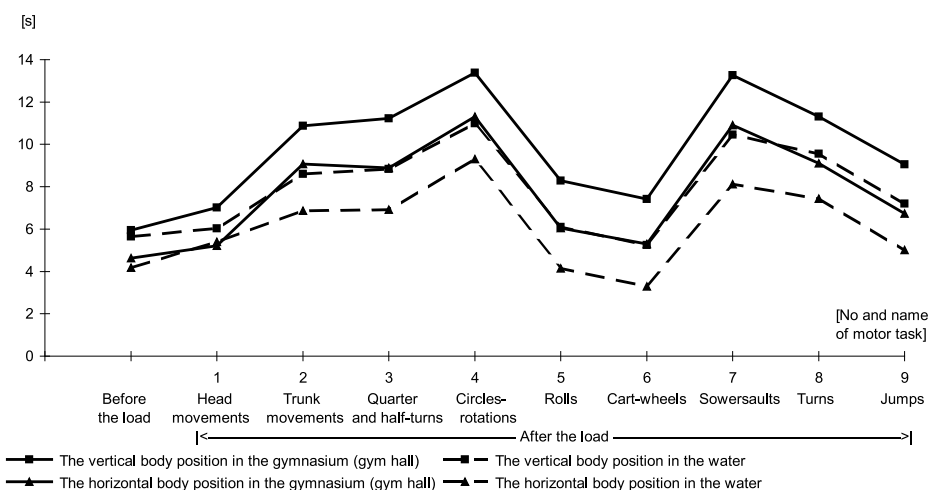


Figure 2. Results of the performance motor tasks by competitor of various martial art sports – experimental group (n=15)

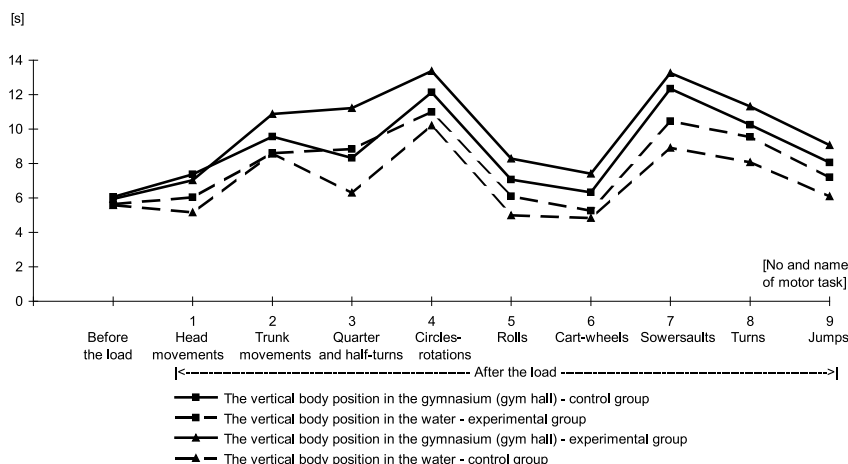


Figure 3. Results of the performance motor tasks by competitors of various martial art sports – control and experimental group (n=31)

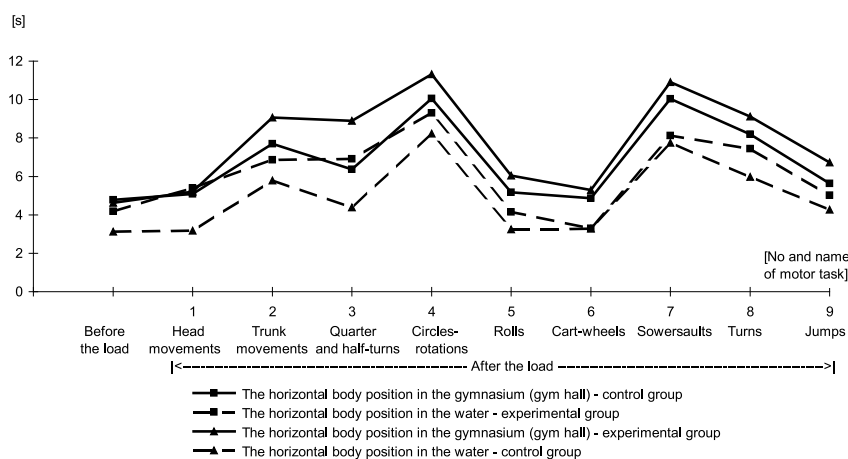


Figure 4. Results of the performance motor tasks by competitors of various martial art sports – control and experiment group (n=31)

maintaining in vertical position (Fig. 3) and in horizontal position (Fig. 4) confirms the before observed tendencies. However, the predominance of the results obtained by the experimental group in nearly all attempts (see Fig. 4), both in the gym and in the water in the vertical body position, is clearly visible. A quite similar inclination of results is being observed in the case of the horizontal body position.

## Discussion

The results of the short-term experiment carried out among athletes of champion class reveal a favourable influence of the environmental change on the level of the movement coordination abilities. It was manifested by an improvement, that is extension of the balance maintaining time in the vertical and horizontal position. It is common knowledge, though, that obtaining any improvement of the movement coordination abilities of the competitors of the highest rank is not easy. There is now doubt, whatsoever, that the increase of such

abilities recorded with the aid of time attempts of balance keeping does not reveal the entirety of the investigated phenomenon. Carrying out tests concerning other movement coordination abilities, as well as special (technical) skills, could have also demonstrated their improvement. This is the hypothesis which may be verified in various researches dealing with the development of movement coordination abilities.

Slighter increases of results as far as the time of balance maintaining in horizontal position may be explained by the fact that for a human being a vertical body position is more typical since it is more commonly assumed in the everyday life. Even if the horizontal position occurs quite often among those practicing combat sports, the proportion of the training time to the time of the everyday activities is too small to affect in any way the domination of this position. The results obtained demonstrate that the proposed original set of special exercises together with the attempts evaluating the ability to maintain the body balance may be used in the training of athletes

practicing different combat sports. A considerably higher increase of the movement coordination ability level may be expected among younger athletes at a lower level of sport advancement and after an extended time of the application of the proposed set of exercises.

## Conclusions

1. The special set of exercises applied in the experiment, both in the gym and in water, affected the level of the balance maintaining ability of the athletes in a varied way. Its considerable improvement was observed among the investigated of the experimental group.
2. The attempts serving to assess the ability to maintain balance in the vertical and horizontal body position used in the researches, as well as the special set of exercises focusing on the development of movement coordination abilities, are appropriate to be applied in the training of athletes at divers levels of advancement, and practicing various combat sports. They account for a reserve to be availed of.
3. Performing technically complex exercises with three stages of body submersion may increase the level of kinesthetic impressions of the athletes, and through that may favour a better „feeling of the opponent” [11]. It is of utmost importance in the success achieving.

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