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# Effects of improvement of hitting accuracy in young tennis players tennis players on the background of short-term vestibular load aftereffects during the experiment

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## Abstract

*Purpose:* The purpose of the present study was to investigate the effects of improving stroke accuracy in 7-8 year old table tennis athletes without and with irritation of the vestibular analyzer under experimental conditions.
*Methods:* Analysis and generalization of literature data, analysis of competitive activity using request monitoring methods, forecasting and modeling based on expert evaluation, instrumental research methods and methods of mathematical statistic.
*Results:* In young tennis players of EG, which was trained in the experimental mode, the total number of strokes for 30 *sec*, performed on the background after the action of 10-fold rotation of the body in the posture of bending forward at 90°, before the experiment was 13,8±4,96 times, and after - it increased insignificantly and was equal to 19,9±6,98 times ($p<0,01$), i.e. this value in the absolute sense increased to 6,1 times, and its relative level increased by 44,20%. The accuracy of strokes per 30 *sec* in this group during the period of experiment increased from 3.9±1.51 to 6.5±2.48 times ($p<0.001$) or this value in absolute terms increased by the end of the experiment 2.6 times, and in the relative sense this increase amounted to 66.67%.
*Conlcusion:* The comparative analysis of the given data shows that, firstly, before the beginning of the experiment the total number of strokes on a given target for 30 *sec* at "rest" in both groups of tennis players was relatively low, of which the volume of accurate strokes was not even 50%. Such a situation suggests that in the process of traditional training sessions the emphasized attention to the conjugate working out of hitting efficiency taking into account the accuracy of strokes in different ways is not removed. Secondly, in CG even during the period of 10-month pedagogical experiment both the number of kicks 30 *sec* and their accuracy did not tend to a pronounced increase by the end of the experiment.
**Keywords:** control group, competitive games, number of accurate strokes in this group, performance of aiming game techniques.

## Introduction

In modern table tennis, for successful performance of game actions with aiming accuracy, perfect stability of balance preservation to the impact of various rectilinear and angular accelerations, repeatedly repeated in the course of intensive competitive games, is extremely important, which has been studied on the example of a number of other sports. For example, A.S. Nazarenko, N.S. Hasnutdinov [2016, p. 157-159], studying this problematic in soccer players, believe that statokinetic stability to maintain balance may be higher at "rest", but even with a small irritation of the vestibular analyzer it acquires a pronounced tendency to decrease and therefore the authors recommend regular training of the function of maintaining body balance. A.S. Nazarenko, A.S. Chin Kin [2011, p. 726-732] showed that in situational sports fatigue arising in the course of intensive training or competitive loads is primarily reflected in the functional activity of the vestibular analyzer, which may be followed by a decrease in the level of aiming accuracy of game actions and discordance of movement control mechanisms.

L.D. Nazarenko [2015, p. 99-101], based on his own research believes that the range and accuracy of throws in basketball, for example, are conditioned not only by the indicators of working muscles, the level of development of glasometer, but also largely depends on the stability of the body to maintain the appropriate posture. And according to A.A. Dzhumok, A.A. Pavlova [2018, p. 45-48] in game sports it is very important to improve the stability to maintain the balance of the body both in the mode of open eyes and closed eyes, which, it turns out, is very important to "hone" the accuracy of differentiation of muscle forces in the performance of aiming game techniques.

## Methods

Two groups of young athletes of 7-8 years old (12 people each) engaged in table tennis at the stage of initial training, one of which participated in this process as a control group and the other as an experimental group, were involved in the study conducted within the framework of a 10-month pedagogical experiment. In the control group (CG) training sessions were conducted according to the traditional program.

And in the experimental group (EG) children performed the following exercises daily in the morning during morning exercises: circular movement of the head in sitting and standing postures to the right-left, head tilts back and forth, to the right-left, turns to the right-left, body rotations to the left-right in the posture of torso tilt forward at 90°; the same exercises were applied during the preparatory part of each training session, and in the final part of the sessions children performed the maximum number of strokes with a bounce from the tennis table to the target 30 *sec*; for this purpose the tennis table is tightly set across to the wall; on the wall at a height of 45 *cm* from the table surface a circle - a target with a diameter of 45 *cm* is drawn; the tennis player standing in the middle of the table edge performs the given strokes; this exercise is repeated 5 times simply without load, 5 times immediately after 10-fold rotation of the head to the left and 5 times the same with rotation of the head to the right (Table) The ratio of the maximum number of accurate and inaccurate strokes in 30 *sec*. performed at rest and immediately after performing a 10-fold rotation of the body to the left in a 90° forward leaning posture was evaluated. Testing was conducted before and after the completion of the 10-month pedagogical experiment.

## Results and discussion

The test results showed that the total number of beats at rest in 30 *sec* in CG before the experiment was 28.2±2.81 times, and by the end of the experiment it increased to 29.7±2.88 times ($p>0.05$) or its absolute increase reached only up to 1.8 times, while its relative increase was 12.41% (Table). Of these, the number of precision strokes in this group before the experiment was equal to 9.3±2.04 times, which increased insignificantly to 10.8±2.32 times by the end of the experiment ($p<0.05$). It can be seen that the absolute increase in hitting accuracy was also 1.5 times, while the relative increase is 16.13%. At the same time in EG, which during the experiment regularly performed the experimental exercises recommended by us, the total number of punches for 30 *sec* before the experiment was equal to 26.9±6.72 times, and by the end of the experiment it increased to 34.5±8.32 times ($p<0.01$) or in absolute terms it increased to 7.6 times, while the relative increase in this indicator amounted to 28.25%. The number of accurate strokes in this group during the period of experiment increased from 8.7±3.65 to 14.9±6.13 times ($p<0.001$), where it increased to 6.2 times in absolute value or in relative terms the accuracy of strokes in EG increased to 71.26%.

**Table. Indicators of differentiated assessment of the development of stroke accuracy in young tennis players of the control and experimental groups by the end of the pedagogical experiment**

| Parameters | Group | Before the experiment x±δ | After the experiment x±δ | AI | RI | p |
|---|---|---|---|---|---|---|
| Strokes at rest for 30 s. | | | | | | |
| Number of strokes | CG | 28,1±2,81 | 29,7±2,88 | 1,5 | 5,32 | >0,05 |
| Stroke accuracy | CG | 9,3±2,04 | 10,8±2,32 | 1,5 | 16,13 | <0,05 |
| Strikes after 10 body rotations in 30 s. | | | | | | |
| Number of strokes | CG | 14,5±3,33 | 16,3±3,65 | 1,8 | 12,41 | >0,05 |
| Stroke accuracy | CG | 4,1±0,65 | 4,6±0,71 | 0,5 | 12,20 | <0,05 |

**Note:** *AI* - absolute increase, *RI* - relative increase, %, *CG*-Control group, *EG*-experimental group

The total number of strokes for 30 *sec* under the influence of 10-fold rotation of the body to the left in the posture of bending forward at 90° in CG before the experiment amounted to 14.5±3.33 times, and after - it increased only to 16.3±3.65 times ($p>0.05$), or the difference of increase of this value in absolute terms amounted to 1.8 times, and the relative increase in the total number of strokes in this group was equal to 12.41%. The number of accurate strokes before the experiment was 4.1±0.65 times, which by the end of the experiment increased to 4.6±0.71 times ($p<0.05$). It can be seen that the number of accurate strokes in KG in absolute terms increased to only 0.5 times and this in relative terms was equal to 12.20%.

## Conclusion

The total number of blows for 30 *sec* and their accuracy almost twice decreased in the conditions of their performance on the background of the aftereffect of 10-fold rotation of the body in the posture of torso tilt forward at 90°, which is associated, in our opinion, not only with insufficient training of impact actions for accuracy, but also such a consequence is mainly due to the weak development of the vestibular analyzer. This is confirmed by the progressive data obtained in EG, which during the period of the experiment regularly in the morning and during training sessions performed various stato- and vestibulokinetic exercises with practicing various kicks on the background of the aftereffect of vestibular loads.

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