

## ANNUAL DEVELOPMENT DYNAMICS OF SPEED INDICATORS IN MILITARY PERSONNEL

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**Annotation.** The article presents data on the generalization, analysis, and discussion of changes in the main statistical characteristics of the results recorded in test and retest exercises during a pedagogical experiment conducted to study the effectiveness of a set of exercises developed to improve speed-related physical qualities in military personnel aged up to 30–35 during training sessions, based on observations in control and experimental groups.

**Key words:** military servicemen, physical qualities, special physical training, combat training, the physical quality of strength.

**Introduction.** The growing attention of developed countries around the world to both the Armed Forces and the field of sports — particularly through efforts to strengthen patriotic values and promote interest in the sport of boxing among the population, especially youth and military personnel — places new responsibilities and tasks on scientists engaged in scientific and pedagogical activities in this area. This, in turn, further increases the relevance of the topic and highlights the necessity of its investigation from a scientific and research perspective, indicating that the issue stands out due to its topical significance.

Across the world, special exercises with a combat-oriented focus are widely used as effective tools for training the younger generation recruited into military service to become healthy, physically strong, mentally resilient, and psychologically stable individuals. In particular, exercises based on the sport of boxing have been recognized by experts in the field for their high effectiveness in creating conditions appropriate to the biological and physiological age of military personnel, developing combat movement skills, enhancing individual and team

activity, and forming qualities such as accuracy and agility required in combat operations.

Today, one of the pressing issues is the need to scientifically substantiate the methodology for improving both general and specialized physical training of military personnel through boxing-based exercises. This includes developing precision, speed, and endurance during combat activities, as well as applying a step-by-step pedagogical approach to teaching special training exercises. This highlights the relevance of developing an effective methodology for enhancing the combat-specific training of military personnel through the use of boxing techniques.

**Results and analysis.** During the pedagogical experiment, military personnel aged 30–35 were divided into two groups — control and experimental — and monitored accordingly. In both groups, the participants' speed-related physical qualities were assessed through specially selected exercises, and the difference in outcomes between the control and experimental groups was identified using statistical methods.

In the subsequent practical control test, the effectiveness of a specially designed set of exercises aimed at improving speed-related physical indicators during the special combat training sessions of military personnel aged 30–35 was studied. The analysis of the results recorded in test exercises within both the control and experimental groups, along with changes in their main statistical characteristics throughout the experiment, allowed for the identification of meaningful differences in speed performance levels.

In the 10x10 meter maximum shuttle run, the experimental group demonstrated an absolute improvement of 1.12 units and a relative increase of 4.11%. Compared to the control group, these results indicate a certain level of positive change in the speed preparedness of the military personnel. However, according to statistical analysis ( $t = 1.90$ ,  $P > 0.05$ ), this difference did not have a statistically significant effect on the overall performance of the participants.

In the experimental group, this particular exercise showed an absolute increase of 0.29 units and a relative increase of 0.97%. Although these changes were notably lower than those observed in the control group, they indicate that the participants maintained stable performance despite the challenging training conditions. Statistical indicators ( $t = 1.74$ ,  $P > 0.05$ ) confirm that the difference is not statistically significant (see Table 3.3).

Changes observed in the experimental group amounted to an absolute increase of 0.41 units and a relative increase of 2.81%. This suggests that while the training aimed at improving speed produced some results, the overall improvement cannot be considered highly substantial. According to statistical analysis ( $t = 1.75$ ,  $P > 0.05$ ), the difference is assessed as statistically insignificant (see Table 1).

**Table 1**

**The dynamic changes in the results of speed exercises among military personnel aged up to 30–35 during the pedagogical experiment**

| T/r | Control group |          |      | Experimental group |          |      | Growth         |                | t    | P     |
|-----|---------------|----------|------|--------------------|----------|------|----------------|----------------|------|-------|
|     | $\bar{X}$     | $\sigma$ | V%   | $\bar{X}$          | $\sigma$ | V%   | Absolute value | Relative value |      |       |
| 1   | 27,22         | 0,24     | 0,87 | 28,34              | 0,22     | 0,81 | 1,12           | 4,11           | 1,90 | >0,05 |
| 2   | 30,01         | 0,38     | 1,30 | 30,30              | 0,38     | 1,29 | 0,29           | 0,97           | 1,74 | >0,05 |
| 3   | 14,60         | 0,23     | 1,59 | 15,01              | 0,23     | 1,55 | 0,41           | 2,81           | 1,75 | >0,05 |
| 4   | 15,7          | 0,23     | 1,51 | 16,01              | 0,23     | 1,49 | 0,31           | 1,97           | 1,66 | >0,05 |

**Note:** 1 – Imitative 10x10 meter shuttle run. 2 – Imitative 10x10 meter shuttle run (with combat gear). 3 – 100-meter sprint. 4 – 100-meter sprint (with combat gear).

In this exercise, the experimental group recorded an absolute increase of 0.31 units and a relative increase of 1.97%. Despite being performed under combat

conditions, the military personnel maintained a stable level of preparedness and, in some cases, showed slight improvements. However, the statistical results ( $t = 1.66$ ,  $P > 0.05$ ) indicate that the difference is not statistically significant.

The experimental group demonstrated positive improvement across all exercises, indicating the overall effectiveness of the pedagogical intervention. Nevertheless, the statistical analysis results ( $P > 0.05$ ) suggest that these changes did not have a significant impact on the participants' overall performance. To achieve a more notable effect, the duration, volume, and quality of training loads should be further optimized.

During the pedagogical experiment, the outcomes of speed exercises among military personnel aged 30–35 were studied. The data presented in the table allows for evaluating the differences between the experimental and control groups, determining the dynamics of changes by exercise type, and establishing statistical reliability. Throughout the training process, the experimental group achieved improvements in average performance across all exercises. The most notable improvement was observed in the 10x10 meter shuttle run. Significant progress was also recorded in the 100-meter sprint, especially when performed with combat gear.

The level of variability in the results was low ( $\sigma = 0.22$ – $0.38$ ), indicating stable and balanced performance indicators within the group. Furthermore, the coefficient of variation ( $V\%$ ) remained below 2% in all exercises, which reflects a systematic and controlled nature of the changes. Statistically, there were no significant differences in performance indicators among participants across the exercises ( $P > 0.05$ ), meaning that the observed changes remained within the range of random fluctuations. However, from a practical standpoint, these changes demonstrate a gradual improvement in the overall physical preparedness of the military personnel.

In the pull-ups on bars with oscillation (repetitions), the experimental group showed an absolute increase of 2.25 units and a relative increase of 6.94%. Compared to the control group, these results indicate a positive dynamic in upper

body strength development among the military personnel. Although the coefficient of variation in the experimental group ( $V\% = 5.71$ ) was slightly higher than in the control group, the results remained balanced. Statistical analysis ( $t = 2.34$ ) confirmed that the difference was statistically significant at the  $P < 0.05$  level, demonstrating the effectiveness of the exercise (see Table 1).

In the L-sit hold on parallel bars (seconds), the experimental group recorded an absolute increase of 2.35 seconds and a relative increase of 10.44%. These results indicate effective development of arm strength and isometric endurance. The variance was similar in both groups ( $\sigma = 2.06$ – $2.13$ ), although the coefficient of variation was slightly higher in the experimental group ( $V\% = 9.47$ ), indicating increased variability in performance outcomes. Nonetheless, the statistical analysis ( $t = 2.16$ ) confirmed that the difference was statistically significant ( $P < 0.05$ ), suggesting that the participants improved their balance and strength control skills significantly through this exercise.

**Summary.** In the special control norms for military personnel aged up to 30–35, tests such as the 100-meter sprint, 10x10 meter shuttle run, and their variations performed with combat gear were used. The experimental group showed higher results across all tests compared to the control group. The most significant differences were observed in the 10x10 meter shuttle run (with combat gear) and the 100-meter sprint, indicating that the experimental group responded more effectively to the training intervention. The smallest difference was noted in the 100-meter sprint (with combat gear), suggesting that the training methodology for this test may require further improvement.

The training methods applied in the experimental group had a positive effect on the participants' general physical and technical preparedness. These results indicate that the methodology used in the experimental group can be further improved and adapted for a broader population of athletes. By applying the test methods that yielded higher results to the tests with lower outcomes, it is possible to enhance overall training effectiveness.

At the initial stage, no statistically significant differences were observed between the control and experimental groups across all tests. The differences were relatively minor (1.21% – 1.51%) and statistically insignificant ( $P > 0.6$ ), indicating that both groups had nearly equal physical readiness at the beginning of the experiment. These results confirm that the training process was conducted under similar conditions during the initial phase.

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