THE CHANGES WITHIN COORDINATION STRUCTURE OF ATHLETES' MOVEMENTS AT VARIOUS CONDITIONS OF GRAVITATION INTERACTIONS

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INTRODUCTION

Motion function may be belonged to a number of most ancient functions. It is obviously its formation had been gone in the phylogenesis under considerable influence of Earth gravitational field. As one was constant with known limitations the neuro-motor and mass-inertial correlations between elements of motion system which were constant relatively have been formed with a human being at the evolution process. On modern stage of human development practically all characteristics of his locomotions are regulated to that or other degree by the parameters of gravitation interactions with the environment (Gazenko, O.G., 1990; Gurfinkel, V.S., 1965; Korzhuyev, P.A., 1971).

METHODS

The changes within coordination structure of athletes' complex motions under simulation of various conditions of gravitation interactions were studied at the experiment. Motion actions of basketballers who performed the throw into basket at jumping: under natural conditions A; under condition B - with weights being positioned on the body so that the geometry of athletes' body masses to keep with the man; under condition C - with weight placed locally on the body (waistcoat) were controlled by the using of videocomputer analysis, the tensodynamography (Laputin, A.N., Khmelnitskaya, I.V., 1995).

RESULTS

The characteristics of vertical component of supporting response as well as the kinematic parameters were registered. Computed t-statistics about the time of the achieving of supporting response' maximum vertical component plus the time of the taking off platform Tmax + Tt for compared samples A and B is -2.3128 at significance level 0.0231, for samples A and C is -1.0704 at significance level 0.2874. Computed t-statistics about the gradient of supporting response' vertical component F'(t) for compared samples A and B is 2.1351 at significance level 0.0355, for samples A and C is 0.4043 at significance level 0.6870. Computed t-statistics about the impulse of supporting response' vertical component $\int F(t)dt$ for compared samples A and B is -3.5362 at significance level 6.5E-4, for samples A and C is -1.4528 at significance level 0.1498. Computed t-statistics about the total time of the jump Tsum for compared samples A and B is -1.2286 at significance level 0.2225, for samples A and C is -0.0218 at significance level 0.0986. The results of hypothesis test for Ho about the differences=0 (at Alpha=0.05) between these statistical samples each by number of observances equal of 45 showed:

1) the hypothesis Ho is not rejected, the differences equal 0 at the comparison between samples of condition A and B;

2) the hypothesis Ho is rejected, the differences are not equal 0 at the comparison between samples of condition A and C.

It was proved by the experiments that the change of module of gravitation interactions with bounds of natural limitations under the keeping of its resultant vector about human body allows to keep the coordination structure of complex motion acquirements. At the same time it was set experimentally that the change of resultant vector of gravitation interactions within human body results in the rise of so called additional force momenta within separate his links. And that does not allow the corresponded muscles to be adapt to such external factors. Thanks to just these physiological mechanisms the coordination structure of human complex movements breaks.

CONCLUSION

The experiments proved the weights being positioned so that the geometry of body mass to keep did not influence essentially onto kinematic structure of throw technique. At the same time the weight of the same mass that is fixed locally on the body causes pronounced changes within the coordination structure of the throw particularly with the time.

Experiments showed the positioning of weights at the keeping of masses' geometry allows to create for examinees the artificial gravitational surround adequate with a motional tasks and so gives the possibility to increase essentially their power potential and to improve greatly the coordination of motions during sport exercises.

REFERENCES

1. Gazenko, O.G., Kasyan, I.I. (1990). Physiological problems of weightlessness. Moscow. Publisher "Medicine".

2. Gurfinkel, V.S., Kotz, Ya.M., Shik M.L. (1965). Regulation of human pose. Moscow. Publisher "Nauka".

3. Korzhuyev, P.A. (1971). Evolution, gravitation, weightlessness.Moscow. Publisher "Nauka".

4. Laputin, A.N. (1986). Training onto sport motions. Kiev. Publisher "Zdorovye".

5. Laputin, A.N., Khmelnitskaya, I.V. (1995). Mastering of Biodynamic Structure of Complex Motional Acquirement by Means of Directional Correction of Human Body's Gravitation Interactions (pp. 160-183). Proceedings of the ninth Biomechanics seminar. Center for Biomechanics: Chalmers University of Technology and Goteborg University.