

**DETERMINING THE LEVEL OF A HIGH SCHOOL STUDENT QUALITIES OF COORDINATION IN THE PROCESS BY BIATHLON TRAINING STABILOGRAPHY**

Trojanovska M. N.

Chernigov National Pedagogical University

**Annotation.** *Purpose:* conduct biomechanical analysis of coordination qualities of girls in the course of employment biathlon. *Material:* the study involved a group of biathlon at the age of 15-16 years. Total surveyed 30 people. To measure the biomechanical parameters of stability of the body biathletes used system based on computer stabilography. *Results:* the method stabilographic control function of body balance allows to evaluate the static-dynamic stability of the body and the work of the vestibular system biathletes. Developed training programs with exercises for improving specific qualities and technical skill athletes. Presents the evaluation of the quality of coordination of the vertical position of the body when standing in a difficult position. *Conclusions:* in the training process newbies need to pay attention to the study of functional stability of the vestibular sensory system.

**Keywords:** biathlete, senior pupils, stabilography, biathlon, coordinating quality.

**Introduction**

Children's and youth's physical education takes very important place in society as one of branches of children's preparation for adult life. It should be oriented on improvement of their physical and mental health, perfection of their fitness for active life and creative professional functioning (G.M. Arziutov, Ye.S. Vilchkovskiy, V.M. Vovk, S.S. Yermakov, L.V. Volkov, A.N. Laputin, N.O. Nosko, L.P. Suschenko, V.M. Platonov, V.I. Plisko, O.V. Timoshenko, B.M. Shyan et al.).

Coordination of body's vertical position is an indicator of functional state of human organism and health [9; 10; 11].

Biathlon is a kind of sports, specific characteristic of which is complex correlation of two different kinds of sport – skiing and shooting – in one competition. In this connection there appears a question, which of these two kinds contributes greater in final sport-technical result in this kind of sports [2; 16; 19].

On the basis of his researches, A.M. Sergoyan thinks that for achievement of high results in biathlon effective shooting is of the first importance. N.I. Bezmelnitsyn also gives prevalence to shooting [1; 15].

Analysis of function of balance is traditional branch of scientific researches [13] in shooting sports (T. D. Poliakova, 1992).

For improving of health and increasing of organism's functional system of a child it is especially important to develop coordination [17].

Coordination is very important for training of sportsman. It is a significant condition of motion skills' formation as well as technical-tactic and physical training of a sportsman [12; 13; 14]. Studying of coordination is one of effective ways to perfection of sportsmanship in kinds of sports with complex coordination, to which biathlon belongs [2]. However, peculiarities of development of coordination of biathlon sportswomen have not been yet a subject of scientific research.

Coordination plays main role in shooting. Every shooter knows that weapon is constantly in motion. These motions determine stability, which can be divided in two parts. The first – are movements caused by not coordinated muscles and their tremor, the second part – movements, caused by heart beatings. If the first part is easy to be trained than the second is practically impossible to be trained. Rather often high class shooter and fresher have equal pulsation component. When analyzing trajectory of pointing of high class shooter, it is easy to see these two components [4; 7; 8].

Shooting from standing position is more difficult than from lying. In mechanics such position of body is called instable as far as general center of mass of system shooter-weapon is much higher than area of support and area of support is much less than in lying position; it is restricted by feet and space between them [7; 8].

Analysis of recent researches showed that in biathlon studying of functional stability of vestibular sensor system was paid insufficient attention to. Though, it would be necessary for improvement of effectiveness of technical actions and at shooting range; for using of biathlon sportswomen's data for diagnosis. However, till now development of coordination of biathlon sportswomen with the help of bio-mechanical control means has been insufficiently worked out.

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

*The purpose of the research* is to conduct bio-mechanical analysis of girls' coordination in process of their biathlon trainings in comparison with new-comers.

*The tasks of the research:*

1. To analyze elucidation of this problem in literature;
2. To determine coordination of biathlon sportswomen with methods of stabilography.

*The methods of the research:* for testing of bio-mechanical parameters of body stability of biathlon sportswomen we applied complex “Stabilan-01 2” on the base of computer stabilography.

At present, for evaluation of body balance method of stabilography is widely used. Recent time this method, except analyzing of bio-mechanical principles of balance, has been using also for studying functional state of human organism, endurance to static loads, evaluation of coordination for future professions. With all complexity of electronic apparatuses a person is not loaded by sensors: he (she) has only to stand on platform of stabilography and fulfill appropriate test [5; 6; 18; 20].

The research was fulfilled at base of Chernigov national pedagogic university, named after T.G. Shevchenko, in bio-mechanical laboratory. Group of biathlon sportswomen of 15-16 years old age participated in the research. In total we tested 30 persons: 10 sportswomen of model group – masters of sports of Ukraine and candidate masters of sports and 20 persons of common group – biathlon sportswomen – newcomers.

**Results of the research**

Stabilography researches were conducted in order to study body balance in tests “Stance on right leg” and “Stance on left leg”.

Tests’ results permit to evaluate coordination of vertical body position with standing in difficult posture.

As a result we determined that in test “Stance on left leg” sportswomen showed the following difference: indicator of shifting in frontal plane (MOx) showed that common group was worse than model one by 61.13 % and in shifting in sagittal plane (MOy) - by 60.25 %; dispersion in sagittal plane (Qy) of CG was worse by 58.15 % than MG. Increasing of these indicators says about reducing of balance in certain plane. Indicator “Mean dispersion of GMC fluctuations (R) in CG was worse by 57.19% than in MG. This indicator determines average total dispersion of mass center fluctuations. Increase of this indicator witnesses about reduction of sportswomen’s stability in both planes. Mean velocity of MC travelling (V) in CG is worse by 55.88% than in MG. This indicator determines mean amplitude value of MC travelling velocity during time of test. Higher velocity is an evidence of active keeping of vertical posture, connected with disordering of one or more functions of organism’s systems (for example vestibular function). Low velocity witnesses about timely compensation of appearing deviations of body – normal operation of systems, keeping vertical posture. Indicator of velocity of changing of static kinesiogram’ plane (SV) in CG was worse by 59.28% than in MG; area of ellipse (static kinesiogram) (EIS) in CG was worse by 57.62% than in MG; index of velocity (IV) in CG was worse by 55.96% than in MG; evaluation of motion (EM) in MG was by 37.41% better than in CG. Relatuion of length of static kinesiogram to mean dispersion was related to time of testing. Its increasing says about worsening of balance and its reduction – about improvement of stability. Mean coefficient of curvature (Kriv) in CG was worse by 55.49% than in MG.

Mean value is reverse to radius at a moment in every point of curve of static kinesiogram. The more sharp turns are made by trajectory of center of movement (there are tremor like oscillations) the higher is this indicator. Indicator of trajectory’s length of stabilography signal in frontal plane (LX) is in MG better by 59.48% than in CG; the same in sagittal plane (LY), is in CG worse by 58.37% than in MG; the length depending on plane (LFS) is in CG worse by 57.89% than in MG. This is a complex coefficient – length of way per unit of area, which was offered by French posturological school on the base of length of static kinesiogram and its area. The quality of balance function (KFR) in CG is worse 62.34% than in MG. Indicator KFR evaluates to what extent velocity of center of movement is minimal. The higher KFR is the better is the balance of biathlon sportswoman (see fig.1)

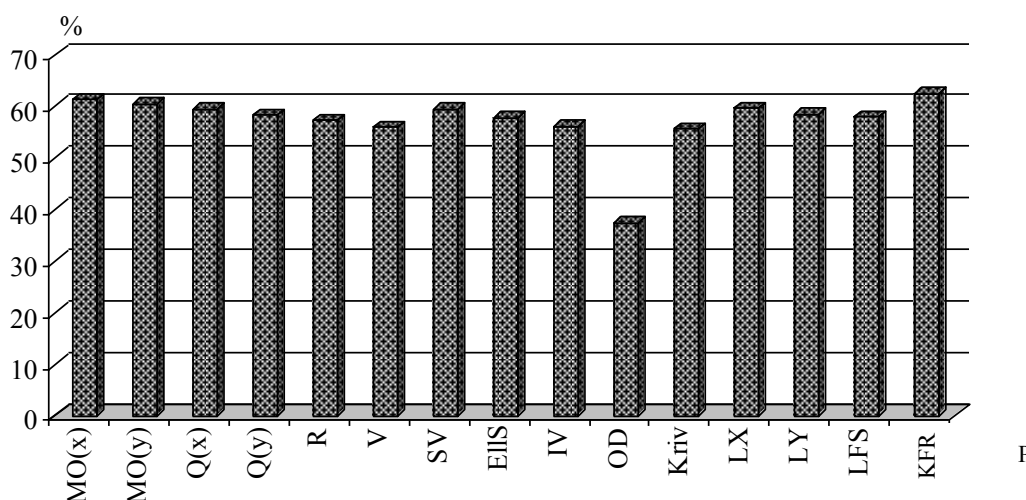


Fig.1. Difference between results (MG) and (CG) in test “Stance on left leg”: P-indicators

As a result of the research, in test “Stance on right leg” we determined that biathlon sportswomen showed the following differences: indicator of shifting in frontal plane (MOx) was worse by 57.70% in CG than in MG, and in sagittal plane (MOy)- by 58.30%; dispersion by frontal plane (Qx) was in CG worse by 59.60 % than in MG and in sagittal plane (Qy) – by 59.75%. Increasing of indicators Qx and Qy shows reduction of stability of biathlon

sportswomen in certain plane. Indicator “Mean dispersion of GMC” (R) in CG is worse by 57.51% than in MG. This indicator determines mean total dispersion of center of movements’ fluctuations. Increase of indicator R witnesses about reducing of stability of biathlon sportswomen in both planes. Mean velocity of MC travelling (V) in CG is worse by 57.92% than in MG. This indicator determines mean amplitude value of velocity of center of movements’ travelling during the time of testing. High velocity says about active processes of keeping vertical posture, connected with disordering of function of one or several organism’s system (for example vestibular function). Low velocity witnesses about timely compensation of appearing deviations of body – normal operation of systems, keeping vertical posture. Indicator of velocity of changing of static kinesiogram’ plane (SV) in CG was worse by 55.63% than in MG; area of ellipse (static kinesiogram) (EIIIS) in CG was worse by 54.92% than in MG; index of velocity (IV) in CG was worse by 53.93% than in MG; evaluation of motion (EM) in MG was by 37.09% better than in CG. Relation of length of static kinesiogram to mean dispersion was related to time of testing. Its increasing says about worsening of balance and its reduction – about improvement of stability. Mean coefficient of curvature (Kriv) in CG was worse by 56.16% than in MG. Mean value is reverse to radius at a moment in every point of curve of static kinesiogram. The more sharp turns are made by trajectory of center of movement (there are tremor like oscillations) the higher is this indicator. Indicator of trajectory’s length of stabilography signal in frontal plane (LX) is in MG better by 57.09% than in CG; the same in sagittal plane (LY), is in CG worse by 54.06% than in MG; the length depending on plane (LFS) is in CG worse by 58.67% than in MG. This is a complex coefficient – length of way per unit of area, which was offered by French posturological school on the base of length of static kinesiogram and its area. The quality of balance function (KFR) in CG is worse 51.95% than in MG. Indicator KFR evaluates to what extent velocity of center of movement is minimal. The higher KFR is the better is the balance of biathlon sportswoman (see fig.2)

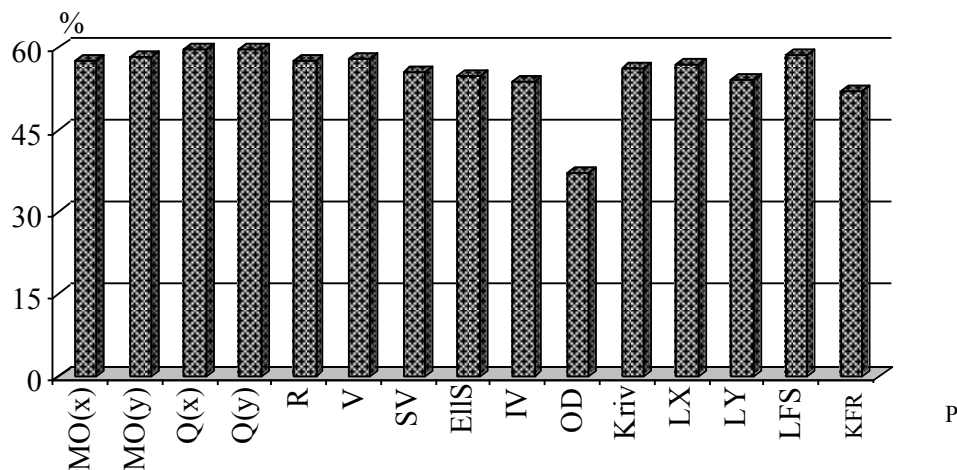


Fig.1. Difference between results (MG) and (CG) in test “Stance on right leg”: P-indicators

**Conclusions:**

Analysis of literature sources showed that insufficient attention was paid to studying of coordination of biathlon sportswomen with the help of bio-mechanical control for improving of technical-tactic effectiveness at racing distance and on shooting range.

The method of stabilography control of body balance function permits to timely evaluate static-dynamic stability of body and functioning of vestibular system as well as to work out training programs with using of exercises for improvement of specific skills in general and sportsmanship in particular.

*The prospects of further researches* imply detail analysis of objects of research, videlicet training process of biathlon sportswomen in out-of school educational institutions.

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**Information about the author:**

**Troyanovska M.N.:** ORCID: <http://orcid.org/0000-0002-7676-8468>;  
masha.lazarenko@bigmir.net; Chernigov National Pedagogical  
University; Getman Polubotka str. 53, Chernigov, 14013, Ukraine.

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