Available online at http://jess.esrae.ru/

"Journal of Economics and Social Sciences"

Computer stabilogram method like one of the physiological and biomechanical method of research different motor actions on slippery surface

Tomsk Polytechnic University

Anastasiya Shunkina [a]

[a] School of Engineering Entrepreneurship, Tomsk Polytechnic University

Abstract

Method of computer stabilogram is one of the most actual physiological and biomechanical methods of evaluating the musculoskeletal system during execution different motor actions on slippery surface. This method helps to evaluate the kinetic stability of body with the help of such parameters like the center of pressure movement, the length of a statokinesiogram graph, the evaluation of actions, the spread of the axes, the quality of balance function and etc. It helps to discover the principles of body adaptation to slippery surface conditions that can expand the understanding of falls avoidance. This paper helps researchers to become acquainted with this kind of method. There are descriptions of the method of computer stabilogram, examples of tests and etc.

Keywords: Stabilogram, slippery surface, falls avoidance, Romberg test, stability test, stabilogram test, center of pressure movement;

1. Introduction

Slippery surface that can be everywhere: ice surface outside, slippery floor in a room; this causes falls and, consequently, injuries. Ability to keep balance during walking on slippery surface is the main skill to prevent falls.

Today the issue of adaptation of different groups of people to slippery surface during doing different motor actions has been poorly studied. To study this issue to discover physiological and biomechanical principles of body adaptation to this type of complicated conditions can expand the understanding how to avoid falls.

Methodological study of this issue is actual. One of the physiological and biomechanical methods of evaluating the musculoskeletal system during the execution of different motor actions on slippery surface can be considered a method of computer stabilogram.

This method is used for registration of mechanical parameters of actions on slippery surface (trajectory, acceleration, speed of developed power). Specific stabilometchric tests, developed by specialists from Taganrog city, and our own developed tests suitable for research purpose are the main way of stabilogram research. [1] These tests help to evaluate the kinetic stability of body with the help of such parameters like the center of pressure movement, the length of a statokinesiogram graph, the evaluation of actions, the spread of the axes, the quality of balance function and etc. [2,3]

2. Registration method:

Registration method: the researched groups should stand on a stabile-platform, covered by material imitated slippery surface. The distance between heels should be 2 centimeters, foots should make an angle about 30^0, the bisector of this angle should match with the sagittal plane of stabile-platform. It`s necessary to put arms along the body without tension. Then it is time to record data.

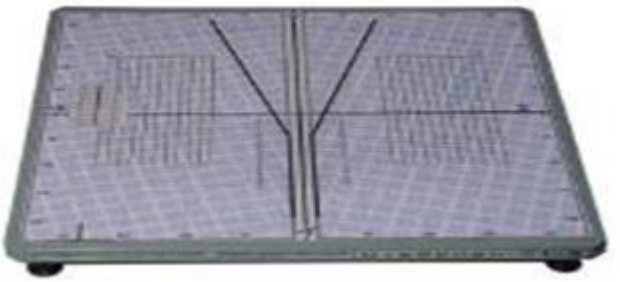

Fig.1. Appearance of the device

There are some tests which can be used in our research [4]:

- *Romberg test*

This test let to evaluate the coordination quality of the vertical position of the body while standing in a difficult pose, the level of motor skills formation (sensor system of managing balance). Test is carried out with a low concentration of attention because of different mind tasks (for example, to count the number of white circle, to count the number of beeps with closed eyes). The test is carried out with opened and closed eyes. As a result a computer program counts the difference between data of tests with opened and closed eyes.

- *Stability test*

This test let to evaluate a reserve of stability when a body is displaced in four main directions – forward, back, right, left. There are two markers (red and green) in a computer screen. The red marker shows the position of man`s center of pressure. The green marker, controlled by a computer, smoothly moves in one of the directions. A man should keep a red marker on green point with the help of the body movements. As a result computer program shows a cross figure. The length of cross sides means a body zone variation in different directions.

- *Stabilography test*

The purpose of this test is to evaluate a level of pose disturbances. Recording of a signal is made in one phase. The advantage of this test is an opportunity to change a move exercise made by a researched man.

3. Conclusion

The method of a computer stabilogram is one of the most actual physiological and biomechanical methods of evaluating the musculoskeletal system while doing different motor actions on a slippery surface. This method helps to study different standard and self-made tests by using various surfaces imitating a slippery one.

References:

1. Arkov V.V., Kalinkin L.A., Milenin O.N. (2007) Stabilo- and tenzometry with injury of sportsman's lower limb. Moscow: Sports science bulletin.
2. Kapilevich, L.V., E.V. Davletyarova, E.V. Koshelskaya (2009). Physiological methods of sports control: tutorial. Tomsk: publishing house of Tomsk polytechnic university.
3. Shestacov, M.P. (2007) Use of stabilometry in sports. Moscow: TVT Divizion.
4. Stabylan-01: user guide (2007). Taganrog: ZAO «OKB» RHYTM.