

# 914. Application of accelerometry in the research of human body balance

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**Abstract.** This article provides methods for evaluating the parameters of human body balance by applying accelerometry and evaluates the impact of physical load on the balance parameters. The presented research work aims at assessing and comparing the parameters of static balance in comparatively healthy adults (20-25 years old) before and after physical activity.

**Keywords:** body balance, physical activity, accelerometry.

## Introduction

Accelerometry is one of the newest and alternative methods for research and evaluation of balance. This method is related with a posturography method; however, differently from applying the posturography method in research, no laboratory conditions and expensive equipment are required. Movements of the head with respect to the trunk are recorded by means of accelerometric method even before the changes in the position of the centre of the body mass, measured by a force plate, appear [1, 2]. During accelerometry, the triaxial accelerometers are used by attaching them to the trunk and limbs of the subjects under study. Computer equipment for processing of the measured signals is used. Speeds and accelerations of the movement of the body parts are determined during these measurements [3].

Accelerometry is a tool suitable for long-term monitoring of subjects living in a free environment, as it allows execution of inexpensive, objective and reliable assessment of the changes in the parameters of motion of unrestricted objects [4]. With the use of this method, it is possible to obtain information on various aspects of interest, including movement classification and assessment of a degree of physical activity, metabolism energy input, equilibrium, gait and transition from sitting to standing position. Most of these functions can be assessed using single triaxial accelerometer fixed to the waist.

One of the main parameters predicting balance pathologies and disorders is an increase in the body oscillation amplitude in the sagittal (forward/backwards) or frontal (on left/right) body planes [5, 6]. Balance is characterized as the human ability to maintain the stable position of the body or to regain the required body position by performing various movements for separate body parts and moving the whole body at different speed [4, 5, 6].

Popularity of the systems intended for assessment of human mobility models and based on the use of accelerometers has strongly increased lately among doctors and researchers in related fields. Efficiency of the use of accelerometers is evident as compared to the traditional gait analysis measures, primarily for their low prices. In addition, tests may be performed not only in the standard laboratory environment [1, 7]. Also, by direct measurement of three-dimensional acceleration, it is possible to avoid errors related to differentiated change and speed data. An issue, studied in the literature, on how accelerometry is applied in analyzing the main space and time related parameters of standing, gait, and noticeable body acceleration, has also been reviewed [6, 7]. Data provided by the accelerometers fastened to the superior part of the body