BODY COMPOSITION AND POSTURAL STABILITY IN GOALKEEPERS OF THE POLISH NATIONAL JUNIOR HANDBALL TEAM

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Abstract

Introduction. The aim of the study was to assess the relationship between the body composition and postural stability of goalkeepers representing the Polish National Junior Handball Team. Material and methods. Body composition was assessed by means of bioelectrical impedance analysis. Postural stability was examined using the AccuGait AMTI force platform. Results. The body composition of the subjects was correct. All of the subjects had very good postural stability. Postural sway was higher in the sagittal plane than in the frontal one. Path Length and Average COP Speed were significantly increased during the closed-eyes trial. Only Fat Mass (%) and Fat Mass (kg) were significantly directly correlated with Area Ellipse (cm²) (OE, open eyes). Inverse correlations occurred between Fat-Free Mass (kg) and Average Load Point Y (cm) (OE) as well as Average Load Point Y (cm) (CE, closed eyes). Muscle Mass (kg) was significantly inversely correlated with Average Load Point Y (cm) (OE) and also with Average Load Point Y (cm) (CE). Body Mass Index correlated negatively only with Average Load Point Y (cm) (CE). Total Body Water (kg) was significantly inversely correlated with Average Load Point Y (cm) (OE) and also with Average Load Point Y (cm) (CE). However, Total Body Water (%) only correlated negatively with Area Ellipse (cm²) (OE). Conclusions. Postural stability was determined by the composition and structure of the body. Single-sided sports specialisation can lead to static disorders of the body during the developmental period discussed. Therefore, systematic tests are needed to monitor the body composition and postural stability of handball goalkeepers.

Key words: body composition, postural stability, AccuGait AMTI force platform, goalkeepers of the Polish National Junior Handball Team

Introduction

The systematic increase in the level and intensity of the training process of handball goalkeepers requires thorough medical examination during recruitment and, then, permanent medical supervision. Medical examinations are aimed at securing the optimal health of young athletes. There is also a need to assess the impact of systematically increased and differently directed physical loads on a young developing body [1-5].

Body composition analysis is one of the most important elements of health assessment in sport. Knowledge about the ontogenetic variability of body composition traits contributes to a more accurate understanding of the physiological and biochemical processes taking place in the body. Knowledge of these issues can significantly help both in the recruitment and training processes of handball goalkeepers. During the developmental period, body structure and composition are subject to multiple changes resulting from the processes of growth and differentiation, which are genetically determined and modified by environmental factors. Body composition analyses should involve morphological and structural assessments. Attention should also be paid to chemical and tissue composition and components in the somatotype. Undoubtedly, the shape and form of the body are most importantly influenced by its two main so-called plasticisers, muscular and fat tissue, and the third fundamental factor – the skeletal system [6-11].

The composition of the body affects its structure and this, in turn, is related to its stability. The physical activity of a handball goalkeeper manifests itself in motor actions, which also include stabilisation of the body. It is a starting base for locomotion and determines the mobility of a goalkeeper. The body can retain its vertical position in space as long as the projection of the centre of gravity remains inside the base area. The mechanical stability of the body, that is its sensitivity to external forces, primarily depends on its mass and shape, and in particular, on the ratio of height to the radius of the posture [12-14].

Body mass, body height, and the size of the support surface are determinants of static mechanical stability. The higher the body mass, the lower the centre of gravity, and the greater the support area, the more stable the standing position. The problem of dynamic stability is different [15-17]. Recovering lost stability requires much more efficiency of the muscular system. In this case, the increase in inertia associated with excessive body mass worsens stability. Stability is maintained by constant or phase tension of the postural muscles, whose activity is controlled by both central and peripheral signals. The resultant of this control is the position of the centre of gravity of the body. Most often, it is assumed that posture control consists in regul-