Strength of postural muscles and selected parameters of body posture

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1. Introduction

Body posture defined by Kutzner-Kozińskiej depends on 3 groups of factors: morphological, functional and environmental. First group indicates that musculo-skeletal-ligament system cooperates (supports) with nervous system. Functional factors are connected with movement habits whereas environmental ones relate to surroundings [1, 2]. To keep upright position posture muscles are required to cooperate antagonistically [3]. The correct position is also influenced by the stato-dynamic fraction where key role is played by flexors and extensors of hip joint, abdominal muscles and dorsum extensors [4]. The group of above mentioned muscles, particularly of dorsum, have the effect on the increase and decrease of spinal curvatures. The size of spinal curvatures determines good body posture alongside with correct organism functioning [5, 3] The focal aim of the study was to find the correlation between the moments of force developed by postural muscles and angles of examined spinal parts in relation to the vertical. These angles are held responsible for the size of spinal curvatures.

2. Methods

2.1 Subject

The study covered 36 adolescent volleyball players from two capital youth clubs. The players were at the age of 15-16 and the have been training for averagely 4,3 ± 1,34 years. The research took place in 2008. The examined group was characterized by high sports level what was proven during the volleyball season when the players won 4th place in the Polish Youth Championship. The average height was 187,4 ± 5,68 cm and body mass 75,1 ± 7,95 kg. The participants were divided into two subgroups, under and above the median of age (15,9 years).

2.2 Methods

2.2.1 Measurement of force moments in static conditions.

During the study the emphasis was put on the measurement of force moments developed during flexor and extensor movements in hip, shoulder joints (right and left) as well as in a trunk. Moreover, the values of force moments for each of hip and shoulder joints were summed up. Further the result was summed adequately with flexor and extensor values in a trunk and was expressed by relative values calculating each kilogram of body mass. The research was carried out in static conditions.

2.2.2 Photogrammetry method of Moire

The evaluation of body posture was measured using photogrammetry technique of Moire. This kind of method is based on light refraction of examined object and it enables to achieve three dimensional picture. During the analysis following angle values were examined: of spinal parts in relation to the vertical (α, β, γ), of thorax kiphosis (KP) and of lumbar lordosis (LL). The statistic analysis included arithmetic mean, standard deviation, test of t Student and Pearson correlation coefficient.
3. Results

Results have revealed that lower values of force moments were noticed in younger group (< 15.9 years). Apart from that it was stated too that body posture disorder happened more often among younger boys [8]. The analysis of Pearson correlation coefficients proved that relationship between strength of postural muscles and body posture were not the same in examined group. The group of older subjects was distinguished by strong correlation between values of angle $\alpha$ and the sum of force moments in hip joints, particularly in left one. At younger players it was observed that lumbar bend (angle $\alpha$) and lordosis (angle LL) depended on extensor force of hip and trunk joint. Also in this group the force of trunk flexor correlated significantly with $\gamma$ angle (angle of spinal part, which connects C7 with kyphosis apex in relation to the vertical) ze szczętem kifozy piersiowej względem pionu).

4. Discussion

Undoubtedly, body posture doesn’t only depend on strength of postural muscles but also by habit (or ability) of maintenance of correct body posture. This habit can be determined by increased training burden. Among younger volleyball players (< 15,9 years) lower values of force moments of postural muscles could be explained by deterioration of body posture [9]. In addition, optimal instability of spine alongside with the increased training burden can also lead to faulty posture more often than usual. Among older players greater strength of muscles bending hip joint and a trunk may significantly affect pelvis position, what as a result can influence body posture.

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References