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Original Article

Biomechanical characteristics of sports technique key elements of the back layout somersault with 900° twist on floor in women's artistic gymnastics

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Abstract:
The main purpose of this paper is to highlight the kinematic and dynamic characteristics of the phasic structure of the acrobatic element called back layout somersault with 900° twist on floor in women's artistic gymnastics. This scientific approach led to the organization of an ascertaining study conducted throughout the National Master Championship held from 16th to 18th of November 2012 in "Nadia Comăneci" Multifunctional Hall of Onesti. A number of 5 gymnasts (finalists on floor) aged 12 to 14, members of the training junior team of Deva, participated in this study. The following methods have been used during the research: method of bibliographic study, method of pedagogical observation, method of video biomechanical analysis, using Physics Toolkit program, experimental method, statistical method (PyPlot) and method of graphical representation. The results of the kinematic characteristics of sports technique key elements used in back layout somersault with 900° twist on floor highlight the phasic sequence of the execution, in terms of preparatory movement made from round-off – back flip connection, moment of taking off of the floor – launching posture, multiplication of body posture (flight phase of the somersault) and the concluding posture – with landing or with launching posture for connection with a front tucked somersault. The analytical biomechanical video processing of each segment pointed out the characteristics of spatial-temporal indicators of sports technique key elements in the case of back layout somersault with 900° twist on floor, according to the data on joints trajectories movement and the graphical representation of the whole body segments of junior gymnasts aged 12 to 14; the somersaults were performed under the conditions of National Master Championship of Artistic Gymnastics 2012. The effective use of the video biomechanical analysis method of back layout somersault with 900° twist highlighted the kinematic and dynamic characteristics of sports technique key elements in accordance with the performances achieved in competitions.
Key words: Gymnastics, kinematics, dynamics, technical structure, performance.

Introduction

At the present moment, artistic gymnastics has recorded remarkable progresses, highlighting the fact that it develops in accordance with the trends of performance sport, but it has its specific features too, such as: increase of sports mastership, increase and rivalry of competitive programs, processing of new complex routines, sports mastership that reaches virtuosity; improvement of components that provide the training of high classification gymnasts (Vieru, 1997; Arkaev, Suchilin, 2004).

In the specialized literature, the general problems of biomechanical analysis of contemporary technique and the knowledge of factors decisive for the technical training and contents of the optimization of gymnastics training are insufficiently treated and known. Current concerns in scientific research on the biomechanical issues in gymnastics and the characteristics of rotation routines were expressed by Hochmuth, Marthold, 1987; Bruggmann, 1994; Witten, Brown, Espinoza, 1996; Prassas, Papadopulous, Krug 1998 (Cre□u M., Simăn, I.I., Bărbulescu M., 2004).

Biomechanical researches in artistic gymnastics can be performed using both biomechanical methods and methods taken from other fields of knowledge (pedagogical, mechanical, physiological, psychological, medical ones, etc.), mainly intended to highlight the features of movement on various apparatus by selecting the means of data recording, processing and analysis (Potop, 2007).

The review of specialized literature certifies about the importance of the research on gymnastics exercises technique and its learning, taking into accounts the body postures and positions. In connection with this fact, V.N. Boloban and E.V. Biriuk (1977) propose the use of the movement postural orientation method for studying the technique of gymnastics sports branches. The concept and methodology of using this method by

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