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COMPARATIVE ANALYSIS OF KINETICS PARAMETERS DURING DIFFERENT LANDING AFTER SPLIT FRONT LEAPS

MICHALINA BŁAŻKIEWICZ¹, ANDRZEJ KĘPCZYŃSKI², ANDRZEJ WIT¹

¹Józef Piłsudski University of Physical Education in Warsaw, Department of Rehabilitation, Warsaw, Poland

²Movement Clinic, Warsaw, Poland

Mailing address: Michalina Błażkiewicz, Józef Piłsudski University of Physical Education in Warsaw, Department of Rehabilitation, 34 Marymoncka Street, 00-968 Warsaw, tel.: +48 22 8641418, e-mail: michalinablazkiewicz@gmail.com

Abstract

Introduction. Dance and rhythmic gymnastics are high leap demanding sports. Leaps are fundamental human movements that require complex motor coordination of both the upper and lower body extremities. The aim of this study was to compare the kinetics parameters of two types of landing after performing front split leaps. **Material and methods.** Fifteen high-level acrobatic gymnasts with a mean age of 22 ± 2.76 years and mean training experience of 12.27 ± 2.34 years participated in the study. Examinations of kinetics parameters of the movements analysed were carried out using the Vicon system and Kistler plates. Gymnasts completed front split leaps with balanced landing (arabesque position) and moving landing (continued movement). **Results.** Values of vertical ground reaction force and values of muscle torque in the hip joint were statistically significant higher ($p < 0.001$) for balanced landing. The value of leg stiffness was also significantly ($p < 0.001$) higher for balanced landing (5.69 ± 2.45 kN/m) compared to moving landing (1.89 ± 0.43 kN/m). For balanced landing, the sequence of maximal peaks of torques from the highest to the lowest values were found in the hip (5.81 ± 1.06 Nm/kg), ankle (3.56 ± 0.71 Nm/kg), and knee (2.01 ± 0.75 Nm/kg) joints. For the split leap with moving landing, the most loaded joints, in descending order, were the ankle (3.50 ± 0.42 Nm/kg), hip (3.39 ± 0.78 Nm/kg), and knee (2.21 ± 0.57 Nm/kg) joints. **Conclusions.** The findings of the study can help to improve the methodology of training the technique and protect gymnasts and dancers against unnecessary injuries.

Key words: biomechanics, front leaps, kinetics parameters, landing, leg stiffness