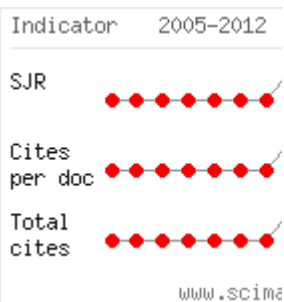


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High diving: evaluation of water impact and considerations on training methods

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Abstract

High diving is a sport that became popular in recent years. Since 2013, FINA has added it to the official list of swimming disciplines. This pilot work focuses on two specific aspects of the High diving: 1. The impact with water: in high diving competitions the platforms are located at a height between 25 and 28 meters. The impact with the water exposes muscles, articulations and the whole athlete body to abnormal solicitations (Snyder & Snow, 1967). 2. The lack of opportunities for athletes to train in

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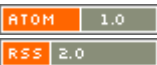
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an environment similar to that in which the performance occurs: divers can practice only on the day before the competition; they can't practice on a daily basis (Paulev & Zubieta-Calleja, 2007). The aim of this study is to develop a training methodology that takes into account these two peculiar difficulties and, on a scientific basis, looks for methodological and technological supports. The approach of research is integrated and composed by two distinct methods: With regard to the influence of impact with the water, the coefficient of impact was calculated using pre-existing data in scientific literature, by reference to studies, conducted in the aeronautical field, concerning the impact of the water on the objects. With regard to the technical side, three international competitions have been studied using video analysis methodology: 2 events related to Red Bull Cliff Diving World Series, and an event relative to Maremeeting Campionato Mondiale di Cliff Diving di Furore (SA). Aim of video analysis was to analyze the various segments of technical execution of each single dive executed by the athlete during the competition in order to better prepare and individualize the strengths and weaknesses of the athlete in each single execution. The athlete's body takes the maximum charge when it is partially submerged. This is verified with the following numbers: 12994,525 [N] in a " dt" of 0,001s (at 9,14 m/s , 4,25 m in height, maximum force 3661,86 [N]). In other words, a diver of 80 kg with a surface impact equal to 0,000508 m² (foot in hyperextension) jumping from a height of 28m finds its highest stimuli at 12994,525 N at 1.64 mt of water penetration. The duration of the maximum stimuli is equal to 0.001 seconds. As is easily

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understood, the diver' s body, even for a short time, is subject to a notable stimuli. Based on the results, it is possible to develop a model that, given height, weight and anthropometric values:

1. Calculate the body segment that will suffer the most stress on impact. 2. Calculate the changes in the coefficient of impact based on the exposed surface. Also constructed model may help athletes to develop a type of training that protects privileged way in the body segments most vulnerable to and including and prevent the consequences of any errors.

Key words: HIGH DIVING, WATER IMPACT, TRAINING METODOLOGY, VIDEOANALYSIS

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