

Summary

The dynamic development of the mixed martial arts and its growing popularity, influenced the interest of the sports science community and sports training, reflected in many studies on the impact of physical activity on the human body within MMA athletes.

Efforts in MMA are characterized by variable intensity of effort, and the structure of the discipline requires a high level of strength and muscle power as well as broadly understood endurance (Bounty et al. 2013, Forbes et al. 2009). Moreover, the above mentioned motor skills in combat conditions are significantly correlated with reaction time, which plays an important role in combat sports and can be defined as the time during which a competitor reacts to a given stimulus (Neto et al. 2009, Bainco et al. 2011). In MMA the reaction time depends on the visual stimulus caused by the opponent's action (attack, defence). During the fight the competitor must act both offensively and defensively at the same time.

Both in the national and world literature there are many reports on the level of strength and muscle power of fight sportsmen (Alm et al. 2013, Lenetsky et al. 2013). In many sports the level of strength and muscle power of the lower limb is similar, however, the character of MMA differs in this respect between the two limbs due to the assumed basic position and the learned movement pattern. Taking into account the above variables, the analysis conducted separately for the lead and trail legs will allow to determine the differences between them (Loffing 2015).

MMA athletes of senior age took part in the study. The research was carried out in the starting period. The system of selecting competitors for the study was mixed. The research involved 45 MMA players with at least 10 years of training experience. The respondents were divided into three weight categories (light: 66-70 kg; medium: 77-84 kg and heavy over 93 kg). The classification of the competitors was developed on the basis of the Ranking of Polish MMA Competitors. During the research 3 competitors were eliminated due to injuries. To each weight category 14 competitors were qualified.

The tests were carried out in the Laboratory of Muscle Strength and Power AWF Katowice with the use of Keiser Leg Press pneumatic device (Keiser, Fresno, CA, USA). The device enables the measurement of muscle strength and power independently for both lower limbs with simultaneous recording of the speed of obtaining these variables. Using the Keiser Leg Press with the A420 diagnostic module, individual variables can be measured across the

entire range of motion. The above mentioned software allows individual recording of the number of repetitions of the following variables: maximum power [W], reaction time [s], level of force at which maximum power [N] was obtained, level of maximum force (1RM). The power will be expressed in absolute values and converted to fat free mass (FFM). Weight and body composition were measured fasting in the morning on the InBody 370 measuring device based on electrical impedance.

Then, in order to solve the research problem, empirical and exploratory analyses of a comparative and model character were applied (Maestas and Preuhs 2000, McCullough and Wilson 2005, Maszczyk et al. 2011, 2012, 2013).

Comparative peak power analysis of advanced athletes in the weight category 66-77 kg showed that the highest peak power was achieved at 50% load for the lead limb and at 60% external load for the trail limb. Meanwhile, intermediate competitors in the same weight category generated the highest peak power at 60% of the external load for the lead leg and 30% for the trail leg. Moreover, the highest values of peak power per fat-free body weight are reached by advanced competitors of the 66-70 kg category.