



Presentation Title:

Energy expenditure and intake in judo athletes during training camp

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Abstract

Purpose: This study aimed to assess total energy expenditure (TEE), physical activities and energy intake in high-level judo athletes. **Methods:** Twenty junior and senior Flemish judo players completed a food diary and activity diary (AD) and simultaneously wore a Sensewear armband (SWA) during a 3 days judo training camp.

Results: TEE was significantly lower when estimated with the SWA compared to the activity diaries (respectively 3137 ± 505 versus 3554 ± 595 kcal/day). SWA values were higher for the non-sport activities compared to the estimates from the diaries. Estimated energy expenditure for randori, the most practiced type of exercise (mean time: 162 ± 49 min/day) was significantly lower for the SWA (707 ± 258 kcal/day) versus the sport specific estimate from the diaries (1545 ± 401 kcal/day).

Conclusion: Estimation of energy expenditure in judo athletes is complex. Energy expenditure during randori as estimated with the SWA is rather low when compared to the reference values. The combination of different methods such as activity diaries and SWA may improve the estimate of the energy expenditure in judo athletes.

Keywords : Physical activity, training of judo, SenseWear Armband, expenditure of energy, intake of energy



Energy expenditure and intake in judo athletes during training camp

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Introduction: It is common knowledge that athletes need to synchronise diet and physical activities for optimal performance, recovery, body composition and weight management. At the moment the literature lacks data on the energy balance during training periods of judo athletes. The problem is that energy expenditure in judo athletes is not well described and, because of high diversity in trainings, difficult to estimate. Randori can be categorized as a high intensity activity with an intermittent pattern of activity and relative rest more or less comparable with a competition fight (Franchini et al., 2009). The diversity of the training program, the unstructured activities during the randori training, and the contact with the opponent, make it very difficult to estimate energy expenditure with most of the available methods. An often used method is the activity diary (AD), which is considered to be one of the most accurate subjective techniques, despite the high participant burden (ACSM, 2009)

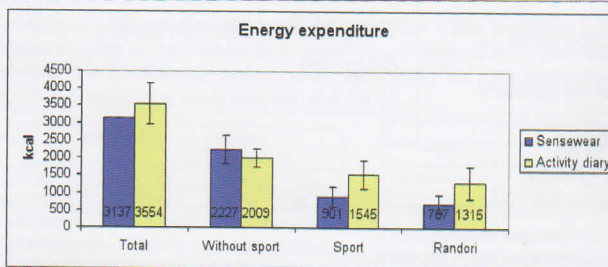
Recently the SenseWear Armband (SWA) was developed. The SWA combines five different sensors into one device attached as an armband around the upper arm. The SWA has shown to give reliable estimates of TEE in healthy free living adults (King et al., 2004; St-Onge et al., 2007; Johannsen et al., 2010).

It was the aim of this study to assess TEE of judo athletes by means of a 3 days activity diary and a multi sensor activity meter, the SWA. It was also the aim to describe judo specific energy expenditure (randori, technique training). Total Energy Intake (TEI) data obtained by 3 days food records were used to calculate the energy balance.

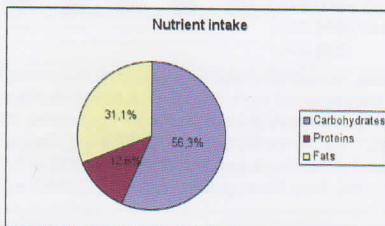
Method: During a 3-days judo training camp energy expenditure was recorded with an activity diary and a Sensewear® armband. In the diary the athletes described all the physical activities they did during the 3 days period (rest, randori, running, techniques, powertraining, ...). With those reports the total and sports specific energy expenditure was calculated based on gender, age and bodyweight. The Sensewear® armband combines 5 different sensors into one device attached as an armband around the right upper arm. The armband contains an accelerometer to register motions, a galvanic resistor to measure electrical conductivity of the skin, a heat flux sensor to measure the amount of heat dissipating from the body, a thermometer and a step counter. With these parameters and personal information (gender, age, length and bodyweight) the device estimates energy expenditure. The energy and nutrient intake was obtained by food records. Athletes wrote down everything they ate and drank during the 3 days period. Based on these diaries and the Nubel food value table, energy and nutrient intake was analysed. The difference between energy intake and expenditure determined the energy balance. The judoka's had weigh-in everyday.



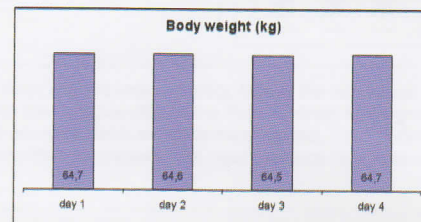
Results:



Energy expenditure: The graphic shows the results of energy expenditure. An average of 30% of the total energy expenditure was used during training. Up to 80% of training energy expenditure consisted of randori training. According to the Sensewear® judoka's use 4 times as much energy during randori then they do in rest state (4MET).



Nutrient Intake: The average energy intake was 2913kcal/day, distributed over the 3 macronutrients according to the recommended intake. The carbohydrate and protein intake was respectively 8,4g/kg and 1,8g/kg.



Body weight: Body weight remained stable over the total evaluation period.

Discussion: The stable body weight during training camp may be an indication for a proper match between energy intake and energy expenditure. Hence, judo players seem to adjust their food intake according to their training. The Sensewear® shows a slight negative energy balance of 223kcal. In several other studies the device is found to give an accurate estimate of the energy expenditure. The calculated energy expenditure seems to have reasonable values. Other studies show that energy intake tend to be underestimated. The combination of possible underestimation of energy intake and the short registration period (3 days) force us to be careful with the interpretation of the results regarding to energy balance. Also the participation of female athletes, who's weight tend to cycle due to menstruation, should be taken into account.

According to provided guidelines the carbohydrate intake is quite good, it should be >55% or 6-10g/kg. Also protein intake matches the criteria of 10-15%. The absolute protein intake is above the recommended amount for power athletes (1,4-1,7g/kg). So supplementation is not really necessary. Although the fat intake is within the guidelines (20-35%) it is high for athletes. These athletes are in a heavy trainings period and need therefore sufficient quality fuel, not only to be able to complete the training also to have optimal recuperation. For sportsmen carbohydrate is a more favourable fuel then fat. Therefore the fat intake should be reduced, so the carbohydrate ingestion can be increased.

Conclusion: During the training camp the athletes were able to keep energy balanced. However the quality of the food can improve by a higher carbohydrate intake that way the fat and protein consumption will reduce. Judo players on training camps are depended on the food served by catering. Often this is not matching their needs. Two hot meals a day with both containing meat can explain the high protein intake. Athletes should learn to make the wright choices, like replacing one meat portion with an extra carbohydrate portion (pasta, potatoes, rice, bread,...). Fat intake can be lowered by avoiding fried meals.

Reference: A complete report of this research was published in "Journal of Combat Sports and Martial Arts", Medsportpress, 2011; 1(2); Vol. 2, 7-11