Journal of Combat Sports and Martial Arts
© MEDSPORTPRESS, 2012; 2(2); Vol. 3, 91-96

The effect of sport massage on the mental disposition in kickboxing and judo competitors, reducing their body mass prior to competitions

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Key words: kickboxing, judo, sport massage, body mass reduction, direct preparation for competition

Summary

Introduction. In kickboxing the competitors are divided into weight categories. Many of them reduce their body weight prior to competition. The goal of the study was to establish the relationships between sport massage procedures and mental disposition of the athletes being prepared for the competition.

Material and methods. The sample included 16 females and 32 males – kickboxers and judokas. The study used Spielberger State Trait Anxiety questionnaire and a tailored questionnaire. The differences between variables were studied using Wilcoxon signed rank test. The minimal significance level was set at $p<0.05$.

Results. Among the competitors qualified for the study, 48% reduced their body mass (Body Mass Reduction – BMR) before each start. They most often started reducing their body mass 10 days before the start by a doing a more intense physical exercise (on average 9.55 days and 9.5 days prior to the start for the female and male subjects respectively) and exercised wearing special clothes triggering sweat glands to release perspiration (8.14 days and 6.56 days for the female and male subjects respectively). Most of competitors (94% of the females and 72%of the males) experienced negative consequences of BMR. The most frequently mentioned side effect was worsening of general feeling (70% of females and 86% of males). Besides, over a half (56%) of the female competitors complained of a decrease in endurance. The obtained results indicate that among the body mass reducing competitors the level of anxiety significantly increases before the start in competition. The differences, however, were only significant in the control group ($p=0.021$ in the females and $p=0.002$ in the males). This indicates a favourable effect of massage on the mental state in the competitors being prepared for the competition.

Conclusions. A large group of athletes reducing their body mass obtain results below their expectations. Therefore, they should be subjected to physician's, physiotherapist's or sport psychologist's care. The massage resulted in low levels of anxiety in the athletes before competitions. Physical disposition is of key importance in start preparation of combat athletes, thus the studies on the application of physiotherapeutic approaches among these athletes should be continued

Introduction

Rivalry in combat sports involves a direct contact of the competitors. Kickboxing is a discipline involving kicking and punching. The techniques using legs and hands are allowed, excluding blows with elbows. Rivalry in judo, in turn, involves effective throwing (nage-waza) and grappling (katame-waza) techniques. Both disciplines are characterised by a short and interrupted anaerobic exercise, requiring optimal strength, speed and endurance levels as in boxing or wrestling [1-4].

Weight limitation to fight in a given category is the formal condition for qualifying athletes for competition. Therefore, kickboxers and judokas have to adjust their body mass to the appropriate weight category within a designated period of time.

To achieve this, they use different methods of body mass reduction (BMR) including limited food and liquid uptake, increased physical activity, procedures triggering the sweat glands to release perspiration or pharmacological agents. All these methods often bring about negative consequences the athletes are not always able to cope [5-8].

The main cognitive goal of the study was to establish relationships between classic massage and mental disposition in kickboxers and judokas directly before a competition.

The applicative goal was to formulate the theses and methodological guidelines for sports physiotherapists to adequately prepare the competitors reducing their body mass before the competition.

Material and methods

The sample included 48 competitors (16 females and 32 males) practising kickboxing and judo. The mean age of the subjects was 21.72 (SD=3.72) and their training record 7.25 years (SD=5.4). All the subjects reduced their body mass before the competition. All of them had MM, M or I sport class.

The study group was composed of 18 athletes subjected to a series of five sports massage procedures, involving massage of the back and limbs. The control group (n=30) included competitors with similar characteristics (Tab. 1).

Physical disposition of the competitors was assessed using Spielberger STAI questionnaire, assessing state] (X-1) and trait anxiety levels (X-2). The questionnaire consists of two parts. The first part involves assessment of state anxiety during the survey. The subject describing his/her general feeling may choose one of the following answers: “definitely not”, “rather not”, “rather yes”, “definitely yes”. The second scale assesses the level of trait anxiety being the tendency to experience anxiety. The respondents can choose one of the following answers: “almost never”, “sometimes”, “often” and “nearly always”. Both parts consist of 20 questions and each subject may score 20 do 80 points [9]. Besides, the subjects filled in the tailored questionnaire including questions about their training record, level of advancement, ways of BMR (if the competitor regularly reduced his/her body mass) and the side effects of BMR.

Based on the training log books (and after consulting the trainers) the optimal results, expected in different tournaments were determined for each competitor.

In the study group classic massage was performed on the shoulder girdle and the dorsal surface as well as on the front and rear surface of the thighs. It involved using basic techniques: stroking, rubbin including muscle attachments, squeezing, kneading, tapping and shaking. The mean time of procedure duration was 30 minutes. Stroking was aimed at warming up the skin and making it more elastic, reducing sensory nerve excitability, stimulation of secretive functions of the sebaceous and sweat glands, and calming down the Central Nervous System (CNS). Rubbing was aimed at stimulate congestion of large areas, increasing the elasticity of muscles, tendons and the whole ligemento-articular apparatus and elimination of muscle induration of different aetiology. Kneading affected muscle tone regulation and acceleration of blood and lymph flow which facilitated tissue exchange in muscles. Slow shaking was also used to stimulate lymph flow in intercellular spaces, reduce muscle tone and stimulate the CNS. Each of the techniques was performed slowly and smoothly without any abrupt changes in intensity and strength. The massage was performed using the largest possible hand surface, depending on the specifics of the technique applied, avoiding point pressure [10-13].Each competitor underwent five procedures. The first series of massage procedures was performed 14 days before the competition. Subsequent series were performed 10, 7 and 4 days before the start. The fifth series was performed on the day preceding the tournament.

Statistical tools were used to analyze the empirical data: the arithmetic mean and standard deviation (SD). The differences between variables were determined using Wilcoxon signed rank test. The minimal significance level was set at $p<0.05$.

Results

Among the competitors qualified for the study, 48% reduced their body mass before each competition (the subjects participated on average in 8.09 competitions during the season) while the rest reduced their body mass only before the most important (target) competitions. The women reduced their body mass on average by 2.5 kg and the men – on average by 3.7 kg which constituted 4.67 and 4.37% of body mass respectively. For the first time they reduced their body mass at the age of 17.7.

The ways of BMR included: limiting food and liquid uptake, more intense physical exercise sauna, exercising in special impermeable clothes and using pharmacological agents. All the subjects reported limitation of food uptake as a main BMR method. Besides, almost half of the respondents reported limited uptake of liquids (60% of the females and 58% of the males) and a more intense physical exercise (73% of the females and 41% of the males). Saunas were used by 33% of the females and 12% of the males while exercising in special impermeable clothes was reported by 44% of males and 28% of females. 20% of the females and 8% of the males reported using pharmacological agents.

Table 1. Biometric characteristics of each group of subjects

groups	gender	age [years]	body mass [kg]	height [cm]	training experience [years]	number of tournaments in season	kick-boxing [n]	judo [n]
Group I	women	21.2 ±2	59.2 ±2.7	168.4 ±3.8	5 ±1.4	8.8 ±3.7	4	1
	men	21.6 ±3.7	74 ±11.8	180 ±8.8	4.8 ±3.9	8.4 ±7.3	5	8
Group II	women	21.7 ±2.9	60.1 ±6.6	165.5 ±3.2	7.1 ±5.6	7.1 ±2.4	7	4
	men	21.9 ±4.5	81.9 ±11.1	179.9 ±7.4	9.5 ±5.9	8.1 ±3.1	9	10

The subjects most often started reducing their body mass 10 days before a competition, first by increasing physical exercise level (the females - on average 9.55 days before the competition and the males on average 9.5 days before the before the competition in) and exercise triggering perspiration (8.14 and 6.56 days before the competition–in the females and males respectively) and reducing food uptake (7.73 and 8.42 days before the competition in the females and males respectively). Moreover, the male competitors more often used a sauna while their female counterparts more often used pharmacological agents (Fig. 1). No significant differences were found between kickboxers and judo competitors.

Most of the competitors (94% of the females and 72% of the males) experienced negative adverse effects of BMR. The most often reported ailments included worsening of general feeling (in 70% of the females and 86% of the males). Over a half (56%) of the female competitors complained of a decrease in endurance and 44% reported decreased strength and headaches. The men, apart from worsening of their general feeling most often reported a decrease in endurance (40%) and strength (36%) (Fig. 2). Other reported ailments included menstrual cycle disorders, hair loss, decrease in libido and aggressive behaviours.

The obtained results indicate a significant increase in anxiety level among the competitors reducing their body mass before a competition. However, only in the control group the differences were statistically significant. This is indicative of the favourable effect of massage on the competitors' men-

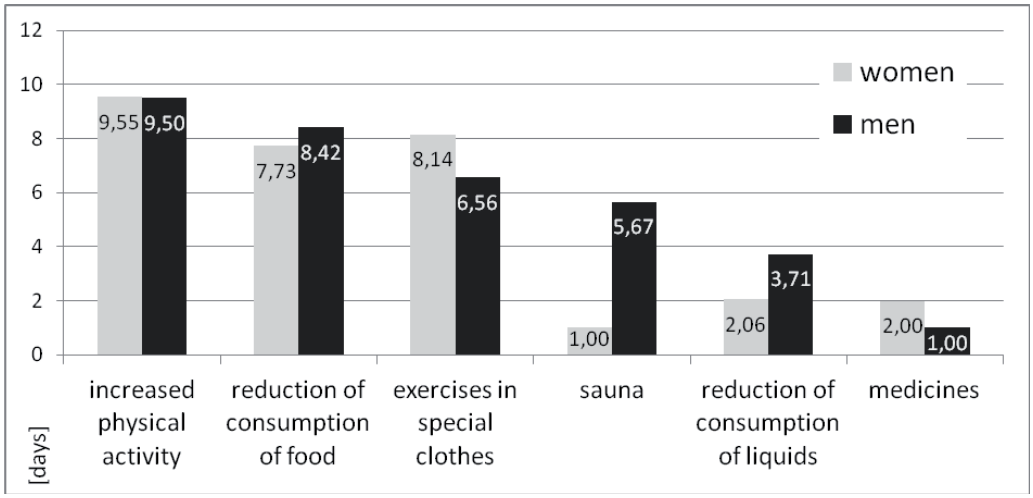

Fig. 1. Methods of BMR used by the studied competitors

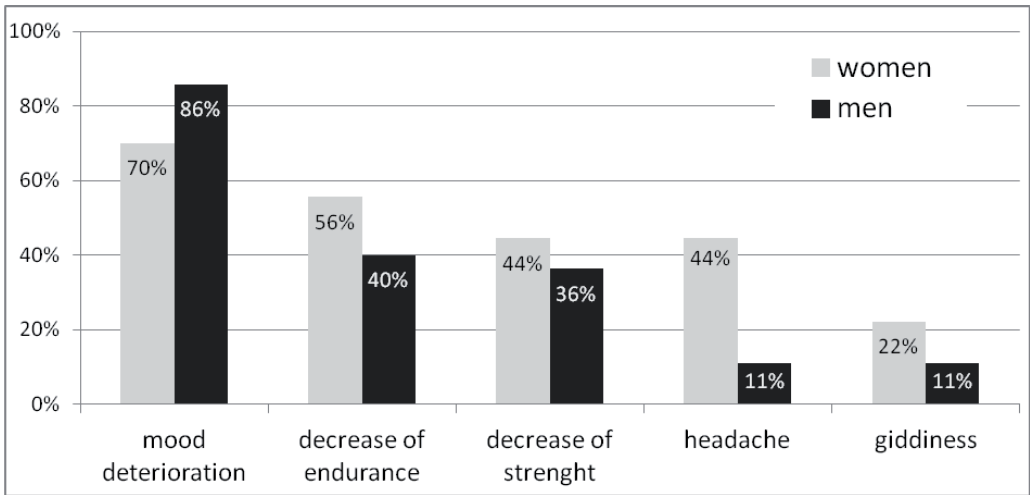

Fig. 2. Adverse effects of BMR in the study subjects

Table 2. Changes in the level of state anxiety (X-1) in both groups

		$\bar{x}$	SD	Max.	Min.	$\bar{x}$	SD	Max.	Min.	p
women	Group I	44.2	12.03	62	34	46.4	6.88	56	38	0.685
	Group II	32.36	6.58	43	23	39.71	8.93	51	24	**0.021**
men	Group I	40.08	10.59	55	24	41.15	8.22	62	31	0.666
	Group II	33.21	10.04	59	23	37.58	10.09	59	24	**0.002**

Table 3. Changes in the level of trait anxiety (X-2) in both groups

		$\bar{x}$	SD	Max.	Min.	$\bar{x}$	SD	Max.	Min.	p
women	Group I	41.4	9.53	54	30	42	9.27	54	30	1.000
	Group II	37.09	8.57	50	23	37.27	8.51	49	23	-
men	Group I	35.54	5.99	45	27	35.85	6.24	46	28	0.179
	Group II	32	6.99	45	22	33.26	7.07	45	22	**0.043**

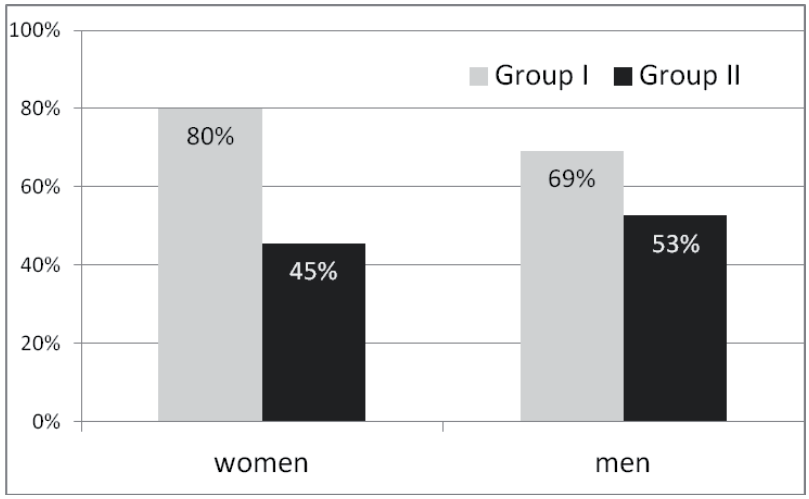

Fig. 3. Realization of expectations concerning competition results among the studied athletes

tal state during the period of preparation for a competition (Table 2). A statistically significant (p=0.043) higher level of trait anxiety was found in the male Group II subjects (Tab. 3).

Kick-boxing competitors were characterized by a higher level of state and trait anxiety. Also among the kick-boxers bigger differences were noted between the first and the second measurement.

The competitors undergoing massage significantly more often obtained the expected results. This group included 4 women (80%) and 9 men (69%) from Group I. Among Group II subjects (control group) less than a half – 5 women (45%) and 10 men (53%) – obtained the expected results (Fig. 3). The expected results during competitions were more often obtained by the judo competitors (60%) as compared with the kick-boxers (53%) and more often by the males (59%) as compared with the females (55%).

Discussion

Although BMR may negatively affect the athlete's body, it is an integral part of many sport disciplines where competitors are assigned to different weight categories (box, kick-boxing, wrestling, weightlifting), but also of the disciplines with no formal limitations, but the competitor's body mass being a factor affecting athletic performance (ski jumps, rock climbing and some athletic categories). The problem concerns most of the athletes competing in the above mentioned disciplines. In the group of kick-boxers and judokas, 48% of the competitors admitted that they reduced their body mass prior to each competition. The athletes lost on average 3.27 kg constituting 4.55% of their natural body mass. For comparison, 77% of young American wrestlers reduced their body mass by more than 2.27 kg while British wrestlers and boxers lost on average 5-10% of their body mass [9,14]. There are also known cases when a competitor reduced his/her body mass by 18.1% [15]. Changes in body mass occur at different pace, e.g. in judo competitors, according to a Japanese study the loss of body mass amounts to 2.8 kg a day [16] while in Australian body builders it amounts to 1.4 kg a day [17]. Another study indicates body mass loss amounting to 1 kg a week when the energy intake with food is limited to 100 kJ/kg/day [18].

The most common method of body mass reduction involves limited food uptake or limited consumption or elimination of some energy substrates from the diet [19, 20]. Other methods of BMR mentioned by the respondents included a limited uptake of liquids, an increased physical activity or exercising in warm, impermeable clothes. This concerned both the judokas and kick-boxers as well as karate competitors, weightlifters and wrestlers [5,6,8,21].

Most of the competitors experience adverse effects of BMR. They mainly result from the reduction of glycogen supply in muscles, blood buffer capacity, plasma volume, plasma albumin (protein) and tracyloglycerol concentration, vitamin B6 and magnesium content and the increase in free fatty acid and cholesterol concentration of plasma [22-25]. During a gradual BMR process, body anaerobic capacity remains unchanged, however, slowed glycogen resynthesis and the loss of muscle protein may affect athletic performance[18]. Ziemlański maintains that an abrupt loss of 5% of body mass decreases exercise capacity even to 30% regardless the used BMR approach[26]. Physical exercise combined with restrictive diet increases plasma activity of creatine kinase which indi-

cates muscle lesions increasing, in turn, the risk of contusion [23]. It is proved that quick BMR enhances stress connected with competitions in athletes, and this in turn affects their results [5,27,28].

Considering the athletes' health, sport practitioners and theoreticians seek adequate methods of minimising the adverse side effects of BMR. It has been proved that exercise dehydration is less harmful than thermal dehydration (sauna, special clothes) resulting in the loss of mineral components, such as potassium or sodium while athletes' bodies are adapted to exercise water loss during normal training sessions [24]. The use of a sauna (popular among athletes) 24 hours before weighing has a more negative impact on the athlete than 48 hours prior to weighing and most of competitors use a sauna 24 hours before a competition, which is confirmed by the results of this study [24, 29].

Medical teams including physiotherapists play an increasingly important role in athletes' preparations for a competition. Using recent physiotherapeutic approaches, they may affect their mental disposition. This concerns both mental (as confirmed by this study results) and motor ability preparation. During the direct preparation before competition (DPC) the competitors who were subjected to massage procedures obtained significantly better results in competitions [6, 30, 31].

Studies on using physiotherapeutic approaches when preparing athletes for competitions should be continued and carried out on a larger scale. The significance of physical procedures for wellness, rehabilitation and sport training is invaluable.

Conclusions

1. The main methods of the body mass reduction before a competition used by kickboxers and judokas include limited food and liquid uptake and intensified physical exercise, which may negatively affect the competitors' mental disposition.
2. Most of the competitors experience negative effects of BMR including worsening of general feeling, decrease in strength and endurance, and headaches. Therefore this problem should be considered when planning the athlete preparation for a competition immediately before the start.
3. A large group of athletes reducing their body mass obtain results in competitions below their expectations. For this reason they should b a physician, physiotherapist or sport physician.
4. The massage contributed to a decrease in anxiety level before competitions in athletes reducing their body mass, Mental disposition is of key importance in preparations for competing in combat sports, therefore the studies on using physiotherapy approaches under such circumstances should be continued on a larger scale in different groups of athletes.

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Received: 17.11.2011
Accepted: 06.05.2012