

Intensity of perceived stress prior to a judo tournament among male and female contestants. A preliminary study

Zbigniew Obmiński¹ Helena Mroczkowska²

¹ Department of Endocrinology, Institute of Sport, Warsaw, Poland

² Department of Psychology, Institute of Sport, Warsaw, Poland

Key words: judo, gender, competition, perceived stress, anxiety

Summary

Introduction. In the present research we sought to determine whether: (i) the levels precompetitive stress in male and female participants of an international judo tournament are alike, (ii) the parallel use of the questionnaire (STAI) for determination of state anxiety (SA) and visual analog scale for determination perceived stress (PS) provide results of high consistency.

Material and methods. Male (n=33) and female (n=33) judo players were examined on the day of an International Judo Tournament. In the morning, few hours prior to the first struggle they were asked to fill the STAI, and to rate their current PS using the visual analog scale. The successive assessments of PS were conducted before and after warm up prior to the first struggles.

Results. Precompetitive situation triggered in the morning somewhat higher SA and PS in females, but the differences were not significant. There were significant correlations between SA and PS in both sexes. Later, PS was elevating with the time to the first struggle and the difference between sexes was greater and significant.

Conclusions. Female judo players responses stronger to anticipatory stress than their male counterparts, especially directly prior to the event. There are good consistency of the results regarding emotional arousal obtained from STAI and visual analog scale.

Introduction

An athletic competition is very stressful event for the contestants. They usually suffer from anticipatory stress, the psycho-emotional state, which is vary from that noted at neutral conditions. The higher level of that stress may considerably disrupt concentration of attention [1]. That affective state may be examined with the use of assessing of physiological indices, for instance responses of salivary cortisol levels, as well as estimation of intensity and direction of emotional arousal using number of psychometric tools. The most often questionnaire used in sport are Competitive State Anxiety Inventory 2, which can distinguish intensity of cognitive and somatic anxiety, and which use is often accompanied with self-confidence and self-efficacy estimation. It was found, that intensity of psycho-physiological responses to a competition depend on several factors, like type of sport, individual strategy of coping with stress, rank of a competition, sex, contestant's skill level and the others circumstances like risk of painful injury and ratio between motivation to win and motivation to avoid failure. For instance, rock climbing elicits state of anxiety, which intensity is parallel to the risk of falling down from a artificial wall during climbing the same route. This falling induces short-

lasting but unpleasant emotion, and the risk and anxiety is higher during lead rope protocol (low rope belaying) than top-rope style (an upper rope belaying) [2]. On the other hand the other studies on climbing did not show style-related differences in anxiety scores [3,4].

With regard to the sex-related differences, it seems, that precompetitive anxiety is higher in female athletes, however, there are few studies, and they were conducted on small samples. Among tennis players female contestants show usually higher state of somatic anxiety and lower self-confidence scores in comparison to their male counterparts, and winners' scores of cognitive anxiety are lower than those reported by losers [5]. Youth female volleyball players displayed higher anxiety and lower self-confidence scores [6].

Psychometric studies on both cognitive and somatic anxiety, showed that less physically and cognitively anxious contestants are of greater chance to pursue their tasks masterly [7]. Objective results regarding assessing of somatic anxiety are provided by the physiological studies. As mentioned earlier, cortisol levels and precompetitive psychical state mirrored each other [2-5]. In soccer players anticipatory cortisol rise is related to unpleasant (but not to pleasant) somatic

emotions [8]. In male judo contestants taking part in an official competition higher cortisol levels were associated with higher anxiety scores [9]. Moreover, in this study the more successful contestants displayed higher testosterone levels and motivation to win scores than those having less successes. Hence, competition may be perceived concurrently as a threat and challenge, both inducing motivation to avoid failure and motivation to win respectively. Those various types of motives are two independent (not bipolar) features, which cross-ratios points more or less anxious athletes [10,11]. It is worth to note, that the behaviors of the coaches play a crucial role on contestants' emotions. It seems, that social support from the coaches and not very excessive expectations promote more effective coping with stress, while negative interpersonal relationships between an athlete and his/her coach elicits higher precompetitive anxiety [12]. Moreover, supportive coaching has a positive effect on task-oriented coping style and better sport achievement [13]. Precompetitive emotions, their intensity and directions are in a great part associated with the final athletic outcome [14,15], therefore, the coaches, who feel responsible for psychical comfort should recognize all circumstances influencing psychical disposition to a competition.

It seems, that precompetitive psychological state among judo contestants with respect to sex-related differences is insufficiently recognized considering the high popularity of that sport. The aim of this study was to assess changes of perceived precompetitive stress during short period of time to a first judo struggle in male and female judokas.

Material and methods

The sample included 33 male and 33 female Polish judokas at age 19-28y, who were examined every year within 8-year period during an international judo competition (Judo World Cup) organized at home by the Polish Judo Association. In the morning of the day of the competition (08:30) perceived stress (PSm), was determined by visual analog scale, while state of anxiety with the use of **The State-Trait Anxiety Inventory, by Spielberger (STAI)**. We thought, that conducting the same study range would be possible a bit later, directly prior to the first judo contests, but majority of the examined

judokas refused filling time-consuming questionnaire (STAI) and focused their attention on warm up and observation of their first opponents. Hence, before and after warm up we collected scores of perceived stress only. The Shapiro-Wilk test showed lack of normal distribution for all variables, therefore, between sexes differences in the scores were tested using non-parametric Mann-Whitney U test. Perceived stress scores at three time points were compared with the use of Friedman's analysis of variance (ANOVA). Relationships between the variables were tested by means Spearman's correlation coefficients.

Results

Between sexes differences in the variables is displayed in Table 1, while changes in perceived stress variables recorded during precompetitive period is shown in Table 2.

The comparison of morning state anxiety and perceived stress showed good consistency of both variables, however, somewhat stronger correlation was found in the males ($r=0.657$) than in the females (0.519). Moreover, perceived stress before warm up (PSbw) correlated significantly with that post warm up (PSaw) in males ($r=0.815$) and females ($r=0.508$). The statistical analysis showed significant mean fluctuations of SA in both sexes during the anticipatory period. Morning values of state anxiety and perceived stress reached approximately half of the maximal values and these values were slightly, but not significantly higher in the females. Irrespective of gender, perceived stress (PS) significantly elevated with time-to-event and slightly declined due to warm up, however, post warm up PSaw scores in both sexes were still significantly higher as compared to those in the morning. Moreover, female judokas demonstrated significantly higher overall PS (aggregated data) than their male counterparts.

Discussion

Our study showed, that the consistency between morning SA obtained from the questionnaire STAI and PS recorded with the use of the visual analog scale were sufficiency good, therefore, PS estimated before and after warm up gave reli-

Table 1. State of anxiety (SA), perceived stress, in the morning (PSm), before warm up (PSbw) and after warm up (PSaw) in male and female judo contestants on the day of a judo tournament (Mann-Whitney U test)

Variables	scale range	females n=35	males n=33	differences	
				Z	p
SA	20-80	44.9±10.9	40.2±6.4	1.70	0.089
PSm	0-100	53.3±16.1	46.9±12.4	1.50	0.130
PSbw	0-100	63.2±7.1	57.4±11.7	2.17*	0.030*
PSaw	0-100	60.2±7.8	52.8±8.7	3.00*	0.003*

Table 2. The effect of time-to-event on sex-related differences in perceived stress (PS) (Friedman's ANOVA)

group	morning (PSm)	before warm up (PSbw)	after warm up(PSaw)	χ^2 (N=33,df=2)	p value	Kendal's coefficient
males	46.9±12.4	57.4±11.7	52.8±8.7	15.33	0.0005*	0.23
females	53.3±16.1	63.2±7.1	60.2±7.8	19.17	0.00007*	0.29

able information how the contestants felt prior to the first judo contest. Similar study conducted by the others, a day before, and one hour before competition showed various individual patterns, where anxiety state was reported rather as facilitator, or among others rather as debilitator, depending on intensity of anxiety [16]. A survey conducted by us in a large sample of combat sport athletes (judo and taekwondo, non published data) suggested, that females more often than males reported precompetitive emotions as unpleasant ones. That may suggest, that females' strategy of coping is insufficient, if majority of them represent high-anxious and low self-confidence pattern [17]. In the case of very strong opponent, an athlete may worry about the outcome of the struggle, hence, social support given by his/her coach may reduce the anxiety and enhance the self-confidence [12,13].

Despite of external circumstances affecting perceived stress, regulation of strong emotions by woman facing a difficult challenge strongly depended on their gender pattern. It was found that women engaged in risk-taking sports demonstrated masculine or androgynous gender identity, and their score on sensation seeking was above average level [18]. Competitive sport of judo is not a risky sport. It belongs to family of combat sports and martial arts, where direct physical contact with an opponent may very seldom result in injury and some offensive action like f.i. successfully performed choking which leads to win also seldom is performed. Thus, in general, a judo struggle does not endanger the life or health of the athletes, although an official judo match is a very intensive effort triggering blood acidosis [19] and successive bouts performed during a competition bring about a huge fatigue [20].

As mentioned quality of interpersonal relationships in a coach-athlete pair play a crucial role in regulation of emotions in a contestant. Study by Felton showed that inadequate relationship in coach-athlete pairs and lack of knowledge about athletes' demands are responsible for poorer athlete's emotional functioning during competition [21], on the other hand coaches competitive anxiety markedly and significantly affects athlete's competitive anxiety [22]. For that reason, highly anxious coach is not able to give a social support, even, if he/she had really wanted. Moreover, in female athletes coach-athlete relationships may be stronger source of acute stress

and female contestants more often use avoidance-cognitive coping styles than did their male counterparts [23].

Unfortunately, in our study the level of demand of social support and relationships between coaches and male or female contestants were not examined. Therefore, the reasons for sex-related differences in perceived stress among judo contestants is unknown, however, similar gender dependent diversity have been reported by others. Tatcher showed different pattern of anxiety changes in both sexes at three time points (-24h, -2h, -1h) prior to a competition. In this study females demonstrated a rise of anxiety with the time during that period, while males did not [24]. Among adult athletes practicing combat or contact sports, prevalence rate of minor or major depressive states and generalized anxiety were higher in females, and the same was found for the other sports [25]. Likewise, differences in adolescent boys and girls (9-14y) in competitive sport situation were found by Grossbard JR. Although in this study anxiety scores were poorly related to sex, girls and older athletes are worried about their poor performance, while boys reported disruption of their concentrations under stress condition [26]. In a search of additional factors modifying intensity of acute stress it is worth to note, that contestants of higher emotional intelligence experience less precompetitive anxiety [27].

In the view of above phenomenon it is worth to take into consideration the desirability and usefulness of special mental training for these judo contestants, whose "hearts are in the fire, and heads in the fridge", that means, their coping strategies are insufficient. In pistol shooters the use of training of meditation brought about beneficial effects regarding performance, and reduced competitive stress, as was confirmed by visual analog scale [28].

Conclusions

1. Visual analog scale for determination of perceived stress is a reliable way for estimation of emotional state occurring directly prior to a competition. This method may be an alternative for the use of time-consuming questionnaires.
2. Female judo contestants are exposed to a stronger stress in competitive situations.

References

1. Mellalieu SD, Hanton S, Shearer DA. Hearts in the fire, heads in the fridge: a qualitative investigation into the temporal patterning of the precompetitive psychological response in elite performers. *J Sports Sci.* 2008; 26(8): 811-24.
2. Aras D, Akalan C. The effect of anxiety about falling on selected physiological parameters with different rope protocols in sport rock climbing. *J Sports Med Phys Fitness* 2014; 54(1): 1-8.
3. Fryer S, Dickson T, Draper N, Blackwell G, Hillier S. A psycho-physiological comparison of on-sight lead and top rope ascents in advanced rock climbers. *Scand J Med Sci Sports* 2013; 23(5): 645-50.
4. Draper N, Dickson T, Fryer S, et al. Plasma cortisol concentrations and perceived anxiety in response to on-sight rock climbing. *Int J Sports Med.* 2012; 33(1): 13-7.
5. Filaire E, Alix D, Ferrand C, Verger M. Psychophysiological stress in tennis players during the first single match of a tournament. *Psychoneuroendocrinology* 2009; 34(1): 150-7.
6. Milavić B, Jurko D, Grgantov Z. Relations of competitive state anxiety and efficacy of young volleyball players. *Coll Antropol.* 2013; 37(Suppl 2): 83-92.
7. Li CH. Predicting precompetitive state anxiety: using the 2 x 2 achievement goal framework. *Percept Mot Skills* 2013; 117(2): 339-52.

8. Alix-Sy D, Le Scanff C, Filaire E. Psycho-physiological responses in the pre-competition period in elite soccer players. *J Sports Sci Med.* 2008; 7(4): 446-54.
9. Salvador A, Suay F, González-Bono E, Serrano MA. Anticipatory cortisol, testosterone and psychological responses to judo competition in young men. *Psychoneuroendocrinology* 2003; 28(3): 364-75.
10. Korobeynikov G, Mazmanian K, Korobeynikova L, Jagiello W. Diagnostics of psycho-physiological states and motivation in elite athletes. *Bratisl Lek Listy* 2011; 112(11): 637-43.
11. Thomassen TO, Halvari H. A hierarchical model of approach achievement motivation and effort regulation during a 90-min. soccer match. *Percept Mot Skills* 2007; 105(2): 609-35.
12. Baker J, Côté J, Hawes R. The relationship between coaching behaviours and sport anxiety in athletes. *J Sci Med Sport* 2000; 3(2): 110-9.
13. Nicolas M, Gaudreau P, Franche V. Perception of coaching behaviors, coping, and achievement in a sport competition. *J Sport Exerc Psychol.* 2011; 33(3): 460-8.
14. Woodman T, Davis PA, Hardy L, Callow N, Glasscock I, Yuill-Proctor J. Emotions and sport performance: an exploration of happiness, hope, and anger. *J Sport Exerc Psychol.* 2009; 31(2):169-88.
15. Rathschlag M, Memmert D. The influence of self-generated emotions on physical performance: an investigation of happiness, anger, anxiety, and sadness. *J Sport Exerc Psychol.* 2013; 35(2): 197-210.
16. Stavrou NA, Psychountaki M, Zervas Y. Intensity and direction dimensions of competitive state anxiety: a time-to-event approach. *Percept Mot Skills* 2006; 103(1): 91-8.
17. Mullen R, Lane A, Hanton S. Anxiety symptom interpretation in high-anxious, defensive high-anxious, low-anxious and repressor sport performers. *Anxiety Stress Coping* 2009; 22(1): 91-100.
18. Cazenave N, Le Scanff C, Woodman T. Psychological profiles and emotional regulation characteristics of women engaged in risk-taking sports. *Anxiety Stress Coping* 2007; 20(4): 421-35.
19. Detanico D, Pupo JD, Franchini E, Dos Santos SG. Effects of successive judo matches on fatigue and muscle damage markers. *J Strength Cond Res.* 2014.
20. Branco BH, Massuça LM, Andreato LV, et al. Association between the Rating Perceived Exertion, Heart Rate and Blood Lactate in Successive Judo Fights (Randori). *Asian J Sports Med.* 2013; 4(2): 125-30.
21. Felton L, Jowett S. „What do coaches do” and „how do they relate”: their effects on athletes’ psychological needs and functioning. *Scand J Med Sci Sports* 2013; 23(2): 130-9.
22. Mottaghi M, Atarodi A, Rohani Z. The Relationship between Coaches’ and Athletes’ Competitive Anxiety, and their Performance. *Iran J Psychiatry Behav Sci.* 2013; 7(2): 68-76.
23. Anshel MH, Sutarso T, Jubenville C. Racial and gender differences on sources of acute stress and coping style among competitive athletes. *J Soc Psychol.* 2009; 149(2): 159-77
24. Thatcher J, Thatcher R, Dorling D. Gender differences in the pre-competition temporal patterning of anxiety and hormonal responses. *J Sports Med Phys Fitness* 2004; 44(3): 300-8.
25. Schaal K, Tafflet M, Nassif H, Thibault V, Pichard C, Alcotte M, et al. Psychological balance in high level athletes: gender-based differences and sport-specific patterns. *PLoS One* 2011; 6(5): 19007.
26. Grossbard JR, Smith RE, Smoll FL, Cumming SP. Competitive anxiety in young athletes: differentiating somatic anxiety, worry, and concentration disruption. *Anxiety Stress Coping* 2009; 22(2): 153-66.
27. Lu FJ, Li GS, Hsu EY, Williams L. Relationship between athletes’ emotional intelligence and precompetitive anxiety. *Percept Mot Skills* 2010; 110(1): 323-8.
28. Solberg EE, Berglund KA, Engen O, Ekeberg O, Loeb M. The effect of meditation on shooting performance. *Br J Sports Med.* 1996; 30(4): 342-6.

Address for correspondence:

Zbigniew Obmiński

Zakład Endokrynologii, Instytut Sportu

ul. Trylogii 2/16, 01-982 Warszawa, Poland

tel. +48 (22) 834-08-12, cell. 508-545-831, e-mail: zbigniew.obminski@insp.waw.pl

Received: 27.03.2014

Accepted: 17.05.2014