

# Pre-competition weight loss among Polish taekwondo competitors – occurrence, methods and health consequences

## Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Manuscript Preparation
- E Funds Collection

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## Abstract

**Background & Study Aim:** Negative health consequences of the rapid weight loss are a well-documented problem in combat sports such as wrestling and judo. The present study aimed the occurrence of pre-competition weight loss among Polish taekwondo athletes, use of rapid weight loss methods and the evaluation of potential consequences of this process.

**Material & Methods:** One hundred and twenty four participants were recruited and interviewed during national competition. Comparisons for age and training patterns between sexes were calculated using Mann–Whitney U test. The usage of rapid weight loss methods in sexes was compared with  $\chi^2$  test. To compare occurrence of specific health symptoms the odds ratio calculation was used.

**Results:** Seventy percent of the respondents declared weight loss before the competition. Food restriction, increased physical activity and exercising in impermeable clothes were cited as the most common methods used to achieve weight reduction. Athletes who were using rapid weight loss methods were almost 16 times more likely to develop feeling of reduced power/strength and increased irritability as well as 12 times more likely to feel fatigue before competition as compared to group of athletes non-using weight loss methods.

**Conclusions:** Competitors who reduced their weight before competition were more likely to develop negative health consequences as athletes who did not follow weight reduction process. Preventive steps regarding pre-competition weight loss of taekwondo athletes should focus on changing behaviours from using rapid methods to using gradual methods of weight loss.

**Keywords:** athletic performance, body weight changes, dehydration, martial arts, sports nutritional sciences

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## INTRODUCTION

Taekwondo is an Olympic sport practiced all over the world. Its popularity in Poland is growing very fast and more and more young people take a high-performance taekwondo trainings and compete in national and international tournaments. In all the tournaments athletes are paired with opponents of similar body weight through weight classes. The aim

of such division is to ensure fairness and promote even handed combats in terms of strength, leverage and agility.

It is well known that sport weight divisions can influence the dietary habits of athletes [1]. Prior studies show that many competitors of sports with weight divisions have used inappropriate or unsafe methods

to get their bodies to an unnatural lower weight and, by doing so, athletes are believed to have a competitive edge over a lower-body weight opponent [2,3].

Prevalence of negative health consequences of the rapid weight loss is a well-documented problem especially in wrestling and judo [4-7], where extreme rapid weight loss regimens were probably the cause of three deaths of young wrestlers in the 1997 and one judo medallist in 1996 [8,9]. Only few studies documented the weight loss habits of taekwondo athletes but it is already known that most competitors use several harmful methods of rapid weight loss in an attempt to classify for a lighter weight division [10-14]. To gain a competitive advantage, a significant proportion of athletes try to reduce their body weight shortly before official weigh-in and then rapidly regain their lost body weight before competition [11, 14]. Regardless of the educational information available from sports organizations, unhealthy weight loss procedures have continued.

Evaluation of the pattern of weight loss of young Polish taekwondo players could be beneficial to educational and preventive efforts in Poland. A greater understanding of weight reduction behaviour in Poland is required to develop an effective support system for promoting safe weight loss.

The study aimed the occurrence of pre-competition weight loss among young Polish taekwondo athletes, use of rapid weight loss methods and the evaluation of potential consequences of this process. The study was approved by the Local Ethics Committee.

## MATERIAL AND METHODS

### Design and participants

The survey was conducted during 2011 Polish Taekwondo Junior and Youth Championships. Participants were recruited during pre-competition

weigh-in so a great number of athletes from different regions and weight divisions could be found. The study group comprised participants who have voluntarily agreed to participate in the research program. Percentage of athletes who refused to participate in the study during Junior Championships was 56% and during Youth Championships 50%.

### Measures

The study was based on the questionnaire which contains questions about weight loss before the competition and the use of rapid weight loss methods adapted from validated Rapid Weight Loss Questionnaire [15] as well as questions about feeling specific symptoms before the competition.

### Statistical analysis

We first calculated descriptive statistics for age and training patterns of competitors. To determine whether a data set is well-modelled by a normal distribution or not, we used the Shapiro-Wilk test. Because of non-normal distribution we compared the data between sexes using Mann-Whitney U test with  $\alpha=0.05$ . The usage of rapid weight loss methods in sexes was compared with  $\chi^2$  test. To compare how much more likely it is that the competitors who are losing weight before competition will develop specific symptoms as compared to competitors who are not losing weight, we used the odds ratio (OR) calculation. When none of the non-RWL subjects declared the symptoms we used continuity correction [16]. Data were analysed using Statistica 10 PL (StatSoft Inc, Tulsa, USA).

## RESULTS

There was no difference in training pattern between sexes in studied sample (Table 1).

The majority (70%) of the respondents declared weight loss before the competition. Of the subjects

**Table 1.** Characteristics of taekwondo competitors

Variable	Total (n=124)		Female (n=89)		Male (n=35)		p-value
	mean	SD	mean	SD	mean	SD	
Age [years]	17.5	1.9	<b>17.3</b>	1.8	<b>18.2</b>	2.1	<b>.023*</b>
	Trainings						
[amount/week]	4.4	2.0	4.5	2.2	4.4	1.5	.593
[h/week]	7.2	3.1	7.1	3.1	7.2	2.9	.783

\*p<0.05

who had used weight reduction methods, 32% had reduced their weight constantly. The percentage of competitors occasionally and constantly losing weight before taekwondo tournaments was similar among female and male athletes (Table 2).

The subjects had employed different methods for weight loss. Food restriction and increased physical activity were cited as the most common methods used to achieve weight reduction. Almost half of the respondents (45% and 46% of women and men, respectively) declared losing weight by sweating during exercising in impermeable clothes. Statistical difference between women and men was found in sauna usage (13% vs. 35%,  $p=0.019$ , respectively) which also lead to fluid loss. Among female athletes the use of diuretics (2%) and laxatives (5%) was reported (Figure 1).

RWL competitors commonly experienced all the studied symptoms. According to odds ratio calculation RWL athletes were almost 16 times more likely to develop feeling of reduced power/strength and increased irritability and 12 times more likely to feel fatigue before competition as compared to non-RWL group (Table 3).

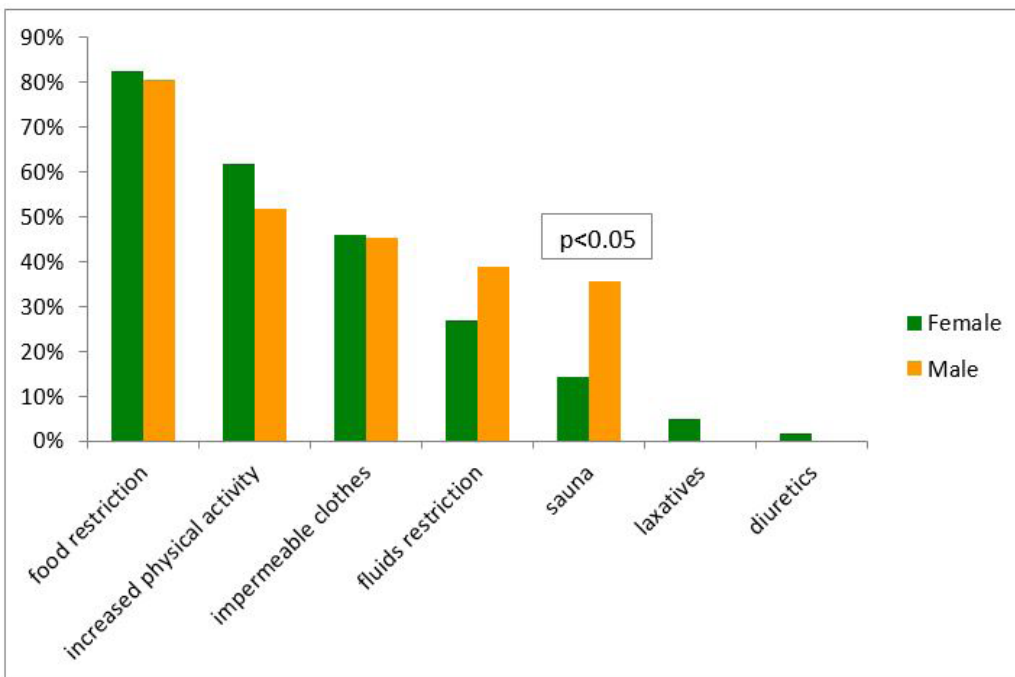
### DISCUSSION

The results of this study suggest that weight loss before competition is common among taekwondo athletes in Poland. The current study found a prevalence of male athletes involved in pre-competition weight loss higher (89%) than that reported by Fleming and Costarelli (87%) [14]. Similar, higher occurrence (71%), we found among female competitors comparing to study conducted by Tsai et al. (50%) [17] and also higher

**Table 2.** Pre-competition weight loss distribution in relation to sex of competitors

Variable	Female (n=89)		Male (n=35)		Total (n=124)	
	n	%	n	%	n	%
RWL including:	63	71	31	89	94	76
oRWL	43	68	21	68	64	68
cRWL	20	32	10	32	30	32
non-RWL	26	29	4	11	30	24

RWL/non-RWL – using/not using rapid weight loss methods; oRWL – occasionally using rapid weight loss methods; cRWL – constantly using rapid weight loss methods



**Figure 1.** Sample distribution in relation to usage of rapid weight loss methods (n=94)

**Table 3.** Sample distribution [n (%)] and odds ratio (OR) of symptoms in relation to pre-competition weight loss

Symptoms	non-RWL n=30	RWL n=94	OR	95% CI	p-value
reduced physical capacity	3 (10%)	13 (14%)	1.44	0.38 - 5.53	.588
fatigue	2 (7%)	44 (47%)	12.32	2.73 - 55.53	.001
reduced power / strength	1 (3%)	33 (35%)	15.69	2.00 - 122.90	.008
dizziness	1 (3%)	14 (15%)	5.08	0.63 - 41.18	.125
increased irritability	0	19 (20%)	15.76	0.92 - 269.25	.057
tension /stress	0	12 (13%)	9.24	0.53 - 160.92	.127
reduced immunity	0	6 (6%)	4.48	0.25 - 81.90	.312

CI – confidence interval; OR – odds ratio; RWL/non-RWL – using/not using rapid weight loss methods

prevalence among total study group (76%) than that reported by van Dijk et al. (28%) [12].

Reported in our study constantly repeated cycling of weight throughout the competitive season in over 30% of participants can be a cause for concern. Cycling involves rapid weight loss before weigh-in and regain after qualifying to chosen weight division. Rapid weight gain is most likely to result from the consumption of large amounts of food and fluid after official weigh-in and rapid rehydration [17]. Acute and cumulative negative effects of rapid weight changes in combat sports were frequently reported [9].

According to our studies, the most prevalent nutritional strategies for reducing weight are food restriction and increased physical activity. It means that the most frequently employed primary strategy is energy restriction. Using saunas was not as common as in the Fleming and Costarelli [14] study (67% vs. 35% of male athletes) but training in impermeable clothes was slightly more frequent (43% vs. 45% of male athletes), fluids restriction was similarly higher among Polish athletes (37% vs. 39% of male athletes). Results from this study suggest that weight control behaviours based on dehydration methods are widely prevalent among Polish taekwondo competitors.

A small percentage of our subjects reported that they have employed pharmacological agents to reduce their weight including diuretics (1%) and laxatives (3%). Use of these drugs was not common and occurred only in female competitors. However, due to their potential side effects, particular attention should focus on discouraging athletes from using such weight reduction techniques.

Weight loss before competition is not always harmful. Excessive body fat can impair athlete's performance and weight loss can be beneficial if it's directed to

losing unnecessary body fat. Preventive steps regarding pre-competition weight loss of taekwondo athletes should focus on changing behaviours from using potentially dangerous, rapid methods to using gradual methods of weight loss.

The results of this study suggest that RWL competitors commonly experience symptoms which were side effects of rapid weight loss. Traditionally some of the coaches and athletes look at rapid weight loss as a critical component of the „no pain, no gain” philosophy [18]. The type of weight loss techniques practiced by many Polish taekwondo competitors would not increase their health and well-being before the tournament. Improper pre-competition weight loss strategy can be an inhibitory factor for their success in sport. Sporting governing bodies should try to eliminate suffering, medical risks and pain from those participating in sporting activities and concentrate on developing safe weight management program for taekwondo competitors.

## CONCLUSIONS

The occurrence of pre-competition weight loss among Polish taekwondo players was higher than reported in other studies. Use of rapid weight loss methods such as food restriction, increased physical activity and use of impermeable clothes during exercise was prevalent. Competitors who reduced their weight before competition were more likely to develop all the studied potential weight reduction consequences as athletes who didn't follow weight reduction process.

Preventive steps regarding pre-competition weight loss of taekwondo athletes should focus on changing behaviours from using potentially dangerous, rapid methods to using gradual methods of weight loss. Some weight loss strategies and guidelines for taekwondo athletes and their coaches should be

developed to make sure they optimize both their performance and health prior to competitions.

providing access to players during their pre-competition weigh-in.

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## COMPETING INTERESTS

The authors declare that they have no competing interests.

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