

## BODY COMPONENTS CHANGES AND DEPRESSION SCORES BEFORE COMPETITIONS AMONG ELITE FEMALE WRESTLERS

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### Abstract

Among weight-sports like wrestling where athletes are required to weigh-in before the competitions and their weights are measured; athletes generally lose weight. Athletes who carry out weight loss through sweat room, fluid and food restrictions undergo dehydration. The current study was undertaken to examine body components changes and their depression scores caused by dehydration among the female elite wrestlers. 29 female elite wrestlers who participated in Turkish Inter-University Wrestling Championship were included in the study. Beck's Depression Inventory (BDI) used to determine depression scores of female elite wrestlers; personal information forms that addressed age, height, weight, amount of weight lost before the competition and body components [Tanita BC-418 brand via bioelectrical impedance analysis (BIA)] were administered one hour before weigh-in competition. Data was tested for normality with the Shapiro-Wilk test. The independent Samples T Test was used to compare pairwise group variables that followed a normal distribution. In the current study it has been found statistically significant difference between percentage of body fat, body fat mass, percentage of total body water and depression scores according to weight loss group and non-weight loss group. As a result; it has been found that fat mass is lower and depression scores' is mild degree for female elite wrestlers performing weight loss.

**Key words:** Beck depression inventory, body components, female wrestlers, weight loss.

### Introduction

The amateur wrestling community and also the worldwide entire sports community in 1997 were shocked by the deaths of 3 college wrestlers in six weeks in the USA (Litsky, 1997). The autopsy results showed that the deaths of athletes were caused by weight loss in a short time and dehydration of their bodies approximately by %15 (Remick, 1998). Following these deaths in 1997, The National Collegiate Athletic Association (NCAA) has tried to take and develop new measures to prevent unsafe weight loss practices. The National Collegiate Athletic Association (NCAA) initiated and developed new safety precautions in order to prevent unsafe weight loss practices (Stuempfle et al., 2003). After studies of this subject, NCAA decided that competition-weighing should be conducted nearer to the competitions and new weight classes should be determined by adding nearly +3 kg to each weight class (Oppliger et al., 2006). Besides, NCAA recommended that weekly weight-loss should not exceed 1.5% of body weight as a part of the Wrestling Weight Certification (WWC) program (Utter, 2001). Dehydration is described as the process of body's losing fluid while rehydration is the process of retaking of the fluid lost. Although the lexical meaning of dehydration in dictionaries is simple, its physiological definition is not so easy (Shirreffs, 2003). Wrestlers usually use methods; such as weight control during the season, fluid or food restriction, wearing nylon or rubber dresses during training, extra trainings after training, training in hot halls and sauna; in order to compete at the desired level (Oppliger et al., 2003). Weight loss with these methods in weight sports has recently been the subject of many

studies by attracting the attention of scientists and academicians. (Artioli et al., 2010; Franchini, Brito and Artioli, 2012; Işık et al., 2013, Alpay et al., 2015, Yildirim, 2015). Generally, athletes doing weight sports think that the time between the competition weight and the competition time ( $\approx 18$  hours) is sufficient for rehydration after dehydration. Demanding of the wrest in lowest possible weight class is the most important factor that drives them to weight loss (Wroble and Moxley, 1998). Nevertheless, studies report that this time period ( $\approx 18$  hours) is not enough to regain the body-weight loss (Sagayama et al., 2013) and dehydration decreases athletes' performances, too (Buford et al, 2006). It was reported that athletes who perform weight-loss before competitions undergo not only change their hydration status, but also experience health problems such as sleep disorders, learning and memory difficulties, irregular body temperature, vasoconstriction, low sexual performance, dysfunctions in skeletal muscles anxiety and depression (Işık et al., 2013). Depression is defined by Beck et al. (1961) as the specific alterations and increases in mood, whether sadness, apathy or loneliness; a negative self-image involving self-blame; a desire or disposition for self-punishment, desire to escape social activities, to hide or withdrawal and inaction; physical or physically expressed changes such as inaction, loss of libido or insomnia. In this context, the purpose of this study is to reveal the differences between body components and depression scores by determining female wrestlers' weight loss level, in how much time they did weight loss.

## Methods

### Participants

The population of this research consists of female wrestlers (N=42) who participated in the Inter-university Turkey Championship. The sample size is composed of 29 elite (international level) woman wrestlers participating in the championship. The female wrestlers are classified as weight loss or non-weight loss groups according to their response to the question "How much weight did you lose before competition weighing?" which is asked as a demographic variable.

### Measurement of Body Height

Body heights are measured with Seca brand stadiometer at 1 mm accuracy.

### Measurement of Body components

The body weights of the female wrestlers and their body components [Body Mass Index (BMI), Basal Metabolic Rate (BMR), Percentage of Fat Mass (PFM), Fat Mass (FM), Fat Free Mass (FFM) and Total Body Water (TBW)] were determined by the athletic mode with the help of BIA with wrestling swimsuit and 250 gr tare.

### Demographic Variables and Beck Depression Inventory (BDI):

In this research participated female wrestlers asked "How many days ago do you start weight loss before competition weighing?" and "How much weight did you lose before competition weighing?" and Percentage of Body Weight Loss (PBWL) was obtained by dividing the lost weight by its own body weight. In addition; It was developed by Beck to measure depression risk, its symptom levels and the change in depression severity among adults in 1961. The Turkish validity ( $r=74$ ) and reliability ( $\alpha=80$ ) tests of the scale were performed by Hisli(1989). It is a four point likert type self-report inventory with 21-question multiple-choice. A value of 0 to 3 is assigned for each item marked by the severity of the depression. Pathologic cut-off is 17 and total scores range between 0 and 63 (8). The scores of the inventory are as follows: 0–9: indicates no depression; 10–16: indicates mild depression; 17–24: indicates moderate depression and  $25 \geq$  indicates severe depression

### Collection of Data

The purpose and importance of the research before the research was explained to the female wrestlers by the researcher and voluntary participation was provided. The measures of this study were applied in official competition weighing time (one day before the official competition, between 06:00 and 06:30 pm).

### Statistical Analysis

Data was tested for normality with the Kolmogorov Smirnov test. The independent samples t test was used to compare pair wise group variables that followed a normal distribution. The correlation between body components and depression scores were analyzed by Pearson correlation test.

## Results

Table 1. Comparison of Demographic Variables of Female Wrestlers

Variables	Groups	n	$\bar{X} \pm SD.$	p
Age	Weight Loss	17	20,94±1,20	0,750
	Non-weight Loss	12	20,75±2,01	
Height (cm)	Weight Loss	17	161,41±5,64	0,481
	Non-weight Loss	12	162,92±5,52	
Body Weight	Weight Loss	17	56,67±6,77	0,203
	Non-weight Loss	12	60,42±8,70	
BMI (kg/m <sup>2</sup> )	Weight Loss	17	21,71±2,13	0,269
	Non-weight Loss	12	22,70±2,58	

There were no statistically significant differences in the demographic variables of female wrestlers who performed in the weight loss and non-weight loss group ( $p > 0.05$ ).

Table 2. Comparison of Body Components and Depression Scores of Female Wrestlers

Variables	Grup	n	$\bar{X} \pm SD.$	p	
PBWL %kg	Weight Loss	17	4,73±1,77	-	
	Non-weight Loss	12	-		
Body components	BMR	Weight Loss	17	1435,71±133,63	0,893
		Non-weight Loss	12	1442,67±138,91	
	PFM (%kg)	Weight Loss	17	16,19±3,07	0,001**
		Non-weight Loss	12	21,77±4,10	
	FM (kg)	Weight Loss	17	9,28±2,72	0,003*
		Non-weight Loss	12	13,43±4,25	
	FFM (kg)	Weight Loss	17	47,39±4,90	0,832
		Non-weight Loss	12	47,00±4,88	
	TBW (kg)	Weight Loss	17	34,69±3,58	0,839
		Non-weight Loss	12	34,42±3,58	
	BDI	Weight Loss	17	10,65±2,32	0,001**
		Non-weight Loss	12	3,25±2,05	

\* $p < 0,05$ , \*\* $p < 0,01$ , Body Mass Index: BMI, Basal Metabolic Rate: BMR, Percentage of Fat Mass: PFM, Fat Mass: FM, Fat Free Mass: FFM, Total Body Water: TBW, Percentage of Body Weight Loss: PBWL, Beck Depression Inventory: BDI

When body components and depression scores differences between of weight loss and non-weight loss group female wrestlers were examined.

It was found that there were statistically significant difference between the levels of PBWL, PFM, FM and BDI scores ( $p < 0,05$ ), whereas no statistically significant difference between BMR, FFM and TBW levels ( $p > 0,05$ ).

Table 3. Correlations between Body Components and Depression Scores of Female Wrestlers

Variables	PBWL	BMR	PFM	FM	FFM	TBW
BMR	-,129					
PFM	-,602**	,367				
FM	-,534**	,616**	,955**			
FFM	-,068	,993	,282	,543**		
TBW	-,068	,993**	,281	,543**	1,000**	
BDI	,858**	-,055	-,474**	-,401*	-,009	-,010

\*p<0,05, \*\*p<0,01

When body components and depression scores correlation of female wrestlers were examined; It was found that there was a positive correlation between PBWL ( $r = ,858$ ) with BDI scores, whereas negative correlation between PFM ( $r = -,457$ ) and FM ( $r = -,401$ ) with BDI scores.

### Discussion and conclusion

Human body is designed to move and act and exercises have served to prevent many health problems that occur in relation with life style (Verhagen et al., 2007). As rehabilitative practices, it is a scientific fact that exercises produce not only physiological benefits but also psychological benefits (Cup et al., 2007). Physical exercises and sports affect central nervous system and increase brain monoamines -such as dopamine or adrenalin and serotonin (happiness hormone)- which are connected with mood state (Balcioglu and Yilmaz, 2013). Again; aerobic-walk exercises are employed in restoring health and wellness in many areas. Some of these health conditions are cardiovascular conditions, hyperlipidemia, fibromyalgia, diabetes and many psychological disorders.

However, aerobic-walk exercises have been proved to be effective most upon the treatment of depression (Gullette, Elizabeth and Blumenthal, 1996). That low levels of 5-Hydroxyindoleacetic acid (5-HIAA) -which is the basic metabolite of serotonin hormone in cerebrospinal fluid- were found among the depressive patients demonstrated that serotonin (5-HT) played a role in pathogenesis of depression. Particularly; the studies made upon those who died by suicide demonstrated that levels of 5-HT and 5-HIAA were very low; which supported the above mentioned conclusion (Yemez and Alptekin, 1998). Dehydration often occurs among the athletes due to the exercises done by them and it is compensated with food and fluid intake during recovery period (Demirkan, Koz and Kutlu, 2010). The studies on dehydration are generally related with the effect of dehydration upon functioning and performance losses (Jacobs, 1980; Kukidome et al., 2008; Handrigan et al., 2010; Lawrence and Christopher, 2010).

Maughan and Shirreffs (2008) reported that a body mass loss of 2%-7% results in 7%-60% performance decrease. Yet, it was observed that body fluid loss of 1-2% did not have any significant effect upon performance during an endurance

exercise lasting < 90 minutes whereas performance was negatively affected by body fluid loss of  $\geq 2\%$  during an endurance exercise lasting > 90 minutes. In another study; it was found out that 1.9% dehydration of body weight and exercises caused a decrease by 10% in  $VO_2$  max. while 4.3% dehydration of body weight and exercises caused a decrease by 22% in  $VO_2$  max. It was also pointed out that any 5% loss of body weight will result in 45% decrease in performance (Yildiz and Arzuman, 2009). In a study conducted by Burge, Carey and Payn (1993) in which the effect of dehydration by 2% was investigated upon running speed during 1.500 m, 5.000 m and 10.000 m running tests; it was detected that blood plasma volume reduced by 11% and mean running speed decreased by 3% in 1.500 m running test while mean running speed decreased by 6% in 5.000 m and 10.000 m running tests. There are studies that examine psychological outcomes of dehydration that occur before weigh-in before the competition in weight-sports.

But, Kunst and Florescu argued that main factors that affected wrestling performance were composed of athlete's psychology by 40 % (Kunst and Florescu, 1971). In this sense; because wrestling is a weight-sport and dehydration occurs among the athletes shortly before the competitions; it is thought that dehydration results in depressive conditions and thus affects performance negatively. In the current study, the responses to the questionnaire show that 58,62% of the female wrestlers underwent rapid weight loss just before the competition (1-10 days) ( $4.73\% \pm 1.77$ ). In the current study, it was identified that PBWL values of the female wrestlers who cut weight were higher than NCAA weight loss guidelines. When the participant female wrestlers were classified; it was seen that there were no differences in terms of demographic variables (age, height, weight and body mass index) ( $p > 0.05$ ), which indicates that the groups compared were homogenous and the differences in body components and depression scores were caused by PBWL levels.

When the two groups were compared, it was detected that FM and PFM levels of weight loss group were relatively lower than non-weight loss group ( $p < 0.05$ ), whereas no changes in BMR, FFM and TBW levels ( $p > 0.05$ ; Table 1). The results of current study made us conclude that female wrestlers performed weight loss through reducing body fat ratio. When the inter-group depression scores were investigated; it was found that depression scores of the weight loss group were relatively higher than the non-weight loss group ( $p < 0.05$ ; Table 2). Depression score of the weight loss group was  $10.65 \pm 2.32$ . This finding showed that the weight loss group had mild level of depression. In the study of Ünver et al. (2015) on depression scores of weight loss elite wrestlers and weight loss sub-elite wrestlers; it was reported that depression scores of sub-elite wrestlers were relatively higher than elite wrestlers. In the study of İşik et al. (2013) on elite male wrestlers; it was found that there was a positive and strong

correlation between amount of weight loss and depression score and male wrestlers who performed <5% dehydration of body weight underwent mild level of depression, whereas those who performed >5% dehydration of body weight underwent severe level of depression. The current study was similar to the studies of Ünver et al. (2015) and Işık et al. (2013).

In the current study; when the correlation between body components and depression scores of the female wrestlers was examined; a positive correlation was found between BDI scores and PBWL values ( $r=.858$ ). However; there was a negative correlation between BDI scores and PFM ( $r=-.474$ ) and FM ( $r= -.401$ ) (Table3), which pointed out that as BDI scores went up so did PBWL values but neither did PFM and FM values.

As a result; female wrestlers who cut weight in a short time before tournaments demonstrated decreases in their body components and therefore experienced mild level of depression. Instead of losing intense weight in a short time, it is necessary to perform weight cutting over a long period; as a result of which both changes in body components and depression levels will be minimized.

#### Conflicts of interest

The authors declare that there is no conflict of interest with this manuscript.

#### Dates of any Congress

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## PROMJENE TJELESNIH KOMPONENTI I DEPRESIJE PRIJE NATJECANJA MEĐU VRHUNSKIM HRVAČICAMA

### Sažetak

Među sportovima poput hrvanja, gdje se sportaši trebaju vagati prije natjecanja i njihovih utega; Sportaši općenito gube na težini, osobito oni koji izvode gubitak težine kroz prostorije za znojenje, tekućine i ograničenja hrane podliježu dehidraciji. Sadašnje istraživanje je poduzeto kako bi se ispitale promjene sastavnica tijela i njihove rezultate depresije uzrokovane dehidracijom među ženskim elitnim hrvačima. U istraživanju je uključeno 29 ženskih elitnih hrvača koji su sudjelovali na turskom prvenstvu u međunacionalnom hrvanju. Beck's Depression Inventory (BDI) koristi se za određivanje depresivnih rezultata ženskih elitnih hrvača; Osobne podatke koji su se odnosili na dob, visinu, težinu, količinu izgubljenu težinu prije natjecanja i dijelove tijela [marku Tanita BC-418 putem bioelektrične impedancijske analize (BIA)] jedan sat prije natjecanja u vaganju. Podaci su testirani na normalnost pomoću Shapiro-Wilk testa. Neovisni T-test uzoraka upotrijebljen je za usporedbu parnih skupnih varijabli koje su slijedile normalnu distribuciju. U sadašnjoj studiji utvrđena je statistički značajna razlika između postotka tjelesne masti, masnoće tjelesne masti, postotka ukupne tjelesne vode i depresije prema skupini mršavljenja i skupini koja nije mršavila. Kao rezultat; Pronađeno je da je mast masnoća niža, a stupnjevi depresije su blagi za elitne hrvačice koji izvode gubitak težine.

**Ključne riječi:** Beckov inventar depresije, sastav tijela, hrvačice, gubitak težine.

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