

The Effect of Weight Reduction on Reaction Times in Wrestlers in the U17  
Category

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ORIGINAL ARTICLE

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**Abstract**

This research was conducted to investigate the effect of weight reduction on simple reaction times in U17 category wrestlers. The research consisted of 24 wrestlers with an average age of 15.41±0.77, an average height of 170.33±7.72 cm and an average body weight of 66.04±16.79 kg in the U17 category group competition held in Malatya. Hubbard Scientific 6027 device was used to measure the reaction times of the participants. The participants were given the instruction to lose 4% of their own body weight after having their height, weight, and basic visual and auditory reaction times measured. Measurements were taken again after losing 4% of their weight. The SPSS 17.0 package program was used to examine the study's data. As a result of the findings of the study, a statistically significant result was observed between the body weight pretest and post-test values of the participant group (p<0,05). While there was a significant difference between the left-hand visual pretest posttest values and the right-hand visual pretest posttest values (p>0,05), there was no significant difference between the left-hand auditory pretest posttest values. As a result, while the left-hand visual reaction time remained unchanged, the right hand visual, right hand auditory, and left-hand auditory reaction times all suffered due to the athletes wrestling in the U17 category losing 4% of their body weight. According to the study, athletes who lose weight quickly will experience negative effects on their reaction performance. For this reason, it is crucial to maintain weight control throughout the season in both athletic and scientific aspects.

**Keywords:** Wrestling, Weight Loss, Reaction Time

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**15-16 Yaş Yıldızlar Kategorisi Güreşçilerde Kilo  
Düşmenin Reaksiyon Sürelerine Etkisi**

**Öz**

Bu araştırma U17 kategori güreşçilerde kilo düşmenin basit reaksiyon sürelerine etkisinin araştırılması amacıyla yapıldı. Araştırma Malatya ilinde yapılan Büyük yıldızlar kategorisi grup müsabakasında yaş ortalaması 15.41±0.77, boy ortalaması 170.33±7.72 cm ve vücut ağırlığı ortalaması 66.04±16.79 kg olan 24 güreşçiden oluştu. Katılımcıların reaksiyon sürelerini ölçmek için Hubbard Scientific 6027 cihazı kullanıldı. Katılımcılardan boy uzunluğu, vücut ağırlığı, basit görsel ve işitsel reaksiyon süreleri alındıktan sonra kendi vücut ağırlıklarının %4'ü kadar kilo düşmeleri istendi. Ağırlıklarının %4'ü kadar kilo düştükten sonra tekrardan ölçümler alındı. Çalışma verileri SPSS 17.0 paket programı ile analiz edildi. Araştırmanın bulguları sonucunda katılımcı grubunun vücut ağırlığı ön test son test değerleri arasında istatistiksel olarak anlamlı bir sonuç görüldü (p<0,05). Sağ el görsel, sağ el işitsel, sol el işitsel ön test son test değerlerinde anlamlı bir sonuç görülürken (p<0,05), sol el görsel ön test son test değerleri arasında herhangi bir anlamlı farklılık tespit edilmedi (p>0,05). Sonuç olarak, yıldızlar kategorisinde güreşen sporcuların vücut ağırlıklarının %4'ü kadar kilo düşmeleri sonucunda güreşçilerde sağ el görsel, sağ el işitsel, sol el işitsel reaksiyon süresi olumsuz yönde etkilenirken sol el görsel reaksiyon süresinde herhangi bir değişim olmadığı tespit edildi. Çalışma sonucunda hızlı kilo düşen sporcuların reaksiyon performansı olumsuz etkileneceğinden dolayı kilo kontrolünün sezon boyunca takip edilmesi sporcu performansı ve bilimsel açıdan önem arz etmektedir.

**Anahtar sözcükler:** Güreş, Kilo Düşme, Reaksiyon Süresi

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## Introduction

Today, sports are followed with interest by many individuals and societies. This is very important in order to maximize the performance of athletes (Neiva et al, 2014). Various training methods and tactics are used by utilizing science to maximize athletic performance (Öğün, 2012). It is known that innovative training methods are used in various sports branches, which date back to ancient times. One of these branches is wrestling, which has a very large following. Wrestling; it is a combat sport consisting of various weights and styles that includes many motoric features such as strength, speed, endurance, flexibility, technique and reaction. The response time to the stimulus is defined as the amount of time that has passed since the stimulation (Türkyılmaz, 2019).

It is impossible to overlook how response time affects wrestlers, as it does in some sports. The ability to react quickly to moving objects and to predetermined (chosen) objects is particularly critical in the wrestling discipline. While it is conceivable in this situation to react in the least amount of time to the opponent's continually changing movements in the first, there is a standard reaction time to the movement comprising of a particular technique in the second. These two abilities have an impact on the growth of complex reaction performance, which calls for reaction drills during wrestling training (Kürkçü and Özdağ, 2005).

Athletes use various methods to reach their target weight. Reducing fluid and food consumption, vomiting the consumed fluids and nutrients, using various drugs (laxatives, slimming pills and diuretics), intense exercise planning, long-term sauna applications are some of these methods (Bradley, 2006). Various methods are used for weight loss. Exercising, losing fluid by sweating in a hot environment, reducing food and fluid intake are some of these methods. It is possible to apply one or more of the above methods for weight loss (Bayer, 2018). Since wrestling is one of the individual combat sports, it is important to adjust the weight according to the weights. Wrestlers lose weight by losing calories with intense exercise or by applying the dehydration method for shorter-term weight loss. The nutrition programs of the athletes are adjusted according to the intensity of the exercise or the competition (Kalyon, 1994).

Numerous studies have examined both the benefits and drawbacks of weight loss prior to competition (Ersoy, 2012; Brito and Martin, 2012; Pehlivan, 2005; Steen and Brownell, 1990). The reaction performances of the athletes who dropped weight in the wrestling branch, however, were studied only in one study when the relevant literature was reviewed. The goal of this study was to determine how weight loss affected the wrestlers in the 15–16 age group's reaction times. It is crucial to investigate how athletes' visual and auditory basic reaction times are altered after losing 4% of their body weight from fluid, nutrient, and electrolyte loss while competing in the U17 category of wrestling in Malatya.

## **Material and Methods**

### ***Research's population and sample***

The sample comprised of 24 wrestlers between the ages of 15 and 16 who competed in this tournament and dropped 4% of their own body weight. The research's target population comprised of athletes competing in wrestling contests in the category of U17 in Malatya.

### ***Data Collection Process***

Before starting the research, all the athletes were given detailed information about the research. Before the study, a voluntary consent form was signed by the families of all athletes. Height, weight, visual and auditory simple reaction time tests were applied to the athletes before starting weight loss practices. In order to determine whether there was any difference at the end of the study, height, weight, visual and auditory simple reaction time tests were applied in the same way. The data obtained were recorded in the participant form prepared by the researcher.

### ***Weight Loss Protocol***

Each athlete employed running, the sauna, dietary restriction, and wrestling training as weight loss techniques separately (Türkyilmaz, 2019).

### ***Data Collection Tools***

**Height and Body Weight Measurements:** Height was measured in cm with a stadiometer (Holtain Ltd. England). Body weight was measured in kg in the morning on an empty stomach, using shorts and combed cotton, and an electronic scale (Seca, Germany) (Kamar, 2003).

### ***Simple Visual and Auditory Reaction Time Measurements***

Reaction Time Device (Hubbard Scientific 6027) was used for simple visual and auditory reaction time measurements. Stimuli were delivered manually via the Hubbard Reaction Time device, invisible to the participant (Semenick, 1990). During the test application phase, the participants stood with their hands on the table while sitting in the chair. They were asked to respond to stimuli given at unequal time intervals. The reaction times of the participants to the stimuli were recorded in milliseconds. In order not to adversely affect the performance of the athletes, the tests were carried out in a very quiet and sufficiently lighted environment. Visual and auditory tests were applied to each athlete 10 times. While the first 5 applications were considered as trials, the average value of the last 5 applications was taken and recorded as simple reaction time value (Tamer, 2000).

### *Weight Loss Protocol*

In welterweight sports, athletes resort to rapid weight loss methods to compete at their target weight. Athletes who want to lose weight quickly can lose 4-5 kg in as little as 3 days by applying methods such as sauna, dehydration, diet pills, sweating rooms, diuretics, mucilage drugs, reducing food consumption (Pehlivan, 2005). Although various suggestions (exercise, diet, sauna, etc.) regarding weight loss were given to all participants, the method to be used was left to the athletes' own preferences (Şahin, 2000).

### *Statistical Analysis*

SPSS statistical package program for SPSS 17.0 was used for data analysis. Numerical variables were expressed as percent, mean±standard deviation, and categorical variables. Two-Related-Samples Wilcoxon Tests from non-parametric tests were used. Significance level was considered as  $p<0.05$ .

### **Findings**

The findings of the research are given in tables below and interpreted.

Table 1

Descriptive Information of Participants

<b>Variable</b>	<b>Min</b>	<b>Maks</b>	<b>Mean</b>	<b>Standart Deviation</b>
<b>Year</b>	14	16	15.4	0.77
<b>Height (cm)</b>	155	185	170.3	7.72
<b>Body Weight (kg)</b>	44	114	66.0	16.7

According to Table 1, the mean age of the research group was  $15.41\pm0.77$ , the mean height was  $170.33\pm7.72$ , and the mean body weight was  $66.04\pm16.79$ .

Table 2

Comparison of body weight, visual reaction, auditory reaction pretest-posttest results of the participant group.

Variable	n	Test	x	Sd	z	p
<b>Body Weight (kg)</b>	24	Pre-test	66.04	16.8	-4.378	0,001*
	24	Post-Test	62.87	16.3		
<b>Right-hand visual (ms)</b>	24	Pre-test	22.29	2.78	-2.253	0,021*
	24	Post-Test	24.29	3.93		
<b>Right-hand auditory (ms)</b>	24	Pre-test	22.87	3.02	-2.679	0,003*
	24	Post-Test	25,54	4.70		
<b>Left-hand visual (ms)</b>	24	Pre-test	22.91	3.84	-1.701	0,081
	24	Post-Test	24.41	2.51		
<b>Right-hand auditory (ms)</b>	24	Pre-test	23.54	3.10	-3.177	0,001*
	24	Post-Test	26.29	4.40		

p<0,05\*  
ms: millisecond

According to Table 2, a statistically significant result was observed between the body weight pretest and posttest values of the participant group of the study (p<0,05). While a significant result was observed in the right-hand visual, right-hand auditory, and left-hand auditory pre-test and post-test values (p<0,05), no significant difference was found between the left-hand visual values (p>0,05).

## Discussion and Conclusions

In this study, it was investigated how the simple visual and auditory reaction time performances of the athletes were affected after the weight loss of 4% of the body weight of the athletes wrestling U17 category in the province of Malatya.

In the literature, there are studies examining the methods of rapid weight loss in weight athletes. Training with clothes that increase sweating, skipping meals (Xiong et al, 2017), reducing carbohydrate and fat consumption (Yagmur et al, 2019), use of slimming pills, mucilage and diuretic pills (Yarar et al, 2017) and sauna (Çatıkkaş, 2016) are quite common methods. It is known that many weight athletes frequently resort to these methods in order to compete at the weight they want. In the

literature, there is no consensus on some parameters and how rapid weight loss affects the athlete performance. There is only one study examining reaction time, especially in wrestlers (Türkyilmaz, 2019). Therefore, this research, which examines how the visual and auditory simple reaction time performances of the athletes competing in the U17 category are affected after a rapid weight loss of 4% of their body weight, is very important because of its contribution to the literature.

As a result of the findings obtained in the study, a statistically significant result was observed between the pretest and posttest values of the participant group's body weight ( $p < 0,05$ ). When the reaction time findings were examined, a significant result was observed in the right hand visual, right hand auditory, and left-hand auditory pretest posttest values ( $p < 0,05$ ), no significant difference was found between the left-hand visual pretest posttest values ( $p > 0,05$ ) (Table 2).

When the literature was reviewed, in a study on judo players measured the reaction time as three repetitions with 15 seconds rest intervals in athletes with rapid weight loss. It was reported that the group with higher weight loss had a significantly longer reaction time for the third trial (Clarys et al,2010). In another study conducted with 3 different groups examining the effect of weight loss on balance and reaction time in elite wrestlers (experimental group with rapid weight loss (3%), controlled weight loss group (3%) and control group) the post-test reaction time was found to be significantly higher in the experimental group, while no difference was found in the controlled weight loss and control groups (Morales et al, 2018). The two studies above support the findings of our study.

In another study conducted to examine the effect of short-term weight loss on reaction time in elite wrestlers, it was determined that there was no significant difference in visual and auditory reaction time (Türkyilmaz, 2019). Another study on jockeys showed that weight reduction had no effect on reaction time ( Wilson et al., 2014). It is possible to claim that age groups are to blame for this discrepancy.

Considering the studies conducted in different branches and examining different performance parameters, it was stated that sodium and potassium were electrolytes responsible for muscle activation and one of the most important parameters affecting the reaction time performance of the athlete is the muscle activation potential (Türkyilmaz, 2019). In a study, it was determined that there was no change in serum potassium, magnesium and zinc levels of athletes who lost weight quickly in 59 hours (Fogelholm et al., 1993). In another similar study, it was reported that there was no change in plasma sodium, potassium, calcium and magnesium levels of athletes who lost about 5.6% of their body weight in 5 days (Reljic et al., 2013). There are other studies showing that there is no statistically significant difference in serum potassium levels of athletes as a result of rapid weight loss (Filaire et al., 2001; Judelson et al, 2008; Yang et al., 2014). While they reported that rapid weight loss did not affect the anaerobic power performance of the athletes (Martinen et al., 2011), it was reported in

another study that the anaerobic power performance of athletes who lost weight rapidly increased (Yadollahzadeh et al., 2015). On the contrary, another study reported a decrease in the anaerobic power performance of athletes (Almasi et al., 2013). In a study examining some sportive parameters as a result of rapid weight loss between 3% and 7% of body weight in elite wrestling and judokas, it was determined that flexibility performance was not affected by rapid weight loss, but aerobic and anaerobic performance was negatively affected by this situation (Yamak, 2019). There is another study reporting that the endurance performance of athletes who lose weight quickly is adversely affected (Yarar et al., 2016). As a result of rapid weight loss, it was observed that the strength performance of the wrestlers competing in the U17 category was negatively affected (Kılıç, 1998). In another study, it was determined that there was a decrease in the strength performance of the athletes as a result of rapid weight loss (Şahin, 2000). It has been reported that rapid weight loss increases the depression level of athletes and that there is a linear relationship between the amount of weight dropped and the level of depression (Özkan et al., 2013). In another study, it was reported that behaviors such as concentration disorder, irritability and irritability increased in athletes who lost weight rapidly. Negative effects such as muscle cramps and dizziness were also reported (Bradley, 2006; Farhan et al., 2014). Based on the above information, it can be said that acute weight loss may negatively affect sportive performance in many sports branches. In a study examining the effects of rapid weight loss on strength and muscle activation, it was stated that rapid weight loss of 5.6% within 48 hours had negative effects on anaerobic peak power and muscular endurance performance (Aydın, 2018).

According to the results of a study examining only the weight loss profiles of weightlifters, the age at first weight loss was  $14.72 \pm 2.45$  kg, the average weight loss rate in a season was  $2.62 \pm 1.49$ , and the maximum weight loss rate at one time was  $5.33 \pm 2.72$  kg. At the same time, 69% of athletes lost weight in the last 2 weeks before the competition. In addition, the reason for the weight loss was that 33.6% of the body weight was between the two categories, 23% of them were good competitors in their own category (according to the results, it can be interpreted that there is a lot of rapid weight loss and this weight loss process takes place 2 weeks before the competition) (Yarar et al., 2019).

In conclusion, as a result of the weight loss of 4% of the body weight of the athletes wrestling in the U17 category, there was a significant difference between the right hand visual, right hand auditory, left-hand auditory reaction times pretest and posttest values. Although there was a numerical difference in left hand visual reaction time, no statistically significant result was observed.

## **Suggestions**

1. The effect of acute and chronic weight loss on reaction time is comparable.

2. By applying different weight loss protocols, studies can be conducted on which protocol will affect the reaction and performance more in athletes who lose weight quickly.

3. Studies can be conducted on how basic motoric features are affected by rapid weight loss.

4. The relationship between rapid weight loss and other performance parameters can be examined.

5. If the athlete needs to lose weight in order to compete in the pre-competition weight, it can be said that it would be more beneficial for the performance of the athlete to drop to the desired weight throughout the season.

6. It provides a disadvantage because rapid weight loss increases fatigue during the competition process. Avoiding sudden weight loss may be beneficial for athlete performance and health. It is thought that future studies, which will examine the effects of acute weight loss on sportive performance, with larger sample groups, different age groups, different branch athletes and different performance parameters will contribute to the field of sports sciences.

### **Conflict Statement**

The authors do not have a statement of conflict regarding the research.

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