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The Effect of Rapid Dehydration on Some Motor Fitness Factors of Wrestlers

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Abstract

The main purpose of this research was to study the effect of rapid dehydration on some motor fitness of wrestlers. So 30 wrestlers were voluntarily selected and randomly divided into two groups (n=15); active and sauna groups. They participated in some motor fitness factors tests such as; reaction time, 9 × 4 meters test to measure agility and 60 m sprint to measure speed. The results showed acute dehydration in the active group had a significant effect on agility, but did not have a significant effect on speed and reaction time. In the sauna group, the effects of acute dehydration on agility and speed were significant but did not have a significant effect on reaction time.

Keywords: dehydration, fitness, wrestlers

1. Introduction

Dehydration is the rapidest way to lose weight (Almond et al, 2015). Compensation for the negative effects of low hydration in the performance of activities/ sports is a difficult task. The effects of these changes on the performance of athletes include reduced exercise performance, muscle endurance, cardiovascular and pulmonary blood flow, volume of blood loss, blood volume and heat loss caused by heat-related illnesses. The main determinant factor is the increase in temperature (temperature above 30 °C). On the other hand, some studies have shown that the negative effects of hydration in athletes are very low or absent (Convertino et al, 1996). Most wrestlers use sunshades and diuretics for weight loss (with weight gain), along with severe dietary restrictions, and especially liquids, such as jogging with plastic suits for sweating.

When the body has a limit to the disposal of chemical and heavy chemicals substances, imposed total toxic burden increases so much. This bioaccumulation affects our physiological and psychological health and causes severe injuries in the body. Sweating is a known method for the disposal of chemicals and heavy. The amount of sweating that takes place every 30 minutes in the sauna is equivalent to sweat that runs 10 kilometers away, our body sweats to cool (American College of Sports Medicine, 1996). During various sports activities, the athlete gradually become dehydrated, on the one hand, sweeping and disposing of waste which is generally carried out by water as a major solvent. If 1% of the weight of the athlete is reduced due to dehydration, osmotic receptors in the body are stimulated and thirst is achieved in the body. If the amount of water deficit reaches 3%, the athlete's ability decreases and negatively affects the quality of his sports activities. Therefore, it is imperative that athletes have enough information about this and drink enough water before they are thirsty (Aldridge et al., 2017). Today, the key to the success of athletes and coaches is that weight control of athletes is necessary, as is the case with other aspects of preparation for the tournament, and must be done scientifically. Many nutritionists and sports physiologists have shown that rapid weight loss through aqueducts reduces the muscular endurance of wrestlers and results in premature fatigue (Benrdot, 1995). Any disturbance in the direction of neural implants disrupts the transfer of neural impedances from the nervous system to the muscles or muscle responses to the nervous system, which has a clear effect on exercise performance (Both endurance activities and resistance activities). Because any decrease in cell water affects its function (Robbert et al., 2011). Therefore, sports physicians always repeat this statement (drink water before thirst and get it out of the urine as drink excess water). Athletes know that due to body heat loss and sweating during exercise, water is reduced, so the best way to do this is to drink water while exercising (Aldridge et al., 2017).

Daniel et al. (2008) showed that hypo hydration can change the metabolic and hormonal responses in resistance exercises and change the blood circulation environment after exercise. They found that body mass declined. The results showed no significant difference in height jump, but a significant decrease in power (jump score) and body strength (scot scoring from the back was isometric) (Daniel et al., 2008). Bijlani (2011) examined the effects of dehydration and subsequent rehydration on muscle EMG during boredomic contractions, and found that dehydration increases muscle

tiredness and is directly related to changes in EMG (Bijlani, 2011).

Gutiérrez et al. (2013) found that the sauna caused dehydration and led to rapid weight loss in men and in women. This reduction is not quickly compensated through raids. The weight loss program does not affect the strength and ability of male mutations. But in women, there is a significant drop in scoot ability, which was compared with that after surgery. Scott jumps dropped linearly in women, indicating that they were associated with a percentage of body weight loss (Gutiérrez et al., 2013). Almond et al. (2015) examined a variety of hydration conditions on professional rugby players in a study, observing that athletes who underwent continuous activity for 30 minutes and did not exercise hydration, Vo_{2max} and heart rate and Urine concentrations and RPE showed a significant increase compared to the hydration group (Almond et al. 2015).

Ismail et al. (2007) found that passive dehydration reduced the 5.6% reduction in the chest press record and, after 2 hours of rest and recursion, was compensated for this decrease, as well as the effects of active dehydration and found that with a reduction of 4.9% of body weight negatively impact on the ISO and wrestling performance (Ismail et al., 2007). Moghaddami (2015) found that the rapid dehydration has some negative effects of rapid dehydration on motor fitness such as sprint, reaction time and agility. Considering that the readiness indicators for wrestlers play a decisive role in their performance, it is possible to negatively affect readiness of the wrestlers. Therefore, the present study intends to compare the effect of two types of weight loss through acute dehydration on motor readiness. Now the research has decided to study the effect of sauna on some motor fitness of wrestlers.

2. Methods

The method of this research was a semi-experimental design. In this research, the weight loss rate of the wrestlers was 3.5-4.3% of the body weight. The method of implementation, necessary points and necessary recommendations were explained and also dehydration status was standardized through the same diet and fluids. On the day of the pre-test, the subjects ate a standard breakrapid and 500 ml of water and participated in the necessary tests after an hour.

2.1 Statistical Society

The statistical population of this research consisted of 30 wrestlers in Erzurum which were randomly divided into two groups (n=15).

2.2 Statistical Sample and Sampling Methods

The subjects of this study were wrestlers between 17 to 23 years old. Sampling was done from available subjects. In this way, after informing and inviting interested persons and completing the registration process, 20 questionnaires were filled out and they were divided randomly into two groups; active and sauna**.**

2.3 Research Tool

1. Health Questionnaire.
2. 160 kilograms KAMOSHITA scale with a precision of 100 grams made in Japan.
3. JANSON Treadmill made in America.
4. Polar timer device manufactured in Finland.
5. Reaction time machine to measure the response time made in China.

2.4 Research Methodology

After collecting the data in the pre-test, the subjects were randomly divided into two groups, active and sauna. The next day at 4:00 PM, group two sat in the sauna and 3 times in 20 minutes in sauna and 5 minutes off between every 20 minutes and in this way they lowered their weight. The weight of the subjects was recorded at any time of rest. After lowering 4.5-4.3% of their body weight and getting the required weight, the subjects participated in the posttest 1 and next day participated in the post- test 2. In group 1, we used the Singh and Sirisingheh method (2007) to lower the weight. The subjects started running on a treadmill with 65% VO_2max for 90 minutes. The maximum oxygen consumed by athletes was calculated by Balk test.

After lowering 3-4% of their body weight, they participated in the posttest 1 and participated in the post-test 2 simultaneously with the sauna group. The time interval between lowering the body weight and performing the second test is according to the rules of the wrestling (Klavora, 2008).

Tests performed by the two groups in them and in three stages of pretest and posttest 1 and post-test 2 included:

1. Reaction time to measure response time
2. 9x4 meter test for agility measurement
3. Test 60 meters speed for speed measurement.

3. Results

Table 1. Physical characteristics and motor fitness variables

Variables	Age (yrs)	Weight (Kg)	Height (cm)	Reaction time (S)	9 x 4 meters (S)	60 meters (S)
Mean	19.68	68.53	173.843	0.434	9.244	7.84
St. dev.	1.97	8.53	7.152	0.068	0.868	0.64

Table 2. The results of K-S test regarding variables measured in pre-test and post-test 1

Variable	Active group		Sauna group	
	Pre-test	Post-test 1	Pre-test	Post-test 1
Reaction time (S)	0.935	0.966	0.309	0.273
Agility (s)	0.767	0.987	0.917	0.985
Speed (S)	0.882	0.273	0.007*	0.931*

After the posttest 1, subjects participated in posttest 2 hours after the dehydration. The active group and sauna participated in this test. The data collected from this test with the results of pre-test and post-test data were analyzed by k-s test. It was found that the distribution of all variables measured is normal. The results are presented in the table below.

Table 3. The results of K-S test for variables measured in pre-test and post-test 2

Variable	Active group		Sauna group	
	Pre-test Sig	Post-test 2	Pre-test Sig	Post-test 2
Reaction time (S)	0.935	0.656	0.309	0.130
Agility (s)	0.767	0.111	0.917	0.992
Speed (S)	0.882	0.032	0.900	1.000

Then, to determine the extent of changes between the two active groups and the sauna, the difference between the pretest and the post-test 1 (dif 1-2) and also the post-test 2 with the post-test 3 (dif2-3) were calculated, and these differences showed that the difference in the rate and at what stage. Then, their distribution was examined by k-s test. The results are presented in the table below.

Table 4. Results of K-S test related to difference between pretest and post-test 1 and difference between post-test 1 and post-test 2

Variable	Active group		Sauna group	
	Pre-test 1-2	Post-test 2-3	Pre-test 1-2	Post-test 2-3
Reaction time (S)	0.922	0.793	0.392	0.371
Agility (s)	0.639	0.170*	0.772	0.856
Speed (S)	0.512	0.62	0.912*	0.985

Average and standard deviation of data collected in Pre-test, post-test 1 and post-test 2 in both active and sauna groups, are listed in Table 6, and 7.

Table 5. Mean and standard deviation of measured variables in the pre-test

Variable	Active group		Sauna group	
	M	Std. dev.	M	Std. dev.
Reaction time (S)	0.467	0.0812	0.4016	0.0278
Agility (s)	9.129	0.8593	9.359	0.9073
Speed (S)	7.906	0.7544	7.7826	0.5546

Table 6. Mean and standard deviation of measured variables in post-test 1

Variable	Active group		Sauna group	
	M	Std. dev.	M	Std. dev.
Reaction time (S)	0.479	0.0790	0.4143	0.0253
Agility (s)	9.6943	1.045	9.621	1.1035
Speed (S)	8.3366	0.2828	8.2693	0.2760

Table 7. Mean and standard deviation of measured variables in post test 2

Variable	Active group		Sauna group	
	M	Std. dev.	M	Std. dev.
Reaction time (S)	0.478	0.06256	0.4113	0.0265
Agility (s)	9.4806	0.8560	9.3543	0.8560
Speed (S)	8.131	0.4487	8.203	0.4487

Table 8. Effect of dehydration on variables in active group

Test	Variable	M	M Er	Sig.
Reaction time	Pre-test	0.467	0.479	0.478
	Post- test 1	-0.012	0.012	0.011
	Post-test 2	0.796	0.796	0.988
Agility	Pre-test	9.1213	0.565	0.000*
	Post- test 1	9.6943	-0.565	0.000*
	Post-test 2	9.4806	0.639	1.000
Speed	Pre-test	7.9060	0.733	0.721
	Post- test 1	8.3366	-0.733	0.721
	Post-test 2	8.131	-7.967	0.919

As the result of table 8 shows, agility is significantly different in pre and posttest 1 and posttest 2. The results shows reaction time and speed results are not significantly different in pre and posttest 1 and posttest 2.

Table 9. Effect of dehydration on variables in sauna group

Test	Variable	M	M Er	Sig.
Reaction time	Pre-test	0.4016	0.013	0.471
	Post- test 1	0.4143	0.013	0.471
	Post-test 2	0.4113	0.010	0.521
Agility	Pre-test	9.359	-0.262	0.032
	Post- test 1	9.621	0.262	0.032
	Post-test 2	9.354	-0.005	1.000
Speed	Pre-test	7.7826	1.713	1.000
	Post- test 1	8.2693	-1.713	1.000
	Post-test 2	8.3022	-1.781	1.000

As the result of table 9 shows agility results are significantly different in pre and posttest 1 and posttest 2 among subjects. The results shows reaction time and speed are not significantly different in pre and posttest 1 and posttest 2 among subjects.

4. Discussion and Conclusion

Due to the rapid reduction of body weight in different sports, various injuries are brought to the athlete's performance. Some motor fitness variables were investigated in this study. In the active group, acute dehydration had a significant effect on wrestlers' ability in both post-test 1 and post-test 2, but in the sauna group in post-test 1, this change was not significant. In post- test 2, this change was significant. This research finding is consistent with the results of other researches.

Robbert et al., (2011) assumed that hypo-hydration directly affects the nervous system and then affects the relationship between the nervous system and the muscular system. Any disturbances in conduction of neural impedances disrupt the transfer of neural impulses from the nervous system to the muscles or muscle responses to the nervous system, which has obvious effects on exercise performance (both endurance activities and resistance activities). Because any decrease in cell water affects its function (Robbert et al., 2011).

Gutiérrez et al. (2013) found that the sauna causes dehydration and causes rapid weight loss in men and in women. This reduction is not quickly compensated through raids. The weight loss program does not affect the strength and ability of male mutations. But in women, there is a significant drop in the ability to scoop up, which was compared with that of rehydration. Scott jumps dropped linearly in women, indicating that they were associated with a percentage of body weight loss.

The other finding of this study showed acute dehydration in the active group and in the sauna group did not have a significant effect on reaction time. Acute dehydration in the active group increased the mean reaction time in both posttest 1 and post- test 2 compared to pretest, but this increase was not statistically significant. Also, in the sauna room, the reaction time in post- test 1 and post-test 2 increased significantly compared to pretest, but this increase was not statistically significant.

The findings of this study were not consistent with some of the other results of the research and agreed with some. Takeshi et al (2017) said that dehydration had no meaningful effect in the simple response and processing speed of information. They said that secretion of some hormones would make dehydration more effective than simple reaction time. In this study, the secretion of arginine hormone (antidiabetic hormone) improved the psycho-nervous function and neutralized the effect of dehydration. Recent findings on conscious motor function show that reaction time is not affected by mild dehydration (6.2% of body weight) (Takeshi et al., 2017).

Another finding of this study was that acute dehydration in the active group and in the post-test phase 1 had a significant effect on agility, but in posttest 2 this did not materialize. It should be noted that in this study, acute depression in the agility of the sauna room had a significant effect on post-test, but in post-test 2, this significant difference was eliminated. The findings of this study are consistent with other research.

Another result in this study showed dehydration did not significantly affect the speed of the active group and the sauna group. The result of this research is not consistent with other research. A direct investigation of the various hydrostatic conditions has been conducted on the athlete's speed. The results of most research studies show that dehydration has an impact on aerobic endurance and maximum oxygen consumption of athletes, but is directly relevant to the direct effect of hypochondria on the speed of contradictory results.

Meanwhile, it has been reported that dehydration causes the time to decide when a penalty is increased. This would increase the error in the operation. If fatigue is accompanied by dehydration, the control of the motor units that are used at the speed of action will be weakened (Takeshi et al. 2017).

The results indicate that dehydration reduces muscle flow during exercise and reduces the transport of glucose in the blood, resulting in accumulation of lactate in prolonged exercise and early fatigue. But Szinnai et al. (2015) found that the reduction in blood flow that occurs in the body due to dehydration does not affect the transfer of glucose and free fats and the elimination of lactic acid during long-term, medium-intensity activity. But during dehydration, dehydration oxidizes carbohydrates and increases lactic acid production (Szinnai et al., 2015). Burke et al (2010) found athletes in the warm air dropped by 3% of body weight from dehydration in warm air athletes. In this study, the cause of this decline was the depletion of intracellular fluid and local muscle tiredness (Burke et al., 2010). It is suggested athletes do not use rapid loss weight at all. They try to do this in a long time period. For future studies, hormones and electrolytes changes would be studied.

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