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October, 2015

Assoc. Prof. Dr. Metin YAMAN
Editor in Chief

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Effects Of Self Selected Dehydration And Meaningful Rehydration On Hematologic And Urinary Profiles Of Elite Wrestlers

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Abstract: The purpose of this study was to find out if the body electrolytes, some blood parameters of the wrestlers recover after 12 hours. A one-way analysis of variance (ANOVA) for repeated measures was applied to detect differences. Both hematocrit (p=0.005) and hemoglobin (p=0.000) concentration increased from the baseline to the RWL (rapid weight loss) and returned baseline levels after 12 hours of recovery (p=0.729 for hematocrit; p=0.386 for hemoglobin). The RWL caused an increase in urea concentration (p= 000); however, it returned to the baseline levels after recovery period (p= 0.268). Glucose values were not changed significantly between time points even there was a little decrease after the RWL. The concentration of sodium in the blood plasma of the subjects decreased significantly (0.000, $p < 0.05$) as a result of the RWL and elevated after recovery period (0.012, $p < 0.05$). The concentration of calcium increased significantly (p=0. 015) after RWL but it was returned to baseline levels after recovery period (p=0.53). However, most of the negative effects of rapid weight loss disappear after 12 hours of recover period.
Key Words: rapid weight loss, recovery, dehydration, blood parameters

INTRODUCTION

It was reported that the severe contest stage lead wrestlers to often lessen mass or ‘‘cut weight’’. The main objective of faster weight loss is to achieve advantages of strength and power over the opponents who do not lower weight in the same weight class (Anderson, 2005; Barfield, 2002; Armstrong, 2006). Rapid mass loss usually is performed in a week and usually entails dehydration (Yankanich, 1996)). Characteristically, wrestlers try to drop weight rapidly through arrangement of vigorous exercise, fluid intake restriction and sweating during the days that go before a planned contest (Oppliger et al, 1996, Martinen, 2011). Although several organizations recommended not tolose body weight rapidly (including the American College of Sports Medicine), many wrestlers quickly lose body mass in the 24 to 48 hours prior to competition because of tradition (NCAA). Sansone and Sawyer (2005) reported that this practice has even reached children’s sports.

The adverse effects of dehydration on endurance have been extensively established (Sawka, 2006]. It is suggested that a reduction of over 2% of body weight has a harmful effect on physical performance in various aerobic sports activities (Sawka, 2006; Baker, 2007; Dougherty, 2006; Cheuvront, 2014); yet, the impact of dehydration on short-term high-intensity activities are not as much of clear. Previous studies indicated that wrestlers might also experience loss in power (Finn, 2004; Fogelhom, 199; Hicner, 1991; Horshill, 1993; Rankin, 1996; Webster, 1990), and competitive performance (Alhman 1961; Hall, 2001; Obligher, 1996) due to rapid weight loss. Also, American College of Sports Medicine (2010) reported that dehydration may not change the muscle strength, but it may negatively impact the anaerobic performance and cognitive function because of rapid mass loss while numerous contradictory reports exist (Alhman, 1961; Hall, 2001;Ransone, 2004).

It was suggested that the procedures used by athletes for causing rapid weight loss (RWL) may produce dehydration, an augmented load on the cardiovascular system, harm of the thermo-regulatory system, depletion of glycogen stores, hypoglycemia and failure of body protein, electrolytes and vitamins (Horswill, 1992; Oppliger et al., 1996). Decreased total body water and plasma volume result in a lessening in sweating rate and skin blood flow that can rise in core temperature. Sweating also reduces the blood volume in turn, causes a decline of the stroke volume (SV). Consequential to the decrease in SV, heart rate (HR) increases to maintain the cardiac output in order to meet the demands of exercise (Virtual Exercise Physiology Laboratory, 2004). Sweat contains sodium, potassium, and chloride, and sweat loss through dehydration may also lead to a considerable loss of electrolytes that may hinder muscular contractions and thus strength and power output (ACSM, 2006).

Wrestlers expect to restore body fluids, electrolytes, and glycogen in a somewhat short cycle of time following weight loss; (12 to 18) hours) however, these may take longer time. (American College of Sports Medicine, 2010). Calcium and sodium plays a role in nerve impulse transmission and muscle contraction. Deficiency or abundance of these electrolytes may cause athletic performance decrements (Hawkins, 2006; Kenney, 2004). In wrestling, there are usually 12-18 hours of time period between the weight in and the first match of the tournament. Conversely, most of the studies used a 5-hour or less for recovery time prior to performance testings (Finn, 2004; Fogelhom, 199; Hicner, 1991; Horshill, 1993; Rankin, 1996; Webster, 1990), Alhman 1961; Hall, 2001; Obligher, 1996). Also, as most investigations failed to gather data immediately prior to competition; thus, a great deal investigation on this issue suffers from the deficiency of generalizability. In light of these evidences and challenges to make generalizations on these matters, this study aimed to find out if the body electrolytes, some blood parameters, and heart rates of the wrestlers recover after 12 hours.

METHODS

Subjects

Twelve elite wrestlers were participated in the study, and the local ‘’Ethics Committee’’ accepted the procedure of study. At the beginning of the study, their mean (± SD) age, body mass and height were 22.45 ± 2.36 years, 73.86 ± 7.68 kg and 175 ± 3.48 cm, respectively. Their involvement in wrestling was 8.5 ± 3.5 years

Study protocol

A sample of 5mL blood was taken from the right vein right at baseline and after the RWL and 12 hours of recovery. After taking the blood, it was instantly frozen for later analysis. A VITROS’ s DT60 II dry slide clinical chemistry system (Ortho-Clinical Diagnostics, Amersham, UK) was used to determine serum Sodium, calcium, hematocrit, and hemoglobin concentrations. The urine samples of the subjects were taken from the subjects at baseline, after the RWL and 12 hours of recovery periods to analyze the urea and glucose values.

Statistical analysis

Statistical analysis of the findings was evaluated by a computer program (SPSS 22.0 package). All data are expressed in mean (Mean ± SD). The distribution pattern of the data was tested using Shapiro-Wilk test. A one-way analysis of variance (ANOVA) for repeated measures was applied to detect differences between values measured before, after the RWL and 12 hours of recovery. Statistical significance was set at $p < 0.05$. ANOVA assumptions, all physiological data were normally distributed, except glucose values displayed some skewness. The rest of the values were normally distributed. Many authors, however, consider ANOVA robust to minor violations of the assumptions (Vincent, 2004). Assumptions of sphericity were assessed using the Mauchly's test of sphericity, with any violations adjusted by use of the Greenhouse- Geisser correction.

RESULTS

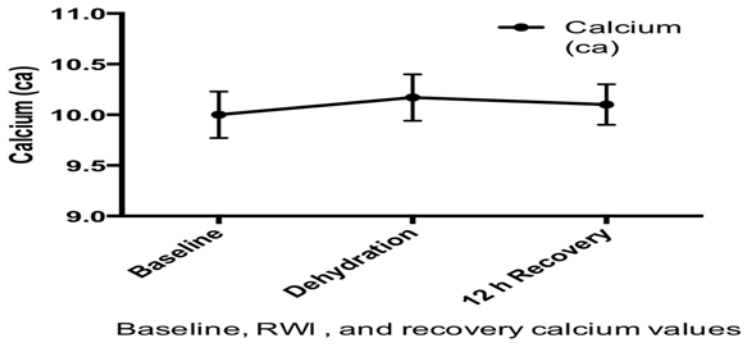
The subjects lost body mass by 3.89 ± 1.01%. The subjects stated that body mass loss was completed by a ongoing reduction of food and fluid intake. The subjects performed their regular exercise through weight loss period.

The hematocrit values of the wrestlers differed significantly between time points ($F (1.818, 18.182) = 18.012$, $P < 0.001$). Both hematocrit ($p=0.005$) and hemoglobin ($p=0.000$) concentration increased from the baseline to the RWL (Table 1, Figure 1) and returned baseline levels after 12 hours of recovery ($p=0.729$ for hematocrit; $p=0.386$ for hemoglobin). A significant raise was experienced in hemoglobin concentration ($p = 0.0008$) and hematocrit ($p = 0.0008$) after RWL (Table 1, Figure 1). Urea values were also changed significantly between time points ($F (1.144, 11.435) = 135.189$, $P =0.000$). The RWL caused an increase in urea concentration ($p= 000$); however, it returned to the baseline levels after recovery period ($p= 0.268$). Glucose values were not changed significantly between time points even there was a little decrease after the RWL ($F (1.019, 10.191) = 2.083$, $P =0.179$). There was no influence of body mass status on the concentration of glucose in the blood plasma of the subjects (Table 1, Figure 1).

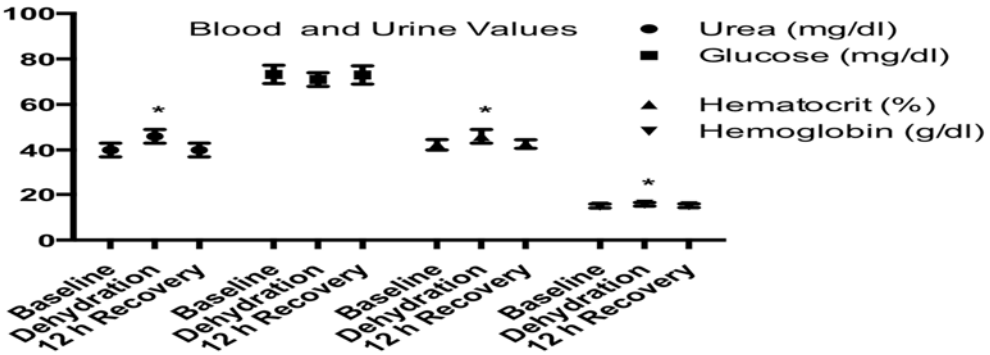
Table 1. Some biochemical and electrolytes values before, after weight loss and 12 hours after recovery

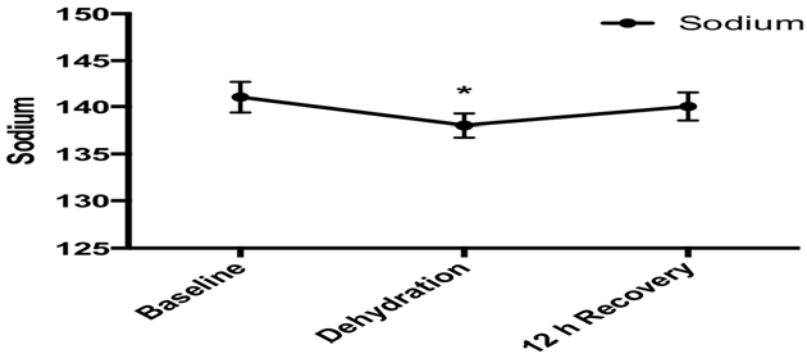
Variable	Baseline (Mean ± SD)	Dehydration (Mean ± SD)	Recovery (12 h) (Mean ± SD)
Calcium (Ca)	9.97 ± .23	10.15 ± .23	10.1 ± .20
Sodium (Na)	141.09 ± 1.64	138.72 ± 1.27	140.63 ± 1.50
Urea (mg/dl)	39.85 ± 2.90	46.62 ± 2.98	40.24 ± 2.98
Glucose (mg/dl)	73.36 ± 3.99	71.56 ± 3.19	73.07 ± 4.06
Hematocrit (%)	42.3 ± 2.27	45.97 ± 2.99	42.63 ± 1.85
Hemoglobin (g/dl)	14.92 ± .88	15.72 ± .79	15.06 ± .83

Figure 1. Some biochemical and electrolytes values before, after weight loss and 12 hours after recovery



Baseline, RWl , and recovery calcium values





* Rapid weight loss caused significant reduction in sodium values.

The concentration of sodium in the blood plasma of the subjects decreased significantly (0.000, $p < 0.05$) as a result of the RWL (Table 1, Figure 1) and elevated after recovery period (0.012, $p < 0.05$). The concentration of calcium increased significantly (p=0. 015) after RWL but it was returned to baseline levels after recovery period (p=0.53).

DISCUSSION

It was stated that, in wrestling, highly anaerobic power and moderate aerobic power is used (Sawka et al, 2006) and weight loss of more than two pounds per week must engage either dehydration or this kind of mass loss that is most harmful to the body (Oppliger, 1996). Many studies used inadequate recovery time prior to making any performance testing since wrestling competitions start at least 12 hours after weigh in. This study is particularly unique for final testing's were performed after 12 hours of recovery period, and they included assessments of the subject's biochemical parameters after the RWL and recovery period.

In the present study, the raise in the concentration of urea in plasma accompanied by the RWL confirms findings of other studies (Timpmann, et al., 2008; Ööpik et al., 2002; Horswill et al. (1990b). According to present study, there was significant difference between urea concentrations measured before and after the RWL. Ööpik et al (2002) examined the impact of RWL elite wrestlers. RWL was 5.1-5.8% in 3 days. Even after a 16.5-hrs recovery time of rehydration and food allawance time subsequent weight loss, urea concentration did not go back to the starting level. In line with this finding, in the current study, urea values did not return baseline values even after 12 hours of recovery period. It was speculated that amplification in plasma urea concentration may be caused by alterations in renal function and/or by an augmented rate of tissue protein degradation (Timpmann, et al., 2008). Yet, more study is considered necessary to make clear judgments about this issue. Existing study findings indicated that blood glucose responses were not affected by the RWL even there was slight increase after the RWL and this finding was supported by Timpmann et al. study (2008).

In the present study, both hematocrit and hemoglobin concentrations increased from the baseline to the RWL (Table 2, Figure 2) and returned baseline levels after 12 hours of recovery. Similar results were confirmed by several studies. The outcome of weight cycling on blood chemistry was studied on eighteen elite wrestlers prior to and subsequent to two to three weeks weight lessening program (Karilla et al, 2004). Dehydration because of RWL (8%) augmented blood hemoglobin, hematocrit values. Similar increases were found in other studies (Mnatzakanian et al., 1984; Timpmann et al., 2008). Also, another study revealed that there were no significant changes in blood hemoglobin and hematocrit concentration after weight loss; however, average body weight loss in subjects was 2.3 % of body mass (Aghai et al., 2011).

It was confirmed that electrolytes creates an electrical gradient across cell membrane that is essential for muscle contraction and nerve transmission; control the acidity (pH) of the blood and the level of oxygen in the blood. Dehydration is a most important basis of electrolyte imbalance. It happens on every occasion water is lost from the body and not replaced enough and rapidly. Calcium and sodium are very important electrolytes that are essential for muscle contraction and nerve transmission (Hawkins, 2006). The current study revealed that RWL caused significant reduction in sodium levels and stayed decreased even after recovery confirming the current knowledge that the subjects largely rehydrate in 12 hours, it takes 24 - 48 hours for full rehydration (Hawkins, 2006). Other studies found out that serum sodium levels were decreased after 4 percent dehydration (Mnatzakanian, et al., 1984) and after 2 days of weight loss (Zambraskie, 1976) that suggesting that the wrestlers were dehydrated prior to competition. Also, calcium concentrations were increased after RWL in the current trial. It was reported if there is less fluid in blood, calcium concentrations rise (Askmayoclinic, 2013).

CONCLUSION

In conclusion, the RWL achieved restriction of energy and fluid intake, induces an increase in blood urea, hematocrit, hemoglobin concentration, and decrease sodium concentrations in experienced wrestlers. Moreover, weight loss via dehydration has negative effects on cardiovascular stability. However, most of the negative effects of rapid weight loss disappear after 12 hours of recover period.

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Examination On The Assertiveness Levels Of Female Futsal Players

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Abstract: Assertiveness is a form of interpersonal relations that individuals develop as a way of expressing their feeling and thoughts clearly and defending their rights by respecting others and recognizing their rights.

In our study, it is aimed to "Examine the Assertiveness Levels of Female Futsal Players". Our study was conducted on total 54 volunteer female futsal players from 4 different teams at the College League Female Futsal Group F. In this study, it was used a personal information form to gather participants' demographical information and 30-item "Rathus Assertiveness Schedule" created by Rathus (1977) and adapted to Turkish by Voltan (1980) to determine their assertiveness levels.

In analyzing the acquired data, it was determined that female futsal players' general average of assertiveness level wass above medium assertiveness level. When examined in terms of the personal differences, it was observed a statistically significant difference between the ages of 18-21 and 24-and over ($p<0.05$). As analyzed in terms of their college year and playing at a different club apart from the college club variables, it was not observed any statistically significant difference.

Key Words: Athlete, Assertiveness, College Futsal League, Futsal

1. INTRODUCTION

As it is observed in various communities, there are individuals whose communication skills are insufficient in Turkish society. Some people are extremely non-assertive while the other part is excessively aggressive. Between non-assertiveness and aggression features, it is seen assertiveness that reflects healthy communication. Assertiveness characteristics is described as a form of interpersonal relations that individuals develop as a way of defending their rights by not belittling others and denying their rights *(Voltan, 1990).*

There is an answer that includes relation initiator attitudes like asking for information and introducing oneself and also responding to others' behaviors. Assertiveness is a skill, not a trait an individual has or is deprived of. Assertiveness comprises two different types of respect. Self-respect is one's determining her/his own needs and defending her/his rights. Respect for others is individual's respecting other people's needs and rights *(Osipow and Reed, 1985).*

Assertiveness, generally, is a way of communicating clearly, directly and honestly within a proper frame. Owing to the roles an individual undertakes in strengthening her/his social position and enabling to be more influential on others, behaving assertively is one of social communication skills that increase an individual's self-confidence, help her/him arouse respect on other people, raise the chance to build honest

relationships, give the feeling that s/he has the control of everyday events and has importance in balancing the interpersonal communication flow *(Gorus, 1999, Ker Dincer, 2005).*

A human being is complete with her/his physiology, emotions and the society s/he lives in. In order to an individual displays behaviors which can be characterized as healthy both psychologically and socially, it is required some prerequisites in interpersonal communication and interaction. It can be mentioned individuals enact three basic behaviors while expressing their emotions and opinions. If these behaviors are discussed in a line, they can be placed on that line in that way: non-assertiveness in one end, aggression in the other end and assertiveness in the middle *(Inceoglu and Aytar, 1987).*

Assertiveness is defined in several different ways in literature. Despite all these definitions, it is seen that the term assertiveness is difficult to define. In this respect Alberti and Emmons stated that the major problem in assesing assertiveness is that it is a difficult term to define. We cannot say "that's assertiveness" by focusing on any personal trait belonging to an individual. That complex fact varies depending on both related person and the situations they are in *(Alberti and Emmons, 2002).*

Sports gives young people the power to cope with problems they may encounter during transition to the adulthood with mutual trials and in competition as it provides growth in short time *(Suveren, 1995).* In several studies, it has been set forth that getting involved in sports activities enables individuals to improve the psychological and personality structure, strengthen will, facilitate group work, provide opportunity for interdependency, build self-confidence, control self, learn to respect for others and it plays an active role in individuals' being assertive. In this context, sportive activities can be regarded to have an influence in the assertiveness level of individuals *(Buyukyazi et al., 2003).*

In studies, it has been found out that individuals doing physical exercises are more lively, extrovert, hardworking, patient, ready to establish social relationship, emotionally balanced than the ones who do not do exercises. In addition, the former accommodates to new situations in an easier way *(Tiryaki et. al, 1991).*

The history of futsal (indoor football) goes back to the year 1930 and Uruguay Montevideo. Juan Carlos Cariani who was a football coach in those years adapted a five-person version of football for the young people in YMCA organizations. The matches were held in outdoor and indoor areas of which size were the same as basketball courts'. The name Futsal is an international term used for the aforementioned play. Its origin comes from the term 'Futbol' or 'Futebol' in Spanish or Portuguese and 'Salon' or 'Sala' in French or Spanish. The play adapted by Cariani made progress particularly in Brazil. We can clearly see the talents who improved with Futsal in the stars from Brazilian Football. It is known that the key Brazilian stars such as Pele, Zico, Socrates, Bebeto improved their talents through futsal. Futsal have made progress under FIFA all over the world *(www.tr.wikipedia.org/wiki/Futsal).*

In our country, the first professional formation for futsal sport that was played amateurishly was actualized via the establishment of Turkey Futsal National Team in 2005. In March 2, 2009, 'Efes Pilsen Futsal League' was formed with the first official matches; thus, the professional futsal period began in the level of clubs in Turkey *(Caglayan and Mehtap, 2010).*

In the light of this information, that study conducted in order to research and determine the assertiveness levels of female athletes who represent their colleges in futsal branch.

2. MATERIAL AND METHOD

The influence of athletes' assertiveness levels in individual success and team success has been frequently studied and proved at scientific literature. Depending on that, our study has importance in terms of the influence of athletes' assertiveness levels.

Research Group

While our research population comprises the College League Female Futsal Teams in 2014-2015 seasons, our sample includes 54 volunteer female futsal players from Firat University, Sutcu Imam University, Mardin Artuklu University and Bitlis Eren University that are in Group F in the College League

Data Acquisition Tools

In data acquisition, it was used a personal information form to gather participants' demographical information and Rathus Assertiveness Schedule (Rathus, 1973) to determine their assertiveness levels *(Rathus, 1973).* That schedule was adapted to Turkish language by Voltan (1980) *(Voltan, 1980).*

In Rathus Assertiveness Schedule (RAS), each item is graded between +1 and +6 as stated in the instructions and there is no zero point. When an individual's assertiveness level is estimated, it is taken the reciprocal of given points for 17 items (1th,2nd,4th,5th,9th,11th,12th,13th,14 th.,15th,16th,17th,19th,23rd,24th, 26th,30th items) (or the given points of each item is subtracted from 7 and the obtained point is accepted as assertiveness point for the item). The points of other 13 items (3rd,6th,7th,8th.10th,18th,20th,21st,22nd,25th,27th,28th and 29th items) are added to the aforementioned points; thus, the assertiveness point of the participant is acquired. The end that goes to non-assertiveness reaches +30 and the end that goes to assertiveness reaches +180. Therefore, the assertiveness point one participant can get from RAS change between 30 and 180 points *(Ari, 1989, Sanders, 2008).*

Analysis of Data

In the study, the acquired data was computerized and analyzed via SPSS 22. With that program, the frequency distribution, arithmetic mean, t test and One -Way Anova was calculated; and in terms of the results with statistically significant differences, the results of Tuket test was used to determine between which groups the differences occurred. The margin of error was analyzed in level of $p<0.05$.

3. FINDINGS

In that section, the findings regarding the variables of our study is presented. The findings that show the distribution of participant female futsal players pursuant to their personal information (their age, grade and if they play at a club different from the college) were analyzed.

Table 1. Statistical Distribution Values of Female Futsal Players' Assertiveness Levels In Terms of Age Variable

	Age	**N**	$\overline{X}$	**Sd**	**F**	**p**
Assertiveness	18-20 years*	28	121.67	9.63	3.35	0.04*
	21-23 years	17	118.94	11.29		
	24 years and over*	9	110.55	15.24		
	Total	54	118.96	11.69		

When the values in Table 1 were examined and the points of female futsal players' assertiveness levels with regard to age variable were compared, it was observed a statistically significant difference between the ages of 18-21 and 24-and over ($p<0.05$).

Table 2. Statistical Distribution Values of Female Futsal Players' Assertiveness Levels In Terms of College Year Variable

	Year of College	**N**	$\overline{X}$	**Sd**	**F**	**p**
Assertiveness	1st Year	21	120.00	12.27	0.08	0.96
	2nd Year	17	118.41	12.86		
	3th Year	10	118.3011	12.32		
	4th Year Total	6	8.00	6.03		
		54	118.96	11.69		

When the values in Table 2 were examined and the points of female futsal players' assertiveness levels with regard to college year variable were compared, any statistically significant difference was not observed between participants ($p<0.05$).

Table 3. Statistical Distribution Values of Female Futsal Players' Assertiveness Levels In Terms of Their Preference to Play at a Club Different from the College Club

	Do They Play at a Different Club	**N**	$\overline{X}$	**Sd**	**t**	**p**
Assertiveness	Yes	21	119.76	11.70	0.39	0.69
	No	33	118.45	11.84		

When the values in Table 3 were examined and the points of female futsal players' assertiveness levels with regard to their preference to play at a club different from the College Club were compared, any statistical difference that could be accepted as significant was not observed between participants ($p<0.05$).

4. DISCUSSION AND CONCLUSION

In this section, the findings regarding whether the assertiveness levels of our research sample, 54 female futsal players from Firat University, Sutcu Imam University, Mardin Artuklu University and Bitlis Eren University that are in Group F in the College League, have been changed with regard to certain variables are discussed and interpreted.

When the findings regarding if the female futsal players have been changed in terms of their personal characteristics were examined:

As the assertiveness levels of the participants in terms of the age variable were analyzed, it was observed a statistically significant difference between the ages of 18-21 and 24-and over ($p<0.05$, *Table 1*). Furthermore, as they age, the assertiveness level decreases. It was concluded that the younger ones had much higher assertiveness level. Contrary to our study, when other studies examined, in "Examination on the Self-Esteem and Assertiveness Levels of Undergraduates Who Do and Do not Do Physical Exercises", a study by Alptug Esen (2012), it was not observed a statistically significant difference on the self-esteem and assertiveness levels of the participants with regard to the results of age variable *(Alptug Esen, 2012).* Buyukyazi et. al (2003), compared the assertiveness levels of sedentary and veteran athletes over the age of 40 considering various variables and found out the age variable did not have a significant effect on the assertiveness levels *(Buyukyazi et. al, 2003).*

When the assertiveness levels of the female futsal players in terms of their year of college were analyzed, it was not observed any differences ($p>0.05$, *Table 2).* However, it was inferred the assertiveness level decreased as the year of college increased. It was identified the freshmen had higher assertiveness levels. As other studies supporting the results of our study was examined, Kucukkaragoz et. al (2013) also found out year of college variable did not create a statistically significant difference on assertiveness in their study that analyses the assertiveness levels and communication skills of preservice teachers *(Kucukkaragoz et. al, 2013.* According to the results of the study which examined the assertiveness and anxiety levels of volleyball players and was conducted by Gacar et. al (2013), it was not observed any statistically significant difference in comparison of the points regarding assertiveness and anxiety levels given according to college year variable *(Gacar et. al, 2013).*

As the assertiveness levels of the female futsal players with reference to the variable of playing at a club different from the college club were examined, any statistically significant difference was not observed ($p>0.05$, *Table 3).* However, it was concluded the assertiveness level point average of the futsal players who played at a different club was higher. It is thought that difference arises from these athletes' working in a more disciplined way and cooperatively with more experience.

Based on the findings acquired at the end of the study, it was seen personal characteristics affected the assertiveness levels of the athletes. It was inferred the younger athletes, freshmen and the ones who play at a different club than the college club had much higher assertiveness levels.

Our study will form a literature for future studies and give a new point of view to the researchers and implementers in assertiveness argument.

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Protein Intake and Resistance Training

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Abstract: This paper aimed to review the interaction between protein and exercise. It was explored that supplementation of protein, either itself or in mixture of carbohydrate with resistance work out, seems to notably increase muscle protein synthesis. In addition, supplementation of protein cause in superior augmentation in strength and a fat-free mass.

Key words: carbohydrate, protein, and strength

INTRODUCTION

Nutritional intake is essential for improving athletic accomplishment. Also, optimizing adaptations to exercise is a vital issue in success of athletes and sports nutrition is one of the major factors optimizing such adaptations. Protein supplementation is considered to be vital for athletes, and they tend to have more protein in their diets.. The superior protein necessity is linked to the improved protein synthesis essential to aid remodel and restore progression of skeletal muscle fibers damaged during a resistance training (Tipton et al., 2001; Tipton et al., 2006; Brian & Loy; 2008). This process is believed to be important factor for improving both muscle size and strength. Particularly with resistance athletes such as bodybuilders, weightlifter, and sprint runners, it is widespread to consume diets that have higher than recommended levels of dietary protein. Furthermore, such athletes were affected by many advertisements of a variety of supplements that contain very high in protein. Thus, this review intended to explore role of protein on athletic performance.

LITERATURE REVIEW

In order to find out training adaptations to athletic training, many studies investigated the effects of supplementing protein alone or combination with carbohydrate on athletic performance. To investigate possible association, in Tipton et al., study (2007) athletes essential amino acids after a resistance training either immediately prior to, or instantaneously (Tipton et al., 2001). It was found that protein synthesis was better when

the protein was supplemented prior to workout. The authors thought that this might be because augmented when tissue blood flow levels were considerably improved; thus, possibly caused to an amplified in protein synthesis (Tipton et al., 2001). Similar investigation by the same authors explored protein metabolism subsequent the supplementation of protein immediately prior to and immediately subsequent to single work out [Tipton et al., 2007]. They found no differences between the before and after the supplementation (Tipton et al., 2007). Results of these experiments propose that supplementation of amino acids and protein prior to workout can optimally excite protein synthesis following the exercise session (Tipton et al., 2001; Tipton et al., 2007). It was concluded that protein intakes above recommended levels were not effective for improving strength modification in collegiate subjects that need strength and power. Also, it was determined that high protein intakes with resistance training did not alter resting hormonal concentrations (Jay et al., 2006). The different results amongst studies may be because of different methodologies applied in the studies such as different exercise and subject characteristics.

The utilization of pre-exercise protein supplementation in preventing acute and concurrent resistance exercise-induced muscle damage have been investigated in several studies (White et al., 2007;Willoughby et al., 2007; Kraemer et al., 2007; Candow et al., 20060. White et al., (2007) assessed 27 subjects who were supplemented either a placebo or a carbohydrate + protein solution which include 75 g carbohydrate and 23 g protein 15 min prior to, or 15 min subsequent to finishing tiring eccentric contractions. It was found that force production is lowered and the level of creatine kinase had greater than before; however, no differences were found between pre and post supplementation times of markers of muscle damage (White et al., 2007). Another prominent study investigated the subjects carried out heavy resistance work out for 10 weeks (Willoughby et al., 2007). The subjects were supplemented either 20 g protein, or 20 g carbohydrate prior to and subsequent to each training. The subjects supplemented the protein ingestion had better improvement in body mass, lean body mass, strength, (Willoughby et al., 2007). These studies recommend that supplementation of protein prior to and subsequent to exercise can help a superior training adjustment than other forms of supplementations such as an isoenergetic or carbohydrate ingestion (Willoughby et al., 2007).

Another study tested the influence of nutrient timing of supplementing of the mixture of protein, creatin and carbohydrate previous to, instantaneously and subsequent to exercise (Cribb & Hayes, 2007). It was concluded that considerably superior improvement in fat-free mass, strength, were determined immediately prior to and

following workouts (Cribb & Hayes, 2006). In Kraemer et al., study (2007), subjects were supplemented 30 minutes of the combination of carbohydrate, protein and fat or an placebo for seven days prior to for two days of resistance exercise (Kraemer et al., 2007). The combination of carbohydrate, protein and fat supplementation considerably enhanced power and quantity of repetitions in a single muscle movement. Also, this nutritional aid notably increased testosterone levels throughout and subsequent to the work out (Kraemer et al., 2007) suggesting that pre-exercise supplementation can help anabolic hormone situation. In Coburn et al., study (2006) unilateral lower body resistance training was carried out by 33 male subjects during six weeks and control group only had + 26 g of carbohydrate while experiment group received + 20 g whey protein and 6 g leucine. Ingestion of whey protein and leucine caused better augmentation in maximal strength before unilateral resistance training. In another study, training period included eight weeks of resistance exercise. The investigation tested supplementation of 1.2 g/kg whey protein + 0.3 g/kg carbohydrate, 1.2 g/kg soy protein + 0.3 g/kg carbohydrate, or placebo before and after exercise. It was concluded that protein supplementation considerably augmented strength and lean mass when compared to placebo, while there were no differences between tow types of supplementation (Tipton et al., 2007).

In conclusion, supplementation of protein, either itself or in mixture of carbohydrate with resistance work out, seems to notably increase muscle protein synthesis (Tipton et al., 2001; Tipton et al., 2006). In addition, supplementation of protein cause in superior augmentation in strength and a fat-free mass (Cribb & Hayes, 2006; Willoughby et al., 2007; Kraemer et al., 2007; Candow et al., 2006). It was suggested that the most favorable protein content of a before exercise is dependent upon issues such as work out length and fitness (Tarnopolsky, 2005). Studies also recommend that the timing of protein intake is as well very significant in increasing the alterations to this type of training. It also helps better recovery from both resistance and endurance training. Supplementation of protein has also been revealed to be vital in the recovery process after training (Brian &Roy, 2008).

DISCUSSION & CONCLUSION

Nutritional intake is essential for improving athletic accomplishment. Also, optimizing adaptations to exercise is a vital issue in success of athletes and sports nutrition is one of the major factors optimizing such adaptations. Protein supplementation is considered to be vital for athletes, and they tend to have more protein in their diets. The superior protein necessity is linked to the improved protein synthesis essential to aid remodel and restore

progression of skeletal muscle fibers damaged during resistance training.

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The Relationship Between Muscle Strength, Anaerobic Performance, Body Composition and Flexibility in Collegiate Soccer Players

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Abstract: The purpose of this study to investigate all together the associations of combination of several fitness parameters (strength, anaerobic power, flexibility, body composition, and influence of such factors on the muscular strength in collegiate soccer players. A total of 16 male collegiate athletes were recruited from the intercollegiate soccer teams. The relationships between upper body strength, lower body strength, flexibility, body composition, and anaerobic performance were evaluated by the Pearson Product Moment Correlation analysis. Isokinetic concentric knee extension strength values were significantly and positively correlated with peak power, absolute and relative upper body strength, and isokinetic knee flexion strength. Flexibility of the subjects was significantly and negatively correlated with peak power, relative upper body strength, and isokinetic knee flexion and extension strength. BMI was not significantly correlated with any of the variables. Peak power and isokinetic knee flexion values were significantly correlated with all the variables except BMI. Relative upper body strength of the subjects was significantly and positively correlated with all the variables except BMI and flexibility. Absolute upper body strength values were significantly correlated with all the variables except BMI and flexibility.
Key words: soccer, power, strength, BMI, and flexibility

INTRODUCTION

Field sports such as soccer and hockey requires intermittent physical activity in which sequences of actions needed a range of skills and explosive type of efforts that are significant factors for successful performance. These efforts are dependent on maximal strength of the neuromuscular system, more predominantly of the lower limbs (Conetti et al., 2001). Field athletes such as soccer players use explosive strength (Thomas and Reilly, 1979). Muscle strength is one of the major factors in victorious sports performance and is a vital indicator of the efficacy of injury treatment in athletes. In addition, it was reported that the intensity of soccer competitions requires forceful contractions to maintain balance and control of the ball against defensive pressure. It has also pointed that concentric and eccentric strength of hamstring and quadriceps muscles may definitely have an effect on sprint and jumping performances of soccer players (Mark et al., 2004). Previous research also suggested that kicking performance in soccer was an essential result of knee extension and flexion strength (De Proft et al., 1988)

It was suggested that body fat are predictive of physical function and strength itself was a major predictor of performance in practical tasks (Lord et al., 2002). It was also reported that strength and flexibility are two of the key signs of physical performance in soccer players (Lehance et al., 2009). Body composition is another factor that is commonly accepted to have an enormous power on athletic performance (Reilly et al., 2000). In particular body fat and fat free mass have been accepted as critical components of anaerobic performance. Body weight,

lean body mass and body fat is crucial factors in relation with anaerobic performance (Mayhew et al., 2001).

It has been declared that evaluation of the fitness parameters of athletes is one of the most important issues in sports, many test used in order that selection measures, for screening candidates, or to screen the efficiency of training regimes (Norkowski, 2002). In spite of sports performance professionals and sports facilitators focus on performance evaluation, there is limited research investigating the relationships between various motor skills (Vescovi and McGuigan, 2008). Although research have been carried out to examine the associations between isokinetic knee strength, anaerobic performance (Kin-isler et al., 2008; Arslan, 2005), it was reported that studies focusing on the correlation between performance in motor skills such as power, body composition, and agility but have concluded inconclusive results (Iossifidou, 2005). It was considered that different results amongst the studies may be due to measuring different joint angular velocities and the positioning of the participants, affecting muscle length and velocity of contraction, subject characteristics and methods used for computation power of joint in isokinetic dynamometry (Iossifidou, 2005). Also, there is common belief that maximum strength should have its maximum result on power produced at heavy loads (Moss et al., 1997; Stone et al., 2003). In the light of previous knowledge that needed further clarification, this study aimed to investigate all together the associations of combination of several fitness parameters (strength, anaerobic power, flexibility, body composition) and influence of such factors on the muscular strength in collegiate soccer players.

METHODS

Subjects

A total of 16 male collegiate athletes (Table 1) were recruited from the intercollegiate soccer (n = 16). Written and oral consent from each participant was obtained at the beginning of the study once the subjects were informed of any potential risks from the experiment. The Ethics Committee of the University approved the experimental protocol. The participants were not informed of the outcomes until the study was concluded. The subjects were motivation verbally throughout the tests.

Anthropometric Measurements

A stadiometer with the accuracy to 1 cm (SECA, Germany), while electronic scales (Tanita BC 418, Japon) accurate to 0.1 kg were used for body mass and percentage of body fat measurements (Lohman et al., 1988).

Isokinetic Leg Strength Measurements

A 5-min warm up on a bicycle ergometer ere completed before isokinetic test. A Biodex Isokinetic Dynamometer (Biodex Medical Systems, Inc., Shirley, New York. The participants were given 5 trials before the test. The regular procedures were applied as previous studies. The leg extensor and leg flexor muscle of each leg were concentrically measured at $90^{\circ} \times s^{-1}$ (10 repetitions).

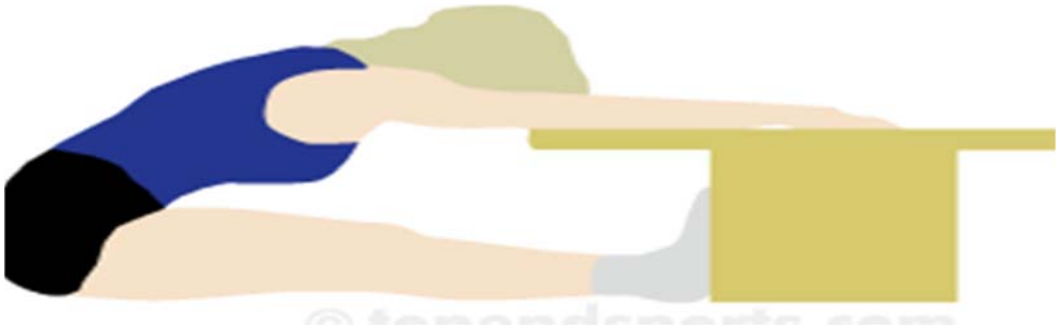
Anaerobic Power Evaluation

A mechanically braked cycle ergometer (834 E, Monark, Vansbro, Sweden) was used for_The Wingate Anaerobic Test (WAnT). WAnT was conducted according to the conventional recommendations for consistency

(Inbar & Skinner, 1996). It test was administered for 30 seconds with resistance set at 7.5 % of body mass. The WAnT session started with a regular warm-up of 5 min of cycling at 50 rpm against no load, subsequent to which the subjects rested for 5 min. The subjects were instructed to pedal as fast as they could.

Flexibility

Sit and Reach test was performed to measure the flexibility of players.



Picture 1. Demonstration of the test

Statistical Analyses

The data are reported as means and standard deviations. Before using parametric tests, the assumption of normality was verified using the Shapiro-Wilk test. The relationships between upper body strength, lower body strength, flexibility, body composition, and anaerobic performance were evaluated by the Pearson Product Moment Correlation analysis. All analyses were executed in SPSS 22 and the statistical significance was set at $p < 0.05$.

RESULTS

The anaerobic power, lower body strength (isokinetic knee strength), upper body strength (1RM bench press) flexibility, and BMI of the soccer players in the study are displayed in Tables 1 and 2 respectively. Table 2 shows the correlations between all the parameters measured. Isokinetic concentric knee extension strength values were significantly and positively correlated with peak power, absolute and relative upper body strength, and isokinetic knee flexion strength. Flexibility of the subjects was significantly and negatively correlated with peak power, relative upper body strength, and isokinetic knee flexion and extension strength. BMI was not significantly correlated with any of the variables. Peak power and isokinetic knee flexion values were significantly correlated with all the variables except BMI. Relative upper body strength of the subjects was significantly and positively correlated with all the variables except BMI and flexibility. Absolute upper body strength values were significantly correlated with all the variables except BMI and flexibility.

Table 1: Average values of soccer players.

Variables	Mean	SD
Age	24.61	2
Height (cm)	175.06	5.78
Weight (kg)	70.98	8.68
BMI	15.72	3.52
Absolute RM	69.05	14.61
Relative RM	0.94	0.1
Flexibility (cm)	31.77	6.07
Peak Power (w/kg)	12.98	1.06
Torque (Extension)(nm)	175.5	25.5
Torque (Flexion)(nm)	91.16	16.85

Table 2: Correlations between anaerobic performance, upper body strength, lower body strength, body composition and flexibility.

	BMI	Absolute 1RM	Relative 1RM	Flexibility (Cm)	Peak Power	Peak Torque (Ext)	Peak Torque (Flex)
BMI	1	0.062	0.191	0.049	-0.334	-0.203	-0.277
Absolute 1RM	0.062	1	.939**	-0.405	.746**	.903**	.633**
Relative 1RM	0.191	.939**	1	-.497*	.668**	.791**	.514*
Flexibility (cm)	0.049	-0.405	-.497*	1	-.554*	-0.333	-.595**
Peak Power (w/kg)	-0.334	.746**	.668**	-.554*	1	.826**	.891**
Torque (Extension)(nm)	-0.203	.903**	.791**	-0.333	.826**	1	.713**
Torque (Flexion)(nm)	-0.277	.633**	.514*	-.595**	.891**	.713**	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION AND CONCLUSION

The purpose of this study was to evaluate the associations among lower body strength, body composition, upper body strength, flexibility, and anaerobic power of field sports players. Significant associations were found between various parameters.

It was reported that anaerobic performance are dependent on various factors (Kin-İşler et al., 2008). It was also suggested that muscular strength is one of the significant factors that have a major role in anaerobic performance and this is because with increased muscular strength the ability of muscles to generate power in short-term high intensity activities also increases (Ozkan et al., 2012). Fried (1992) stated that, in soccer practice, it is typically thougt that the quadriceps muscle group have an significant function in jumping and ball kicking while the hamstring controls the running activities and stabilizes the knee during turns or tackles. Furthermore, it was

declared that knee flexor contribution to joint stability becomes increasingly important with increasing limb velocity (Hagood, 1990). In the present study, peak anaerobic power was significantly correlated with isokinetic lower body strength, upper body strength, and relative strength. These results are consistent with the results of previous studies. For example, significant relationship between quadriceps strength and peak power was reported (Kin Isler et al., 2008). Kin-İşler et al. (2008) also found that there was a significant relationship between anaerobic power, capacity and peak isokinetic concentric knee extension strength of professional football players at all contraction velocities (60º, 150º, 240º). Similarly, Baker and Nance (1999b) found that there was a strong positive association between maximum strength and maximum power in rugby athletes. Similarly, Thorland et al. (1987) determined a strong considerable relationship between anaerobic power and capacity and isokinetic knee strength in female middle-distance runners and sprinters. In addition, Arnason et al. (2004) declared a linear affiliation between countermovement jump, leg power and team success. In some studies, it was also reported that there were important association reported between peak anaerobic power (assessed using the Wingate test) and repeated sprint indices (Bishop et al., 2004; Haj-Sassi et al., 2011). In addition, Burr et al. (2008) study results showed that leg power, as assessed by a vertical jump test, was more or less correlated with National Hockey League Entry Draft selection order. Moreover, Mayhew et al. (2001) and Arslan (2005) studies suggested that that peak and mean power were associated with explosive leg strength. In the present study, these findings were supported with the results that relative and absolute upper body strength of the subjects was significantly and positively correlated with all the variables.

In the present study, body composition was not significantly correlated with any strength and power parameters. Previous studies noted similar findings. In a study, it found there was not any significant correlation between BMI and the rest indices of WAnT. The findings in that study suggested that the players with higher BMI have lower jumping abilities and lower anaerobic capacity (Nikolaidis and Ingebrigtsen, 2013). They found that there was a opposite correlation between BMI and mean power during the 30 s WAnT, which was not significant neither for adolescent nor for adult team handball players. Nikolaidis and Ingebrigtsen (2013) revealed that prior studies on soccer players had revealed similar, but statistically significant, scores $r = -0.24$ ($p = 0.002$; (26) and $r = -0.30$ ($P<0.001$), respectively. It was reported that having low training experience may be one of the reasons for not finding an association between body composition, anaerobic performance and one possible explanation for the lack of association may be the different energy systems that each measure demands (Ali Özkan et al., 2012).

In conclusion, better stress on the improvements of physical parameters such as strength, power, and flexibility could help the coach to proficiently develop training programs and thus broaden progress the level of play in soccer. Numerous physiological attributes contribute to successful sport and athletic performance with the combined interface of anaerobic power, muscular strength and power, and flexibility being crucial to the accomplishment of soccer players.

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