

The effects of weight class athletes' nutrient consumptions and eating habits on their depression-anxiety-stress levels

Deniz Özge Yüceloğlu Keskin, Menderes Kabadayı, Özgür Bostancı, Levent Bayram, Deniz Günay Derebaşı

Ondokuz Mayıs University, Yaşar Doğu Faculty of Sport Sciences - E-mail: levent.bayram@omu.edu.tr

Summary. Diet is important in sports in terms of having an influence on bodily and mental health besides sportive performance. The objective of this study is to find out the effects of dietary habits and eating attitudes on moods of weight class athletes. The study was conducted with a total of 60 athletes -33 wrestlers who participated in Turkey Men's Greco-Roman Wrestling National Team Preparation Camp, 18 wrestlers who participated in Turkey Men's Freestyle National Team Preparation Camp and 9 judokas who participated in Turkey Men's Judo National Team Preparation Camp during the years 2013 and 2014. Athletes' demographic characteristics and information about their three-day eating habits were found, eating attitudes test (EAT) and Depression, Anxiety and Stress Scales (DASS-42) were applied and some of their anthropometric measurements were found. Student-t, Mann Whitney U, Anova and Kruskal tests were used for the statistical analysis of data. Statistically significant difference was found between the EAT scores of Greco-roman wrestlers and freestyle wrestlers and EAT scores of Greco-roman wrestlers were found to be higher ($p < 0,05$). Average carbohydrate intake and stress scores of athletes whose stress scores were higher than normal were found to be significantly higher when compared with the group with normal stress scores ($p < 0,05$). Unhealthy diets which athletes follow to keep body weight under control both damage the athletes' diet and negatively affect their moods.

Key words: diet, wrestling, judo, sport

Introduction

Sports nutrition has recently become an excessively researched and increasingly interesting area of science. It has become an area in which sport scientists and also trainers, athletes and athlete families should have sufficient and correct information and this nutritional information should be received from expert dieticians (1).

Appropriate and balanced diet is essential for young athletes not only in terms of sportive achievement but also for their growth, development and general health conditions (2). An appropriate diet is important especially for developing performance,

maintaining condition and protecting from post-exercise recovery and injuries (3). Mostly, individuals cannot allocate time for eating due to various reasons and thus, they cannot be nourished properly (4). It is certainly a truth to say that it is impossible to expect high performance from an athlete whose diet is not proper and whose health is deteriorated (5).

Psychological factors such as perfectionism, anxiety, mood, mood disorders, disrupted bodily image and self-respect have a role in the multi-factor etiology of eating disorders (6,7). According to American Psychiatry Association (APA)'s DSM-V (Diagnostic and Statistical Manual of Mental Disorders-V, 2014), eating disorders (ED) include anorexia nervosa (AN), bu-

limia nervosa (BN) and other eating disorders (APA, 2014). Significant associations have been found between eating habits and anxieties about body shape, social anxiety, depression and body mass index (8).

In addition, it is also stated that eating habits and behaviors can be damaged as a result of exercise and also eating habits and behaviors can cause mood disorders and consequently depression (9-12).

In all sports branches based on weight class, athletes limit their daily energy consumption and thus by decreasing their weight, they get advantage when compared with other contestants (13).

Diet is important in sports in terms of having an influence on bodily and mental health besides sportive performance. The objective of this study is to find out the effects of dietary habits and eating attitudes on moods of weight class athletes.

Material and Method

The universe of the study consists of athletes who participated in TM wrestling (Greco-roman and Free-style) and judo NTPC as part of 2013-2014 activity program. A total of 60 voluntary national team athletes – 33 athletes who participated in İstanbul Mersinli Ahmet Wrestling Camp Training Center Men's Greco-roman NTPC, 18 athletes who participated in Ankara Elmadağ Wrestling Camp Training Center Men's Freestyle NTPC and 9 judokas who participated in Samsun Atatürk Sports Hall Turkey Olympics Preparation Center Men's Judo NTPC- were included in the study. Of the national team athletes who were included in the study from wrestling, 17 had medals in European Championship, 27 had medals in World Championship and 7 had medals in Olympic Games. The athletes were informed about the questionnaires and measurements. Athletes who had injuries or health problems were not included in the study. Elite weight class athletes who are in camp train for an average of 5 days a week and 4 hours a day. In this study, the athletes' demographic features and information about their three-day food consumption were collected through questionnaire form and EAT and DASS-42 were applied and some anthropometric measurements were taken.

Demographic Information Form

A form which included 12 questions to get information about the athletes' demographic features was prepared.

Nutritional Status

Nutritional status was found by recording the dietary consumption of athletes in three consequent days. The amount of nutrients in individuals' one course were calculated by using the amounts determined by the individuals and by using Kutluay's book entitled "Standard Recipes for Catering of Institutions"(14). Energy and macro nutrient analyses of these consumptions were calculated by using diet information systems (BEBIS 6) package program and their averages were taken.

Anthropometric Measurements

All the participants' weights and body compositions (body fat mass and percentage, lean tissue mass, total bodily fluid) were measured. Tanita make BC 418 model BIA device was used to find out body components. The subjects were measured with shorts on and bare feet.

Body mass index

BMI is an easily calculated ($\text{Weight [kg]}/\text{Height}^2 [\text{m}]$) criterion which is accepted as a good indicator of total body fat (15).

Depression, Anxiety, Stress Scales (DASS-42)

The validity and reliability of this scale developed by Lovibond and Lovibond (1995) was conducted by Akin and Bayram (2007) (16,17). Each item in the scale has 4 Likert type grading of "0": did not apply to me at all, "1": applied to me to some degree or for some of the time, "2": applied to me to a considerable degree or for a good part of time and "3": applied to me very much or most of the time. The adaptation validity scores of DASS were .87 and .84, respectively. Cronbach Alpha internal consistency reliability coefficient was .89, while item total correlations were found to be between .51 and .75. The test retest and split-half reliability scores of the scale were found as .99 and .96. These results show that DASS has high level of reliability and validity. The participants are asked to choose

the item that applies most to them. The questions in the Depression and Anxiety category are grouped in three different groups and assessed according to the total scores of the individual from each group. According to these, a score of 0-9 taken from the depression category, a score of 0-7 taken from the anxiety category and a score of 0-14 taken from the stress category are interpreted as "normal" values. Higher values of these scores in each category show the increase in depression, anxiety and stress levels. Since we did not have too many participants, we did not grade them as normal, mild, fair and advanced level according to depression, stress and anxiety average scores, instead grouped in two as those within normal range and those over normal range.

The Eating Attitude Test- EAT: It is a self-assessment scale developed by Garner and Garfinkel (1979) to assess the disorders in eating attitudes and behaviors. The scale was adapted into Turkish by Savaşır and Erol (1989) (18,19). The cut-off score of EAT scale was found as 30. Savaşır and Erol (1989) found the Cronbach alpha reliability coefficient of the scale as 70. Individuals are asked to choose the choice that fits them best by thinking about their eating habits (20). In terms of pathology, 3 points are given for each end response and 2 and 1 points are given for the other choices. Total score is obtained by adding up the grading (21).

Statistical Analysis: Statistical analysis of all the data obtained within the context of the research was assessed through SPSS (Statistical Package for Social Sciences for Windows) 17.0 statistic program. Student-t, Mann Whitney U tests were used for the statistical assessment of the data. In the comparison of more than two independent groups, the groups which were normally distributed were compared with Anova test. Tukey multiple comparison test was used for paired comparisons. The groups which were not normally distributed were compared with Kruskal Wallis test.

Results

In Table 1, no statistically significant difference was found between the groups which participated in the study ($p > 0.05$).

In Table 2, as a result of the calculation of energy and nutrient elements of daily average food consumption of the athletes who participated in our study, carbohydrate intake percentage of the wrestlers was found as $37,98 \pm 12,42$, while their protein intake percentage was found as $18,58 \pm 6,42$ and their fat intake percentage was found as $42,46 \pm 16,48$. Carbohydrate intake percentage of free-style wrestlers was found as $44,50 \pm 16,74$, their protein percentage was found as $18,13 \pm 5,68$ and their fat percentage was found as $36,31 \pm 12,98$. As a result of judo energy and nutrient element calculations, judokas' carbohydrate intake percentage was found as $38,33 \pm 1,56$, their protein intake percentage was found as $19,97 \pm 4,24$ and their fat intake percentage was found as $40,89 \pm 9,39$.

In Table 3, the athletes' depression score average was found as $6,72 \pm 5,69$, their stress score average was found as $11,78 \pm 6,20$, and their anxiety score average was found as $7,33 \pm 5,56$.

In Table 4, depression anxiety, stress and eating attitudes of the athletes in the study were examined as normal and above normal. Depression score was found as above normal in 21 (35%) participants and as normal in 39 (65%) participants. Stress score was found as above normal in 23 (38.3%) participants and as normal in 37 (61.7%) participants. Anxiety score was found as above normal in 24 (40%) participants and as normal in 36 (60%) participants. When eating attitude scores were examined, 10% of the athletes were found to have eating disorder.

In Table 5, statistically significant difference was found between eating attitude test score averages of Greco-Roman wrestlers and free style wrestlers ($p < 0.05$). No statistically significant difference was found between groups when depression anxiety, stress score averages were examined ($p > 0.05$).

When the athletes' EAT scores were compared between groups in terms of their eating attitude, anxiety, stress and depression scores, a statistically significant difference was found between EAT scores of Greco-Roman and Freestyle wrestlers ($p < 0.05$).

In Table 6, average carbohydrate intake of athletes who had above normal stress scores was found to be higher. This difference was found to be statistically significant ($p < 0.05$). No statistically significant difference was found between other nutrient elements and stress levels ($p > 0.05$).

Table.1. Descriptive Information about the athletes

Parameter	Group	N	Ave ±Sd	Min.	Max.	p
Age (years)	Greco Roman	33	24,39 ±3,45	17	31	,096
	Freestyle	18	26,06 ±2,96	21	31	
	Judo	9	23,22 ± 3,90	18	31	
	General	60	24,71 ±3,46	17	31	
Height (cm)	Greco Roman	33	176,03±7,10	164	190	,080
	Freestyle	18	172,50±8,08	155	192	
	Judo	9	170,67±5,59	165	183	
	General	60	174,17±7,42	155	192	
Weight (kg)	Greco Roman	33	85,91±18,38	62,1	123,8	,117
	Freestyle	18	79,68±16,78	63	118,6	
	Judo	9	73,43±8,16	63,5	89,2	
	General	60	82,17±17,17	60	123,8	
BMI (kg/m ²)	Greco Roman	33	27,41±4,11	22,3	37	,648
	Freestyle	18	26,53±3,23	21,3	32,2	
	Judo	9	25,38±1,71	22,5	27,7	
	General	60	26,84±3,62	21,3	37	
Fat (%)	Greco Roman	33	11,05±4,85	4,4	23,6	0,277
	Freestyle	18	11,28±4,88	2,7	20,1	
	Judo	9	8,38±3,83	3,3	14,2	
	General	60	10,72±4,76	2,7	23,6	

p<0.05

Table 2. Comparison of the athletes' average carbohydrate, protein and fat intake in percentages according to groups

Group	Carbohydrate intake	Protein intake	Fat intake
	Ave ±Sd	Ave ±Sd	Ave ±Sd
Greco Roman(%)	37,98±12,42	18,58±6,42	42,46±16,48
Freestyle(%)	44,50±16,74	18,13±5,68	36,31±12,98
Judo(%)	38,33±1,56	19,97±4,24	40,89± 9,39
Total (%)	39,85 ±13,39	18,66±6,02	40,52±15,35

Table 3. Depression, Stress and Anxiety Average Scores of the Athletes

Variable	N	Ave. ± S.d.	Min.	Max.
Depression score	60	6,72 ±5,69	0	19
Stress score	60	11,78± 6,20	0	23
Anxiety score	60	7,33 ±5,56	0	21

Table 4. Depression, Stress, Anxiety and Eating Attitudes of the Athletes

Variable	Group	N	%
Depression Score	Higher than normal	21	35
	Normal	39	65
	Total	60	100
Stress Score	Higher than normal	23	38.3
	Normal	37	61.7
	Total	60	100
Anxiety Score	Higher than normal	24	40
	Normal	36	60
	Total	60	100
Eating Attitude (EAT) Score	30>	6	10
	30<	54	90
	Total	60	100

Table 5. Comparison of groups' eating attitude, anxiety, stress and depression scores in terms of branches

Variable	Group	N	Ave. ± S.D.	Min.	Max.	p
Eating Attitude (EAT)	Greco-Roman	33	13,84 ± 8,289 ^b	4	48	0,034*
	Freestyle	18	26,67 ± 2,43 ^a	4	81	
	Judo	9	15,33 ± 10,75 ^{ab}	6	40	
	Total	60	17,92 ± 15,21	4	81	
Anxiety Score	Greco-Roman	33	7,51 ± 5,79	0	19	0.618
	Freestyle	18	7,83 ± 5,52	1	21	
	Judo	9	5,67 ± 5,05	0	15	
	Total	60	7,33 ± 5,56	0	21	
Stress Score	Greco-Roman	33	11,72 ± 6,20	0	23	0.993
	Freestyle	18	11,78 ± 5,49	2	20	
	Judo	9	12,00 ± 8,08	0	20	
	Total	60	11,78 ± 8,08	0	20	
Depression Score	Greco-Roman	33	7,30 ± 5,79	0	19	0.245
	Freestyle	18	7,11 ± 5,84	0	19	
	Judo	9	3,78 ± 4,52	0	12	
	Total	60	6,72 ± 5,69	0	19	

Table 6. Comparison of average total energy, carbohydrate, protein and fat intakes in terms of branches

Mood	Nutrients	Level	N	Ave. ± S.d	Min	Max	p
Anxiety	Carbohydrate	Normal	24	237,05 ± 82,94	121,7	410,5	0,633
		Higher than normal	36	227,15 ± 70,27	30,5	385,2	
	Protein	Normal	24	105,61 ± 34,27	21	174	0,638
		Higher than normal	36	109,98 ± 35,67	30	186,9	
	Fat	Normal	24	104,38 ± 42,21	25,9	182,1	0,991
		Higher than normal	36	104,50 ± 38,35	34,4	212,9	
Depression	Carbohydrate	Normal	39	233,03 ± 88,24	30,5	410	0,768
		Higher than normal	21	227,56 ± 54,53	121,7	334	
	Protein	Normal	39	108,36 ± 34,82	30	186,9	0,968
		Higher than normal	21	107,99 ± 35,88	21	168,3	
	Fat	Normal	39	396,84 ± 180,46	34,4	163,6	0,975
		Higher than normal	21	386,79 ± 201,93	25,9	212,9	
Stress	Carbohydrate	Normal	21	257,28 ± 70,25	158,7	410,5	0,038*
		Higher than normal	39	214,85 ± 78,47	30,5	379,5	
	Protein	Normal	21	111,97 ± 29,08	52,7	174	0,517
		Higher than normal	39	105,90 ± 38,260	21	186,9	
	Fat	Normal	21	107,73 ± 34,82	41,9	182,1	0,617
		Higher than normal	39	102,41 ± 42,62	25,9	212,9	

p < 0.05

Anxiety scores of the athletes who participated in our study were normal and the groups which had higher than normal anxiety scores were compared in terms of some nutrients. Average carbohydrate intakes of athletes who had higher than normal stress scores were found to be higher. This difference was found to be statistically significant ($p < 0,05$).

Discussion

The objective of our study was to compare the effects of eating habits and eating attitudes of weight athletes on their mood. The total body fat percentage average of the athletes who participated in our study was found as $10,72 \pm 4,76\%$. Groups' body fat percentages were found to be $11,05 \pm 4,85\%$ for Greco-roman wrestlers, $11,28 \pm 4,88\%$ for freestyle wrestlers and $8,38 \pm 30\%$ for judokas ($p > 0,05$). Various studies have shown average body fat values of wrestlers to be between 6% and 15% (22). In Roemmich and Sinning's (1996) study, BMI of adolescent wrestlers was found to be 7,8%, while in Zorba's (2006) study, BMI of elite Turkish wrestlers was found to be $10,92 \pm 5,3\%$ and this result was in parallel with the results of our study (23,24).

As a result of energy and nutrient calculations of athletes' daily average food consumption, carbohydrate percentage was found as $39,85 \pm 13,39$, protein percentage was found as $18,66 \pm 6,02\%$ and fat percentage was found as $40,52 \pm 15,35$. While it is sufficient for healthy adults to take 55-60% of their daily energy from carbohydrates, 12-15% from proteins and 25-30% from fats for a sufficient and balanced diet, for athletes, the contribution of nutrients to daily energy is different in terms of the athletes' branches. It has been reported that in sports branches such as boxing, wrestling, judo, karate, taekwondo, it is sufficient for 50% of the energy to come from carbohydrates, 20% from proteins and 30% from fats (25,26,27,28). It was found that the weight class athletes in our study had low intake of daily carbohydrate and protein, while they had higher values of fat intake than the levels recommended. When it is taken into consideration that the measurements in our study were conducted 3 days before competition and weigh-in, it can be seen that as a method of adjusting weight, athletes tend to get away

from nutrients that have carbohydrate and protein and specific weight that can influence weight-in. This has shown a state that can be assessed negatively in general eating habits.

In our study, depression ($6,72 \pm 5,69$) and stress ($11,78 \pm 6,20$) scores of elite athletes were found to be within normal values and it was thought that this could occur as a result of sport's positive effect on depression and stress. A great number of studies have examined the association between depression and anxiety and shown that a regular sport is useful for such disorders (29). In their study they compared the depression levels of elite wrestlers and taekwondo athletes, Kumartaşlı et al (2015) found that depression levels of elite wrestlers and taekwondo athletes were in intermediate levels (30).

Anxiety scores of our athletes were found to be above normal ($7,33 \pm 5,56$). In their study conducted with 131 male judokas and wrestlers participating in Universities Turkey Championship competitions, Civran et al. (2010) reported that athletes had average level of anxiety (31). When the sportive careers of the athletes in the study are taken into consideration, the size and significance of the competitions they participate in are understood better. The fact that they are participating in the biggest and most important competitions of the world and the national pressure they feel can cause increase in the anxiety levels of athletes.

Carbohydrate intake of the group with normal stress scores was found to be higher than the group with stress scores higher than the normal ($p < 0,05$). This result related with stress is also present for depression scores, though not statistically significant. High amounts of carbohydrate or alcohol intake stimulates dopamine use in the brain (32). High amounts of food intake artificially triggers the reward center in the brain, provides dopaminergic activation and creates a kind of therapeutical effect (33). A diet in favor of carbohydrates at the same time eases tryptophan's transition to the brain and transformation into serotonin (34, 35). It is known that the serotonin level in the brain is effective on mood and the decreases in serotonin level are known to contribute to the etiology of depression in some individuals. The decreases in tryptophan levels which are necessary for serotonin synthesis also influence the decreases in serotonin

level. This situation results in a decrease in the moods of some individuals, though not in all (36).

It was found that the 10% of the athletes in our study got scores of 30 cut-off point and higher from EAT, while 90% got scores of lower than 30 cut-off point. In their study they conducted to examine the eating disorders of 446 high school students with an average age of 16,07, Tanriverdi et al. (2011) found that 17.3% of the students got scores of 30 cut-off point and higher from EAT (37). In their study they conducted on 372 university students between the ages of 17–30, Toker (2008) found that 4,83% got scores of 30 cut-off point and higher from EAT (38). While some of the results of our study were in parallel with other studies, it was found that unlike some studies, the percentage of those who got scores of EAT cut-off point and higher were higher than the percentage of other groups.

When the EAT scores of the athletes who participated in our study were examined, a statistically significant difference was found between the EAT scores of Greco-roman wrestlers and freestyle wrestlers, with EAT scores of freestyle wrestlers being higher ($p < 0,05$). There is an insignificant but noticeable difference between anxiety levels of groups. The average anxiety levels of Freestyle wrestlers were found to be higher than the other groups. Eating behavior is considerably influenced by mood. Various studies have found that the frequency of courses, the amount eaten and what is eaten are associated with psychological needs and it has been accepted that there is a strong association between these. In a study which examined the association between food intake amount and different kinds of emotion, while excessive food intake was found to be associated with distress, depression and fatigue, small quantities of food intake was associated with fear, tension and pain (39).

It can be interpreted that high levels of anxiety leads these athletes to have less balanced and consistent behaviors of eating.

Athletes may follow unhealthy diets from time to time as weight control is a significant factor for weight class athletes, and as a result some essential nutrients which are not taken sufficiently can contribute to the development of depression and anxiety.

For the optimal performance of elite athletes, an experienced nutritionist who plans and follows

the dietary habits and food consumptions of athletes not only during camp periods but also before and after camp periods and also a psychological advisor and regular training programs can make information more permanent and cause it to become a life style. We are of the opinion that increasing the number of athletes who participate in such studies can lead to healthier scientific information about the subject.

In weight athletes, body weight has significant effects on performance. Inappropriate diets to control body weight on the one hand disrupt the athlete's nutrition and on the other hand have a negative effect on their mood. It can be said that insufficient and unbalanced nutrition and negative mood will have a negative effect on the general health of athletes and also on their sportive success.

References

1. Nazni P, Vimala S. Nutrition knowledge, attitude and practice of college sportsmen. *Asian journal of sports medicine*, 2010;1(2), 93.
2. Cotugna N, Connie EV, McBee S. Sports nutrition for young athletes. *The Journal of School Nursing*. 2005; 21(6):323-328.
3. Aoi W, Naito Y, Yoshikawa T. Exercise and functional foods. *Nutrition Journal*. 2006; 5(15):1-5.
4. Clark N. *Sports Nutrition Guidebook*, America. Human Kinetics. 1997.
5. Pehlivan A. *Sporda beslenme*. İstanbul. Yayıncılık Matbaası. 2005.
6. Markey MA, Vander Wal JS. The role of emotional intelligence and negative affect in bulimic symptomatology. *Compr Psychiatry*. 2007; 48:458–64.
7. Sassaroli S, Ruggiero GM. The role of stress in the association between low self-esteem, perfectionism, worry and eating disorders. *Int J Eat Disord*. 2005; 37:135–41.
8. Liu LL, Li BM, Yang J, Wang YW. Does dopaminergic reward system contribute to explaining comorbidity obesity and ADHD? *Med Hypotheses*. 2008; 70:1118-1120.
9. Vardar E. Egzersiz bağımlılığı. *Arşiv Kaynak Tarama Dergisi*. 2012; 21(3):163-173.
10. Bamber DJ, Cockerill IM, Rodgers S, Carroll D. Diagnostic criteria for exercise dependence in women. *British Journal of Sports Medicine*. 2003; 37(5):393-400.
11. Öztürk O, Uluşahin A. *Ruh Sağlığı ve Bozuklukları*. Ankara. Nobel Tıp Kitapevleri. 2008.
12. Karamustafaloğlu O, Yumrukçal H. Depresyon ve anksiyete bozuklukları. *Şişli Eftal Hastanesi Tıp Bülteni*. 2011; 45:65-74.
13. Hall C, Lane A. Effects of rapid weight loss on mood and

- performance among amateur boxers.. *Br J Sports Med.* 2001; 35:390-5.
14. Kutluay T. Toplu Beslenme Yapılan Kurumlar İçin Standart Yemek Tarifleri. Ankara. Hatipoğlu Yayınevi. 2003.
 15. Sarria A, Moreno LA, Garcia-Llop LA, Fleta J, Morellón MP, Bueno M. Body mass index, triceps, skinfold and waist circumference in screening for adiposity in male children and adolescents. *Acta Paediatr.* 2001; 90(4):387-92.
 16. Lovibond PF, Lovibond SH. The structure of negative emotional states: comparison of the Depression Anxiety Stress Scale (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy.* 1995; 33:335-343.
 17. Akin A, Çetin B. Depresyon anksiyete stres ölçeği (DASÖ): geçerlik ve güvenilirlik çalışması. Kuram ve Uygulamada Eğitim Bilimleri / Educational Sciences: Theory & Practice. 2007; 7(1):241-268.
 18. Garner DM, Garfinkel P E. The eating attitudes test: An index of the symptoms of anorexia nervosa. *Psychological Medicine* . 1979; 9:273-279 .
 19. Savaşır I, Erol N. Yeme tutum testi: anoreksiya nervoza belirtileri indeksi. *Psikoloji Dergisi.* 1989; 7:19-25.
 20. Aydemir Ö, Köroğlu E. Psikiyatride Kullanılan Klinik Ölçekler. Ankara. Medico Graphics Matbaası. 2007;153-161.
 21. Öner N, Le Comte A. Durumluk Kaygı Envanteri El Kitabı, İstanbul. Boğaziçi Üniversitesi Yayınları. 1983.
 22. Houtkooper LB, Going SB. Body composition: how should it be measured? Does it affect sport performance? *Sports Sci Exchange.* 1994; 7:1-8.
 23. Roemmich JN, Sinnig WE. Sports-seasonal changes in body composition, growth, power and strength of adolescent wrestlers. *International Journal of Sports Medicine.* 1996; 17(2):92-99.
 24. Zorba E. Vücut Yapısı. İstanbul. MMP Baskı Tesisleri. 2006; 186-189.
 25. Baysal A. Beslenme. Ankara, Hatiboğlu Yayınevi, 13. Baskı. 2011.
 26. Baysal A, Aksoy M, Besler T, Bozkurt N, Keçecioğlu S, Merdol KT, Pekcan G, Mercanlıgil S, Yıldız E. Diyet El Kitabı. 6.baskı. Ankara, Hatiboğlu Yayınevi. 2011.
 27. McArdle WD, Katch FI, Katch VL, Sport and Exercise Nutrition. Third Ed: PA-USA. Lippincott Williams & Wilkins. 2005.
 28. Geisserler C, Powers H. Human Nutrition. 11th Ed. UK. Elsevier Churchill Livingstone. 2005.
 29. Byrne A, Byrne DG. The effect of exercise on depression, anxiety and other mood states-A review. *J Psychosom Res* 1993; 37:565-574.
 30. Kumartaşlı M, Alp M, Yılmaz E, Gökbel S. Comparison of depression levels of elite wrestling and taekwondo athletes. *Turkish Journal of Sport and Exercise.* 2015; 17(1): 67-70.
 31. Civan A, Arı R, Görücü A, Özdemir M. Bireysel ve takım sporcularının müsabaka öncesi ve sonrası durumluluk ve sürekli kaygı düzeylerinin karşılaştırılması. *Uluslararası İnsan Bilimleri Dergisi.* 2010; 7(1):193-206.
 32. Liao Y, Knoesenb NP, Castleb DJ, Tanga J, Dengd Y, Bookunb R, Chena X, Haoa W, Menga G, Liua T. Symptoms of disordered eating, body shape, and mood concerns in male and female Chinese medical students. *Comprehensive Psychiatry.* 2010; 51:516-523.
 33. Solanto MV. Dopamine dysfunction in AD/HD: integrating clinical and basic neuroscience research. *Behav Brain Res.* 2002; 130:65-71.
 34. Berry EM, Growdon JH, Wurtman JJ, Caballero B, Wurtman RJ. A balanced carbohydrate: protein diet in the management of Parkinson's disease. *Neurology* 1991; 41:1295-1297.
 35. Yokogoshi H, Wurtman RJ. Meal composition and plasma amino acid ratios: effects of various proteins or carbohydrates, and of various protein concentrations. *Metab Clin Exp* 1986; 35:637-642.
 36. Thomas B. Mental Illness. Manual of Dietetic Practice. 3rd ed. Oxford: Blackwell Publishing. 2001; 571-9.
 37. Tanrıverdi D, Savaş E, Gönüllüoğlu N, Kurdal E, Balık G. Lise öğrencilerinin yeme tutumları, yeme davranışları ve benlik saygılarının incelenmesi. *Gaziantep Tıp Dergisi.* 2011; 33-39.
 38. Toker ED. K.T.Ü. Trabzon Sağlık Yüksek Okulu öğrencilerinde yeme tutumu ve aile yapısı arasındaki ilişki. Trabzon. Karadeniz Teknik Üniversitesi, Sağlık Bilimleri Enstitüsü. Sağlık Psikolojisi Anabilim Dalı. Yüksek Lisans Tezi, 2008.
 39. Sevinçer GM, Konuk N. Emosyonel yeme. *Journal of Mood Disorders.* 2013; 3(4):171-8.

Correspondence:

Levent Bayram

Ondokuz Mayıs University, Yaşar Doğu Faculty of Sport Sciences

E-mail: levent.bayram@omu.edu.tr