RedFame

Journal of Education and Training Studies
Vol. 5, No. 6; June 2017
ISSN 2324-805X E-ISSN 2324-8068
Published by Redfame Publishing
URL: http://jets.redfame.com

Comparison of the Dietary Habits of Elite Turkish Male and Female Weightlifters

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Received: April 28, 2017 Accepted: May 9, 2017 Online Published: May 11, 2017

doi:10.11114/jets.v5i6.2393 URL: https://doi.org/10.11114/jets.v5i6.2393

Abstract

Nutritional habits affect performance directly or indirectly in weight class included sports. The aim of this study was to compare the dietary habits of elite female and male weightlifters. After getting official records of athletes from Turkish Weightlifting Federation, a survey was conducted on several factors of the athletes such as weight class, education level, national and international success, income level, weight reduction condition, whether the athlete has knowledge about nutrition, fluid intake, dietary approach before competitions, and type of ergogenic usage. The correlation analyses were completed to determine the relationship between the groups. One-way ANOVA was used to compare the groups. Fischer's exact tests were calculated again to compare the dietary preferences between different groups. Results of this study showed that lower income, weight category, lower age and level of education of male weightlifters negatively affect the performance. Male weightlifters underestimate the importance of fluid intake and they consumed different types of diets. The use of ergogenic products in female weightlifters was differentiated according to their education levels, weight classes and the competition category. Again, the international female weightlifters consumed more ergogenic substance than national level weightlifters. Both male and female weightlifters showed no significant correlations between the performance variables and all other conditions. It can be suggested that the socio-economic status and education level related to sport nutrition in weightlifters should be increased for enhancing of the weightlifting performance.

Keywords: nutrition, weight management, weightlifters

1. Introduction

The nutrition regime of weightlifters with increased their strength and power needs should be focused on the determination of a balanced nutrition program according to the energy consumption during the training and recovery as well as the quality of the foods consumed. Also, the consumption of the nutrients and supplements is an important part of the workout and high performance for weightlifters. For the development of a proper nutrition philosophy of sportive lifestyle, there is a need to determine realistic goals that can be achieved in specific, measurable and attainable period from young age to an elite level (American Dietetic Association, Dietitians of Canada, & American College of Sports Medicine, 2009).

Components of energy consumption are metabolic and physiological factors that regulate daily energy expenditure. These components include factors such as basal and resting metabolic rate, physical activity, recovery, growth and thermal effects of foods (American Dietetic Association, Dietitians of Canada, & American College of Sports Medicine, 2009; USA Weightlifting Federation, 2013).

Elite athletes should pay attention to exercise their diet in a timely manner, and determine a balanced volume and intensity of training, the amount and type of food, daily weight lifting goals, fluid consumption, vitamin and mineral intake, and total caloric intake and use of ergogenic products approved by National Sanitary Foundation (NSF) and World Doping Agency (WADA) at the recommended daily allowance by FDA (U.S. Food & Drug Administration) (Bean, 2000; http://www.fda.gov, 2017). Weightlifters should determine their energy consumption from 3000 to 10000 kcal/day taking into account their own body weights, training needs and weight (USA Weightlifting Federation, 2013).

Nutritional supplements should only complete a healthy diet. They should not be able to meet the nutritional regime and substitute for them. Supplements can be proved to be particularly helpful for athletes needing more calories and nutrients

at the intense and higher volume of training. However, it should be known that supplements do not take place of a good nutritional regimen and do not make the athlete physically better without taking the training effect into consideration (American Dietetic Association, Dietitians of Canada, & American College of Sports Medicine. 2009; USA Weightlifting Federation, 2013).

Performance at the weightlifting is almost entirely dependent on the ability to produce short and explosive power by the anaerobic energy system. Aerobic energy systems are also used to lift weights and to regenerate energy store in exhausted muscles. A well-balanced diet is useful to optimize muscle repair and restoration of energy stores (Fleming & Brooks, 2011).

When high-level training loading is accompanied by inadequate nutrition, performance falls in both genders. Low caloric intake from food leads to loss of muscle mass, menstrual disorder, increased fatigue, and consequently a decrease in athlete performance (Ainsworth et al. 2000).

It has been reported that the daily energy consumption of 10 weightlifters with the mean age of 21 years is 4597 kcal (Chen et al. 1989). This value is more than 1500 kcal in Brazilian weightlifters prepared for the 2008 Beijing Olympics (Cabral et al., 2006). On the other hand, Grandjean (1989) reported 3643 kcal daily energy consumption values studying on 28 weightlifters. In all weight category sports, athletes reduce their body weight by limiting their daily energy consumption and gain advantage over the other competitors (Hall & Lane, 2001).

Kinningham and Gorenflo（2001). reported that 24% of the high school wrestlers imposed at least one week of food restriction and 10% of them preferred one day the food restriction before the competition. Many athletes spend most of their time on intense trainings and competitions without demonstrating necessary care to reduce the negative effect that the food restrictions create on their performance(Hall & Lane, 2001).Low caloric intake will limit the athletes' performance goals. It is known that there is a significant relationship between the level of knowledge on nutrition and under nutrition habits (Burke, 1995).

Cuspiti et al. (Cuspiti et al., 2000) reported that the nutritional knowledge levels and attitudes toward nutrition in the athletes were better than ordinary individuals, suggesting a positive effect of sport on nutrition knowledge levels and eating habits (Cuspiti et al., 2000). Body composition can be an indirect indicator of nutritional status. Athletes have a low body fat percentage due to their natural body structure. Regular trainings have a negative effect on caloric balance and affect the body composition critically (Cabral et al., 2006). Considering the daily energy consumption of Brazilian male weightlifters, their energy intakes were below their daily needs. So, it is possible to increase daily energy consumption either through the energy intensity of meals or through the number of daily meals in order to overcome this deficit. But daily consumptions of same weightlifters were in the normal limits on consuming basic nutrients (Cabral et al., 2006). The percent distribution of carbohydrate intake was 54.09 ±6.8% for male and 56.3 ±4.7% for female, represents the level of consumption by other athletes, like a triathlete (Nogueira & Da Costa, 2004; Cabral et al., 2006). However, the lower level of CHO consumption is rarely observed in elite weightlifters while this consumption was 41,8% for swimmers and 43% for weightlifters (Chen et al. 1989); Grandjean, 1989).

Daily carbohydrate consumption was changed between 7 and 10 g/kg body weight (Sherman & Lamb,1988). Cabral et al. (2006) reported that carbohydrate consumption was 5.97 g/kg for male and 4.36 g/kg for female in weightlifting. These studies showed that the consumption of body weight in males was 5.97 g/kg and the average value for females was 4.36 g/kg, respectively. In both cases the average values were below the recommended daily allowance. The amount of carbohydrates consumption should be determined according to athletes' body weight (Sherman & Lamb, 1988). The specific situation for assessed athletes with daily recommended carbohydrate consumption was from 400 to 600 g (Costill, 1988).

While the mean intake of carbohydrate consumption was 286±106 g/day in female weightlifting team, 407.1 ± 115.3 g/day was determined in male weightlifting team (Cabral et al. 2006). These averages indicated that the male weightlifters were lower than that of the threshold recommended by Costill (Costill, 1988) and that had lower energy consumption (Cabral et al. 2006; Costill, 1988). Carbohydrate consumption is strongly recommended before, during, and after exercise (Marins et al., 2004).

During exercise, consumption of carbohydrates maintains glycogen levels delaying fatigue formation and results in low circulation averages of pro-inflammatory cytokines, which are indicative of injury to the body and diseases. Simple carbohydrate should be consumed only 5 minutes before competition. The avoidance of hypoglycemia will be possible (Cabral et al., 2006) while carbohydrate consumption restrictions result in fatigue-induced, glycogen storage, which impairs working ability (Saunders et al., 2004). After exercise, carbohydrate intake is necessary to accelerate muscle and liver glycogen resynthesis (Marins et al., 2004). Especially in high intensity sports activities, the carbohydrate metabolism is high. It is clear that appropriate CHO consumption is important for high quality training (Marins et al., 2004). Traditionally, athletes and coaches believe that high values of dietary protein are necessary for ideal physical performance

(Cabral et al., 2006). Proteins are important in endurance, body building, and muscle fiber repair, and their needs depend on factors such as gender, age, training level, exercise type, duration and intensity (Bishop et al.,2002). Although many athletes believe that they should consume more protein than the normal population, it is necessary to take energy and protein in appropriate quantities and thus an increase in muscle mass occurs (Bishop et al.,2002). Tarnopolski et al. (2002). reported in a study of athletes performing strength training that 0.86 g/day protein consumption has been observed to result in lean mass repair, but they also showed that high protein consumption (1.4 kg/day) results in high fat synthesis (Tarnopolski et al., 2002). Cabral et al. (2006) reported that consumption of protein per kilogram of body weight was 1,56 ± 0,32 g for male and 1,11 ± 0,6 g for female and that energy intake was not ideally followed, considering body weight. When the athlete is subjected to strength training, the recommended weight for daily protein consumption is between 1.5 and 2.5 g/kg (Lemon, 1991).

Cabral et al. (2006) reported that decreased training and recovery ability in female weightlifters can be due to protein deficiency. Increased protein level can cause health problems such as hypercalciuria indicating calcium excess in urine, dehydration signifying water loss, and increased specific kidney and liver activity leading to increased oxygen consumption and specific dynamic effects in long term (Lemon, 1991).

Excess fat consumption was also observed in other studies (Cabral et al., 2006).It was found out to be 40% in the study of Chen et al.(1989) and 39% in Grandjean's study (1989). Low consumption was often recorded in athletes with extremely severe body weight control, such as gymnasts, artistic gymnasts, Jockeys, dancers, bodybuilders and combat athletes (Williams, 2002). Fats are important for the production of energy during exercise. Fat loss during exercise creates a metabolic advantage. More fatty acid oxidation results in savings in glycogen stores (Ainsworth et al., 2000). It is generally not recommended to consume high amounts of fat. In the daily diet, it is recommended that saturated fat acids should not exceed 10%, and that 30% fat should be consumed. Low fat consumptions under the total daily energy need may lead to health problems as well as reducing physical ability. In male athletes, who probably should not keep body fat percentages below 5%, low calorie consumption resulted in low body fat percentages (Mahan, 2002).

Awareness of the athletes in determining proper dietary preferences and behaviors should be made part of the training programs for proper nutrition habits (USA Weightlifting Federation, 2013). The nutritional habits are an important part of the weight training and high performance goals. Each athlete should be focused on the nutritional program to determine when to consume meals according to the training and the energy needs, as well as the quality of the consumed foods and supplements.

It seems important to increase the awareness of which nutritional habits are exhibited in both sports and daily life. A study investigating the direct relationship between nutrition habits and performance of Turkish weightlifters is not available in the literature. Thus, the aim of this study was to investigate the relationship between nutrition habits of elite female and male weightlifters and weight adjustment and performance.

2. Material and Method

2.1 Participants

Data were obtained from 27 male and 16 female volunteer weightlifters training in the preparation camps of the Turkish National weightlifting team in Ankara and Konya. Also the approval forms were collected from National junior and senior athletes in 2014. Senior category is composed of two age groups including 20-22 years and over 23 years.

The mean age and body weight values of male seniors participants were 26,94 ± 4,92 years, 71,63 ± 16,69 kg while the these values for male junior participants were 18,55 ± 0,69 years of age, 80,18 ± 16,06 kg, respectively. While the mean age and body weight values of junior female participants were 20 ± 1,87 years, 69,2 ± 6,94 kg, these values were for female seniors were 23,09 ± 3,08 years, 59,18 ±8,05 kg, respectively.

2.2 Data Collection Tools

The recordings of official male and female athletes' clean and jerks, snatches and weights they have lifted in total in the National and international competitions were provided from the Turkish Weightlifting Federation. Following questions were asked to determine whether the age, weight, education level, national and international success, monthly income level, weight loss status and nutrition of the weight lifters are adequate or not and whether they use ergogenic substances or not as well as nutrition knowledge level, fluid consumption, pre-competition dietary type.

2.3 Data Analysis

After determination of normal data distribution, t-test was used for comparisons between two groups, and one-way analysis of variance (ANOVA) was applied for the comparison of multiple groups. The post hoc LSD test (the least significance test used in group comparisons) was used to determine differences. Fisher exact test was used to determine the distribution and proportions of male and female weightlifter groups according to independent variables in different

dependent variables. Spearman rank order correlation coefficients were calculated to determine the level of relationships between dependent and independent variables (Jascaniene et al., 2013).

3. Results

Dependent variables including clean and jerks, snatches and weights they have lifted in total that make up the performance of the weight lifters, whether they are fed adequately, whether they are fed or not, whether they have enough weight, whether they have enough knowledge about nutrition, whether they pay attention to fluid intake during training, what type of diet they use before the competition, whether they use ergogenic substances, respectively, are evaluated according to different independent variables. These independent variables consist of age groups, education level, monthly income level, competition category, and weight groups, national and international successes. The results were presented if they were statistically significant.

Unlike female in the age groups, the amounts of weights of the male weightlifters' clean and jerks, snatches and weights they have lifted in total differed significantly ($p < 0.05$) (Table 1).

Table 1. Comparison of clean and jerk, snatch and combined total with respect to age groups in male and female weightlifters

Variables	Age Groups	Males						Females					
		N	X	SD	F	Sig.	LSD	N	X	SD	F	Sig	LSD
Clean and Jerk (kg)	G 1. (18-19 years)	10	139,8	20,79	5,932	,008**	G3<G1, G2	2	89,5	27,58	,083	,921	ND.
	G 2. (20-22 years)	5	136,4	28,58				9	95,67	19,69			
	G 3.(23 years>)	12	170,29	24,14				5	95,4	17,36			
	Total	27	152,72	27,92				16	94,81	18,49			
Snatch (kg)	G 1. (18-19 years)	10	128,8	14,94	3,542	,045*	G3>G2	2	76,5	19,09	,667	,530	ND.
	G 2. (20-22 years)	5	121	17,83				9	83,89	11,47			
	G 3.(23 years>)	12	144,13	20,59				5	76,4	13,39			
	Total	27	134,17	19,89				16	80,63	12,53			
Combined Total (kg)	G 1. (18-19 years)	10	258,6	46,52	4,285	,026*	G3<G1, G2	2	166	46,67	,224	,802	ND.
	G 2. (20-22 years)	5	235,2	69,77				9	179,56	26,53			
	G 3.(23 years>)	12	306,92	47,63				5	171,8	30,42			
	Total	27	275,74	57,75				16	175,44	28,17			

*p<0.05, **p<0.01. LSD= Least Significance Difference; ND.=No Difference.

According to weight groups, unlike female, male weightlifters' clean and jerks, snatches and weights they have lifted in total differed significantly ($p < 0.05$) (Table 2).

Table 2.Comparison of clean and jerk, snatch and combined total with respect to weight classes groups in male and female weightlifters

Variables	Weight Groups	Males						Females				
		N	X	SD	F	Sig.	LSD	N	X	SD	t	Sig
Clean and Jerk (kg)	Light	5	135,2	14,08	4,445	,023*	G3>G1, G2	7	86,86	18,31	-1,593	,133
	Middle	10	142,7	21,76				9	101	17,07		
	Heavy	12	168,38	29,76				-	-	-		
	Total	27	152,72	27,92				16	94,81	18,49		
Snatch (kg)	Light	5	113	9,38	8,709	,001**	G3>G1, G2	7	76,43	14,55	-1,199	,250
	Middle	10	129,7	20,14				9	83,89	10,4		
	Heavy	12	146,71	13,34				-	-	-		
	Total	27	134,17	19,89				16	80,63	12,53		
Combined Total (kg)	Light	5	248,2	22,5	1,884	,174	ND.	7	163,29	30,44	-1,599	,132
	Middle	10	262,3	55,62				9	184,89	23,74		
	Heavy	12	298,42	64,02				-	-	-		
	Total	27	275,74	57,75				16	175,44	28,17		

*p<0.05, **p<0.01. LSD= Least Significance Difference; ND.=No Difference.

In male weightlifters, the rate of paying attention to fluid intake during the training sessions between the light, middle and heavy weight groups was significantly different (Fischer's exact p value=.028, $p<0.05$). In females, there were no significant differences between light and middle weight groups (Fischer's exact p value=.400, $p>0.05$) (Table 3).

Table 3.Comparison of the fluid intake in training with respect to weight classes groups in male and female weightlifters.

Weight Categories	Males			Weight Categories	Females		
	Yes	No	Total		Yes	No	Total
Light Weights (56, 62 kg)	3	2	5	Light Weights (48, 53 kg)	5	2	7
Middle Weights (69, 77, 85 kg)	10	0	10	Middle Weights (58, 63 kg)	8	1	9
Heavy Weights (94, 105 kg)	12	0	12	Heavy Weights (69, 75 kg)	-	-	-
Total	25	2	27	**Total**	13	3	16

Fischer's exact p value=.028, p<0.05 for males; Fischer's exact p value=.400, p>0.05 for females

While the rate of ergogenic products' usage according to the educational level of male weightlifters differentiated (Fischer's exact p value=.024, p<0.05), this ratio was not differed among secondary school, high school and university graduates in female (Fischer's exact p value=.951, p>0.05) (Table 4).

Table 4. Comparison of the usage of ergogenic supplements before competition with respect to education levels in male and female weightlifters

	Males			Females		
Education Level	Yes	No	Total	Yes	No	Total
Secondary School	3	5	8	1	3	4
High School	9	5	14	1	5	6
University	2	3	5	5	1	6
Total	14	13	27	7	9	16

Fischer's exact p value=.024, p<0.05 for males; Fischer's exact p value=.951, p>0.05 for females

While the rate of use of ergogenic products by male weightlifters according to junior and senior category did not change (Fischer's exact p value=.436, p>0.05), this ratio significantly varied between the junior and senior categories ((Fischer's exact p value=.034, p<0.05) in female (Table 5).

Table 5. Comparison of the usage of ergogenic supplements with respect to competition category in male and female weightlifters

Competition Category	Males			Females		
	Yes	No	Total	Yes	No	Total
Junior	5	6	11	0	5	5
Senior	9	7	16	7	4	11
Total	14	13	27	7	9	16

Fischer's exact p value=.436, p>0.05 for males; Fischer's exact p value=.034, p<0.05 for females

While the rates of use of ergogenic products between national and international male's weightlifters do not change (Fischer's exact p value=.252, p>0.05), this ratio varies significantly between national and international male's weightlifters (Fischer's exact p value=.001, p<0.01) (Table 6).

Table 6. Comparison of the usage of ergogenic supplements between national and international athletes in males and females

	Males			Females		
Competition Category	**Yes**	**No**	**Total**	**Yes**	**No**	**Total**
National	10	6	16	0	8	8
International	4	7	11	7	1	8
Total	14	13	27	7	9	16

Fischer's exact p value=.252, p>0.05 for males; Fischer's exact p value=.001, p<0.01 for females

While the usage ratios of ergogenic products between the light and Middle weight groups of male weightlifters varied significantly (Fischer's exact p value=.041, p<0.05), these ratios did not change significantly between national and international female weightlifters (Fischer's exact p value=.100, p>0.05) (Table 7).

Table 7. Comparison of the usage of ergogenic supplements with respect to weight classes in male and female weightlifters

Weight Classes	**Males**			Weight Classes	**Females**		
	Yes	**No**	**Total**		**Yes**	**No**	**Total**
Light Weights (56, 62 kg)	2	3	5	Light Weights (48, 53 kg)	3	4	7
Middle Weights (69, 77, 85 kg)	2	8	10	Middle Weights (58, 63 kg)	4	5	9
Heavy Weights (94, 105 kg)	10	2	12	Heavy Weights (69, 75 kg)	-	-	-
Total	14	13	27	**Total**	7	9	16

Fischer's exact p value=.041, p<0.05 for males; Fischer's exact p value=.100, p>0.05 for females

In males the monthly income or socio-economic level in males showed high correlation with the average of clean and jerks score (r=.495 , p <.01) and total score (r=.460, p <.05) while the ergogenic aid in females was significantly correlated to the average snatch score (r=.505, p<.05) and total score (r=545, p<.05).

4. Discussion

Sexual dimorphism indicates differences in body size and shape between male and female, leads male to have a larger body structure and better snatches and clean and jerks averages. Adult male is taller (7%) than female (Kirchengast, 2010). World records in the records of the World Weightlifting Federation (IWF) confirm that clean and jerks, snatches, and weights they have lifted in total differ in favor of male between male and female weightlifters (http://www.iwf., 2015). The results of our study confirm the gender-dependent performance difference in clean and jerks, snatches and weights they have lifted in total of male weightlifters differed significantly (p <0.05) (Table 1).

The average values of clean and jerks, and snatches in males significantly differ among the light, middle and heavy weight groups, except for the weight averages lifted in total. In these two criteria, the heavy weight has larger average values than the light weight and the middle weight. In female, there is no significant difference between light and middle weights.

The average values of clean and jerks, and snatches is significantly differed in national and international females weightlifters while there were no significant differences between two groups in males (Table 2). These results seemed similar with the gender and age-related differentiation indicated by Wells (2007) and Loomba and Styne (2009).

High level training loads lead to organic problems in both genders when accompanied by inadequate nutrition. Anemia, mineral loss, menses in female and other nutritional disorders were observed. Among the athletes, these disorders are not in the same form (Hall & Lane, 2001; Onywera et al., 2009; Farajian et al., 2004; Smolak et al., 2000). Weight lifting, training with maximal loads, is one of the most outstanding sports where nutritional deficiencies are reflected in performance. Low calorie intake from food leads to loss of muscle mass, menstrual disorder, increased fatigue, and consequently a decrease in athlete performance (Ainsworth et al., 2000). In this study, malnutrition in male and female weightlifters were not reported in terms of education level, monthly income level, competition category, size, nationality or international status. Similar to this study, Cuspiti et al. (2000). reported that better nutritional attitudes and knowledge levels of athletes are appropriate when compared to ordinary individuals, suggesting a positive effect of sport on eating habits (Cuspiti et al., 2000).

On the other hand, Burke (1995). reported that there is a meaningful relationship between the level of knowledge on nutrition and poor nutrition habits (Manjarrez and Birrer, 1983). Grandjean (1997). reported that athletes were not different from their cultural norms despite the increase in knowledge levels of the athletes on the nutritional level. In the United States, it was reported that the level of knowledge of athletes on general nutrition was not different (Grandjean, 1989).

Food and fluid restrictions have a negative effect on the physical and psychological performance of athletes (Boisseau et al., 2015). On the other hand, many weightlifters do not pay enough attention to fluid intake as other food items when they lose weight or during normal trainings.

In this study, the rate of paying attention to fluid intake during the training sessions between the light, middle and heavy weight groups in male weightlifters differed significantly (Fischer's exact p value=.028, p<0.05). In females, there were no significant differences between light and middle groups (Table 3). The best way to raise awareness and change the negative attitudes of such a deficit is to train the athletes in an Olympic sense (Boisseau et al., 2015).

In this study, the diet types consumed before the competition between light, middle and heavy weight groups in male weightlifters not differentiated both in two genders. It seems impossible to compare the results of this study with the results of daily caloric consumption of weightlifters and diet analyzes in the literature, since daily caloric calculation and diet analysis are not performed in this study. It was shown that Brazilian weightlifters are within normal limits on

consuming basic food items (Cabral et al., 2006). Although lower carbohydrate consumption is observed in dietary records, this type of behavior is not generalized for all weightlifters (Cabral et al., 2006).

In general, protein supplements have been shown to improve physical performance before and after training (Hoffman et al., 2009; Josse et al., 2010).lean body mass (Cribb & Hayes 2006; Josse et al., 2010). On the other hand, specific gains vary according to the type and amount of proteins (Hoffman et al., 2009; Andersen et al., 2005). While the usage rate of ergogenic products according to the educational level of female weightlifters is not changed, this ratio varies significantly between secondary school, high school and university graduates (Fischer's exact p value=.024, $p<0.05$) in males (Table 4). Olympic athletes' food consumption includes many factors such as the presence of food, food preference, and economic factors (Wolinsky & Driskell, 2001). While the rates of using ergogenic products according to the competition categories of male weightlifters are unchanged, this ratio varies significantly between the junior and senior categories (Fischer's exact p value=.034, $p<0.05$) in females (Table 5). No significant changes was observed in the usage rates of ergogenic substances among national and international male weightlifters but this value varies significantly in females (Fischer's exact p value=.001, $p<0.01$) (Table 6).

While the use of ergogenic products among light and middle groups of male weightlifters varied significantly (Fischer's exact p value=.041, $p<0.05$ for males) in contrast to insignificant difference in females (Table 7).

In the other variables related to dietary habits, no significant differences were found between the groups. It is clear that education on ergogenic aid is the most important instrument in the elimination of differences among weight classes and between national and international athletes.

In a study carried out by Zaggelidis et al. (2008) emphasizing this fact, 74.71% of Greek judo athletes reported that ergogenic aids had a positive effect, 22.66 % of them reported they had no effect and 2.63% of them reported they had a negative effect. These researchers also emphasized the need for educating athlete to use ergogenic substances and to learn side effects. Cabral et al. (2006) reported that the intake of protein in the diet of Brazilian weightlifters was to meet their needs, but inadequate for only one male and one female athlete.

While the monthly income or socio-economic level in males showed high correlation with the average of clean and jerks score ($r=.495$, $p <.01$) and total score ($r=.460$, $p <.05$), the ergogenic aid in females was significantly correlated to the average snatch score ($r=.505$, $p<.05$) and total score ($r=545$, $p<.05$).

Some of studies investigating the relationship between nutrition knowledge and dietary intake in athletes have reported that athletes with the higher nutritional knowledge were from the higher socioeconomic level and educational levels (Worsley, 2002; Parmenter & Wardle, 1999). Trakman, et al. (2016) concluded that there was difficulty in the assessment of nutrition knowledge in athletes. As a result, all athletes should follow specific nutritional strategies before, during and after training and competition to enhance their physical and mental performance (The Nutrition Working Group of Medical and Scientific Commission of International Olympic Committee, 2016).

5. Conclusions

The weight lifted in the clean and jerks, and snatch by male weightlifters varies depending on the age and weight classes. In addition the level of attention to fluid intake during training and the consumption of a dietary-type diet before competition vary according to the weight classes in male. The usage level of ergogenic products differ between national and international male and female weightlifters according to their education levels and competition categories.

For determining the effects of sport-specific nutritional habits on weightlifting performance, it is suitable to use a survey aiming to nutritional habits of the athletes with different ages, genders, socio-economic, educational levels and performance related to the nutrition knowledge, fluid consumptions, the types of pre-competition diet, the usage of ergogenic substances.

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