



Determination of Knowledge and Attitude Toward Doping and Sports Dietary Supplements Among Elite Wrestlers

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Abstract

Objectives: The aim of this study is to examine the attitudes and levels of knowledge among Turkish wrestlers regarding athlete nutritional supplements and doping, with the objective of investigating their potential applications in enhancing muscle endurance and reducing recovery times.

Methods: A total of 196 elite wrestlers voluntarily participated in the study, competing in the Greco-Roman, women's, and freestyle categories. Participants' attitudes and knowledge levels regarding sports nutritional supplements and doping, along with their anthropometric data, were assessed through a three-stage questionnaire and face-to-face interviews.

Results: Significant differences were observed among participants competing in the Greco-Roman and women's styles and those in the freestyle category regarding the previous use of sports nutritional supplements ($p=0.003$; $p<0.01$). In comparison to athletes in other groups, women statistically preferred sports nutritional supplements specifically for "increasing muscle mass" ($p=0.11$; $p<0.05$). Freestyle wrestlers expressed a statistically significant negative opinion about the use of sports nutritional supplements compared to athletes in other styles ($p=0.015$; $p<0.05$). In addition, female participants exhibited a higher level of knowledge about ergogenic aids compared to male participants ($p=0.000$).

Conclusion: The intensive use of different muscle groups in various wrestling competition categories influences participants' attitudes toward sports nutritional supplements. Wrestlers in the Greco-Roman and women's categories demonstrated a more positive inclination towards sports nutritional supplements, indicating a tendency to use these supplements to shorten recovery times, increase muscle mass, and enhance overall strength.

Keywords: Doping, ergogenic, Greco-Roman, sports nutritional supplements, wrestling.

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Wrestling is an individual, Olympic combat sport worldwide. It is known as an ancestral sport in Turkey since pre-historic times. The 63% of medals won by Turkish athletes in the Olympics belong to the wrestlers, and 44% of them are gold medals.^[1] Wrestling is a sport that requires strength, concentration, coordination, energy, skill, agility, and muscular endurance.^[2] To increase the desired success, energy, performance, maintain health, avoid malnutrition, support the immune system, and shorten recovery time

after injury, wrestlers use nutritional supplements such as sports dietary supplements (SDS) and ergogenic aids that may be recommended by the teammates, competitors, coaches, and friends.^[3] The regulation of these products is not like medicinal products. They may contain undeclared substances or substances that are banned by the World Anti-Doping Agency (WADA) such as anabolic steroids, beta2 agonists, and stimulants.^[4] Even the dosage of ingredients on the labels can be misleading.^[5]

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According to the WADA report, the number of abnormal test findings (AAF) recorded by anti-doping authorities worldwide has increased by more than 24% from 2012 to 2019. Indeed, wrestling ranks in the 3rd place according to the percentage of total findings of AAF results.^[6] Interestingly, studies have shown that using nutritional supplements increases the tendency of athletes toward doping-containing products.^[7] The aim of this study was to determine wrestlers' knowledge levels, attitudes, perceptions, and beliefs toward doping and SDS, their usage intentions, and consciousness levels based on the strong relationship between nutritional supplements and doping. To the best of our knowledge, such kind of study has not been performed on Turkish wrestlers.

Materials and Methods

Participants

A total of 196 elite wrestlers (167 males and 29 females) volunteered to participate in this study and were successfully qualified to take part in the national wrestling team camps in the Turkish championships in 2020. The wrestlers belonged to different categories such as seniors, U-23 and youth categories, Greco-Roman, women, and freestyle. The sociodemographic characteristics of the wrestlers are given in Table 1. All participants were previously informed about the study objectives to avoid misunderstanding of the survey questions. This research study was approved by the Ethics Committee of University of Health Sciences (no: 19/108) and it was carried out in accordance with the procedures approved by the Declaration of Helsinki.

Data Collection

This study was performed between March and November 2020. The questionnaire was divided into three parts. The first part includes 10 questions about the demographic

and personal information of the study participants. The second and third parts are about doping knowledge and SDS knowledge of the wrestlers that were composed of 20 questions each in the form of closed-type questions and questions scored using a 3-item Likert scale; 1 (yes), 2 (partially), and 3 (no). The wrestlers were asked about the usage, importance, reason for use, source of information, safety, and procurement of SDS in the second part. The third part tested the wrestlers' knowledge about doping practices and doping knowledge, beliefs, and attitudes for doping. The questionnaire was prepared by experts on the subject, taking examples from questions from a similar study^[8] and it was applied by one-to-one interview method.

Statistical Analysis

Descriptive statistical methods (mean, standard deviation, median, frequency, percentage, minimum, and maximum) were used to evaluate the data. Shapiro-Wilk test and graphical examinations were used to assess the normal distribution of the data. Mann-Whitney U test was used for comparisons between two groups of quantitative variables that did not show normal distribution. Pearson Chi-square test, Fisher's exact test, and Fisher-Freeman-Halton exact test were used to compare qualitative data. Spearman correlation analysis test was used to evaluate the relationship between variables. Number Cruncher Statistical System 2007 (Kaysville, Utah, USA) program was used for statistical analysis. Statistical significance was accepted as $p < 0.05$.

Results

A total of 196 elite wrestlers participated in the research, with 29 female and 167 male. The average age of the athletes was determined as 23.35 ± 5.49 . Statistical information about the anthropometric measurements of the athletes is presented in Table 1.

Table 1. Anthropometric measurements of athletes

	Total (n=196) Mean±SD min-max (median)	Woman (n=29) Mean±SD min-max (median)	Men (n=167) Mean±SD min-max (median)	p
Age (cm)	23.35±5.49 17–40 (22)	20.59±2.56 17–27 (20)	23.83±5.72 17–40 (22)	^b 0.006**
Weight (kg)	77.53±17.80 48–128 (75)	61.52±8.10 50–76 (60)	80.31±17.57 48–128 (77)	^b 0.000**
Height (cm)	173.26±8.82 150–197 (174)	165.03±6.78 150–177 (167)	174.69±8.35 151–197 (175)	^b 0.000**
BMI (kg/m ²)	25.54±3.85 18.8–41.2 (25.0)	22.52±1.98 18.82–26.30 (22.32)	26.06±3.86 18.75–41.29 (25.35)	^b 0.000**

^b: Mann Whitney U Test, **: $p < 0.01$. SD: Standard deviation, BMI: body mass index.

Table 2. Nutritional supplements usage according to wrestling styles

	Style						p
	Freestyle		Greco-Roman		Woman		
	n	%	n	%	n	%	
Have you ever used nutritional supplements?							
Yes	47	62.7	78	84.8	24	82.8	ª0.003**
No	28	37.3	14	15.2	5	17.2	
Protein supplements							
Yes	37	49.3	67	72.8	13	44.8	ª0.001**
No	38	50.7	25	27.2	16	55.2	
BCAA							
Yes	38	50.7	57	62.0	24	82.8	ª0.008**
No	37	49.3	35	38.0	5	17.2	
Glutamine							
Yes	26	34.7	48	52.2	12	41.4	ª0.072
No	49	65.3	44	47.8	17	58.6	
Arginine							
Yes	17	22.7	29	31.5	4	13.8	ª0.140
No	58	77.3	63	68.5	25	86.2	
Nitric Oxide							
Yes	5	6.7	9	9.8	1	3.4	ª0.613
No	70	93.3	83	90.2	28	96.6	
Creatine Phosphate							
Yes	23	30.7	47	51.1	7	24.1	ª0.004**
No	52	69.3	45	48.9	22	75.9	
Amino Acid Supplements							
Yes	17	22.7	27	29.3	2	6.9	ª0.033*
No	58	77.3	65	70.7	27	93.1	
Multivitamin multimineral supplements							
Yes	23	30.7	38	41.3	9	31.0	ª0.318
No	52	69.3	54	58.7	20	69.0	
Carbohydrate gels							
Yes	16	21.3	35	38	8	27.6	ª0.062
No	59	78.7	57	62	21	72.4	
Caffeine							
Yes	11	14.7	22	23.9	3	10.3	ª0.173
No	64	85.3	70	76.1	26	89.7	
Forest fruits							
Yes	8	10.7	10	10.9	0	0	ª0.164
No	67	89.3	82	89.1	29	100	
Tribulus terrestris							
Yes	18	24	36	39.1	1	3.4	ª0.001**
No	57	76	56	60.9	28	96.6	
L-Carnitine							
Yes	18	24	34	37	12	41.4	ª0.098
No	57	76	58	63	17	58.6	
Omega-3							
Yes	32	42.7	41	44.6	14	48.3	ª0.890
No	43	57.3	51	55.4	15	51.7	
Probiotic supplements							
Yes	13	17.3	24	26.1	9	31.0	ª0.225
No	62	82.7	68	73.9	20	69.0	

Table 2. Cont.

	Style						p
	Freestyle		Greco-Roman		Woman		
	n	%	n	%	n	%	
Conjugated Linoleic Acid							
Yes	4	5.3	7	7.6	1	3.4	ª0.782
No	71	94.7	85	92.4	28	96.6	
I don't use	24	32.0	12	13.0	3	10.3	
Why do you use them if you are using nutritional supplements?							
To increase my muscle mass	2	2.7	8	8.7	4	13.8	ª0.011*
To feel better	2	2.7	12	13.0	4	13.8	
To recover faster	16	21.3	23	25.0	5	17.2	
To be protected from diseases	4	5.3	2	2.2	1	3.4	
To improve my performance	27	36.0	35	38.0	12	41.4	
I don't use nutritional supplements	24	32.0	12	13.0	3	10.3	
Who recommended these supplements to you?							
Coach	7	9.3	11	12.0	12	41.4	ª0.001**
Nutritionist	17	22.7	31	33.7	11	37.9	
Doctor/ Pharmacist	7	9.3	6	6.5	0	0	
Friends	9	12.0	17	18.5	3	10.3	
Masseur	6	8.0	6	6.5	0	0	
Other	5	6.7	9	9.8	0	0	
I don't use	24	32.0	12	13.0	3	10.3	
Do you get support from someone about sports nutrition?							
No	48	64.0	40	43.5	11	37.9	ª0.009**
Yes	27	36.0	52	56.5	18	62.1	

^a: Freeman Halton Test, *: p<0.05, **: p<0.01.

When the athletes participating in the research were grouped according to styles, 29 (14.8%) female freestyle, 75 (38.3%) men's freestyle, and 96 (46.9%) men's Greco-Roman style participated in the study. The number of athletes under the age of 20 was 82 (41.8%), the number of athletes between the ages of 21 and 23 was 41 (21.4%), and the number of athletes over the age of 23 was 72 (36.7%).

Nutritional supplements usage according to wrestling styles is shown in Table 2. A statistically significant difference was found between the previous use of nutritional supplements by the wrestling styles of the athletes ($p=0.003$; $p<0.01$). The rate of using nutritional supplements in Greco-Roman and female wrestling is higher than the free wrestling style. A statistically significant difference was found between the athletes' consumption of protein-containing products according to their wrestling styles ($p=0.001$; $p<0.01$). "Why do you use them if you are using nutritional supplements?" was asked to the different wrestling style groups and a statistically significant difference was found between the answers given to the question ($p=0.011$; $p<0.05$). The rate of

answering "to increase my muscle mass" among women is higher than wrestling Greco-Roman and freestyle ones. The rate of those who say "to feel good about myself" in freestyle wrestling is lower than Greco-Roman and women (Table 2). Nutritional supplements knowledge levels according to wrestling styles are shown in Table 3. According to the wrestling styles of the athletes, the "Should every athlete use nutritional supplements?" question has been answered with a statistically significant difference ($p=0.015$; $p<0.05$). The rate of answering "No" for freestyle wrestling is higher than Greco-Roman and female ones. Likewise, women's partial response rate is higher than freestyle wrestlers (Table 3).

For the doping knowledge evaluation part the participants were asked, "Where did you first hear the word doping?" question's answer had a significant difference ($p=0.021$; $p<0.05$); the rate of female wrestlers that were given the answer "coach" is higher than that of freestyle and Greco-Roman wrestlers. "Can the athlete use doping as long as he is not caught?" was another question that showed a statistically significant difference ($p=0.044$; $p<0.05$). Greco-

Table 3. Nutritional supplements knowledge level according to wrestling styles

	Style						p
	Freestyle		Greco-Roman		Woman		
	n	%	n	%	n	%	
Do you receive information from health professionals about nutritional supplements?							
Yes	28	37.3	39	42.4	18	62.1	ª0.241
No	30	40	32	34.8	8	27.6	
Partially	17	22.7	21	22.8	3	10.3	
Are nutritional supplements doping?							
Yes	2	2.7	7	7.6	0	0	ª0.322
No	65	86.7	80	87	27	93.1	
Partially	8	10.7	5	5.4	2	6.9	
Should every athlete use nutritional supplements?							
Yes	22	29.3	37	40.2	8	27.6	ª0.015*
No	33	44	21	22.8	6	20.7	
Partially	20	26.7	34	37	15	51.7	
Is the natural diet of the athletes enough?							
Yes	22	29.3	37	40.2	8	27.6	ª0.591
No	33	44	21	22.8	6	20.7	
Partially	20	26.7	34	37	15	51.7	
Can athletes show the same performance without using nutritional supplements?							
Yes	17	22.7	18	19.6	4	13.8	ª0.676
No	31	41.3	44	47.8	11	37.9	
Partially	27	36	30	32.6	14	48.3	

^a: Fisher's Freeman Halton Test, *: p<0.05.

Roman wrestlers are more likely to say yes than women. The statistical evaluation of the answers given to the questions about the level of doping knowledge is presented in Table 4.

Discussion

Wrestlers resort to ergogenic supports to control body weight, increase performance, and shorten recovery times.^[9,10] According to the previous study, athletes who experience successful matches during a tournament have significantly induced ratings of fatigue and decreased strength and muscular power.^[11] This results with incomplete recovery, and declined levels of physical performance during tournaments. Ergogenic aids support performance and improve recovery.^[12] In this study, differences were found between wrestling styles regarding whether the wrestlers used nutritional supplements before or not. The rate of using nutritional support in Greco-Roman (p=0.003) and female (p<0.01) wrestlers was statistically significant. Greco-Roman style wrestlers are only allowed to use their upper body during the fight and it is forbidden to hold the lower body of the opponent's body. In freestyle, the use of the whole body is allowed.^[13] Freestyle athletes are also found to be less in need of information and support

from any nutrition-related specialist when compared to Greco-Roman and women elite athletes. According to this study's findings, women prefer to use nutritional supplements for muscle mass increase compared to other categories. The answer to feeling better was higher for Greco-Roman and women than for freestyle. In a study conducted with national wrestlers in Korea, the injury rates of Greco-Roman and female athletes were found to be higher.^[14] The reason behind the women prefer to use their nutritional supplements to increase their muscle mass may be related to their injury rates. A study found that sodium bicarbonate supplementation produced more effective results for men when compared with women.^[15] The muscle anatomy differences between the two genders are also may be effective. It has been known that men are usually stronger whereas women are not feeling fatigued as soon as men.^[16] Those could be other reasons to women rely on nutritional supplements more than other categories. Athletes competing in the Greco-Roman style have a higher incidence of injury in the lightweight than the heavyweight categories compared to the freestyle athletes.^[14] This may be the reason behind the higher levels of preference for nutritional supplements in Greco-Roman-

Table 4. Doping knowledge level according to wrestling styles

	Style						p
	Freestyle		Greco-Roman		Woman		
	n	%	n	%	n	%	
Do you use any drugs regularly?							
Yes	0	0	3	3.3	0	0	ª0.384
No	75	100	89	96.7	29	100	
Where did you first hear the word doping?							
Coach	27	36.0	30	32.6	20	69.0	ª0.021*
Doctor	16	21.3	17	18.5	5	17.2	
Nutritionist/ Masseur/ Physiotherapist	6	8.0	5	5.4	0	0	
Social media	20	26.7	23	25.0	2	6.9	
Others	6	8.0	17	18.5	2	6.9	
What do you know about the side effects of the drugs you use?							
A lot	8	10.7	5	5.4	7	24.1	ª0.088
Middle	28	37.3	43	46.7	13	44.8	
Little	24	32.0	32	34.8	7	24.1	
None	15	20.0	12	13.0	2	6.9	
Should doping be used to become an elite athlete?							
Yes	13	17.3	13	14.1	1	3.4	ª0.159
No	56	74.7	72	78.3	28	96.6	
Partially	6	8.0	7	7.6	0	0	
Do you believe that doping has side effects?							
Yes	56	74.7	72	78.3	26	89.7	ª0.138
No	15	20.0	10	10.9	1	3.4	
Partially	4	5.3	10	10.9	2	6.9	
Are there any athletes around you that you believe are doping?							
Yes	50	66.7	55	59.8	18	62.1	ª0.765
No	16	21.3	28	30.4	8	27.6	
Partially	9	12.0	9	9.8	3	10.3	
Can athletes use doping as long as they are not caught?							
Yes	15	20.0	24	26.1	1	3.4	ª0.044*
No	53	70.7	55	59.8	25	86.2	
Partially	7	9.3	13	14.1	3	10.3	
Should the country protect the athlete who is determined to have doping?							
Yes	15	20.0	25	27.2	1	3.4	ª0.063
No	46	61.3	52	56.5	23	79.3	
Partially	14	18.7	15	16.3	5	17.2	
Should successful athletes use doping to overcome their fear of losing?							
Yes	6	8.0	8	8.7	2	6.9	ª0.720
No	59	78.7	74	80.4	26	89.7	
Partially	10	13.3	10	10.9	1	3.4	
Do you think you have enough knowledge about doping?							
Yes	20	26.7	19	20.7	19	65.5	ª0.001**
No	32	42.7	50	54.3	6	20.7	
Partially	23	30.7	23	25.0	4	13.8	
Does the use of doping in sports lead to unfair competition?							
Yes	56	74.7	68	73.9	25	86.2	ª0.324
No	12	16.0	20	21.7	4	13.8	
Partially	7	9.3	4	4.3	0	0	

Table 4. Cont.

	Style						p
	Freestyle		Greco-Roman		Woman		
	n	%	n	%	n	%	
Do the health professionals in your institution have enough information about doping?							
Yes	25	33.3	42	45.7	16	55.2	ª0.041 *
No	33	44.0	28	30.4	4	13.8	
Partially	17	22.7	22	23.9	9	31.0	
Would you use doping to increase your country's success?							
Yes	14	18.7	12	13.0	2	6.9	ª0.170
No	51	68.0	74	80.4	26	89.7	
Partially	10	13.3	6	6.5	1	3.4	
Have you ever passed a doping control?							
Yes	43	57.3	73	79.3	27	93.1	ª0.001 **
No	32	42.7	19	20.7	2	6.9	

^a: Fisher's Freeman Halton Test, *: p<0.05, **: p<0.01.

style wrestlers. The answer to the question of whether each athlete should use nutritional support was found to be statistically different. Freestyle competitors answered this question "No" more than the other two groups. This result also overlaps with previous answers to the questions that detect reasons to use nutritional supplements.

Protein-based nutritional supplements are preferred by all elite athletes much more than other supplements that have been examined in this study. Protein supplements are related to improved muscle functions and recovery so this may be the reason behind the choice of this study's participants.^[17] Tribulus terrestris (TT) is another supplement that has been preferred by this study's participants. The potential anti-inflammatory and antioxidant effects of TT^[18] may be the reason behind this preference.

Compared to the other two groups, female athletes heard the word doping more from their coaches. This finding is also compatible with the findings related to trust level to the knowledge of participants' institutional health professionals. These results match with a previous study that examined wrestlers' knowledge sources about ergogenic aids.^[19]

Our findings showed that Greco-Roman style wrestlers are closer to using doping as long as they are not caught when compared with female athletes especially. This may be related to a possible higher risk of injury of Greco-Roman style wrestlers.^[14] In a study evaluating elite wrestlers' attitudes toward doping use, no difference was found between styles. This study revealed that the difference in attitude is related to education levels.^[20] In another

study it has been found that an increased education level was related to decreased knowledge about doping and increased thoughts about doping is not a threat to health.^[21]

According to this study's result, female athletes think that they have a higher level of knowledge about ergogenic aids than male athletes. This may be related to a possible extra need for the ergogenic aims of female athletes.

To our knowledge, this is the first study in Turkey that examines the attitudes and knowledge of wrestlers towards both nutritional supplements and doping in both genders and all styles of wrestling. A possible fear of answering the questions related to doping was a limitation of this study with the additional limitation that comes from unequal participants from both genders. Since wrestling is a very important sport in Turkey and it has a history going back to the Ottoman Empire^[22] the results of this study are important contributions for further studies related to wrestling and ergogenic aids.

Conclusion

The findings of the study indicate that elite wrestlers competing in the female and the Greco-Roman categories reported a greater need for sports nutrition supplements. This outcome is based on the belief that athletes in both categories require additional support to reduce recovery time, increase muscle mass, and contribute to overall performance. Further research is needed to assess the opinions of elite athletes in wrestling and other sports regarding the use of sports supplements and doping.

Disclosures

Ethics Committee Approval: The study was approved by the University of Health Sciences Hamidiye Non-interventional Research Ethics Committee (no: 19/108, date: 28/06/2019).

Authorship Contributions: Concept – M.A., İ.Ö.A., B.B.; Design – M.A., B.B., İ.Ö.A.; Supervision – B.B.; Funding – M.A.; Data collection and/or processing – M.A.; Data analysis and/or interpretation – M.A., B.B.; Literature search – İ.Ö.A., B.B.; Writing – İ.Ö.A., B.B., M.A.; Critical review – İ.Ö.A.

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