TURKISH JOURNAL OF HEALTH SCIENCE AND LIFE
TJHSL

Nutritional knowledge levels of e-sports players

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ARTICLE INFO

RESEARCH ARTICLE

Article history:
Received: 25 January 2026
Accepted: 24 June 2026
Available: 24 August 2026

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Turkish Journal of Health Science and Life
2026, Vol.9, 49-54.
DOI: https://doi.org/10.56150/tjhsl.1870335

ABSTRACT

Background: *E-sport is a novel sport type that e-athletes can have a sedentary lifestyle which causes various health problems, such as obesity.*
Objective: *This study aimed to determine the level of nutritional knowledge of e-sports players.*
Methods: *The data was collected and evaluated using a personal data form and the Nutrition for Sport Knowledge Questionnaire (NSKQ).*
Results: *A total of 90 e-sports players participated in the research. All participants were male and the average age was determined to be 21.8±2.11. It was found that 98.9% of the participants had poor nutrition knowledge, while only 1.1% had average-level knowledge. The average score of the e-sports players on the NSKQ was 24.88±1.00. The BMI values of the e-sports players were determined to be an average of 25.56 ± 0.8 kg/m^2. No significant relationship was found between the e-sports players' nutrition knowledge levels and league status (p>0.05).*
Conclusion: *Based on these data, the nutrition knowledge level of e-sports players is weak, and their BMI values indicate that they are overweight. To support health and optimize nutrition-related knowledge among e-sports players, nutrition education programs may be beneficial.*
Key Words: *E-sports player, nutrition, sedentary life*

1. INTRODUCTION

E-sport is a new generation sport type that involves team or individual competition through various software and devices, in which players are accepted as athletes in multiple countries. It requires more activity than most sports, both physically and mentally (1). In some countries, e-athletes are accepted as official athletes, and e-sports federations exist in countries such as America and England. The first e-sports team in Turkey is the Dark Passage team, founded in 2003. Then, the prevalence of e-sports teams increased with Team Turquality and HWA Gaming (2). In 2016, Turkey's national team became the world champion by beating Argentina in the final in the "Counter-Strike: Global Offensive" game held in Belgrade, Serbia (3).

The interest in e-sports performed by tens of thousands of amateur and professional people, generally between the ages of 15-25, has been active for over the last 3-4 years (1). This interest is increasing daily due to its potential source of income. The spreading internet and social media also increase the number of e-sports tournaments. Individuals who start e-sports younger can continue this sport until middle age. In this case, intense training and the nutrition that comes with this training become habits for e-athletes. Although

6-10 hours of daily training involves high physical activity, e-athletes can have an inactive lifestyle because they only exercise hand-arm muscles, and the activity is done on the desk. This situation can cause many health problems caused by an inactive lifestyle, such as obesity (2). Studies have observed that as the time spent in video games increases, the prevalence of obesity and sedentary status also increases (4-6).

A recent scoping review of esports nutrition research concluded that although esports athletes generally recognize the importance of nutrition for performance, current evidence suggests that many exhibit suboptimal dietary habits that may negatively affect both health and performance. The authors also emphasized the limited availability of nutrition-related research in esports populations (7). Nutritional and lifestyle factors may influence cognitive performance in e-sports athletes. Goulart et al. reported that many e-sports athletes failed to meet recommended intakes for several micronutrients and fruits and vegetables, while higher intakes of selected nutrients were associated with better cognitive performance. These findings highlight the potential importance of nutrition in supporting both health and performance among e-athletes (8).

This study was carried out to evaluate sports nutrition knowledge and BMI characteristics of e-athletes.

2. MATERIALS AND METHODS

The study data was conducted using the Nutrition for Sport Knowledge Questionnaire (NSKQ) and personal information form, between May and October 2022, by asking e-athletes to answer the online questionnaire at an available time.

The research population consists of active e-athletes participating in national and international official e-sports competitions organized in Turkey. The universe size cannot be determined because some e-sports tournaments are held temporarily in certain seasons and some e-sports players participating in these tournaments do not continue their e-sports careers. Due to the limited number of active e-sports athletes participating in official national and international competitions during the study period, all eligible volunteers who met the inclusion criteria were invited to participate. The study was completed with 90 participants.

Height and body weight data were obtained through self-report. Anthropometric information was available for only 26 participants; therefore, BMI analyses were conducted using the available data only.

The study group consists of individuals aged 18-35 who are active e-athletes participating in national and international official competitions held in Turkey. Participants who had a head injury within the last week were not accepted into the study. As the sampling method, convenience sampling method was preferred, and the study was completed with 90 participants.

2.1. Nutrition for Sport Knowledge Questionnaire (NSKQ)

The original Nutrition for Sport Knowledge Questionnaire (NSKQ), developed by Trakman et al. (2017) (9), was adapted and validated for the Turkish population by Çırak et al. (2019). The Turkish-adapted version (10) of the NSKQ was used in this study. The Cronbach Alpha Internal Consistency Coefficient of NSKQ is 0.908. The scale has 6 sub-dimensions, and the reliability coefficient for these dimensions is determined as 0.195 for weight control, 0.769 for macronutrients, 0.687 for micronutrients, 0.655 for sports nutrition, 0.712 for supplements, and 0.726 for alcohol (10).

Overall performance in the scale (68 statements were considered as 100) was determined using the scoring system. Those who scored between 0-49% were considered poorly knowledgeable, 50-65% were considered averagely knowledgeable, 66-75% were considered well knowledgeable, and 76-100% were considered perfectly knowledgeable.

2.2. Statistical Analysis

The research data were analyzed using SPSS 24 (Statistical Package for the Social Sciences) program. The data was analyzed by descriptive statistical methods such as number, percentage, mean, and standard deviation. The Student t-test was used to examine the difference between the

means. Independent samples Student's t-test was used to compare NSKQ subdimension and total scores between League 1 and League 2 players. The significance level was accepted as $p<0.05$.

2.3. Ethical Aspect of Research

Approval was received from Aydın Adnan Menderes Üniversitesi to conduct the research. An explanation was made to the e-athletes who met the sampling criteria, and consent was obtained from those who wanted to participate in the research.

3. RESULT AND DISCUSSION

All participants were male with a mean age of 21.8±2.11 (not shown in the table). When the participants were classified according to the sports nutrition knowledge scale, it was determined that 98.9% (n=89) had poor knowledge, 1 person had average knowledge, and the average score was 24.88±1.00 (Table 1).

Table 1. *Classification of participants on the sports nutrition knowledge scale (n=90)*

NSKQ *classification*			
Poor knowledge		*Average knowledge*	
Number	*%*	*Number*	*%*
89	98.9	1	1.1

Of the 90 participants, 39 competed in League 1 and 31 competed in League 2, while 20 participants did not report their league status. Therefore, league-based comparisons were based on the 70 participants who provided league information. NSKQ score of participants was 24.88±1.00 for the sum of 6 subdimensions (Table 2). Body-mass index (BMI) value of participants was 25.56±0.8 kg/m^2 which is considered as overweight (Table 3). BMI values were calculated for the 26 participants who provided both height and body weight information. The mean BMI was 25.56 ± 0.8 kg/m², corresponding to the overweight range according to WHO classification. Due to the limited number of participants with complete anthropometric data, BMI category distributions were not presented separately.

Electronic sports is a new expanding athletic activity in which high grades of cognitive performance and attention are needed. Strategies to boost performance have emerged with its rising popularity. Making better esports athlete performance may bound up with nutritional or lifestyle agents (1,8)

In our study, all participants were male. In another study by Bayram, 94.5% of the participants were men and 5.5% were women (11). According to the findings regarding the gender of the participants, e-sports are mostly performed by men.

In this study, BMI values were determined as 25.56±0.8 kg/m^2 (Table 3). Goulart et al. have found that the BMI values were 27.5±8.4 kg/m^2 for males, 26.0±6.7 kg/m^2 for females (8). Anthropometric measurements of e-athletes are similar in both studies. This shows us that e-athletes are within the BMI range considered overweight.

Since there is no study measuring the sports nutrition knowledge levels of e-athletes, the results were compared with studies measuring the sports nutrition knowledge levels of traditional athletes.

Table 2. *NSKQ score of participants for 6 subdimesions and 2 leagues*

Subdimensions	***League 1***	***League 2***	***Total***	***p***
Weight Control	1.01±0.17	0.98±0.22	0.96±0.11	0.203
Macronutrients	9.59±0.68	10.19±0.78	9.16±0.43	0.238
Micronutrients	4.84±0.37	5.15±0.61	4.77±0.29	0.230
Sports Nutrition	3.02±0.38	2.70±0.45	2.76±0.24	0.268
Supplements	2.36±0.37	1.67±0.34	2.14±0.23	0.387
Alcohol	5.88±0.35	4.95±0.47	5.10±0.25	0.385
Total	26.71±1.42	25.57±2.05	24.88±1	0.266

League comparisons were performed among participants who reported league information.

Table 3. *Anthropometric measurements of participants*

	Min	***Max***	***Mean ± SD***
Height (cm)	171	211	183.38±1.92
Body weight (kg)	60	110	85.65±3.03
Body-mass index (BMI) (kg/m ^{2})	17.92	32.74	25.56±0.8

In this study, 98.9% of e-athletes were measured as having poor knowledge and 1.1% had average knowledge (Table 1). NSKQ score was measured as 24.88±1 (Table 2). In light of this information, it appears that e-athletes' sports nutrition knowledge levels are insufficient. In another study, the sports nutrition knowledge levels of professional football and volleyball players were measured, and it was found that all of the athletes had poor knowledge. NSKQ scores were measured as 20.06±7.49 (12).

E-sports is a sport type that is generally done at young ages when proper nutrition is not known. According to the findings, e-athletes demonstrated low levels of sports nutrition knowledge. Considering the importance of adequate nutrition for health and performance, nutrition education programs may be beneficial for this population. However, further studies evaluating dietary intake, physical activity, and health-related outcomes are needed. The low nutrition knowledge scores observed in the present study may partially explain the suboptimal dietary patterns reported in previous e-sports research. For example, Goulart et al. found that many e-sports athletes did not meet recommended intakes for fruits, vegetables, and several micronutrients, emphasizing the need for improved nutrition education in this population (8).

Participants had a mean BMI of 25.56 kg/m², which falls within the overweight range according to WHO classification. Considering that the ratio of overweight and obese individuals over the age of 15 to the total population in Turkey is 56.1%, (13) individuals who do e-sports at a young age can be protected from nutrition-related diseases that may occur in the future with a healthy diet. A study investigating the health behavior of e-athletes in Germany has reported that average fruit and vegetable consumption is 2.7±1.8 portions/day and it is 11% of the daily recommendation. This study also showed that the mean quantity of sedentary behavior is 7.7±3.6 h a day (14). Recent evidence has also demonstrated associations between BMI and health-related outcomes among e-sports athletes. In a study of Polish e-sports players, higher BMI values were associated with less favorable health indicators, highlighting the importance of monitoring nutritional status in this population (15). Obesity may occur when individuals consume more energy than they need or spend less than they consume by adopting a sedentary lifestyle (16). A study by DiFrancisco-Donoghue et al. indicated that 40% of e-athletes were not enough active, as they were attending less than 60 min of daily physical activity (17).

When the score of the NSKQ and its subdimensions were evaluated, no significant difference was observed between e-athletes playing in the 1st league and 2nd league (Table 2). Based on this finding, we can say that there is no relationship between e-athletes' sports nutrition knowledge levels and their success, but since 98.9% of the players have poor knowledge according to the NSKQ, it may be useful to retest this comment with other studies.

There were difficulties in collecting data due to the busy training and competition calendars of e-athletes. The insufficient scientific studies on e-sports have made it difficult to review the literature on this subject. E-athletes' sports nutrition knowledge levels are mostly poor. According to the BMI values of e-athletes, it is seen that they are overweight. Based on the mean BMI value, participants were classified within the overweight range. However, BMI alone is insufficient to determine physical activity patterns or lifestyle characteristics. These findings suggest that the participants had a mean BMI within the overweight

range; however, further body composition assessments are needed to draw conclusions regarding obesity status.

This study has several limitations. First, anthropometric measurements and questionnaire responses were based on self-reported data. Anthropometric data were available for only a subset of participants (n=26), which limited further analyses and interpretation of BMI-related findings. Second, all participants were male, limiting the generalizability of the findings to female e-sports athletes. Third, convenience sampling was used, which may introduce selection bias. Future studies including larger and more diverse samples are recommended.

4. CONCLUSION

Considering the findings obtained from the study, it is thought that working with e-athletes and dietitians together may have positive effects on both the health and performance of e-athletes, and it is recommended that studies be carried out to increase the nutritional knowledge of e-athletes.

Acknowledgements: This article has been prepared by deriving it from Deniz Arlı's master's thesis, numbered 768333.

Financial Support: This research received no grant from any funding agency/sector.

Conflicts of Interest: The authors declared that there is no conflict of interest.

Ethical Statement: Approval was received from Aydın Adnan Menderes Üniversitesi to conduct the research.

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