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Original article

The Validity and Reliability Study of the Turkish Version of the General and Sport Nutrition Knowledge Questionnaire (GeSNK)

Pinar Gokensel Okta[1], *Emine Yildiz*[1]

[1] Eastern Mediterranean University, Faculty of health Sciences, Department of Nutrition and Dietetic E-mail: gokensel_pinar@hotmail.com

Abstract

Background: Since nutrition is important for success in sports, studies have been conducted for many years to investigate athletes' knowledge about nutrition. Questionnaires and scales developed to determine athletes' levels of nutrition knowledge have drawn attention. This study is the validity and reliability study of the Turkish version of the General and Sport Nutrition Knowledge Questionnaire (GeSNK).

Method: This study's participants were 401 male soccer players in the Cyprus Turkish Football Association who were 10-19 years old. The GeSNK has 62 items in 2 subscales. The first subscale, general nutrition knowledge, has 29 items. The second subscale, sports nutrition knowledge, has 33 items. The reliability of the questionnaire was determined using the split-half method, Kuder-Richardson Formulas 20 and 21, and the Cronbach's alpha reliability coefficient (Cronbach's alpha reliability should be over 0.70).

Item discriminating power and item discrimination index were also used. The items with an item discrimination index below 0.20 were removed from the test. The content validity of the questionnaire was determined by consulting experts.

Findings: This study found a Cronbach's alpha value of 0.884, indicating that the Turkish version of the GeSNK is reliable.

Conclusions: The Turkish version of the GeSNK can be used to measure athletes' nutrition knowledge levels.

Keywords: adolescents, sports nutrition, nutrition knowledge levels, the General and Sport Nutrition Knowledge Questionnaire.

Introduction

In recent years, unhealthy dietary habits have increased along with both increases in population growth rates and changes in people's lifestyles. This sets the scene for increased health problems due to poor nutrition. Many health problems, especially obesity, are due to the consumption of high-fat and sugary foods. Healthy dietary habits have an important place in both the improvement of people's health and the fight against diseases (1, 2).

The literature shows that a balanced and healthy diet is important for both personal and social health (3, 4, 5). Studies have shown that unhealthy dietary habits have recently been common at all levels of society, leading to the prevalence of some health problems (6, 7, 8, 9).

Nutrition is clearly important at all times for humans, from conception until old age. To live healthily, people should maintain healthy and balanced diets. In recent years, studies have been carried out to help people develop healthy dietary habits. They are mainly intended to encourage people to adopt healthy dietary habits to protect community health, but also discuss which diets are healthy diets (10, 11).

Sedentary lifestyle is another factor that has adversely affected human health in recent years (12). Sedentary lifestyle is considered a global health problem because 23% of adults worldwide and 81% of 11-17 year-olds have low levels of physical activity (13). To minimize health problems due to sedentary lifestyle, people should take up sports activities and increase their physical activity levels (14). The literature indicates that participating in sports supports physical (15, 16, 17), psychological (18, 19, 20, 21), social (22, 23) and motor development (24, 25, 26) and protects health (27, 28).

Sports nutrition is a constantly developing area thanks to hundreds of studies published every year, and since nutrition is an important factor in athletes' performance, this topic will probably draw even more attention. Nutrition affects almost every process in the body from energy production to the recovery period after exercise. Needs vary by age and gender, so to gain maximum benefit from sports activities, it is very important to have a nutrition program that is specific to a specific sport. Similarly, nutrition is important for the recovery period after physical exertion (29, 30, 31, 32). The primary reason for this is that athletes need more energy than sedentary people. Furthermore, studies indicate that proper nutrition is essential for athletes to get the calories necessary and for sports performance and to ensure hydration (33). They also indicate that proper nutrition for athletes helps to ensure good sports performance and balanced health (34). Therefore, new strategies have been developed for sports nutrition in recent years (35).

This information indicates that proper nutrition has many benefits for athletes. Therefore, athletes need to consume food that is appropriate for their sport according to certain principles. For athletes to consume food according to nutrition principles, it is very important that they are knowledgeable about both general nutrition and sports nutrition. Nutrition knowledge is a modifiable determinant of dietary behavior, which can significantly affect athletic performance. Current studies of this topic should be followed because the research is constantly being updated, and this way, accurate information can be obtained about the role of nutrition in performance and training (29, 30, 36). Many scales and questionnaires have been developed for general nutrition and sports nutrition (37, 38, 39, 40), and there are also many studies of the levels of nutrition knowledge and dietary habits of athletes in different sports (41, 42, 43, 44).

This is a validity and reliability study of the Turkish version of the GeSNK.

Material and Method

Research Sample

This study was conducted in the Turkish Republic of Northern Cyprus from December 2018 to April 2019. Its participants were amateur soccer players who agreed to participate in the study, were affiliated with the Cyprus Turkish Football Association and were 10-19 years old. Due to the unknown number of athletes, the plan was to interview 384 athletes using simple random sampling for an unknown population. The study was completed with 401 male athletes. Simple random sample selection was used to select the sample. Since each individual in a population has an equal chance of being in the sample, this sample selection model is widely used in the literature (45).

Ethical Dimensions

To test the validity and reliability of the Turkish version of the GeSNK, permission to use the questionnaire was obtained by e-mail from Patrizia Calella who is responsible for communication. Ethical permission from Eastern Mediterranean University's Scientific Research and Publication Ethics Committee was obtained on October 15, 2018 with decision number 2018/60-06 prior to conducting the study. Written permission was obtained from the parents of the adolescents who met the participation criteria.

Data Collection Tools

The GeSNK was developed by Calella et al. in 2017 to evaluate the general and sports nutrition knowledge of athletes at different levels. Its original name is the General and Sport Nutrition Knowledge Questionnaire (GeSNK). The original questionnaire has 62 items in two sections: 29 in the general nutrition section and 33 in the sports nutrition section. Its questions are 3-point Likert-type items (true, false, I don't know). Its first 8 questions are about the contents of basic macro- and micro-nutrients in foods and are also 3-point Likert-type items (high, low/not present, I don't know) (46).

Standard translation-back translation was used to translate the GeSNK. The original English questionnaire was translated into Turkish by three experts. These translations were translated back into English by different experts. The final version of the Turkish questionnaire was created by comparing the English translation to the original questionnaire. The scales and questionnaires in the literature were also adapted into other languages using this translation process (47).

Collection of data

The data collection tool was administered to the athletes under supervision of the researcher and the trainer before training at the sports facilities. Before the athletes filled the questionnaire, they were told that it was important to read the questions carefully and answer them honestly.

Statistical Analysis

SPSS 24 software was used for statistical analysis. Item difficulty, item discrimination, Cronbach's alpha, the split-half and the Kuder-Richardson (KR20 and KR21) analyses were conducted for the validity and reliability study of the GeSNK. Item difficulty analysis was used to determine the items to be removed from the GeSNK. This study deemed that the item difficulty index values for an ideal questionnaire should be above 0.20, like other studies in the literature (48).

Discrimination indexes were evaluated to determine the item discrimination levels of the GeSNK. To evaluate the indexes, values between 27% with the highest score and 27% with the highest score were taken into consideration. If values from the item discrimination test are between 0.00 and 0.20, the item has a high discrimination level, so the items with the item discrimination level indicated above were included on the questionnaire. The higher the item discrimination test value (0.20-0.30 or higher than 0.30), the more it should be included on the questionnaire (49). The content validity of the questionnaire was investigated by consulting experts.

Findings

Item Difficulty Values

The participants' correct answers to the GeSNK items and their item difficulty values are shown below. The item (general nutrition 2.1.) stating that chicken is high in protein was found to be easy, so it was removed. The participants gave fewer correct answers for these items: pasta (general nutrition 8.1), honey (general nutrition 8.4), glycemic index food (general nutrition 24), malnutrition is the only risk factor for cardiovascular disease (general nutrition 25), athletes should minimize fat intake (sports nutrition 32), and vitamin C supplements are always needed for strength sports (sports nutrition 59). These items were removed from the questionnaire because they were very difficult (Table 1.).

Table 1. The General and Sport Nutrition Knowledge Questionnaire's Item Difficulty Values

	Correct	Wrong	Item Difficulty	Comment
General nutrition 1.1	102	301	0.254	Suitable
General nutrition 1.2	236	167	0.589	Suitable
General nutrition 1.3	141	262	0.352	Suitable
General nutrition 1.4	138	265	0.344	Suitable
General nutrition 1.5	109	294	0.272	Suitable
General nutrition 1.6	241	162	0.601	Suitable
General nutrition 2.1	363	40	0.905	**Very easy**

Table 1. The General and Sport Nutrition Knowledge Questionnaire's Item Difficulty Values (Continued)

	Correct	Wrong	Item Difficulty	Comment
General nutrition 2.2	164	239	0.409	Suitable
General nutrition 2.3	168	235	0.419	Suitable
General nutrition 2.4	126	277	0.314	Suitable
General nutrition 2.5	192	211	0.479	Suitable
General nutrition 2.6	122	281	0.304	Suitable
General nutrition 2.7	160	243	0.399	Suitable
General nutrition 3.1	235	168	0.586	Suitable
General nutrition 3.2	225	178	0.561	Suitable
General nutrition 3.3	214	189	0.534	Suitable
General nutrition 3.4	173	230	0.431	Suitable
General nutrition 3.5	254	149	0.633	Suitable
General nutrition 3.6	189	214	0.471	Suitable
General nutrition 4.1	105	298	0.262	Suitable
General nutrition 4.2	175	228	0.436	Suitable
General nutrition 4.3	113	290	0.282	Suitable
General nutrition 4.4	110	293	0.274	Suitable
General nutrition 4.5	155	248	0.387	Suitable
General nutrition 4.6	108	295	0.269	Suitable
General nutrition 5.1	150	253	0.374	Suitable
General nutrition 5.2	209	194	0.521	Suitable
General nutrition 5.3	136	267	0.339	Suitable
General nutrition 5.4	194	209	0.484	Suitable
General nutrition 5.5	161	242	0.401	Suitable
General nutrition 6.1	96	307	0.239	Suitable
General nutrition 6.2	150	253	0.374	Suitable
General nutrition 6.3	213	190	0.531	Suitable
General nutrition 6.4	147	256	0.367	Suitable
General nutrition 6.5	100	303	0.249	Suitable
General nutrition 7.1	233	170	0.581	Suitable
General nutrition 7.2	179	224	0.446	Suitable
General nutrition 7.3	86	317	0.214	Suitable
General nutrition 7.4	91	312	0.227	Suitable
General nutrition 8.1	79	324	0.197	**Very Difficult**
General nutrition 8.2	139	264	0.347	Suitable
General nutrition 8.3	121	282	0.302	Suitable
General nutrition 8.4	79	324	0.197	**Very Difficult**
General nutrition 9	88	315	0.219	Suitable
General nutrition 10	82	321	0.204	Suitable
General nutrition 11	149	254	0.372	Suitable
General nutrition 12	127	276	0.317	Suitable
General nutrition 13	168	235	0.419	Suitable
General nutrition 14	164	239	0.409	Suitable
General nutrition 15	176	227	0.439	Suitable
General nutrition 16	161	242	0.401	Suitable
General nutrition 17	135	268	0.337	Suitable
General nutrition 18	130	273	0.324	Suitable
General nutrition 19	183	220	0.456	Suitable
General nutrition 20	140	263	0.349	Suitable
General nutrition 21	163	240	0.406	Suitable
General nutrition 22	86	317	0.214	Suitable
General nutrition 23	204	199	0.509	Suitable
General nutrition 24	47	356	0.117	**Very Difficult**
General nutrition 25	71	332	0.177	**Very Difficult**
General nutrition 26	184	219	0.459	Suitable
General nutrition 27	194	209	0.484	Suitable
General nutrition 28	125	278	0.312	Suitable
General nutrition 29	152	251	0.379	Suitable
Sports nutrition 30	195	208	0.486	Suitable
Sports nutrition 31	178	225	0.444	Suitable
Sports nutrition 32	71	332	0.177	**Very Difficult**
Sports nutrition 33	136	267	0.339	Suitable
Sports nutrition 34	89	314	0.222	Suitable
Sports nutrition 35	90	313	0.224	Suitable
Sports nutrition 36	164	239	0.409	Suitable
Sports nutrition 37	198	205	0.494	Suitable
Sports nutrition 38	143	260	0.357	Suitable
Sports nutrition 39	199	204	0.496	Suitable
Sports nutrition 40	122	281	0.304	Suitable
Sports nutrition 41	134	269	0.334	Suitable
Sports nutrition 42	81	322	0.202	Suitable
Sports nutrition 43	85	318	0.212	Suitable
Sports nutrition 44	95	308	0.237	Suitable
Sports nutrition 45	115	288	0.287	Suitable
Sports nutrition 46	180	223	0.449	Suitable

Table 1. The General and Sport Nutrition Knowledge Questionnaire's Item Difficulty Values (Continued)

	Correct	Wrong	Item Difficulty	Comment
Sports nutrition 47	121	282	0.302	Suitable
Sports nutrition 48	106	297	0.264	Suitable
Sports nutrition 49	202	201	0.504	Suitable
Sports nutrition 50	206	197	0.514	Suitable
Sports nutrition 51	252	151	0.628	Suitable
Sports nutrition 52	102	301	0.254	Suitable
Sports nutrition 53	116	287	0.289	Suitable
Sports nutrition 54	156	247	0.389	Suitable
Sports nutrition 55	122	281	0.304	Suitable
Sports nutrition 56	144	259	0.359	Suitable
Sports nutrition 57	98	305	0.244	Suitable
Sports nutrition 58	149	254	0.372	Suitable
Sports nutrition 59	69	334	0.172	**Very Difficult**
Sports nutrition 60	105	298	0.262	Suitable
Sports nutrition 61	109	294	0.272	Suitable
Sports nutrition 62	91	312	0.227	Suitable

Discrimination Values

The GeSNK item discrimination values are shown below. The following items were removed from the questionnaire because their item discrimination indexes were below 0.20 (Table 2): white beans (general nutrition 2.2), chocolate (general nutrition 2.6), pears (general nutrition 4.5), sea bass (general nutrition 7.4), high fat foods are always high in cholesterol (general nutrition 10), dairy products are a good source of iron (general nutrition 22), consuming more protein promotes muscle growth (sports nutrition 34), athletes should consume meals with low glycemic index, but rich in carbohydrates 1-2 hours after training (sports nutrition 42), consume fluids before, during and after a competition (sports nutrition 44), what is the optimal drink after a two hour training session? (sports nutrition 52), spice-free meals are the best choice for building and toning muscles (sports nutrition 60), and athletes can eat low-calorie foods whenever they want (sports nutrition 62).

Table 2. The General and Sport Nutrition Knowledge Questionnaire's Item Discrimination Analysis

	Item Discrimination	Comment
General nutrition 1.1	0.259	Suitable
General nutrition 1.2	0.352	Suitable
General nutrition 1.3	0.315	Suitable
General nutrition 1.4	0.333	Suitable
General nutrition 1.5	0.222	Suitable
General nutrition 1.6	0.333	Suitable
General nutrition 2.2	0.176	**Remove**
General nutrition 2.3	0.398	Suitable
General nutrition 2.4	0.259	Suitable
General nutrition 2.5	0.352	Suitable
General nutrition 2.6	0.194	**Remove**
General nutrition 2.7	0.306	Suitable
General nutrition 3.1	0.389	Suitable
General nutrition 3.2	0.435	Suitable
General nutrition 3.3	0.426	Suitable
General nutrition 3.4	0.287	Suitable
General nutrition 3.5	0.370	Suitable
General nutrition 3.6	0.352	Suitable
General nutrition 4.1	0.315	Suitable
General nutrition 4.2	0.426	Suitable
General nutrition 4.3	0.361	Suitable
General nutrition 4.4	0.296	Suitable
General nutrition 4.5	0.167	**Remove**
General nutrition 4.6	0.287	Suitable
General nutrition 5.1	0.241	Suitable
General nutrition 5.2	0.491	Suitable
General nutrition 5.3	0.296	Suitable
General nutrition 5.4	0.417	Suitable
General nutrition 5.5	0.426	Suitable
General nutrition 6.1	0.343	Suitable
General nutrition 6.2	0.380	Suitable
General nutrition 6.3	0.435	Suitable
General nutrition 6.4	0.333	Suitable
General nutrition 6.5	0.222	Suitable
General nutrition 7.1	0.546	Suitable
General nutrition 7.2	0.250	Suitable
General nutrition 7.3	0.287	Suitable
General nutrition 7.4	0.185	**Remove**

Table 2. The General and Sport Nutrition Knowledge Questionnaire's Item Discrimination Analysis (Continued)

	Item Discrimination	Comment
General nutrition 8.2	0.287	Suitable
General nutrition 8.3	0.250	Suitable
General nutrition 9	0.222	Suitable
General nutrition 10	0.046	**Remove**
General nutrition 11	0.370	Suitable
General nutrition 12	0.315	Suitable
General nutrition 13	0.454	Suitable
General nutrition 14	0.444	Suitable
General nutrition 15	0.528	Suitable
General nutrition 16	0.657	Suitable
General nutrition 17	0.352	Suitable
General nutrition 18	0.389	Suitable
General nutrition 19	0.500	Suitable
General nutrition 20	0.389	Suitable
General nutrition 21	0.602	Suitable
General nutrition 22	0.185	**Remove**
General nutrition 23	0.472	Suitable
General nutrition 26	0.352	Suitable
General nutrition 27	0.435	Suitable
General nutrition 28	0.333	Suitable
General nutrition 29	0.352	Suitable
Sports nutrition 30	0.352	Suitable
Sports nutrition 31	0.519	Suitable
Sports nutrition 33	0.435	Suitable
Sports nutrition 34	0.120	**Remove**
Sports nutrition 35	0.259	Suitable
Sports nutrition 36	0.380	Suitable
Sports nutrition 37	0.472	Suitable
Sports nutrition 38	0.472	Suitable
Sports nutrition 39	0.574	Suitable
Sports nutrition 40	0.259	Suitable
Sports nutrition 41	0.343	Suitable
Sports nutrition 42	0.185	**Remove**
Sports nutrition 43	0.157	**Remove**
Sports nutrition 44	0.148	**Remove**
Sports nutrition 45	0.213	Suitable
Sports nutrition 46	0.398	Suitable
Sports nutrition 47	0.204	Suitable
Sports nutrition 48	0.269	Suitable
Sports nutrition 49	0.537	Suitable
Sports nutrition 50	0.343	Suitable
Sports nutrition 51	0.472	Suitable
Sports nutrition 52	0.148	**Remove**
Sports nutrition 53	0.324	Suitable
Sports nutrition 54	0.324	Suitable
Sports nutrition 55	0.296	Suitable
Sports nutrition 56	0.444	Suitable
Sports nutrition 57	0.222	Suitable
Sports nutrition 58	0.472	Suitable
Sports nutrition 60	0.176	**Remove**
Sports nutrition 61	0.324	Suitable
Sports nutrition 62	0.139	**Remove**

Reliability Analysis

The results of the GeSNK reliability analysis are shown below. They show that the Cronbach's alpha value for the participants' answers to the GeSNK was 0.884. Since this Cronbach's alpha value was above 0.70, the GeSNK is reliable. The split-half test determined that the correlation coefficient between the two halves was 0.794. The Spearman-Brown coefficient was 0.885. Thus, the GeSNK is reliable due to its high correlation coefficient and its Spearman-Brown coefficient above 0.70. The KR20 and KR21 values were 0.875 and 0.884, respectively, indicating that the GeSNK is reliable (Table 3).

GeSNK Scores

The participants' mean score on the general nutrition subscale of the GeSNK was 21.07±8.67, and their mean score on the sports nutrition subscale was 9.04±4.54. The participants' mean score on the entire GeSNK was 30.11±11.84. The lowest score was 0, and the highest score was 59 (Table 4).

Table 3. The General and Sport Nutrition Knowledge Questionnaire's Reliability Analysis

Analysis	Value
Cronbach's alpha	0.884
Split-half correlation	0.794
Split-half Spearman-Brown coefficient	0.885
KR21	0.875
KR20	0.884

Table 4. The Participants' Scores on the General and Sport Nutrition Knowledge Questionnaire

	n		s	Min	Max
General Nutrition	402	21.07	8.67	0	42
Sports Nutrition	402	9.04	4.54	0	20
Entire GeSNK	402	30.11	11.84	0	59

Sociodemographic Characteristics

All of the participants (100%) were male. Of them: 13.47% were 12-13 years old, 37.91% were 14-15 years old, 32.92% were 16-17 years old, and 15.71% were 18-19 years old. The mothers of 10.44% were business people, managers or professionals. The mothers of 23.69% were office workers. The mothers of 65.86% were workers or housewives. The fathers of 20.31% were business people, managers or professionals. The fathers of 25.29% were office workers, and the fathers of 54.41% were workers. The mothers of 31.87% of the participants had primary school or less education, the mothers of 51.0% had graduated from high school, and the mothers of 17.13% had bachelor's degrees. The fathers of 30.83% of the participants had primary school or less education, the fathers of 52.57% had graduated from high school, and the fathers of 16.60% had bachelor's degrees (Table 5).

Discussion

Even though interest in soccer is increasing worldwide, there are few studies of soccer players' levels of nutrition knowledge and dietary habits (50). Many studies (51, 52) have discussed the nutrition of soccer players. This study investigates the nutrition knowledge levels of soccer players living in the Turkish Republic of Northern Cyprus due to the limited number of studies of this topic there, and the validity and reliability study of the GeSNK was conducted along with data collection. A total of 401 amateur soccer players participated in this validity and reliability study, which found that the Cronbach's alpha internal consistency coefficient of the GeSNK was 0.884. This indicates that the Turkish version of the GeSNK has high validity and reliability. Its Turkish version has two

Table 5. The distribution of the participants by sociodemographic characteristics

	Number (n)	Percentage (%)
Gender		
Male	401	100.00
Age		
12-13 years old	54	13.47
14-15 years old	152	37.91
16-17 years old	132	32.92
18-19 years old	63	15.71
Mother's occupation		
Business person, manager, professional	26	10.44
Office worker	59	23.69
Worker, housewife	164	65.86
Father's occupation		
Business person, manager, professional	53	20.31
Office worker	66	25.29
Worker	142	54.41
Mother's education level		
Primary school or less education	80	31.87
High school	128	51.00
Undergraduate	43	17.13
Father's education level		
Primary school or less education	78	30.83
High school	133	52.57
Undergraduate	42	16.60

sections with 49 items, 25 in the general nutrition section and 24 in the sports nutrition section.

The literature shows that many of the scales for sports nutrition have high validity and reliability. Kaprinski et al. (2019) conducted a validity and reliability study of the 49-item Sports Nutrition Knowledge Instrument (49-SNKI) and found that its internal consistency coefficient was 0.843 (53). Calella et al. (2017) conducted a validity and reliability study of the GeSNK and found internal consistency coefficients of 0.82 for the general nutrition subscale, 0.83 for the sports nutrition subscale and 0.85 for the entire scale (46). Putnoky et al. (2020) also conducted a validity and reliability study of the GeSNK in Romania. They found that the questionnaire was valid and reliable enough for use with athletes in Romania (54). Trakman et al. (2018) conducted a validity and reliability study of the Nutrition for Sport Knowledge Questionnaire (NSKQ) with Australian soccer players and found that the questionnaire had high validity and reliability (38).

This study found that the participants' scores for general nutrition, sports nutrition and on the GeSNK were medium, indicating that they do not have high nutrition knowledge levels. The research results in the literature show that soccer players have low knowledge levels about both general nutrition and sports nutrition. Islamoglu et al. (2019) compared the levels of nutrition knowledge and dietary habits of amateur and professional soccer players; the study participants consisted of 48 amateur soccer players in university soccer teams and 21 professional soccer players in U-21 soccer teams. The study found that, compared to the professional soccer players, the amateur soccer players had low levels of nutrition knowledge and poor dietary habits (55). Abbey et al. (2017) investigated the dietary habits of 88 American soccer players and found that they had low levels of nutrition knowledge and poor dietary habits. They recommended that soccer players improve their nutrition knowledge and dietary habits to protect their overall health (56). Judge et al. (2016) examined the nutrition knowledge of 100 university soccer players and found that they had low levels of sports nutrition knowledge, indicating that studies need to be done to improve soccer players' sports nutrition knowledge (57). Hidalgo et al. (2015) investigated the dietary habits of 15-20 year-old Mexican soccer players. They reported that the participants had inadequate levels of nutrition knowledge for their sport (58). Jonnalagadda et al. (2001) investigated the dietary habits of university soccer players and found that they had poor dietary habits and low levels of nutrition knowledge. As a result, the researchers emphasized that soccer players should be provided training about nutrition (59).

Conclusion

The findings of this validity and reliability study of the Turkish version of the General and Sport Nutrition Knowledge Questionnaire show that the questionnaire has high validity and reliability. The General and Sport Nutrition Knowledge Questionnaire can be used in Turkish studies to determine the nutrition knowledge of athletes.

All the authors declared that "there is no conflict of interest".

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