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Knowledge, Attitude, and Nutritional Practice Related to COVID-19 in Students of Kurdistan University of Medical Sciences

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ABSTRACT

Background: It has been known that healthy nutrition is important in increasing immunity and reducing diseases. Lack of some nutrients can lead to a decrease in the function of the immune system and, as a result, an increase in the probability of infections or their exacerbation. This study was conducted with the aim of investigating knowledge, attitude and nutritional practice related to COVID-19 in the students of Kurdistan University of Medical Sciences. **Methods**: The present descriptive and analytical study was conducted in 2022 on 350 students of Kurdistan University of Medical Sciences. The research tools included a demographic checklist and a questionnaire of knowledge, attitude and nutritional practice related to COVID-19, used in a similar study. The collected data were analyzed by SPSS 24 software using descriptive statistics and analysis of variance, independent t-test, and Pearson's correlation coefficient. **Results**: The mean age of the subjects was 22.15±4.98 year. The mean scores of knowledge, attitude, and nutritional behavior of students of Kurdistan University of Medical Sciences regarding COVID-19 were 23.17±4.17, 18.04±3.29, and 41.64±7.16, respectively. The results showed that there was a statistically significant relationship between the knowledge score with the educational level and history of infection with COVID-19 and the nutritional practice score with the variable of history of infection with COVID-19 ($P < 0.05$). Also, there was a positive and significant correlation between Knowledge, attitude, and practice. **Conclusion:** According to the results of the study, the studied students had a relatively good knowledge, attitude, and practice towards nutritional issues

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related to COVID-19; however, there is still room for improvement.

Keywords: *Knowledge; Attitude; Behavior; Nutrition; Students; COVID-19*

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Introduction

Coronaviruses are a large family of viruses that, in addition to mild to severe infections of the respiratory tract, can also involve other vital organs of the body and in acute cases cause digestive problems such as diarrhea, coagulation disorders, heart problems and kidney failure (Mitchell, 2020). There are hundreds of different types of corona virus, most of which are found in animals such as pigs, camels, bats, and cats, and seven of them are known to cause disease in humans (Seah and Agrawal, 2020). In December 2019, an outbreak of SARS-CoV-2 was reported from the city of Wuhan, China, and caused the disease of COVID-19 (Marzban *et al.*, 2022). The World Health Organization (WHO) announced it a global pandemic in 2020 (Salehi *et al.*, 2022). Approximately two-thirds of the identified patient cases were linked to a seafood market in Wuhan, where live aquatic animals such as civets and raccoons were sold (Chen *et al.*, 2020). COVID-19 is a highly contagious infectious disease that is transmitted from person to person directly through respiratory droplets of infected people when they sneeze or cough (Morawska and Cao, 2020). The behavior of people in the society has a direct effect on the control and prevention of COVID-19 disease, and the transmission process of this disease can be affected by public health behaviors (La Torre *et al.*, 2021). In the absence of a specific treatment for this new virus, finding alternative methods can play an important role in preventing, controlling, multiplying, and spreading the virus. Effective non-pharmacological interventions combined with promoting a healthy lifestyle and beneficial dietary patterns can improve overall health and reduce the risk of infection due to SARS-CoV-2 (Hibino and Hayashida, 2022). Following a balanced and healthy diet that contains all the essential nutrients is very important to maintain health (Misra, 2020). Macronutrients (fats, proteins, and carbohydrates) and micronutrients (vitamins and minerals) promote healthy immune responses and for many years, the importance of healthy nutrition has been known in increasing immunity and reducing diseases (Taghdir *et al.*, 2020). Many studies have shown that a lack of certain nutrients such as zinc, selenium, iron, vitamins E, D, C, B, A, proteins, and omega-3 fatty acids can lead to a decrease in the immune system and an increase in the probability of infections and or their aggravation (Alsan *et al.*, 2020, Luo *et al.*, 2021). On the other hand, anti-inflammatory nutrients such as beta-carotene, vitamin C, vitamin E, vitamin B3, probiotics, and polyphenolic compounds can strengthen the function of the immune system through the production and activity of antimicrobial proteins and increasing the activity of neutrophils and macrophages (Calder *et al.*, 2020, Martineau *et al.*, 2017). Therefore, the anti-inflammatory strategy by nutrients can be considered as a suitable option in the management of the COVID-19 disease (Conti *et al.*, 2020, Kritas *et al.*, 2020). Based on studies, increasing people's knowledge about health issues has a very favorable effect on improving health status and leads to healthier nutritional practices (Jahed *et al.*, 2012, Marzban *et al.*, 2022). The role of medical students in raising knowledge during public health emergencies has long been proven, and medical students with higher levels of health literacy may act as public role models for adopting preventive health behaviors against COVID-19 (Martin *et al.*, 2022). It is required to design

strategies to encourage more communities to follow health standards. In addition, lifestyle and dietary modification can improve overall health status and prevent diseases other than those associated with COVID-19 (Hibino and Hayashida, 2022). This information may also be used by medical universities to improve curricula to prepare for future disease outbreaks (Adli *et al.*, 2022). Therefore, considering the importance of students' knowledge and attitude towards food safety during the COVID-19 and lack of related studies among medical students, the present study aimed to investigate the knowledge, attitude, and nutritional practice related to COVID-19 in students of Kurdistan University of Medical Sciences.

Materials and Methods

Study design and participants: This descriptive-analytical study was carried out in 2022. The study population consisted of all students of Kurdistan University of Medical Sciences. The sample size was determined at 350 people using similar studies (Mansoorian *et al.*, 2021) through the following formula, taking into account the confidence level of 95% and Z=1.96.

$$n = \frac{z^2 p(1-p)}{d^2}$$

Measurements: The demographic information asked from the participants included age, gender, educational level, economic status, college, marital status, and number of family members. The questionnaire included three questions about the history of chronic diseases such as diabetes, blood pressure, etc., as well as the history of COVID-19.

The Questionnaires were completed online in the press line space, and prior to completion, necessary arrangements were made to obtain informed consent through virtual space and phone calls. Questionnaire link was sent to each person via email or social networks such as WhatsApp or Telegram.

The research tool of knowledge, attitude, and nutritional practice questionnaire related to the COVID-19 was examined in the study of Marzban and Mansoorian (Mansoorian *et al.*, 2021, Marzban *et al.*, 2022) in Yazd City, and its validity and reliability were confirmed. Cronbach's alpha in three parts of knowledge, belief, and nutritional behavior about COVID-19, were obtained 0.82, 0.79, and 0.83, respectively.

The questionnaire included 20 questions related to people's nutritional knowledge about COVID-19, which were based on a 3-point Likert scale, including 'correct', 'incorrect', and 'I do not know'. The 'correct' answer was scored 2, and the answer 'I don't know' was scored 1 and the 'incorrect' was scored zero. The obtained score of each person in the knowledge section was in the range of 0-40.

The questionnaire included 13 questions related to the nutritional attitude of people regarding the COVID-19, and the answers were based on a three-point Likert scale, including 'I agree', 'I have no opinion', and 'I disagree', graded from 1 to 3. The obtained score of each person in the nutritional attitude section was in the range of 13-39.

The questionnaire included 20 questions related to the nutritional practice of people regarding the COVID-19, and the answers were based on a three-point Likert scale, including 'always', 'sometimes' and 'never'. The answers were scored from 1 to 3. The obtained score of each person in the nutritional practice section was in the range of 20-60.

The inclusion criteria were being a student of Kurdistan University of Medical Sciences and participating in the program until the end of the study. The exclusion criteria were unwillingness to cooperate or an incomplete questionnaire. Before starting the research, the conditions were explained to them and finally those who wanted to participate in the study were included in the study.

Data analysis: The collected data were entered into SPSS 24 software and analyzed with Pearson's correlation coefficient tests, descriptive statistics, chi-square, t-test, and analysis of variance.

Ethical considerations: It should be mentioned that the present study is taken from a research project at Kurdistan University of Medical Sciences, with a code of ethics approved by the Ethics Committee IR.MUK.REC.1401.116.

Results

The mean age of the participants was 22.15±4.98 year. The results showed that among the 350 students, the majority (54.85%) were female, and

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36.28% of them were in the age range of 21-24 year. Also, 55.16% of them were undergraduate students, 23.71% were from Nursing-Midwifery Faculty, 56.57% of the students had a moderate economic status, and 66% of the participants were married. Moreover, 53.14% of the students had been infected with COVID-19 and 90.58% had no history of chronic diseases. General information about the demographic characteristics of the students is given in **Table 1**.

The mean scores of knowledge, attitude, and nutritional practice of Kurdistan University of Medical Sciences students regarding COVID-19 were 23.17±4.17, 18.04±3.29, and 41.64±7.16, respectively.

According to **Table 2**, the results showed that there was a statistically significant relationship between the knowledge score with education level and the history of being infected with COVID-19.

Table 3 reveals that the most important source of information for people regarding COVID-19 was cyberspace, and people obtained the least information through television and radio.

Results show a positive and significant correlation between the variables of knowledge, attitude, and practice, and the correlation coefficient between attitude and practice was greater.

Table 1. Frequency distribution of demographic variables in Kurdistan University of Medical Sciences students.

Variables	Description	N	%
Gender	Male	158	45.15
	Female	192	54.85
Age (year)	<21	112	32.00
	21-2,4	127	36.28
	>24	111	31.72
Level of education	Bachelor	193	55.16
	Master's degree	89	25.42
	PhD and professional doctorate	68	19.42
Faculty	Medical	65	18.57
	Paramedical	62	17.71
	Dental	63	18.00
	Health	78	22.28
	Nursing and Midwifery	83	23.71
Economic status of the family	Good	84	24.00
	Moderate	198	56.57
	Weak	68	19.42
Marital status	Single	231	66.00
	Married	119	34.00
A person's history of COVID -19	Yes	186	53.14
	No	164	46.86
A person's history of chronic diseases	Yes	317	90.58
	No	33	9.42

Table 2. Mean score of knowledge, attitude, and practice of Kurdistan University of Medical Sciences students according to demographic variables.

Variables	Description	knowledge		Attitude		Practice	
		Mean	SD	Mean	SD	Mean	SD
Gender	Male	23.84	4.25	18.69	3.57	41.01	7.95
	Female	23.64	4.19	18.07	3.09	41.33	7.35
P-value[a]		0.24		0.21		0.17	
Age (year)	<21	23.57	4.12	18.69	3.55	41.12	7.14
	21-24	23.15	4.19	18.07	3.67	41.39	7.06
	>24	23.17	4.78	18.67	3.33	41.65	7.31

Table 2. Mean score of knowledge, attitude, and practice of Kurdistan University of Medical Sciences students according to demographic variables.

Variables	Description	knowledge		Attitude		Practice	
		Mean	SD	Mean	SD	Mean	SD
P-value[b]		0.32		0.30		0.27	
Level of education	Bachelor	19.24	4.31	18.24	3.60	41.03	7.28
	Master's degree	26.25	4.57	18.54	3.95	41.97	7.09
	PhD and professional doctorate	34.12	4.87	18.03	3.54	41.52	7.16
P-value[b]		<0.001		0.25		0.18	
Faculty	Medical	23.75	4.54	18.17	3.01	41.34	7.49
	Paramedical	23.64	4.13	18.32	3.44	41.05	7.06
	Dental	23.84	4.03	18.94	3.09	41.26	7.66
	Health	23.34	4.06	18.24	3.88	41.08	7.37
	Nursing and Midwifery	23.15	4.11	18.06	3.91	41.21	7.13
P-value[b]		0.35		0.34		0.21	
Economic status of the family	Good	23.17	4.07	18.22	3.14	40.29	7.01
	Moderate	23.16	4.69	18.57	3.15	41.35	7.33
	Weak	22.98	4.08	18.35	3.06	41.87	7.79
P-value[b]		0.14		0.19		0.16	
Marital status	Single	23.66	4.88	18.54	3.19	40.18	7.46
	Married	23.19	4.60	18.09	3.45	40.09	7.69
P-value[a]		0.20		0.17		0.24	
A person's history of COVID - 19	Yes	37.12	4.11	18.67	3.67	41.11	7.37
	No	23.11	4.05	18.02	3.12	41.32	7.19
P-value[a]		<0.001		0.21		0.15	
A person's history of chronic diseases	Yes	23.11	4.66	18.33	3.68	41.06	7.42
	No	23.17	4.51	18.04	3.49	41.11	7.56
P-value[a]		0.23		0.31		0.25	

[a]: Independent Samples t-test, [b]: ANOVA test.

Table 3. The frequency of the source of information about the Covid-19 in the students of Kurdistan University of Medical Sciences.

Sources	N	%
Cyberspace and internet	75	21.42
TV and radio	41	11.71
Doctor and health center staff	56	16.00
Friends and family	58	16.57
Book and magazine	52	14.85
University professors and courses	68	19.42
Total	350	100

Discussion

One of the most important measures in maintaining health and preventing infectious diseases is to have proper and basic nutrition and enough sleep. This study was conducted with the aim of investigating the knowledge, attitude, and nutritional practice related to COVID-19 among the students of Kurdistan University of Medical Sciences.

The mean age of the participants in the study was 22.15±4.98 year. In the study of Marzban (Marzban *et al.*, 2022) and Mansourian (Mansoorian *et al.*, 2021), the mean age of the subjects was 36.57±5.24 and 37.30±11.30 year. In Luo's study (Luo *et al.*, 2021) among Chinese people, the mean age of people was 24.09±9.14 year and 54.85% of

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participants were female. In Alhaj's study (Alhaj *et al.*, 2021) in Jordan, 69.5% of the participants were female. However, in the study of Marzban (Marzban *et al.*, 2022) and Mansourian (Mansoorian *et al.*, 2021), 56.90% and 52.70% of the participants were male. Women seem to be more likely to respond to diet and health surveys, since they are usually responsible for the diet and nutrition of families (Al-Sheyab *et al.*, 2019). In the present study, 53.14% of the students reported a history of being infected with COVID-19; however, in Marzban's study, 61.62% of the them were not infected with COVID-19. The difference in the number of infected cases can be attributed to the spread of the omicron strain, which involved most of people in the community due to its greater contagion.

The mean score of nutritional knowledge of Kurdistan University of Medical Sciences students was 23.17±4.17 in relation to COVID-19. The mean nutritional knowledge score of the people of Yazd city was reported 21.35±4.54 in Marzban's study (Marzban *et al.*, 2022). In Mansourian's study (Mansoorian *et al.*, 2021), which investigated nutritional knowledge, attitude, and practice of the people of Gonabad city, the mean nutritional knowledge score of people was 9.70±1.40. In Luo's study (Luo *et al.*, 2021), examining knowledge, attitude, and practice of Chinese people in the field of food safety and nutrition during the COVID-19, the mean knowledge score of people was reported 5.20±1.60. Knowledge of nutrition and diet is an integral part of health knowledge. In China, the "Healthy China 2030" plan with the aim of promoting and improving food safety and the nutritional status of Chinese residents is considered as an important content and goal (Luo *et al.*, 2021). Knowledge is a key tool for patients and their families to have a correct understanding of the COVID-19, and not having enough knowledge can disrupt the process of modifying food habits and behaviors. Nutrition knowledge and related skills can also enable people to make appropriate food choices and improve their metabolic status and quality of life. There has been no extensive research on the relationship between nutritional knowledge and food intake in patients with COVID-19 due to the new nature of this disease; however, it has been proven that nutrition has an important role in viral and infectious diseases and proper nutrition can improve the immune system (Al-Badayneh, 2021, Sami *et al.*, 2021).

The mean score of nutritional attitude of the students towards COVID-19 was 18.04±3.29. The mean score of attitude in the study of Marzban (Marzban *et al.*, 2022) and Mansourian (Mansoorian *et al.*, 2021) was 20.74±3.58 and 14.3±3.5. With the development of society and improvement of living standards, people's attention to food safety and nutrition has increased. Food behavior is the result of the interaction between human knowledge and attitude. Knowledge refers to the knowledge of things and processes that distinguish specialists from non-specialists. Attitudes are people's opinions that are influenced by knowledge and lead to certain actions (practice). Therefore, behaviors vary from simple behaviors such as chewing food to complex ones such as food preparation, social etiquette, and policy making. Lack of health literacy is associated with poor health outcomes. However, people may have necessary knowledge about nutrition, but the correct attitude has not been formed in them, and this knowledge will not play a role in improving people's health.

The mean score of people's nutritional practice in relation to COVID-19 is 41.64±7.16. The mean score of nutritional practice in the study of Marzban (Marzban *et al.*, 2022) and Mansourian (Mansoorian *et al.*, 2021) was 38.99±7.39 and 29.6±4.2. The mean practice score of Chinese people in Luo's study (Luo *et al.*, 2021) was 3.7±1.0. In this study, many Chinese residents changed their food safety behaviors and dietary patterns, including increasing their consumption of vegetables, fruits, and water and decreasing their consumption of sugary drinks and snacks. However, in Alhaj's study (Alhaj *et al.*, 2021) in Jordan, the participants did not pay much attention to their diet during the COVID-19. Regarding nutrition, two important questions may be raised: "What food should be consumed to strengthen the immune system?" "How can we consume food to prevent

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contamination?" In response to the first question, it is recommended to avoid consuming open or bulk foods, traditional dairy products, cakes, cookies, dumplings, and nuts in centers that are served in open or bulk form. Protein materials such as eggs, all kinds of meats, kebabs, and steaks should be well cooked. Eating raw food should be avoided and cooked food should not come in contact with raw food. Corona virus is destroyed by heat, industrial packaging can help prevent this virus, and when buying bread, it should be put directly to the buyer's clean hand using clean gloves. Intermediaries such as metal surfaces of bakeries can be dangerous; therefore, surfaces should be frequently disinfected and the contamination of intermediaries in this way should be reduced as much as possible. The best and most important way to strengthen the immune system is to use food rich in vitamins. White blood cells need vitamins to provide enough energy to fight viruses, so it is important to identify the role of different vitamins in the body's immune system and food ingredients containing these vitamins (Ramezani and Amirpour, 2020).

The results showed that there is a statistically significant relationship between the knowledge score with the level of education and the history of COVID-19 infection. This finding was consistent with the results of Marzban (Marzban *et al*., 2022) and Luo (Luo *et al*., 2021) studies . However, in Mansourian's study (Mansoorian *et al*., 2021), no significant relationship was observed between demographic variables and knowledge scores. Higher education leads to more information about viral diseases, and since the study population was medical students, with the advancement of education level, they take more courses on infectious diseases and nutrition. Also, the history of the disease causes a person to be more sensitive about ways of recovery and prevention.

Conclusion

According to the results of the study, the studied students had a relatively good knowledge, attitude, and practice towards the nutritional issues related to the COVID-19; however, there is still room for improvement. Research has shown that nutrition knowledge interventions can effectively improve people's understanding of relevant knowledge and, as a result, create positive changes in attitudes and practices. Public education on healthy nutrition should be promoted as a normal subject and widely implemented in various units and departments at the public level. Virtual space, which occupies an important part of people's lives, should be considered in this case.

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Authors' contributions

Marzban A and Dowlati M were involved in designing and supervising the survey. Emami P and Sherafatmanesh S were involved in designing the study, data collecting, and data analyzing. Rahmanian V and Marzban A participated in data analysis. Marzban A, Emami P and Dowlati M participated in writing the manuscript. All authors critically reviewed the manuscript and approved the final version submitted for publication.

Conflict of interest

The authors declared no conflict of interest.

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