

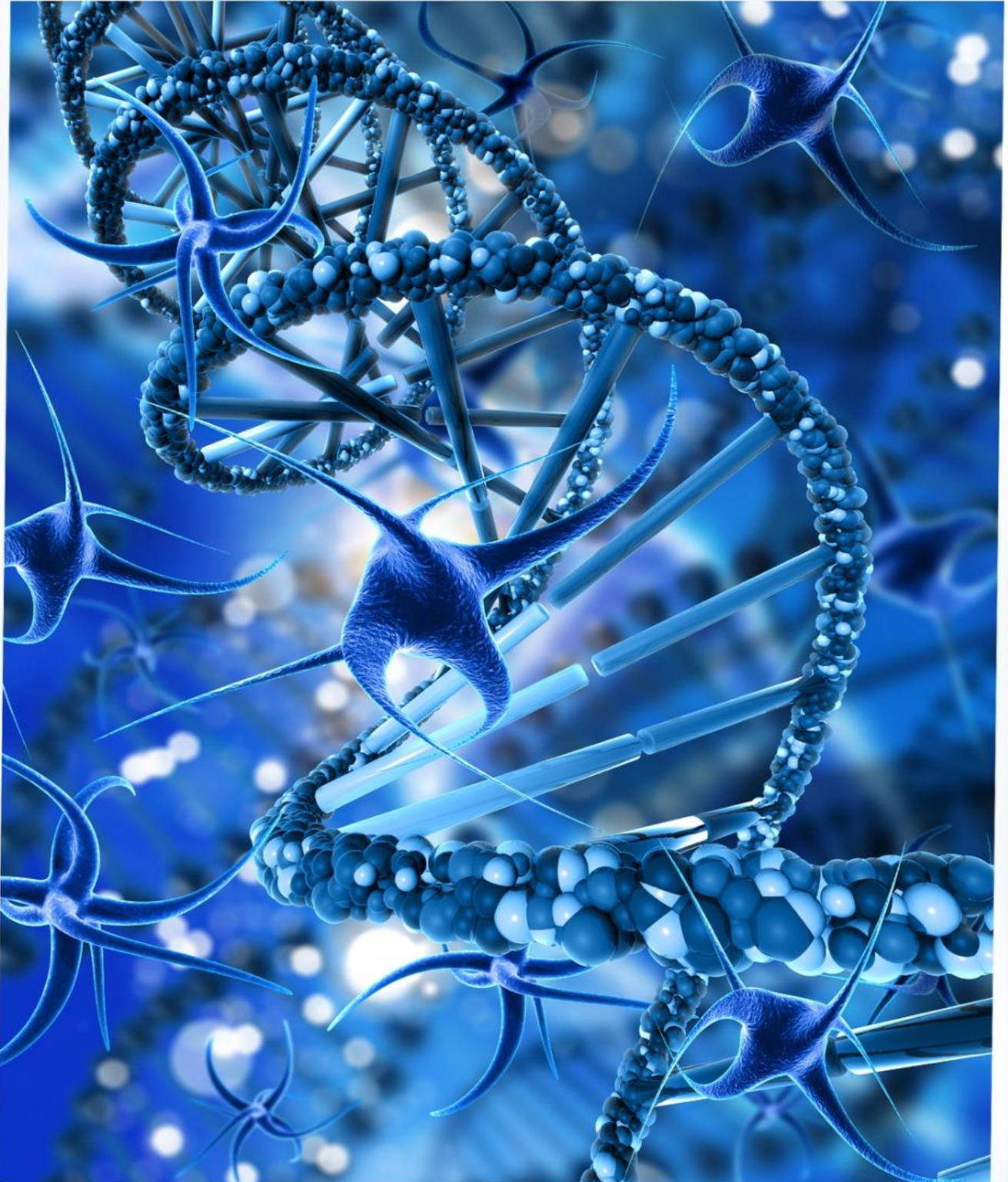


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COVID-19 Pandemisinde Karadeniz Teknik Üniversitesi Tıp Fakültesi Öğrencilerinin COVID-19 Risk Algısı ve Sağlık İletişimi Hakkındaki Tutumlarının Değerlendirilmesi

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ABSTRACT

The communication of medical students with patients/patient relatives is very important in the diagnosis and treatment of health problems. The better the patient/relatives feel understood in communication, the more positive improvement can be achieved in the treatment process. It is thought that one of the factors affecting students' communication with patients/patient relatives is the COVID-19 pandemic. The aim of this study is to examine medical school students' COVID-19 risk perception levels and their attitudes towards health communication during the pandemic period. 903 students were included. An online survey method was used because it was thought that face-to-face data collection would not be appropriate during the pandemic. The mean COVID-19 risk perception scores of students who had a disease or risk factor related to the respiratory system, who hadn't had SARS-CoV-2 infection, who followed the daily COVID-19 case table, and who encountered a patient with suspected or confirmed SARS-CoV-2 infection were statistically significantly higher (p values 0.009; 0.041; <0.001; 0.020, respectively). The mean risk perception score of the students who said "I communicate with patients as briefly and superficially as possible during the pandemic" was significantly higher (p=<0.001). The mean risk perception score of the students who said, "I can communicate under all circumstances if the patient/patient relatives follow the mask and physical distancing rules" was found to be significantly lower (p=0.013). The level of COVID-19 risk perception of students can direct their attitudes towards health communication. Students can be trained on risk management and the importance of correct communication, and appropriate psychological support can be provided to enrich the technological and administrative features of risk management with sociopsychological considerations and precautions.

Keywords: COVID-19, Health communication, Medical students, Physician-patient communication, Risk perception

ÖZET

Tıp fakültesi öğrencilerinin hasta/hasta yakınlarıyla kurdukları iletişim, sağlık sorunlarına tanı konulması ve tedavi aşamasında göz ardı edilemeyecek öneme sahiptir. Hasta/hasta yakınları iletişimde ne kadar iyi anlaşıldıklarını hissedersen o ölçüde tedavi sürecinde pozitif yönde iyileşme sağlanabilir. Öğrencilerin hasta/hasta yakınlarıyla iletişimlerini etkileyen faktörlerden birinin COVID-19 pandemisi olduğu düşünülmektedir. Bu çalışmada tıp fakültesi öğrencilerinin COVID-19 risk algı düzeyleri ve pandemi döneminde sağlık iletişimine yönelik tutumlarının incelenmesi amaçlanmıştır. Çalışmaya 903 öğrenci dahil edilmiştir. Pandemi sürecinde yüz yüze veri toplamanın uygun olmayacağı düşüncesiyle çevrimiçi anket yöntemi kullanılmıştır. Solunum sistemi ile ilgili bir hastalık ya da risk faktörü bulunan, SARS-CoV-2 enfeksiyonu geçirmemiş, günlük COVID-19 vaka tablosunu takip eden ve SARS-CoV-2 enfeksiyonu şüpheli ya da doğrulanmış bir hasta ile karşılaşan öğrencilerin COVID-19 risk algısı puan ortalamaları istatistiksel açıdan önemli derecede yüksek bulunmuştur (p değerleri sırasıyla 0.009; 0.041; <0.001 ve 0.020). "Pandemi döneminde hastalarla mümkün olduğunca kısa ve yüzeysel iletişim kurarım" diyen öğrencilerin risk algısı puan ortalaması önemli derecede yüksek bulunmuştur (p=<0.001). "Hasta/hasta yakınları maske ve fiziksel mesafe kurallarına uyarsa her koşulda iletişim kurarım" diyen öğrencilerin risk algısı puanı ortalaması önemli derecede düşük bulunmuştur (p=0.013). Çalışmada öğrencilerin COVID-19 risk algısı düzeyleri belirlenmiş ve risk algılarının sağlık iletişimine yönelik tutumlarını yönlendirebildiği ortaya konmuştur. Bu bağlamda öğrencilere, risk yönetimi ve doğru iletişimin önemi hakkında eğitimler verilebilir. Risk yönetiminin teknolojik ve idari özelliklerinin sosyo-psikolojik düşünceler ve önlemlerle zenginleştirilmesi amacına yönelik uygun psikolojik destek sunulabilir.

Anahtar kelimeler: COVID-19, Hekim-hasta iletişimi, Risk algısı, Sağlık iletişimi, Tıp öğrencileri

INTRODUCTION

The quality of health services and patient safety issues have gained importance worldwide in recent years. "Patient-centered health care service" is defined as a care service based on cooperation between the patient, patient's relatives and health care provider, in line with the values, preferences and needs of the patient. Effective communication between the patient and healthcare providers is one of the basic requirements of patient-centered healthcare.¹⁻³

Health communication is defined as sharing the necessary information with authorized persons/organizations to meet the health-related needs of individuals and conveying the necessary and sufficient information about the health problem determined by the health service providers in line with this shared information.⁴ It can occur at different levels such as individual, interpersonal, intergroup and institutional. Health communication campaigns carried out by institutions, interpersonal communication such as patient-physician communication or information campaigns for health problems that concern the whole society at a higher level are included in the discipline of health communication. It is a type of communication that enables people to form health-related attitudes and behaviors and develop healthy lifestyles by obtaining accurate and real health information.⁵

It is emphasized in the literature that there are two main purposes of communication during the interview between physician and patient. One of these goals is information sharing between the physician and the patient. While physicians need to obtain information from the patient in order to decide on the correct diagnosis and effective treatment plan, patients need information from physicians about their health problems and how to be treated. Another target during physician-patient interviews is the relational dimension. The patient-centered health communication model emphasizes the relational dimension of physician-patient interaction. The vast majority of studies show that there is a significant correlation between the physician's interest and the patient's personal satisfaction, and that good communication between the physician and the patient provides a positive improvement in the treatment process.^{6,7}

Communication between medical faculty students and patients/patient relatives has an undeniable importance in diagnosing and treating health problems. It is thought

that one of the factors affecting students' communication with patients/patient relatives is the COVID-19 pandemic. Factors such as the prolongation of the pandemic process, the inability to find an effective treatment method, the inability to stop the spread, failure to disseminate effective immunization in a timely manner, contact with possible/definite COVID-19 patients, the thought that protective equipment is inadequate, the death of colleagues, and the difficulties experienced during the pandemic period may affect the perception of COVID-19 risk.⁸ Risk perception consists of the decisions a person makes to characterize and evaluate dangerous situations. Therefore, attitudes, emotional responses, and avoidance behaviors may commonly accompany.⁹

Monitoring individuals' perceptions of risk is an important part of emergency management in public health emergencies. Therefore, examining the risk perceptions towards COVID-19 during the current pandemic period can help to understand the attitudes of individuals towards the disease and to predict their behaviors.¹⁰ In studies, it was found that COVID-19 positivity was significantly higher in people living with healthcare professionals.^{11,12} Due to the fact that both themselves and the people they live with are at risk for infection, mental problems, fear and stress, especially anxiety, may cause students to be cautious about providing services, not be able to provide quality services, and negatively affect their communication with patients/patient relatives.^{13,14} In studies, it has been reported that the risk perception of healthcare workers for COVID-19 is higher than the perceived risk in past pandemics (SARS, MERS, H1N1).¹⁵⁻¹⁸ It is important to understand how medical students perceive COVID-19, how they assess risks, and how such assessments can lead them to change their attitudes.

The aim of this study is to examine the COVID-19 risk perception levels of medical students and to investigate the relationship between their COVID-19 risk perception levels and their attitudes towards health communication during the pandemic period.

METHODS

This descriptive study consists of 1575 students registered at Karadeniz Technical University Faculty of Medicine. It was aimed to reach the entire universe. The online survey method was used because it wouldn't be appropriate to collect face-to-face data during the pandemic. The survey link was sent via personal

messaging services and each participant who voluntarily answered the questionnaire was included in the study. Table 1 shows the proportions of those who participated in the research according to the number of students in the classes. The survey was created by the researchers after the literature was searched and consists of 4 sections/40 questions.

Table 1. Proportions of the students who participated in the study by grades

Grades	Total number of students	Joined the research students	
	N	n	%
Preparatory	105	61	58.1
First grade	225	121	53.8
Second grade	266	123	46.2
Third grade	283	163	57.6
Fourth grade	217	140	64.5
Fifth grade	259	153	59.1
Sixth grade	220	142	64.5

In the first part, the participants were asked questions about their sociodemographic characteristics; in the second part, questions were asked about their health status and COVID-19; in the third part, questions about the risk perception of COVID-19, and in the fourth part, questions about communication with patients/patients relatives during the pandemic.

In the third part, there are 12 propositions for examining and evaluating the risk perception of COVID-19. These propositions were created by the researchers using the 'COVID-19 Disease Risk Perception Scale'. The scale was developed by Özlü et al. to determine COVID-19 risk perceptions in adults, and its validity and reliability were established. The scale has no cut-off point. Higher scores indicate an increased risk perception of COVID-

19.¹⁹ All propositions were scored in a three-point Likert type ("I agree" (2), "I am undecided" (1), "I do not agree" (0)) and the possible score is between 0-24. However, in the analysis, the scores were converted into a 100-point system. The higher the score of each participant, the higher the perceived risk of COVID-19. As a result of the internal consistency analysis performed on all items, the Cronbach's alpha coefficient was calculated as 0.82.

Prior to the research, approval was obtained from Karadeniz Technical University Faculty of Medicine Deanship (decision dated 26.10.2021 and numbered 72699152-663.08-22367) and Scientific Research Ethics Committee (decision dated 09.12.2021 and numbered 24237859-894). SPSS 23.0 was used for statistical analysis. In descriptive statistics; numbers and percentages are given for categorical variables, mean and standard deviation values are given for numerical variables. Mann Whitney U Test or Kruskal Wallis Test was used according to the number of groups compared in the analysis of numerical variables that did not fit the normal distribution. While determining the significance as a result of the Kruskal Wallis Test, posthoc analysis was performed to determine which groups the significance originated from. The significance value was taken as "p<0.05".

RESULTS

903 students participated in the study. 58.0% (n=524) of the participants were male. The mean age of the participants was determined as 21.6±2.6 years (17-35). 51.8% (n=468) of the students are in the preclinical period (preparatory, 1st, 2nd and 3rd grade). Some sociodemographic characteristics of the participants are shown in Table 2.

Table 2. Some socio-demographic characteristics of the participants (N=903)

Features		n	%
Gender	Female	379	42.0
	Male	524	58.0
Age (year)	Mean ± SD (min-max)	21.6±2.6 (17-35)	
Academic level	Preclinical (preparatory class, 1st, 2nd and 3rd grade)	468	51.8
	Clinical (4th, 5th and 6th grade)	435	48.2
People they live with	Living alone	271	30.0
	Living with their family	290	32.1
	Living with their friends	342	37.9
Are there any children among the people they are living with?	Yes	344	38.1
	No	559	61.9
Education level of the mother	Didn't complete the formal education	325	36.0
	High school/University	578	64.0
Education level of the father	Didn't complete the formal education	183	20.3
	High school/University	720	79.7

It was determined that 20.6% (n=186) of the participants had a risk factor for COVID-19 and 19.9% of them had a disease/risk factor related to the respiratory system. Among the participants, the proportion of those infected with SARS-CoV-2 until then was 17.9% (n=162). The proportion of those who had the vaccines for COVID-19 was determined as 98.8% (n=892). The health status and characteristics of the participants related to COVID-19 are presented in Table 3. Table 4 shows the

suggestions made to evaluate the risk perceptions of the participants towards COVID-19. 75.9% of the students (n=685) stated that they thought that the disease could't be controlled because of people who did not have the vaccines for COVID-19. The proportion of those who think that the probability of being infected with SARS-CoV-2 increases because they are in the hospital for a long time during the day, 73.1% (n=660).

Table 3. Health status and characteristics of participants related COVID-19 (N=903)

		n	%
Having COVID-19 risk factor/factors	Yes	186	20.6
	No	717	79.4
Having disease/risk factor related to respiratory system (n=186)	Yes	37	19.9
	No	149	80.1
Being infected with SARS-CoV-2	Yes	162	17.9
	No	741	82.1
Quarantine	Imposed	216	23.9
	Not imposed	687	76.1
Type of mask commonly used	N95-99/FFP2-3	70	7.8
	Fabric mask	71	7.9
	Medical/surgical mask	762	84.4
Against COVID-19	Not vaccinated	11	1.2
	Vaccinated	892	98.8
Vaccinated against COVID-19 (n=892)	With the Sinovac vaccine	85	9.5
	With the Biontech vaccine	505	56.6
	Both of them	302	33.9
Following the daily COVID-19 table publishing by the Ministry of Health	Yes	318	35.2
	No	585	64.8

Table 4. Suggestions for participants to evaluate their perceptions of COVID-19 risk (N=903)

	I agree		I am undecided		I do not agree	
	n	%	n	%	n	%
I think that I am more likely to be infected with COVID19 because I am in the hospital environment for a long time during the day.	660	73.1	128	14.2	115	12.7
I worry about catching COVID-19 because it is crowded in my classroom or in my unit.	593	65.7	104	11.5	206	22.8
I am worried about contracting COVID-19 due to the use of shared items and surfaces in the classroom or in my unit.	464	51.4	138	15.3	301	33.3
I am worried about catching the disease due to people who do not comply with the mask, distance and hygiene measures related to COVID-19 in the classroom or in my unit.	534	59.1	141	15.6	228	25.2
Hearing about people infected with COVID-19 among my classmates or people in my unit worries me a lot.	460	50.9	175	19.4	268	29.7
I am afraid that if I get COVID-19, I will die.	112	12.4	204	22.6	587	65.0
If I do get COVID-19, I worry that the available treatments may not be enough.	234	25.9	243	26.9	426	47.2
If I get COVID-19, I think there may be permanent damage even if I recover.	464	51.4	240	26.6	199	22.0
I am afraid of transmitting the SARS-CoV-2 virus to the people I live with.	772	85.5	72	8.0	59	6.5
I think that the use of elevators in the hospital is high risk in terms of transmission of the SARS-CoV-2 virus.	462	51.2	258	28.6	183	20.3
I think that the hospital cafeteria and canteens increase the risk of transmission of the SARS-CoV-2 virus.	615	68.1	169	18.7	119	13.2
I think that the disease cannot be controlled due to people who do not have the vaccine for COVID-19 as recommended by the Ministry of Health.	685	75.9	134	14.8	84	9.3

The mean total COVID-19 risk perception score of the participants was determined as 65.1±22.5 out of 100 points. According to gender, the mean COVID-19 risk perception score of women (68.0±20.5) was found to be statistically significantly higher than that of men (61.2±24.4) (p<0.001). We checked whether there was a correlation between age and the COVID-19 risk perception score, but no significant correlation was

found (rs=0.059, p=0.074). Also no statistically significant difference was found between the preclinical period and the clinical period students in terms of COVID-19 risk perception score means (p=0.179). In Table 5, the mean of the COVID-19 risk perception scores and comparison results according to some socio-demographic characteristics of the participants are shown.

Table 5. COVID-19 risk perception scores according to the socio-demographic characteristics of the participants

Total COVID-19 Risk Perception Score		65.1 ± 22.5 (0-100)	
Mean ± SD (min-max)			
		Score (Mean ± SD) *	p°
Gender	Female	68.0 ± 20.5	<0.001
	Male	61.2 ± 24.4	
Academic level	Preclinical	64.1 ± 22.7	0.179
	Clinical	66.3 ± 22.1	
People they live with	Living alone	65.5 ± 23.5	0.567
	Living with their families/relatives/friends	65.0 ± 22.0	
Are there any individuals in the child age among the people they live with?	Yes	64.8 ± 22.8	0.680
	No	65.3 ± 22.3	
Education level of the mother	Didn't complete the formal education	66.0 ± 22.3	0.429
	High school/University	64.7 ± 22.6	

° Mann Whitney U Test was used

* COVID-19 Risk Perception Score is calculated out of 100 points.

In Table 6 COVID-19 risk perception mean scores and comparison results according to the health status and characteristics of the participants related to COVID-19 are presented. Among the participants, the mean of COVID-19 risk perception score (74.9±17.5) of those with respiratory system-related disease/risk factor was

found to be statistically significantly higher than those who did not (64.7±22.6) (p=0.009). Similarly, the mean COVID-19 risk perception score of those not infected with SARS-CoV-2 (65.8±22.5) was found to be statistically significantly higher than those who were infected (62.1±22.3) (p=0.041).

Table 6. COVID-19 risk perception scores according to participants' health status and characteristics related to COVID-19

		Score (Mean ± SD) *	p°
Having disease/risk factor related to respiratory system	Yes	74.9 ± 17.5	0.009
	No	64.7 ± 22.6	
Being infected with SARS-CoV-2	Yes	62.1 ± 22.3	0.041
	No	65.8 ± 22.5	
Type of mask commonly used	N95- 99 / FFP2-3	70.0 ± 22.2	0.132*
	Medical/surgical mask	64.9 ± 22.4	
	Fabric mask	63.3 ± 23.3	
Against COVID-19	Vaccinated	65.2 ± 22.5	0.226
	Not vaccinated	59.9 ± 17.5	
Vaccinated against COVID-19 (n=892)	With the Sinovac vaccine	60.7 ± 23.5	0.115*
	With the Biontech vaccine	65.2 ± 22.2	
	Both of them	66.4 ± 22.7	
Following the daily COVID-19 case table published by the Ministry of Health	Yes	70.5 ± 21.2	<0.001
	No	62.2 ± 22.6	

° Mann Whitney U Test was used, * Kruskal Wallis Tset was used.

* COVID-19 Risk Perception Score is calculated out of 100 points.

The COVID-19 risk perception scores of the participants who had a COVID-19 risk factor among their cohabitants, who were infected with SARS-CoV-2 among their cohabitants, and who died due to COVID-19 among their cohabitants were evaluated and statistically was found to be not significantly different. Similarly, no statistically significant difference was detected in the COVID-19 risk perception scores of the participants whose classmates or internships were infected with SARS-CoV-2. It was determined that there was a significant difference between the groups as a result of the comparison made according to whether or not there was a patient suspected or confirmed to have COVID-19 in the unit where they were interned ($p=0.027$). As a result of the posthoc analysis carried out to determine which groups the difference originated from, the mean of the COVID-19 risk perception score of the students who encountered a patient who was suspected and confirmed to have COVID-19 in their

internship units was found to be statistically significantly higher than those who did not encounter such a patient ($p=0.020$).

In Table 7, COVID-19 risk perception mean scores and comparison results are shown according to the attitudes of the participants about health communication during the pandemic period. The mean risk perception score of the students who said "I communicate with patients as briefly and superficially as possible during the pandemic period" (70.5 ± 21.0) was found to be significantly higher than those who didn't think in this way (62.5 ± 22.7), ($p<0.001$). The mean risk perception score of the students who said "I will communicate under all circumstances if the patient/patient relatives comply with the mask and physical distance rules" (63.9 ± 22.1) was found to be significantly lower than those who didn't think in this way (67.7 ± 23.1), ($p=0.013$).

Table 7. COVID-19 risk perception scores according to participants' attitudes about health communication

		n	%	Score (Mean \pm SD) *	p ^o
Due to the risk of infection during the pandemic period, I isolate myself and do not communicate with patients/patient relatives.	Yes	79	8.7	64.1 \pm 24.6	0.796
	No	824	91.3	65.2 \pm 22.3	
During the pandemic period, I communicate with the patient/patient relatives as briefly and superficially as possible.	Yes	295	32.7	70.5 \pm 21.0	<0.001
	No	608	67.3	62.5 \pm 22.7	
Since I think that more accurate information and support is needed during the pandemic period, I communicate with patients/patient relatives at length and in depth.	Yes	103	11.4	64.8 \pm 21.7	0.806
	No	80	88.6	65.2 \pm 22.6	
Since I could not see patients in the previous period due to the pandemic, I ignore the pandemic and communicate with the patient/patient relatives under all circumstances.	Yes	60	6.6	62.4 \pm 22.9	0.372
	No	843	93.4	65.3 \pm 22.4	
If mask use and physical distance rules are followed, I will communicate with the patient/patient relatives under all circumstances.	Yes	615	68.1	63.9 \pm 22.1	0.013
	No	288	31.9	67.7 \pm 23.1	

^o Mann Whitney U Test was used.

* COVID-19 Risk Perception Score is calculated out of 100 points.

When asked about the opinions of the patient/patient relative not paying attention to the use of masks during communication, 79.0% (n=713) of the participants answered "I warn them and expect them to wear masks appropriately to continue communication". We asked about the effect of using personal protective equipment on communication, 57.0% (n=515) of the students said, "The mask causes difficulty in understanding my speech." replied as. Students were also asked whether they had communication problems with patients/patient relatives during the pandemic period, 13.4% (n=121)

stated that they had problems, and 57.0% (n=69) of those stated that they had verbal arguments.

DISCUSSION

Ever since SARS-CoV-2 was discovered and began its journey around the world, and the World Health Organization (WHO) declared the disease a Public Health Emergency of International Concern, all people, including healthcare professionals, have been greatly concerned about the effects of the infection. Medical students have often been at risk for infectious diseases,

and the importance of this situation has been understood once again during the COVID-19 pandemic. As a result of the study, it has been revealed that there are significant relationships between the descriptive characteristics of the participants and their perceptions of COVID-19 risk. It was determined that there were significant relationships between the COVID-19 risk perception levels of the participants and their attitudes about health communication.

Hoşgör et al. conducted a study on students, a statistically significant difference was found according to gender and it was stated that this difference was caused by women.¹⁵ Consistent with our study results, it has been reported that women have a higher perception of COVID-19 risk in the studies conducted by Kavaklı et al., Wang et al., and Kim et al.²⁰⁻²² This can be explained by the fact that women are more vulnerable and the psychological effects of the COVID-19 pandemic are more intense in women.

In the study conducted by Alsoghair et al. on 4, 5 and 6th-grade medical students, no significant relationship was found between age and COVID-19 risk perception.²³ In the study conducted by Kim et al. to examine the risk perception of nursing students related to MERS, no significant relationship was found between age and MERS risk perception²¹, so our study is consistent with previous studies. In the study of Taghrir et al., 7th-grade and 5-6th-graders were compared and it was shown that there was a significant difference in their COVID-19 risk perception scores. Regarding the reason, it is thought that 7th-grade students have more experience in patient care, have higher self-confidence, therefore they perceive lower risk, and experience less stress and anxiety.²⁴ In our study, no significant difference was found between the students in the preclinical and clinical period in terms of risk perception. However, when the students in the clinical period were evaluated, the COVID-19 risk perception scores of the students who encountered a confirmed and suspected COVID-19 patient in their internship unit were found to be statistically significantly higher than those who did not encounter such a patient.

If healthy communication can be established between the scientific world and the public, behavioral and attitude changes can be observed at the social level, and this can positively affect the course of the epidemic. At this point, it is of great importance to convey health-related information to the public in a simple and

understandable language and to create social awareness while doing this.

During the pandemic process, the Ministry of Health carried out studies by following a series of communication strategies for the course and control of COVID-19 in order to inform large segments of the public regardless of their education level. The Ministry conveyed the messages it prepared with the support of the media to large masses. The experts of the field, who were invited to the television programs, informed the masses about the course of the disease and the measures that can be taken for its prevention. Announcements about the measures to be taken for public and health personnel and the steps to be followed in almost all areas of social life are detailed on the official website of the Ministry.²⁵ The developments regarding the course of the disease have been shared with the public in detail every day by the Ministry of Health and continue to be shared. In our study, no significant difference was found between the levels of risk perception according to the educational status of the parents of the participants.

Many risk factors have been identified that can cause COVID-19 to progress to a serious stage. One of these risk factors is underlying respiratory system diseases.²⁶ Bloom et al. characterized the COVID-19 patients admitted to the hospital. They found that underlying respiratory system disorders are common in patients. It was determined that patients with underlying respiratory system disorders were more likely to receive critical care and there was a significant mortality increase in patients with chronic lung disease compared to patients without an underlying respiratory system disease.²⁷ In our study, the mean COVID-19 risk perception score of the students with respiratory system-related disease/risk factors was found to be statistically significantly higher than those who didn't. This can be explained by the fact that medical students heard, read about or observed the effects of SARS-CoV-2 on the respiratory system.

In our study, the proportion of those who stated that if the patient/patient relative doesn't pay attention to the use of mask during communication, they will warn and wait until they wear the mask properly, found to be high (79.0%). The proportion of those who stated that they could communicate under all circumstances if the patient/patient relative comply with the use of masks and physical distance rules, found to be high (68.9%). Both show that students attach importance to preventive behaviors. In studies, high COVID-19 risk perception

was associated with higher preventive behaviors. It has been shown that as the risk perception due to COVID-19 increases, the level of compliance with the measures also increases.^{15,23} Additionally, in our study, it was determined that 98.8% of the students had the COVID-19 vaccine. It has been determined that these people have higher risk perception levels. However, various findings are presented in the literature on the relationship between the vaccine against COVID-19 and risk perception. It is thought that this situation is caused by the unfounded information pollution against vaccination.

Each of the parties must willingly participate in the communication so that the communication between the health personnel and the patient can be carried out healthily. In Işık's study, it was determined that patients primarily pay attention to whether the physicians listen to them carefully and to the attitudes of the physicians towards them. The participants expressed that they were afraid of physicians who exhibited cold and superficial attitudes during the communication.²⁸ However, it is also important to understand the emotions and thoughts experienced by healthcare professionals along with their efforts to demonstrate their professional knowledge and skills during the pandemic. In the study conducted by Yılmaz et al. to evaluate the perspectives and attitudes of healthcare professionals towards the COVID19 pandemic, it was determined that physicians predominantly experienced feelings of fear, anxiety and uneasiness during the pandemic. The growth of the epidemic, the death of colleagues, the risk of infection by themselves or their family members, negative events and concerns experienced by physicians were evaluated.²⁹

In the study performed by Eren et al. on healthcare workers, 66% of the participants survived the disease mildly, and the proportion of those who had severe was determined as 1.2%.³⁰ Another study conducted by Fakhim et al., 66.6% of the participants had the disease asymptotically.¹³ The study of Jary et al., no severe infection was observed in any of the participants.³¹ 17.9% of the students participating in our study were infected with SARS-CoV-2, and the mean of the COVID-19 risk perception score of the infected people was found to be statistically significantly lower than the uninfected ones. The participants weren't asked about the severity of the disease, but it is thought that the fact that the patients with COVID-19 were asymptomatic or outpatient may have reduced the risk perception of

COVID-19. However, the thoughts of the students who have had the disease about the protection of the antibodies developed in their bodies may have also been influential. A study conducted by Ripperger et al., it was determined that antibodies were still present in the blood five to seven months after the infection.³² But the fact that people's immune systems tend to respond to natural infections in very different ways shouldn't be forgotten. In our study, no statistically significant difference was found between those who were vaccinated against COVID-19 and those who weren't. Stokel-Walker stated that the cases of re-infection detected after vaccination are few and most of the re-infected people have mild disease.³³ However, care should be taken that even if the symptoms are mild or absent, this doesn't mean that the virus can't be transmitted.

During the COVID-19 pandemic, when research on health workers is examined, it is seen that they are generally related to their physical and mental health.^{34,37} In the study of Que et al., it was stated that psychological problems are common among healthcare workers during the pandemic and as the process lengthened and the situation became more serious, fear and anxiety due to uncertainty, feelings of inadequacy, hypersensitivity and helplessness emerged.³⁸ These emerging feelings negatively affected the communication levels of healthcare professionals with patients/patient relatives in pandemic, where the use of effective communication skills is more important than ever.³⁹ In our study, 32.7% of the participants stated that they could communicate as briefly and superficially as possible with the patients/patient relatives during the pandemic. The mean score of COVID-19 risk perception of these people was found to be significantly higher. However, in order to preserve the care in physician-patient communication, to comply with ethical rules and for patients to receive quality service, health professionals should be the parties that guide the process, under appropriate working conditions, rather than being affected by the pandemic.

In the study conducted by Wang et al., it was stated that the fear of being infected with SARS-CoV-2 and the anxiety of infecting family members are the main causes of stress among healthcare workers. It was also emphasized that although they were disturbed by these effects, health professionals were able to reduce their stress thanks to their professional commitment, responsibility and sacrifice to their profession.⁴⁰ In our study, 68.1% of the participants stated that they could

communicate with the patient/patient relatives in any condition if mask use and physical distance rules are followed. The COVID-19 risk perception scores of these people were found to be significantly lower. This shows that students consider the measures to be taken to protect themselves from the pandemic and they are already aware of the responsibilities required by their future profession, even though they are just at the beginning of the road.

When asked about the effect of using personal protective equipment on communication in our study, 57.0% of the students stated that the mask made it difficult to understand speech. In studies, it has been stated that communication is more effective when auditory input is accompanied by visual input, but masks used may prevent effective communication by both hiding mimic/lip movements and causing a change in tone/volume of voice.⁴¹

When we look at the literature on patient-physician communication, many studies have been conducted, and most of them have evaluated the issue from a patient's point of view. The prominent feature of our study is that it evaluates this issue in connection with the current COVID-19 pandemic. In the study, communication was evaluated from the perspective of medical students, who both provide the necessary cooperation in the diagnosis and treatment of diseases and are a potential source of health information in the society, and it is associated with the risk perception of COVID-19. Our study is the first study in the literature that examines the risk perception of all medical students from the preparatory class to the 6th grade and their attitudes towards health communication during the pandemic. For this reason, it is thought that it will contribute to health professionals, field researchers, community leaders and educators in coping with the effects of COVID-19.

The sampling method and size can be considered as the limitation of our study. Since the participants could not be interviewed face-to-face due to the COVID-19 pandemic, the study was conducted online and therefore the sample size could not be clearly determined. For this descriptive study, 903 participating medical faculty students were considered to be appropriate and sufficient in terms of providing general information on

the subject, although the results were not completely generalisable.

CONCLUSION

In this study, it was revealed that students' COVID-19 risk perception levels can direct their attitudes towards health communication with patients/patient relatives during the pandemic. One of the most important problems we encounter during the pandemic is that no precautionary measures have been taken for medical students for situations that may be experienced during the pandemic. In this context, health policymakers and educators should be more involved in the medical education process related to the pandemic, and medical students should be informed about the importance of risk management and correct communication. In addition, since they are a vulnerable group, they should be closely monitored, and appropriate psychological support should be offered to students to enrich the technological and administrative features of risk management with socio-psychological considerations and precautions.

Authorship contribution statement

Concept and desing: NO, MT, NEB.

Acquisition of data: NO, BS.

Analysis and interpretation of data: NO, MT.

Drafting of the manuscript: NO, BS.

Critical revision of the manuscript for important intellectual content: NO, MT, NEB.

Statistical analysis: NO, BS.

Declaration of competing interest

None of the authors have potential conflicts of interest to be disclosed.

Ethical approval

This study was approved by the Scientific Research Ethics Committee of Karadeniz Technical University Faculty of Medicine (decision dated 09.12.2021 and numbered 24237859-894).

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

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An Important Adipokine: Isthmin-1

Önemli Bir Adipokin: İsthmin-1

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ABSTRACT

The presence of isthmin-1 in different body compartments reveals its significance in metabolism, cell proliferation, endothelial permeability, angiogenesis and immunity. Studies have categorized isthmin-1 as an adipokine with insulin-like behavior that uptakes glucose by the adipocytes and inhibits liver steatosis through a not identified tyrosine kinase receptor, that it is distinct from insulin receptor. Additionally, this adipokine demonstrates important functions in regulating organs development and homeostasis. This review aims to summarize the informations of isthmin-1 protein mainly its functions on glucose and lipid metabolisms.

Keywords: Adipokine, Glucose and lipid metabolism, Isthmin-1

ÖZET

İsthmin-1'in farklı vücut bölmelerinde bulunması metabolizma, hücre çoğalması, endotel geçirgenliği, anjiyogenez ve immünitadaki önemini ortaya koymaktadır. Çalışmalar isthmin-1'i, adipositler tarafından glukozu alan ve bilinmeyen bir reseptör aracılığıyla karaciğer yağlanmasını engelleyen insülin benzeri davranışa sahip bir adipokin olarak kategorize etmiştir. Ek olarak, bu adipokin organ gelişimini ve homeostazisini düzenlemede önemli işlevler göstermektedir. Bu derleme, isthmin-1 proteininin esas olarak glukoz ve lipid metabolizmaları üzerindeki işlevleri hakkındaki bilgileri özetlemeyi amaçlamaktadır.

Anahtar Kelimeler: Adipokin, Glukoz ve lipid metabolizması, İsthmin-1

INTRODUCTION

Isthmin-1 gene (*hIsm*) is found on chromosome 20p12.1 in human.¹⁻³ Although it was first discovered in the brain, later studies have shown that it is found in many tissues.^{1,4,5} This 60 kDa protein contains 499 amino acids in human. In mice, the isthmin-1 gene is located on chromosome 2 (2;2F3), has a size of 52 kDa, and contains 454 amino acids.^{3,6} In chickens, this gene is located on chromosome 3 and has an amino acid sequence of 443. In zebrafish, this gene is found on chromosome 13 with an amino acid sequence of 443.³ Isthmin-1 undertakes many important functions through two main receptors: Alpha-v beta-5 (avβ5) receptor and glucose-regulated protein 78 (GRP78) receptor.⁷⁻⁹ The isthmin-1 protein possesses three domains; a N-terminal signal peptide (SP), a thrombospondin type 1 repeat (TSR1) and an adhesion-associated domain in mucin 4 (MUC4) and other proteins in the C-terminal region (AMOP).¹⁰ The TSR1 domain has three important motifs which are “aspartic acid - glutamic acid - glycine” motif, “tryptophan – serine – leucine - tryptophan” motif and “cysteine – serine – valine – threonine - cysteine - glycine”. These motifs display essential biological processes in collagen receptor activation, transforming growth factor β activation and anti-angiogenic activation. On the other hand, the AMOP domain of Isthmin-1 contains two important motifs, which are “arginine – lysine - aspartic acid” motif and “lysine - glycine-aspartic acid” motif; the binding of these motifs to avB5 receptor will initiate cell adhesion, migration, and vascular permeability.¹¹⁻¹⁴ Additionally, this protein has crucial posttranslational modification sites, such as N-glycosylation and C-mannosylation sites, which they play an important role in the export of isthmin-1 from the endoplasmic reticulum to the golgi, protein folding and secretion.^{3,15}

Functions of isthmin-1 in metabolism

The term adipokine indicates a set of cytokines and hormones secreted from adipose tissues.¹⁶ To date, approximately 600 adipokines with different functions have been discovered.¹⁷ Adipokines regulate the circulatory and immune systems, affecting many organs such as the brain, liver, muscle, and heart. These proteins regulate glucose and lipid metabolism, endothelial functions, apoptosis, angiogenesis, inflammation, hemostasis, etc.¹⁸

A study by Jiang *et al.* (2021) suggested isthmin-1 is an adipokine that manifests endocrine functions and performs important functions in adipose tissues,

regulating growth, metabolism, and development of distant organs.¹⁹ Additionally, a study by Liao *et al.* (2023) has stated that the adipokine isthmin-1 significantly regulates insulin sensitivity, glucose tolerance, and inflammation.²⁰ Isthmin-1 increases glucose uptake by the phosphorylation of phosphoinositide 3-kinase/protein kinase pathway and represses de novo lipogenesis and liver steatosis through interfering with the inductions of sterol regulated element binding protein-1c, acetyl-CoA carboxylase, low density lipoprotein receptor, peroxisome proliferator-activated receptor γ coactivator 1β and carbohydrate response element binding protein. Additionally, it enhances protein synthesis in the liver through the protein kinase-mammalian target of rapamycin kinase 1- ribosomal protein S6 pathway.^{3,21,22} Thus, excision of isthmin-1 can result in reduction in the muscles fiber size and intensity.²³ However, the above-mentioned metabolic processes are achieved by still not-identified receptor tyrosine kinase.¹⁷

Lei *et al.* (2024) found that serum isthmin-1 levels were higher in patients with fatty liver and type 2 diabetes when compared to healthy controls; in those with metabolic syndrome when compared to those without metabolic syndrome; in obese people when compared to lean people; in those with low levels of high density lipoprotein cholesterol compared to those with high levels of high density lipoprotein cholesterol; and in men when compared to women.²⁴ Ruiz-Ojeda *et al.* (2023) found high isthmin-1 and leptin levels in obese children, but they didn't find any significant correlation between them.²⁵ They also determined that isthmin-1 levels were directly proportional to body mass index, alanine aminotransferase and total cholesterol levels, and inversely proportional to high density lipoprotein cholesterol levels.^{24,26} Supportingly, a study expressed that isthmin-1 blood levels have been found to be higher in men than in women and showed positive correlation with waist circumference and β-cell function.²⁷ Notably, direct correlations were detected between serum isthmin-1 concentration and the values of maternal waist circumference, oral glucose tolerance test 2nd-hour blood glucose, glycated haemoglobin, homeostasis model assessment insulin resistance, and epigastric subcutaneous and periumbilical adipose tissue density. However, another study determined that no major association was found between maternal serum isthmin-1 concentration and maternal age and fasting blood glucose level.²⁸

Interestingly, isthmin-1 is positively correlated with type 2 diabetes, and acts as a protective factor for diabetes. Serum isthmin-1 levels were higher in slim females compared to obese females with type 2 diabetic mellitus. However, no significant alterations in isthmin-1 levels were observed in obese males with type 2 diabetic mellitus. The same study pointed out that there is no relationship between serum isthmin-1 levels and the occurrence of diabetic sensorimotor peripheral neuropathy.²⁰ A study by Menghuan *et al.* (2023) stated that serum isthmin-1 concentration is elevated in individuals with macroalbuminuria, which is a key feature of diabetic nephropathy. This indicates that isthmin-1 increases the risk of developing type 2 diabetes mellitus.²²

Studies have confirmed that the aging heart depends mainly on energy sources from glycolysis instead of

glucose oxidation and lipid catabolism. A study conducted by Hu *et al.* (2024) found that isthmin-1 plays a prominent role in promoting glycolysis, the hexosamine biosynthetic pathway, glucose transporter-4 (GLUT4) transportation to the cell surface, and activation of sirtuin 1 deacetylase in aging mice; thus, isthmin-1 significantly inhibits cardiac dysfunction and inflammation and improves the quality of life in aging mice.²⁹

As a result, it can be said that although isthmin-1 has similar action to insulin in the aspect of glucose and protein metabolism, it shows different effect on lipid metabolism (lipogenesis) in liver.

Other functions of isthmin-1

Isthmin-1 has a lot of functions in addition to its anti-adipogenic functions, and so in metabolism. These functions are summarized in table-1.

Table 1. A brief overview about the functions of isthmin-1

Functions	Explanations	References
Anti-angiogenesis	The AMOP domain of isthmin-1 binds to avB5 integrin, inhibits vascular endothelial growth factor and restrains the development of new blood vessels.	3,5,30
Anti-cancer	It controls the proliferation of hepatocellular cancer, gastric cancer, breast cancer and melanoma.	3,31-33
Anti-inflammation	It suppresses NF-κB activation and inflammatory cytokine and chemokine production.	18,34
Apoptosis	Mobilized isthmin-1 acts on avB5 integrin in extracellular endothelial cells to initiate an activation series of caspase-3 and caspase-8, leading to apoptosis. Immobilized isthmin-1 binds to avB5 receptor and activates focal adhesion kinase, resulting in cell division, migration, and proliferation. Soluble isthmin-1 binds to the GRP78 receptor on the surface of endothelial cells. Then isthmin-GRP78 complex penetrates the cell through endocytosis, which is then transferred to the inner mitochondrial membrane, which can interact with AAC and block the transportation of ATP from mitochondria to the cytosol, resulting in apoptosis.	6,22,30
Endothelial permeability	Isthmin-1 boosts endothelial permeability by binding to GRP78 and avβ5 receptors.	35
Hematopoiesis	Isthmin-1 ameliorates the production of mesenchymal progenitors, endothelial progenitor cells, hematopoietic stem and progenitor cells, neutrophils, macrophages, and erythrocytes.	36,37
Kidney development	Isthmin-1 is shown to be expressed in metanephric mesenchyme and ureteric epithelium and takes a part in kidney development through three essential receptors, which are α8β1, ephrin-β1, and plexin-β2.	38
Lung homeostasis	Isthmin-1 efficiently preserves lung homeostasis in several diseases, such as asthma and chronic obstructive pulmonary disease, by preventing emphysema, bronchial hyperresponsiveness, and severe lung inflammation. This protein binds to GRP78 receptor, thereby causes the stimulation of adiponectin secretion from alveolar cells and ultimately alleviates allergic asthma.	39,40

Abbreviations: Alpha-v beta-5 (avβ5), Adenine nucleotide translocase (AAC), adhesion-associated domain in mucin 4 (MUC4) and other proteins (AMOP), adenosine triphosphate (ATP), Glucose regulated protein 78 (GRP78), nuclear factor kappa B (NF-κB).

CONCLUSION and RECOMMENDATIONS

Isthmin-1 is a recently expressed adipokine protein that exhibits multiple functions in different body organs. So far, few studies have been done on isthmin-1. However, the research on isthmin-1 has been going rapidly in the last few years. There is still a need to determine isthmin-1 in different aspects, such as the mechanism of interaction of isthmin-1 with its receptor in metabolism. In addition, more detailed studies are required to identify the physiological and pathological functions of isthmin-1. The relationships between isthmin-1 and various diseases such as cardiovascular, neurological, skin and joint disorders are also suggested to be investigated. We think that the significance of isthmin-1 in many biological areas will make it an attractive topic in the future.

Authorship contribution statement

Concept and design: KAMSA, BK.

Drafting of the manuscript: KAMSA, SK.

Critical revision of the manuscript for important intellectual content: KAMSA, BK, SK.

Declaration of competing interest

No conflicts of interest to be disclosed.

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