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Medical faculty students risk perception, attitudes, and behaviors regarding protection from COVID-19 infection

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Abstract. – OBJECTIVE: This study aims to determine the risk perception, attitude, and behavior characteristics of Pamukkale University Faculty of Medicine students towards protection from COVID-19.

SUBJECTS AND METHODS: A total of 698 (48.2%) students of Pamukkale University Faculty of Medicine participated in this analytical cross-sectional study. Dependent variables were attitudes and behaviors related to protection from COVID-19, and independent variables were socio-demographic characteristics, sources of information about COVID-19, and health status. Data was collected through a survey using Google Forms. SPSS 17.0 (Inc., Chicago, IL, USA) software package was used for statistical analysis. Descriptive statistics were expressed as numbers and percentages for nominal data and mean and standard deviation for numerical data. Numerical data were compared with Mann Whitney U and Kruskal Wallis tests. Spearman correlation and backward linear regression analyses were used. A p-value of <0.05 was considered significant.

RESULTS: The mean age of 698 students participating in the study was 21.8±2.2, and 60% of them were female. The mean attitude score was 54.99±5.17 and the mean behavior score was 50.64±6.06. The information sources of the students about COVID-19 were TV news (69.3%). Linear regression analysis revealed that attitude scores of the female gender were higher than male gender (β=0.757±0.364 *p*=0.038, 95% CI: 0.440-1.471) and scores for using websites/social media accounts of professional organizations and professional associations as information sources were higher than not using (β=0.981 ± 0.388 *p*=0.011 95% CI: 0.230-1.732).

CONCLUSIONS: Medical students' attitude and behavior score towards protection against COVID-19 infection is slightly above the average level. Medical education curriculum should prepare students to manage epidemics.

Key Words:
COVID-19, Pandemic, Medical faculty students, Public health.

Introduction

Epidemics caused by old or new infectious agents continue to be an important public health problem in the world[1]. The Chinese Center for Disease Control and Prevention reported the emergence of a new type of pneumonia agent in Wuhan City (Hubei, China)[2,3]. After that, on March 11, 2020, the World Health Organization (WHO) declared a global pandemic[4]. There have been more than 273 million cases and more than 5.3 million deaths in the world[5,6]. The COVID-19 strategy report published by the World Health Organization emphasizes that every individual in the society has critical importance in the prevention of pandemics and underlines the importance of protective behaviors of individuals in the protection of both themselves and others[5-9]. Medical students are considered influential on their close social circles, especially their families. Therefore, it is necessary to know their knowledge, attitude, and behavioral characteristics towards COVID-19[10,11]. This research aims to evaluate the risk perception, attitudes, and behaviors of medical school students regarding protection against COVID-19.

Subjects and Methods

It is an analytical-cross-sectional study. It is based on a population of 1,449 students studying at Pamukkale University Faculty of Medicine. The study took place in March 2021. The dependent variables were attitudes and behaviors related to protection from COVID-19. The independent variables were age, gender, school year, socio-demographic and economic characteristics, sources of information about COVID-19, and health characteristics. An online (Google) survey was used as the data collection tool. The 15-item

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attitude questionnaire consisted of 5-point Likert-type questions. (1=Strongly disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly agree). Only one item was reverse calculated. The 12-item behavior questionnaire consisted of 5-point Likert-type questions (1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Always).

Statistical Analysis

SPSS 17.0 (Inc., Chicago, IL, USA) software package was used for statistical analysis of the data. Descriptive statistics were expressed as numbers and percentages for nominal data and mean and standard deviation for numerical data. Numerical data were compared with using Mann Whitney U and Kruskal Wallis tests. Spearman correlation was used to determine the relationship between attitude and behavior mean scores, and backward linear regression analysis was used for advanced analysis of attitude and behavior characteristics. A p-value of <0.05 was considered statistically significant. Ethical approval was obtained from the University Ethics Committee (E-60116787-020-44860 dated 07.04.2021).

Results

Sociodemographic Characteristics of Medical Students

A total of 698 students (48.2%) participated in our study. The mean age of the medical faculty students was 21.8±2.2, 60.0% (n=419) female, 87.5% (n=611) did not have a chronic disease and 77.4 (n=540) did not smoke. 69.3 (n=84) of the medical students were getting information from television news. 99.3% (n=693) of the students were wearing masks. 61.8% (n=431) of the participants evaluate their knowledge level about COVID-19 as sufficient/very sufficient and 54.4% (n=380) had been vaccinated against COVID-19 (Table I).

Attitudes of Medical Students Towards Protection from COVID-19 Infection

The mean attitude score of the medical students was 54.99 ± 5.17 (min 31-max 74). Medical students marked the following items as strongly agree: COVID-19 is a preventable disease (29.1%), I am worried that someone in my family will be infected with COVID-19 (68.9%), and I invite my family members who are eligible to be vaccinated against COVID-19 following the indication of the Ministry of Health of the Republic of Turkey (69.9%), I think everyone should use a mask (79.9%) (Table II).

Behaviors of Medical Students towards Protection from COVID-19 Infection

The mean behavior score of the medical students was 50.64 ± 6.06 (min 29 - max 60). Students marked the following items: I avoid close contact with people who are sick, sneezing or coughing (52.0%); I cover my nose and mouth with a tissue when coughing or sneezing (48.1%); I throw away the used handkerchief directly (51.1%). They also always marked the following points: I use a mask to cover my nose (87.2%); Due to COVID-19, I avoid using public transport such as buses or subways (47.3%); I wash my hands more often than usual (56.3%) due to COVID-19; I do not apply to health institutions except in urgent and very necessary situations (55.3%); I inform my relatives/family who are not healthcare professionals about protection from COVID-19 infection (50.9%) (Table III).

Chi-Squared Statistical Analysis

While there was no significant difference between the education years in medical students (p=0.059), significant difference was found in behavior scores (p=0.032) and the female gender (p=0.02). Regarding the information-gathering characteristics, there was a significant difference between those who used websites/social media accounts of professional organizations and specialty associations (p<0.001), medical books, journals, or articles (p=0.003), communication groups such as WhatsApp-Telegram (p=0.002). The mean behavior scores of medical students differed significantly in terms of using the World Health Organization website/social media account (p<0.001), television news (p=0.007), medical books, medical journals, or articles (p=0.001). The mean attitude scores of medical students differed significantly in those who expressed insufficient knowledge about COVID-19 (p<0.001) and vaccination status (p=0.003). In addition, the mean attitude and behavior scores (p<0.001) of those who expressed their knowledge about COVID-19 as very sufficient was significantly different (Table IV).

Correlation analysis

The medical students' age had no significant relationship with the attitude (rho= -0.032, p=0.396) and behavior mean scores (rho=0.031, p=0.412), the relationship between the means of attitude

Table I. Socio-demographical characteristics of medical students.

Attitude score		Attitude score	
Mean±SD (Min-Max)	54.99 ± 5.17 (31-74)	Physicians' personal websites/social media accounts	335 (48.0)
Median±SD (Min-Max)	55.0 ± 5.17	TV news	484 (69.3)
Behavior score		TV health programs/debate programs	233 (33.4)
Mean±SD (Min-Max)	50.64 ± 6.06 (29-60)	Medical books, medical journals, or articles (in print or online)	169 (24.2)
Median±SD (Min-Max)	51.0 ± 6.06	Events such as seminars/meetings/ congress held in institutions	106 (15.2)
Age (Mean±SD)	21.8±2.2	Communication groups such as WhatsApp, Telegram	278 (39.8)
Demographic characteristics	**n (%)**	Other	21 (3.0)
Year 1	133 (19.1)		
Year 2	111 (15.9)	**Precautions taken by medical students regarding COVID-19 infection**	
Year 3	92 (13.2)	Mask	693 (99.3)
Year 4	108 (15.5)	Glove	220 (31.5)
Year 5	115 (16.5)	Cologne	581 (83.2)
Year 6	139 (19.9)	Disinfectant	536 (76.8)
Gender		Handkerchief	330 (47.3)
Female	419(60.0)	Not contacting anyone	159 (22.8)
Male	279(40.0)	Avoiding crowded places	499 (71.5)
		Not leaving the house	202 (28.9)
Marital status		Online shopping only	285 (40.8)
Single	693 (99.3)	Avoiding public transportation	370 (53.0)
Married	5 (0.7)	Avoiding close contact	595 (85.2)
		Other	4 (0.6)
Mother's education status			
Illiterate	13 (1.9)	**Medical students' health characteristics regarding COVID-19 infection**	
Literate	6 (0.9)		
Primary school graduate	145 (20.8)	**Evaluation of the level of knowledge about COVID-19**	
Secondary school graduate	56 (8.0)		
High school graduate	231 (33.1)	Very insufficient	8 (1.1)
University / College graduate	247 (35.4)	Insufficient	57 (8.2)
		Undecided	202 (28.9)
Father's education status		Sufficient	378 (54.2)
Illiterate	1 (0.1)	Very sufficient	53 (7.6)
Literate	4 (0.6)		
Primary school graduate	91 (13.0)	**Evaluation of current health level**	
Secondary school graduate	39 (5.6)	Very good	202 (28.9)
High school graduate 231	180 (25.8)	Good	405 (58.0)
University/College graduate	383 (54.9)	Moderate	82 (11.7)
		Poor	6 (0.9)
Presence of a chronic disease or a disease that requires regular drug use		Very poor	3 (0.4)
Yes	87 (12.5)		
No	611 (87.5)	**Those who had the flu vaccine this year**	20 (2.9)
Smoking status			
Yes	124 (17.8)	**Those vaccinated against COVID-19**	380 (54.4)
No	540 (77.4)		
Quit	34 (4.9)	**Those who participated in training on COVID-19**	219 (31.4)
Medical students' resources of information about COVID-19	n (%)		
Ministry of Health website/social media account	463 (66.3)		
World Health Organization website/social media account	196 (28.1)		
Professional organizations, specialty associations' websites/social media accounts	217 (31.1)		

Rows contain multiple options.

Table II. Medical students' attitudes towards protection from COVID-19 infection.

	Strongly agree n (%)	Agree n (%)	Indecisive, n (%)	Disagree n (%)	Strongly disagree n (%)
COVID-19 is a preventable disease.	203 (29.1)	327 (46.8)	140 (20.1)	26 (3.7)	2 (0.3)
Health education has no effect on the prevention of COVID-19 infection.	17 (2.4)	48 (6.9)	92 (13.2)	220 (31.5)	321 (46)
I am worried about getting infected with COVID-19.	233 (33.4)	340 (48.7)	69 (9.9)	39 (5.6)	17 (2.4)
I believe that the COVID-19 vaccine will be an effective solution in the fight against the pandemic.	248 (35.5)	311 (44.6)	119 (17)	18 (2.6)	2 (0.3)
I am worried that one of my family members will get infected with COVID-19.	481 (68.9)	192 (27.5)	15 (2.1)	3 (0.4)	7 (1)
I encourage my family members entitled to have the COVID-19 vaccine within the scope of the ministry of health applications to get vaccinated.	488 (69.9)	181 (25.9)	24 (3.4)	2 (0.3)	3 (0.4)
If I develop flu-like symptoms, I will avoid usual activities such as going to school or work, traveling, or shopping. I think it is not appropriate for schools to reopen after the holiday is declared.	473(67.8)	192(27.5)	20(2.9)	6(0.9)	7(1.0)
I think everyone should wear a mask.	558 (79.9)	113 (16.2)	18 (2.6)	3 (0.4)	6 (0.9)
I find all the health measures taken by the Ministry of Health regarding COVID-19 infection sufficient.	22 (3.2)	54 (7.7)	135 (19.3)	229 (32.8)	258 (37.0)
I do not find it appropriate to announce the rate of COVID-19 cases by cities.	42 (6)	59 (8.5)	78 (11.2)	184 (26.4)	335 (48.0)
If the rate of COVID-19 cases in my city is higher than in other cities, I will go to another city.	18 (2.6)	19 (2.7)	45 (6.4)	225 (32.2)	391 (56.0)
I do not find it appropriate for schools to reopen after a holiday is declared.	245 (35.1)	162 (23.2)	150 (21.5)	76 (10.9)	65 (9.3)
I think that curfews should be increased in our country.	321 (46.0)	206 (29.5)	104 (14.9)	36 (5.2)	31 (4.4)
I am sure that if I wash my hands as and when necessary, I will be protected from this virus.	111 (15.9)	194 (27.8)	254 (36.4)	109 (15.6)	30 (4.3)
I think everyone should be tested, whether suspected or not.	178 (25.5)	137 (19.6)	175 (25.1)	142 (20.3)	66 (9.5)

(rho= -0.0376, $p<0.001$) and behavior scores were significantly correlated (rho= -0.0376, $p= 0.001$).

Regression analysis

The mean attitude score of medical students was affected by the following variables: female gender (β=0.757±0.364, $p=0.038$, 95% CI: 0.440-1.471), using websites/social media accounts of professional organizations and specialty associations as the source of information (β=0.981±0.388, $p=0.011$, 95% CI: 0.230-1.732), considering their level of knowledge about COVID-19 sufficient (β=1.006±0.400, $p=0.0012$, 95% CI: 0.220-1.792), behavior score (β=0.355±0.029, $p<0.001$, 95% CI: 0.297-0.412), not being vaccinated against COVID-19 (β=1.177±0.355, $p=0.001$, 95% CI: 0.479-1.874) ($r^2=0.19$). The mean behavior score of medical students was affected by the following variables: female gender (β=1.797±0.419, $p<0.001$, 95% CI 0.975-2.619), attitude score (β=0.455±0.040, $p=0.001$, 95% CI: 0.377-0.534), using the World Health Organization website/ social media accounts as a source of information (β=1.261±0.460, $p=0.0006$, 95% CI: 0.358-

2.164), using medical books, medical journals or articles (β=1.161±0.490, *p*=0.018, 95% CI: 0.199-2.123), considering their level of knowledge about COVID-19 sufficient (β=1.064±0.430, *p*=0.0014, 95% CI: 0.220-1.907) (r^2=0.21).

Discussion

In our study, we found that the majority of medical students (61.8%) consider the level of knowledge about coronavirus sufficient/very sufficient, and their attitude and behavior score towards protection from COVID-19 infection is just above the average level. We also evaluated only theoretical attitudes and intentions towards behavior. Students' attitudes were affected by the female gender, using professional organizations and specialty associations' websites/social media accounts as a source of information, behavior scores, and considering their level of knowledge about COVID-19 sufficient. The COVID-19 pandemic has had a great impact, especially on healthcare workers[12]. Healthcare workers' risk perceptions and protective measures are also critical for the protection of the general population[13]. Uzun et al[11] reported the mean risk perception score as 22.70 ± 4.68 (max 44), the behavior scores as 32.20 ± 4.70 (max 40), and risk perception as moderate. There was a significant positive relationship between the risk perception and behavior scores. Risk perception was higher in female students and those with low income, those whose mothers were highly educated, those considering their health status poor, and those with insufficient knowledge about COVID-19. Our study was similar in terms of the female gender with a slightly above moderate behavior score. In their study with nine medical school students in Uganda, Olum et al[14] found that 91.0% had good knowledge, 74.0% had a positive attitude, and 57% had good practice. Attitude scores of the female gender were higher than those of the male gender, and scores for following TV and radio programs related to COVID-19 were higher than those for not following these programs; practice scores for people ≥24 years old, attending online courses related to COVID-19, were higher than those for people under 24 years old and not attending online courses. Although the rate of sufficient knowledge about COVID-19 in our country was lower than in Uganda, the positive attitude score percentages were similar[14]. In their study on non-medical university students and staff in Paki-

Table III. Medical students' behaviors towards protection from COVID-19 infection.

	Always n (%)	Often n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)
I follow developments and information about COVID-19.	150 (21.5)	352 (50.4)	162 (23.2)	30 (4.3)	4 (0.6)
I avoid close contact with people who are sick, sneezing, or coughing.	363 (52)	296 (42.4)	30 (4.3)	8 (1.1)	1 (0.1)
I generally avoid touching my eyes, nose, and mouth with my hands.	252 (36.1)	312 (44.7)	99 (14.2)	28 (4.0)	7 (1.0)
I cover my nose and mouth when coughing or sneezing with a tissue.	336 (48.1)	242 (34.7)	81 (11.6)	27 (3.9)	12 (1.7)
I throw the used tissue directly into the trash.	357 (51.1)	236 (33.8)	85 (12.2)	12 (1.7)	8 (1.1)
I clean the surfaces that people constantly touch with alcohol or a disinfectant.	182 (26.1)	201 (28.8)	187 (26.8)	82 (11.7)	46 (6.6)
I use a mask to cover my nose and mouth in crowded places.	609 (87.2)	72 (10.3)	13 (1.9)	4 (0.6)	0 (0.0)
Due to COVID-19, I avoid using public transport such as buses or subways.	330 (47.3)	209 (29.9)	98 (14.0)	38 (5.4)	23 (3.3)
Due to COVID-19, I avoid going to crowded places, markets, shopping malls.	248 (35.5)	263 (37.7)	135 (19.3)	38 (5.4)	14 (2.0)
Due to COVID-19, I wash my hands more often than usual.	393 (56.3)	225 (32.2)	55 (7.9)	14 (2.0)	11 (1.6)
I do not apply to health institutions except in urgent and very necessary situations.	386 (55.3)	242 (34.7)	50 (7.2)	11 (1.6)	9 (1.3)
I inform my relatives/family, who are not healthcare professionals, about protection from COVID-19 infection.	355 (50.9)	239 (34.2)	76 (10.9)	24 (3.4)	4 (0.6)

Table IV. Factors affecting medical students' attitude and behavior scores according to several variables.

Year	Attitude score (Mean±SD)	*p*-value	Behavior score (Mean±SD)	*p*-value
Year 1	55.43 ± 6.08		50.97 ± 5.79	
Year 2	54.86 ± 5.44		49.16 ± 6.83*	
Year 3	55.21 ± 4.78	0.059	51.38 ± 5.98	**0.032**
Year 4	54.34 ± 4.44		51.36 ± 4.76	
Year 5	55.68 ± 5.44		51.18 ± 6.74	
Year 6	54.45 ± 4.44		49.99 ± 5.83	
Gender				
Female	54.93 ± 4.42	0.401	51.29 ± 5.51	**0.002**
Male	55.07 ± 6.12		49.66 ± 6.69	
World Health Organization website/social media account				
Yes	55.68 ± 5.40	0.037	52.09 ± 6.0	**<0.001**
No	54.72 ± 5.05		50.07 ± 5.99	
Professional organizations, specialty associations' websites/ social media accounts				
Yes	55.86 ± 4.82	**<0.001**	51.33 ± 5.85	0.088
No	54.59 ± 5.27		50.32 ± 6.13	
TV news				
Yes	55.02 ± 4.98	0.693	50.33 ± 5.66	**0.007**
No	54.92 ± 5.57		51.34 ± 6.84	
Medical books, medical journals, or articles (in print or online)		**0.003**		**<0.001**
Yes	55.81 ± 5.33		52.08 ± 5.86	
No	54.72 ± 5.09		50.18 ± 6.05	
Communication groups such as WhatsApp, Telegram				
Yes	54.4 ± 4.86	**0.020**	50.24 ± 5.48	0.055
No	55.38 ± 5.33		50.9 ± 6.4	
Evaluation of the level of knowledge about COVID-19				
Very insufficient	53.75 ± 4.13		48.5 ± 10.82	
Insufficient	52.4 ± 3.81*		48.7 ± 4.95	
Undecided	54.81 ± 4.85	**<0.001**	49.85 ± 5.36	**<0.001**
Sufficient	55.29 ± 5.16		50.95 ± 6.18	
Very sufficient	56.47 ± 6.72		53.83 ± 6.6*	
Those vaccinated against COVID-19				
Yes	54.53 ± 4.71	**0.003**	50.73 ± 5.71	0.811
No	55.53 ± 5.62		50.52 ± 6.45	

*group that makes the difference.

stan, Salman et al[15] reported that the main source of information was social media, and 50.2% of the participants had sufficient knowledge, 65.4% had a positive attitude, and 36.5% had good preventive practice. Our results were better in all respects. This may be due to the sample consisted of medical school students. In Iran, Taghrir et al[16] determined that of 5th and 7th-year medical students with a mean age of 23.67, 86.96% had sufficient knowledge and 79.60% had a high level of knowledge about COVID-19. The mean rate of preventive behavior was 94.47%. Iranian medical students were found to have a high level of knowledge and preventive behavior and moderate risk perception[16]. The knowledge about COVID-19 in our survey was lower than that of Iranian medical students. This may be attributed to the inclusion of first-term students in the survey. In a study of higher education students in Portugal, Carvalho Alves et al[17] reported that they were knowledgeable and had a positive attitude towards preventive behavior and revealed that women exhibited higher levels of knowledge and more positive attitudes and behaviors. Similarly, female gender

was an effective variable in our analysis. These findings can be interpreted as the protective behaviors of medical school students differ between genders. Baniyas et al[18] reported that medical and health science students in the United Arab Emirates mostly (87.0%) acquire information from more than one reliable source and 95.0% wear face masks. In the same country, Hasan et al[19] study on university students in the 20-25 age range found a general knowledge score of 72.4% and revealed that the main source of information was the internet and social media (85.2%). They stated that most of the students were using masks, those who were receiving health education avoided crowds (99.4%) and practiced social distancing more (97.4%). In brief, these two studies are consistent with our findings. Tadesse et al[20] reported that 69.6% of university students in Ethiopia had sufficient knowledge, 56.6% had a positive attitude, and 65.0% had good practice. In our study, we obtained better results. In their study in South Korea, examining knowledge, attitudes, and practices (KAP) and related factors among the public toward COVID-19, Lee et al[21] found that knowledge was effective in wearing masks, hand hygiene, and avoiding crowded places. The prominence of knowledge among members of the public as a means of protection from COVID-19 highlights the pivotal role of medical students in the fight against the pandemic. According to the COVID-19 KAP study[22] at Mizan Tepi University, 47.0% of the students had sufficient knowledge, 54.0% had a positive attitude, and 42.8% had good practice. These rates are significantly lower than our own findings. The strength of this research is that it examines the risk perception for COVID-19 and is conducted on medical students who are future healthcare practitioners. We think that studies on risk perception and protection behaviors will help control the pandemic. The limitations of the research were that the survey form was delivered to the participants online, and the participation rates of all semester students were not homogeneous.

Conclusions

Our study revealed that medical students' knowledge, attitude, and behavior levels were sufficient. The medical education curriculum should prepare its students for the pandemic with public health policies and clinical practices aimed at managing epidemics. When necessary, local, political authorities and civic groups can be involved in the training process.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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Authors' Contributions

Study conception and design: N. Meydan Acimis and N. A. Celikyurek. Data collection and input: N. A. Celikyurek and M. Akin. Analysis and interpretation of the results: N. Meydan Acimis, N. A. Celikyurek and M. Akin. Draft manuscript and preparation: N. Meydan Acimis and N. A. Celikyurek. All authors gave their final approval and agreed to be accountable for all aspects of the work.

Ethics Approval

Written permission was obtained from the Pamukkale University Ethics Committee (E-60116787-020-44860 dated 07.04.2021). This study was conducted in conformity with the Declaration of Helsinki.

Informed Consent

Before starting the study, all the students were informed on the study, and the voluntary ones were included in the study.

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