

## COVID-19 vaccination intent in university students and influencing factors: An analytical cross-sectional study

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### Abstract

**Objective:** To determine coronavirus disease-2019 vaccination intent and factors influencing the decision among university students.

**Method:** The analytical cross-sectional study was conducted from 25 January - 25 February 2021 at a state university in Muğla, Turkey, and comprised undergraduate students. Data was collected using a self-designed questionnaire through Google Forms. Factors affecting vaccination intent were identified using multinomial logistic models. Data was analysed using SPSS 22.

**Results:** Of the 1069 subjects, 629(58.8%) were females and 440(41.2%) were males. The overall mean age of the sample was 21.34±2.99. Overall, 712(66.6%) students were enrolled in health-related fields, and 357(33.4%) were pursuing non-medical degrees. Besides, 578(54.1%) students intended to have the vaccine. While 458(64.3%) of the subjects studying health-related subjects intended to have the vaccine, only 120(33.8%) in other academic streams said they would get vaccinated. Students who had had the disease or had been in contact with someone who had it 102(33%) were more likely to believe that the vaccine was safe. Smoking, having a flu vaccine in the past, and having a coronavirus disease-2019 test were the factors influencing the intent to have the vaccination ( $p<0.05$ ).

**Conclusion:** Having had a flu vaccine in the past, social media use, history of, or exposure to, coronavirus disease-2019 and enrolment in health-related programme of studies were the factors influencing the vaccination intent of the students.

**Keywords:** COVID-19, COVID-19 vaccine, Vaccine intent, University student, Public health. (JPMA 73: 785; 2023)

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### Introduction

The coronavirus disease-2019 (COVID-19) pandemic is a global public health problem. The increasing number of cases necessitated the development of safe and effective vaccines for the virus as part of a sustainable strategy to control the pandemic. Vaccines are one of the most powerful public health tools for fighting infectious diseases. It has been claimed that a 60-70% herd immunity, which would end the pandemic, can only be achieved with vaccinations.<sup>1</sup> While COVID-19 vaccination programmes continue, a lack of large cohorts in vaccine studies, and a lack of data with regard to serious adverse effects, together with speculations about their effects and protective capacities, have had a negative effect on confidence in COVID-19 vaccines.<sup>2</sup> Barelllo et al.<sup>3</sup> reported that university students have an insufficient or basic level of information about COVID-19, and also 86.1% students intended to have the COVID-19 vaccine, while the remaining 13.9% were not sure. Similarly, in another study, 50.6% students said they

would get vaccinated, 29.8% said they would not, and 19.3% were undecided.<sup>4</sup>

University students are known to make a significant contribution towards increasing public awareness about vaccine uptake and, thus, towards preventing future pandemics. The current study was planned to determine COVID-19 vaccination intent and factors influencing the decision among university students.

### Subjects and Methods

The analytical, cross-sectional knowledge-attitude-practice (KAP) study was conducted from 25 January - 25 February 2021 at a state university in Muğla, Turkey. After approval from the institutional ethics review committee, the sample size was calculated using the formula<sup>5</sup>

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

Where p and q were 0.5, effect size (d) 0.25, type I error ( $\alpha$ ) 0.05, z value 1.9616. It was calculated with 95% confidence interval (CI) and 50% proportion of population.

The sample was raised using purposive sampling technique from among undergraduate students enrolled

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in various departments at the university. Data was collected online using a self-designed questionnaire through Google Forms. The questionnaires were pilot-tested on 99 students who were studying at locations other than the central campus. The power of the test was calculated by G\*Power 3.1, and it was 0.9861.<sup>6</sup>

For the main study, data was collected after taking informed consent from the subjects. Those who did not volunteer to participate were excluded, and so were invalid questionnaires.

The questionnaire had two sections. The first was related to personal factors, including information, such as gender, where the participants lived, and the academic department. The second section was related to the participants' general health, and of their families, COVID-19 status, and their views on getting vaccinated.

Data was analysed using SPSS 22 and STATA 16. Descriptive statistics, including mean, standard deviations, frequencies, percentages, and 95% CI were used to express data as appropriate. Chi-square test and multinomial logistic model (MLM) were also used. Factors affecting the intent to be vaccinated were determined using MLM. Two-tailed  $p < 0.05$  was considered statistically significant.

## Results

Of the 1069 subjects, 629 (58.8%) were females and 440 (41.2%) were males. The mean age of the sample was 21.34+/-2.99. Overall, 712 (66.6%) students were enrolled in health-related fields, and 357 (33.4%) were pursuing non-medical degrees. Regarding the level of protection offered by vaccines at large, 349 (32.6%) subjects were unsure, while 469 (43.9%) were hesitant about the efficacy of COVID-19 vaccine compared to 321 (30%) participants who had confidence in COVID-19 vaccine. Besides, 578 (54.1%) students intended to have the vaccine. While 458 (64.3%) of the subjects studying health-related subjects intended to have the vaccine, only 120 (33.8%) in other academic streams said they would get vaccinated ( $p < 0.05$ ) (Table 1).

**Table-1:** Demographic data and its correlation with various study parameters (n=1069).

	Mean±SD	% (95%CI)
<b>Mean Age (years)</b>	21.34±2.99	
<b>Mean Household Size:</b>	4.65±1.75	
	<b>n</b>	
<b>Gender</b>		
Female	629	58.8 (55.7-61.6)
Male	440	41.2 (38.4-44.3)
<b>Living with</b>		
Family	892	83.4 (81.0-85.7)
Friend	86	8 (6.5-9.6)
Relative	11	1 (0.5-1.7)
Alone	71	6.6 (5.1-8.1)

Other	9	0.8 (0.4-1.4)
<b>Department/School</b>		
Literature	18	1.8 (0.9-2.5)
Education Sciences	98	9.2 (7.5-11.0)
Science	37	3.5 (2.4-4.6)
Economics and Administrative Sciences	159	14.9 (13.0-17.2)
Engineering	18	1.7 (0.9-2.4)
Health Sciences	294	27.5 (24.9-30.0)
Sports Sciences	40	3.7 (2.7-5.0)
Aquaculture	10	0.9 (0.4-1.5)
Technology	12	1.1 (0.6-1.8)
Medicine	378	35.4 (32.6-38.1)
Tourism	3	0.3 (0.0-0.7)
<b>Believe to be at risk of COVID-19</b>		
Yes	517	48.4 (45.5-51.5)
No	552	51.6 (48.5-54.5)
<b>Tobacco Use</b>		
Yes	321	30 (27.2-32.6)
No	748	70 (67.4-72.8)
<b>Have COVID-19 test</b>		
Yes	278	26 (23.3-28.5)
No	791	74 (71.5-76.5)
<b>Use of social media as an information source for COVID-19</b>		
Yes	915	85.6 (83.4-87.7)
No	154	14.4 (12.3-16.6)
<b>Confidence in COVID-19 vaccine</b>		
Yes	321	30 (27.4-32.8)
No	176	16.5 (14.1-18.7)
Undecided	572	53.5 (50.3-56.8)
<b>Believe that vaccines provide protection</b>		
Yes	630	58.9 (55.8-61.7)
No	90	8.4 (6.8-10.2)
Undecided	349	32.6 (30.0-35.6)
<b>Believe that COVID-19 vaccines provide protection</b>		
Yes	459	42.9 (39.7-46.0)
No	141	13.2 (11.2-15.3)
Undecided	469	43.9 (40.7-47.1)
<b>COVID-19 vaccination intent</b>		
Yes	578	54.1 (51.1-57.2)
No	169	15.8 (13.7-18.1)
Undecided	322	30.1 (27.4-33.0)
<b>COVID-19 vaccination intent of the family</b>		
Yes	541	50.6 (47.4-53.9)
No	136	12.7 (10.8-14.8)
Undecided	392	36.7 (33.6-39.8)
<b>Chronic Disease</b>		
Yes	78	7.3 (5.8-9.1)
No	991	92.7 (90.9-94.2)
<b>Chronic Medication use</b>		
Yes	107	10 (8.2-11.8)
No	962	90 (88.2-91.8)
<b>Want to have information about COVID-19 vaccine</b>		
Yes	951	89 (87.2-90.8)
No	118	11 (9.2-12.8)
<b>Social media is a reliable source for COVID-19</b>		
Yes	407	38.1 (35.3-41.0)
No	662	61.9 (59.0-64.7)

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	n	% (95%CI)
<b>Agree that COVID-19 vaccines have side effects</b>		
Yes	396	37 (34.1-40.0)
No	87	8.1 (6.5-9.7)
I do not know	586	54.8 (51.5-57.8)
<b>Had influenza/pneumonia vaccine in the past</b>		
Yes	262	24.5 (22.0-27.0)
No	807	75.5 (73.0-78.0)
<b>Place of residence</b>		
Home	1012	94.7 (93.4-96.1)
Boarding house	33	3.1 (2.1-4.1)
Apartment hotels for students	20	1.9 (1.0-2.7)
Other	4	0.4 (0.1-0.7)

SD: Standard deviation, COVID-19: Coronavirus disease-2019.

The majority of the students 908(84.9%) believed that healthcare workers should be vaccinated, and that the vaccination process should be carried out hospitals and primary care practices. The overall knowledge about COVID-19 protective measures, including the vaccine, and the choices of the subjects were noted in detail (Table 2).

**Table-2:** Vaccine, methods of protection and general status about COVID-19 (n=1069).

	n (%)
<b>Who should take the vaccine</b>	
People >65 years	822 (76.9)
Healthcare workers	908 (84.9)
People with chronic diseases	898 (84.0)
All civil servants	666 (62.3)
All people >18 years	639 (59.8)
Other	216 (20.2)
<b>Where should vaccines be administered</b>	
Hospital	789 (73.8)
Primary Care Centre	754 (70.5)
Home	334 (31.2)
School	161 (15.1)
Pharmacy	149 (13.9)
Other	47 (4.4)
<b>COVID 19 history</b>	
Respondent	119 (11.1)
Family	187 (17.5)
Neighbour	329 (30.8)
Relative	419 (39.2)
Friend	365 (34.1)
Other	107 (10.0)
<b>Contact with a COVID-19 patient</b>	
Respondent	175 (16.4)
Family	167 (15.6)
Neighbour	142 (13.3)
Relative	179 (16.7)
Friend	203 (19.0)
Other	74 (6.9)
<b>Past Quarantine/isolation</b>	
Respondent	159 (14.9)
Family	182 (17.0)
Neighbour	219 (20.5)
Relative	244 (22.8)

Friend	269 (25.2)
Other	91 (8.5)
<b>Minimum one of them ( COVID 19 history + Contact with a COVID-19 patient+ Past Quarantine/isolation)</b>	
Respondent	309 (28.9)
Family	348 (32.6)
Neighbour	445 (41.6)
Relative	522 (48.8)
Friend	507 (47.4)
Other	161 (15.1)
<b>Which protective measures should be used for COVID-19</b>	
Mask	1030 (96.4)
Goggles	149 (13.9)
Disinfectant	990 (92.6)
Social distance	1051 (98.3)
Face shield	341 (31.9)
Hand washing	1034 (96.7)
Vaccine	776 (72.6)
Supplements (vitamins, drugs etc.)	471 (44.1)
Other	86 (8.0)
<b>Which protective measures are used for COVID-19</b>	
Mask	1055 (89.7)
Goggles	77 (7.2)
Disinfectant	966 (90.4)
Social distance	1025 (95.9)
Face shield	67 (6.3)
Hand washing	1039 (97.2)
Vaccine	-
Supplements (vitamins, drugs etc.)	259 (24.2)
Other	68 (6.4)
<b>Who can have an effect on your information about vaccination?</b>	
Social media influencers	107 (10.0)
Healthcare workers	885 (82.8)
Friend	238 (22.3)
Family	344 (32.2)
University lecturers	657 (61.5)
Celebrities	93 (8.7)
Other	105 (9.8)
<b>Who can influence your attitude towards vaccination?</b>	
Social media influencers	81 (7.6)
Healthcare workers	682 (63.8)
Friend	184 (17.2)
Family	379 (35.5)
University lecturers	556 (52.0)
Celebrities	82 (7.7)
Other	87 (8.1)
<b>Who can influence your vaccination intent?</b>	
Social media influencers	73 (6.8)
Healthcare workers	662 (61.9)
Friend	185 (17.3)
Family	350 (32.7)
University lecturers	501 (46.9)
	70 (6.5)
	83 (7.8)
<b>Choice of vaccine</b>	
Female Local	385 (36.0)
European	327 (30.6)

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	n (%)
American	163 (15.2)
Chinese	164 (15.3)
Russian	110 (10.3)
Other	129 (12.1)
Male Local	209 (19.6)
European	257 (24.0)
American	141 (13.2)
Chinese	110 (10.3)
Russian	50 (4.7)
Other	86 (8.0)
<b>Reasons not to take the vaccine</b>	
Vaccines were developed in a very short period of time	285 (26.7)
Immediate side effects	181 (16.9)
The exact reason why vaccines were developed is not known	145 (13.6)
Lack of scientific studies on vaccines	164 (15.3)
Long term vaccine associated adverse reactions/complications/diseases	399 (37.3)
Reaction of the body to the vaccine is not known	363 (34.0)
Vaccines are foreign products /not trusted	198 (18.5)
Hearsay/second hand information/effect of negative opinions in the society	97 (9.1)
Effect of social media/TV etc.	59 (5.5)
Lack of confidence/belief in the protection of vaccines	236 (22.1)
Lack of information	203 (19.0)
Fear of vaccines	150 (14.0)
Other	40 (3.7)
<b>Reasons why your family does not take the vaccine</b>	
Vaccines were developed in a very short period of time	270 (25.3)
Immediate side effects	235 (22.0)
The exact reason why vaccines were developed is not known	165 (15.4)
Lack of scientific studies on vaccines	160 (15.0)
Long term vaccine associated adverse reactions/complications/diseases	381 (35.6)
Reaction of the body to the vaccine is not known	359 (33.6)
Vaccines are foreign products /not trusted	201 (18.8)
Hearsay/second hand information/effect of negative opinions in the society	160 (15.0)
Effect of social media/TV etc.	109 (10.2)
Lack of confidence/belief in the protection of vaccines	258 (24.1)
Lack of information	226 (21.1)
Fear of vaccines	185 (17.3)
Other	34 (3.2)

COVID-19: Coronavirus disease-2019; Respondents were allowed to choose more than one answer.

The two most significant reasons for not getting vaccinated were the possibility of side effects 399(37.3%), and lack of knowledge about the body's potential reaction to the vaccine 363(34.0%).

Willingness to be vaccinated against COVID-19 varied in line with respondents' characteristics. Smoking, having a flu vaccine in the past, and having a COVID-19 test were the factors influencing the intent to have the vaccination ( $p < 0.05$ ). Students who had had the disease or had been in contact with someone who had it were more likely to believe that the vaccine was safe 102(33%) (Table 3).

The students used social media as a source of information about COVID-19 ( $p < 0.05$ ). Female students were more

concerned about having relevant information than male students ( $p < 0.05$ ), but were more hesitant about having the COVID-19 vaccine than male students ( $p < 0.05$ ).

MLM showed that having had a flu vaccine in the past, social media use, a history of COVID-19 and education in medical/nursing schools were the factors influencing the students' intent to get vaccinated (Table 4).

## Discussion

The current study had participants with chronic diseases and those who smoked. One study demonstrated a correlation between severe COVID-19 infection and diabetes mellitus (DM).<sup>7</sup> In another study, active smokers were found to be at almost twice the risk of COVID-19 disease.<sup>8</sup> Given the negative effects of smoking and tobacco use on the severity of COVID-19, ensuring that university students are aware of these issues will contribute to the prevention of many chronic diseases and to the fight against COVID-19.

The main protective measures against COVID-19 among the current students were mask usage, handwashing, social distancing, hand sanitisers, dietary supplements, goggles, and face shields. These findings may indicate that students who felt at risk were more careful about following the protective measures, whereas those who did not feel at risk were more relaxed about such protective measures. The most frequently used protective measures against COVID-19 are masks, social distancing, avoiding crowded spaces, handwashing and vaccination.<sup>9</sup> Compliance with the recommended protective measures is important.

Although the percentage of students who had confidence in the COVID-19 vaccines was reasonably high, those who were undecided in this regard were even more in numbers. It was observed that people's confidence and trust in COVID-19 vaccination, and their intent to get vaccinated, varied depending on whether they had had COVID-19 or had been in contact with a COVID-19 patient. Vaccination hesitancy is associated with a decrease in acceptance of COVID-19 vaccines.<sup>10</sup> It is believed that widespread vaccine hesitancy due to concerns over a vaccine's safety and effectiveness jeopardises the process of achieving herd immunity. The fact that the participants were not willing to have the vaccine or were unsure about having the vaccine showed that they needed more information.<sup>4</sup> It is important to convince people who are not sure about the safety of the vaccine to have the vaccine, and information about the potential side effects and safety profile of the vaccine should be provided to these people to reduce the level of hesitancy.<sup>11</sup> The current study showed that some students were afraid of the unknown. Social media plays a significant role in the spread of fear and hesitancy about

**Table 3:** Willingness to be vaccinated against COVID-19 according to respondent characteristics (n=1069).

	Agree that COVID-19 vaccines have side effects			COVID-19 vaccination intent			Want to have information about COVID-19 vaccination			Confidence in COVID-19 vaccine						
	Yes	No	I do not know	Yes	No	Undecided	Yes	No	Undecided	Yes	No	Undecided	Yes	No	Undecided	P-value
<b>Gender</b>																
Female	235	43	351	326	97	206	587	42	0.079	587	42	0.000***	159	101	369	0.000***
Male	161	44	235	252	72	116	364	76					162	75	203	
<b>Chronic disease</b>																
Yes	39	7	32	42	11	25	65	13	0.878	886	105	0.077	23	18	37	0.244
No	357	80	554	536	158	297							298	158	535	
<b>Chronic Medication use</b>																
Yes	48	6	53	61	18	28	92	15	0.643	859	103	0.328	33	24	50	0.164
No	348	81	533	517	151	294							288	152	522	
<b>Tobacco Use</b>																
Yes	126	32	163	171	64	86	278	43	0.035**	673	75	0.111	103	69	149	0.002***
No	270	55	423	407	105	236							218	107	423	
<b>Believe to be at risk of COVID-19</b>																
Yes	208	33	276	275	78	164	465	52	0.516	486	66	0.331	135	89	293	0.026**
No	188	54	310	303	91	158							186	87	279	
<b>Had a COVID-19 test</b>																
Yes	105	40	133	163	49	66	239	39	0.026**	712	79	0.075	86	51	141	0.483
No	291	47	453	415	120	256							235	125	431	
<b>Use of social media as an information source for COVID-19</b>																
Yes	327	73	515	493	138	284	829	86	0.140	714	93	0.000***	270	146	499	0.244
No	69	14	71	85	31	38	122	32					51	30	73	
<b>Had influenza/pneumonia vaccine in the past</b>																
Yes	94	16	152	152	24	86	237	25	0.003**	714	93	0.428	93	38	131	0.080
No	302	71	434	426	145	236							228	138	441	
<b>Believe that vaccines provide protection</b>																
Yes	230	70	330	474	23	133	574	56	0.000***	307	41	0.000***	307	41	282	0.000***
No	58	9	23	9	71	10	56	34					4	75	11	
Undecided	108	8	233	95	75	179	321	28					10	60	279	
<b>Believe that COVID-19 vaccines provide protection</b>																
Yes	157	64	238	412	12	35	415	44	0.000***	296	13	0.000***	296	13	150	0.000***
No	91	10	40	18	103	20	98	43					4	112	25	
Undecided	148	13	308	148	54	267	438	31					21	51	397	
<b>COVID-19 vaccination intent of the family</b>																
Yes	181	71	289	442	25	74	468	53	0.000***	267	31	0.000***	267	31	243	0.000***
No	74	5	57	12	92	32	97	39					2	89	45	
Undecided	141	11	240	124	52	216	366	26					52	56	284	
<b>Medical/nursing/health education</b>																
Yes	252	62	398	458	65	189	637	75	0.000***	313	42	0.534	251	73	388	0.000***
No	143	25	187	120	102	133							70	102	183	
<b>COVID-19 interaction (self)</b>																
Yes	123	28	158	166	65	78	266	43	0.004***	412	104	0.037**	102	60	147	0.040**
No	273	59	428	412	104	244	685	75					219	116	425	

COVID-19: Coronavirus disease-2019; Notes: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01. Estimates shown in bold are significant at 5%.

the COVID-19 vaccine. Information campaigns that stress the social benefits of vaccination and collaboration among public officials are important strategies to decrease hesitancy and increase willingness to have the vaccine.<sup>11</sup>

Also, strategic public health approaches are needed to reduce fear and encourage healthy behaviour.

Having had a flu vaccine in the past, social media usage, history of COVID-19 and education in medical/nursing schools were the main factors influencing vaccination intent in the current study. One study found that vaccine rejection and hesitancy were significantly correlated with female gender, age, low education level, adverse reactions to previous vaccines, and having no specific chronic condition.<sup>12</sup> According to another study, people who did not have university degrees were more inclined to accept the vaccine.<sup>13</sup> In another study, the factors affecting vaccination intent were gender, marital status, risk perception, having had a flu vaccine in the past, believing in the efficacy of COVID-19 vaccines, following doctors' recommendations, the convenience of vaccine procedures and the price of the vaccine.<sup>14</sup> Based on the results of a logistic regression analysis, another study demonstrated that gender, being married, higher risk perception, having had a flu vaccine in the past, believing in the efficacy of COVID-19 vaccines, and following doctors' recommendations could increase acceptance of the need to be vaccinated.<sup>15</sup>

The reasons cited in literature regarding vaccine hesitancy include the fact that the vaccine is 'new', potential side effects, lack of trust in the vaccine's efficiency and safety, believing that the disease poses no threat to them, that the vaccine is dangerous for health, that the vaccine is not effective, that long-term side-effects of the vaccine are not known, that the vaccine is harmful, that they suffer from allergies, that there are not enough studies about the safety of the vaccine, not wanting to risk long-term health, the fear of the unknown, that more data and evidence are needed, and various conspiracy theories.<sup>4,11,15-17</sup>

In the current study the students believed that healthcare workers, people with chronic diseases and people who are aged >65 years should be vaccinated. Healthcare workers have priority in COVID-19 vaccination programmes.<sup>18</sup>

The current study has limitations in terms of sample orientation. Besides, data was collected using a self-administered online survey, which may allow for subjectivity although it is the most appropriate method that matches the study design.

Further qualitative and quantitative studies will contribute significantly to medical literature.

## Conclusion

Having had a flu vaccine in the past, social media use, history of, or exposure to, COVID-19 and enrolment in health-related programme of studies were found to be the factors influencing the vaccination intent of the students.

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