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ORIGINAL RESEARCH

Public Perception Regarding COVID-19, Nature of the Disease, Susceptibility to Complications, and Relationship to Influenza: A Study from Jordan Using Google Forms

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Background: COVID-19 was declared by the World Health Organization (WHO) as a pandemic and had spread to most of the globe. In the current study, perception regarding the nature of the COVID-19 disease, susceptibility to its complications, and its relationship to seasonal influenza was investigated among the Jordanian population.

Methods: This was a survey-based cross-sectional study among public in Jordan.

Results: A total of 1863 participants agreed to participate in this questionnaire-based study. The results showed that more than half (55%) of the sample believed that COVID-19 is a naturally occurring virus which causes a serious and possibly fatal disease (50.7%). The majority (62.9%) did not accept that this disease is actually caused by bacteria, or is similar to seasonal influenza. Interestingly, 45.0% of the sampled population felt that the COVID-19 virus was engineered in the lab. Most of the participants (95%) agreed that the elderly or individuals with chronic illnesses such as diabetes and heart disease were more susceptible to severe COVID-19 infections. With respect to symptoms, about two-thirds of the participants (65.2%) felt that the symptoms of COVID-19 are to a large extent similar to those of seasonal influenza. In addition, the majority (82.7%) believed that only some COVID-19 patients develop symptoms that can be described as severe. Factors such as age, gender, and education were found to modulate some of the perceptions of Jordanians regarding different aspects of COVID-19 disease.

Conclusion: The majority of Jordanians have a good perception about the nature, cause and symptoms of COVID-19 disease.

Keywords: perception, COVID-19, susceptibility, complications, Jordan

Introduction

The coronavirus 19 (COVID-19) was initially reported in December 2019 among few patients from the fish market in Wuhan, China.[1] The patients presented symptoms similar to the severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS).[1] These symptoms included elevation in body temperature, cough and difficulty breathing.[1] Additionally, respiratory complications and death were reported in severe cases. Sequence analysis of the genome of the above virus suggested that the virus is a close relative of the viruses that caused MERS and SARS with closest homology to the latter.[2,3] However, unlike SARS, the above novel virus has a higher degree of infectivity; thus, a larger potential to

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spread across populations.[4,5] Indeed, the COVID-19, according to the World Health Organization (WHO) recommendations, was declared a pandemic on the twelfth day of March of 2020.[6]

Experience from previous disease outbreaks clearly showed that the success of public health measures to contain any disease is largely influenced by public practice.[7,8] Several studies reported a direct correlation between knowledge of COVID-19 disease with the compliance of the public to the governmental measures mandated to contain its spread.[9–11]

Jordan is a developing Middle Eastern country. The current population of Jordan is estimated to be 10.2 million in 2020 with a mean age of 22.8 years. The majority of the population is Arab and Muslims. The literacy rate in Jordan is one of the highest in the world at 98% in 2015.[12] The first confirmed case of COVID-19 was registered in the country at the beginning of March of 2020.[13,14] Several measures were mandated by the government to prevent COVID-19 from overwhelming the health care system. These measures included shutting down schools and universities, prohibiting social gatherings including prayer congregations, social events, and a complete lockdown over the weekend.[14] Although considered among the strictest in the world, the above measures successfully controlled the spread of the virus[14] and at the time of writing this report, the number of COVID-19 cases actively treated for their illness in Jordan never exceeded 300 patients at a single point of time.[15] However, despite this relatively low number of COVID-19 cases, the country remains vulnerable for future second more aggressive COVID-19 wave, as expected in the rest of the world.[16]

Considering that COVID-19 is still spreading in neighboring countries and the vulnerability of Jordan for a second wave of COVID-19, there remains a pressing need to comprehend the perception and attitude of the public in Jordan toward the disease. This survey-based investigation was thus conducted on a convenient sample of 1863 residents of Jordan to investigate the perception regarding the nature of the COVID-19 disease, susceptibility to its complications, and its relationship to seasonal influenza.

Materials and Methods

Participants

The study participants were Jordanian adults aged ≥18 years and from both genders. Participants were invited to participate in this survey-based study during April–May of 2020. Recruitment was achieved online methods, including Facebook, Whatsapp, and other social media platforms. A snow-ball sampling design was used where each study participant was asked to nominate others from his social network until the desired number of participants was achieved. The research team of the study followed up participants' recruitment closely to ensure proper representation of most settings, spectra and entities of the Jordanian society. The participants consented to volunteer in the study prior to filling the questionnaire. For data analysis and reporting, the participants were categorized according to age (young, middle age, and elderly), income (low, middle, and high), education (high school, diploma, bachelor, and graduate), and perceptions (agree, disagree, and neutral). The study procedures were approved by the Institutional Review Board of Jordan University of Science and Technology (Approval Number: 245/2020). The survey did not collect any personal or identifying information.

The Instrument

The instrument of the study was constructed by the research team based on COVID-19 literature. The initial draft of the survey was content, and face validated to a group of experts to provide their feedback, and the survey was modified accordingly. Then, the final draft of the questionnaire was pilot tested with a group of 50 participants to provide their advice regarding the clarity and comprehensibility of the questions, and the responses from those participants were excluded from the final analysis. The introductory questions of the questionnaire collected data regarding the demographics of participants that included age, gender, social status, education and income. The income contained three categories: low (less than 750 JD), medium (750–less than 1500 JD), and high (more than 1500 JD). Participants were asked about their perception regarding the nature of COVID-19 disease (In your opinion, COVID-19 disease is …). The provided choices were as follows: naturally occurring human virus, engineered virus in the labs, animal disease transmitted to human, caused by bacteria, punishment from God, serious and fatal, and similar to seasonal influenza. Then, participants were asked about their perception related to susceptibility to severe COVID-19 infection (In your opinion, who is most susceptible to a severe COVID-19 infection?). The provided choices for this part were as follows: all individuals, children, pregnant women, elderly, and

People with chronic illnesses such as heart diseases and diabetes. Finally, participants were asked about their perception about the relationship between COVID-19 and seasonal influenza. This included the following question: What is your opinion regarding the following. Among the provided choices were: symptoms of COVID-19 are similar to seasonal influenza to a large extent/some extent, all/some COVID-19 patients develop severe symptoms, and COVID-19 patients with chronic illnesses develop severe symptoms. The three-point Likert scale (agree, neutral, and disagree) was used with items of the perception questions. Open questions were not used in the questionnaire.

Statistical Analysis

For statistical analysis, the SPSS (version 21) was used. The data are presented as mean±SD, frequency and percentages, and α was set a priori at 0.05. The distribution of the participant's responses to survey questions was determined. Furthermore, cross-tabulation was used to determine the relationship of potential factors with the participant's responses to the questions. The potential factors were age, gender, income, and education.

Results

Background Characteristics

In this study, the authors investigated the perception of a Jordanian population toward COVID-19 (n=1863). The mean age of the participants was 33.6 ± 11.3 years, which reflects the young nature of the Jordanian population that has a mean age of 22.8 years. Over one-third (42%, n=783) of the participants reported that they were less than 30 years old at the time of the survey. In addition, about 29.6% (n=551) were ≥40 years old. Gender distribution showed that the majority of the participants (69%) were females. Education of the participants was 19.0% (n=354) high school or less, 13.9% (n=259) diploma, 50.7% (n=945) bachelor, and 15.0% (n=279) with master/PhD degrees. About three quarters (75.9%) had a medium income, whereas 7.3% and 15.5% had high and low incomes, respectively.

Perception of Participants Toward the Nature of COVID-19 Disease

The perception of participants toward COVID-19 is summarized in Table 1. Data analysis showed that more than half (55%) of the participants believed that COVID-19 is a naturally occurring virus which causes a serious and possibly fatal disease (50.7%). The majority (62.9%) did not accept that this disease is actually caused by bacteria, or is similar to seasonal influenza. Interestingly, more than one-third (45.0%) of the sampled population felt that the COVID-19 virus was engineered in the lab and less than half of the participants (48.9%) believed that this was a disease transmitted to humans through an animal host.

Following the above, we were interested in testing the relationship between different demographic variables and perception of the participants toward COVID-19. The results of this analysis are also shown in Table 1. Current findings demonstrated that females were more likely to think that COVID-19 is a naturally occurring human virus. Participants who believed that COVID-19 was an animal virus transmitted to humans, or those who believed that COVID-19 was caused by bacteria were more likely to be younger than 30 years of age. On the other hand, a larger percentage of participants older than 40 years than any of the other age group felt that COVID-19 was a "punishment from God" and was a serious and fatal disease. Education also affected the perception toward COVID-19. Data analysis showed that a larger percentage of participants who only held a school degree believed that COVID-19 was 1) engineered in the lab, 2) a punishment from God, 3) caused by bacteria or 4) serious and fatal.

Perception of the Participants of Who are Most Susceptible to Severe COVID-19 Infections

The perception of the participants regarding susceptibility to severe COVID-19 infections is summarized in Table 2. Most of the participants (95%) agreed that the elderly or individuals with chronic illnesses such as diabetes and heart disease were more susceptible to severe COVID-19 infections. More than half of the participants believed that all individuals are susceptible to severe disease (57.6%), including children (53.0%) or pregnant women (71.2%).

Cross tabulation with the different demographic variables (Table 2) showed that sampled females were more likely to include children or pregnant women as individuals most susceptible to severe infections by COVID-19. With respect to age, the "30–39" age group was more likely to agree that all individuals are susceptible to severe COVID-19 including children or pregnant women. On the other hand, participants 40 years old and above were more likely to consider elderly patients or patients with chronic illnesses as the most susceptible to a severe COVID-19

Table 1 Perception of Participants About Nature of COVID-19 Disease

Variables	Category	Total: N(%)	Gender		Age Groups			Education			
In Your Opinion, COVID-19 Disease is			**Male**	**Female**	**18–29**	**30–39**	**>40**	**School**	**Diploma**	**Bachelor**	**Master/ PhD**
Naturally occurring human virus	Agree	950(55.0)	267(50.3)*	676(56.9)	417(56.4)	265(54.4)	268(53.2)	188(58.4)*	123(51.3)	488(54.4)	149(56.4)
	Neutral	424(24.5)	127(23.9)	297(25.0)	180(24.3)	124(25.6)	120(23.8)	88(27.3)	72(30.0)	212(23.6)	52(19.7)
	Disagree	354(20.4)	137(25.8)*	215(18.1)	143(19.3)	95(19.6)	116(23)	46(14.3)*	45(18.8)	197(22.0)	63(23.9)
	χ^2; *p*-value		16.8, 0.002		3.11, 0.534			22.26, 0.004			
Engineered virus in the labs	Agree	780(45.0)	228(42.3)	551(46.4)	323(43.6)	223(45.6)	238(47.1)	166(52.2)*	99(41.1)	411(45.3)	106(40.3)
	Neutral	605(34.9)	178(33.0)	426(35.9)	252(34.1)	184(37.6)	169(33.5)	106(33.3)	83(34.4)	320(35.3)	94(35.7)
	Disagree	345(19.9)	133(24.7)*	210(17.7)	165(22.3)	82(16.8)	98(19.5)	46(14.5)	59(24.5)	176(19.4)	63(24.0)
	χ^2; *p*-value		13.1, 0.011		6.92, 0.14			15.59, 0.047			
Animal disease transmitted to human	Agree	842(48.9)	246(46.0)	593(50.2)	377(51.0)*	235(48.8)	230(45.8)	132(41.4)*	120(50.4)	434(48.8)	151(55.9)
	Neutral	422(24.5)	137(25.6)	284(24.0)	172(23.3)	133(27.6)	117(23.3)	70(21.9)	57(23.9)	238(26.7)	57(21.1)
	Disagree	459(26.6)	152(28.4)	304(25.7)	190(25.7)	114(23.7)	155(30.9)	117(36.7)*	61(25.6)	218(24.5)	62(23.0)
	χ^2; *p*-value		3.75, 0.442		9.52, 0.049			28.72, <0.001			
Is caused by bacteria	Agree	261(15.7)	76(14.7)	184(16.1)	157(21.9)*	49(10.4)	55(11.5)	94(30.7)*	53(23.3)*	104(11.9)*	9(3.5)*
	Neutral	356(21.4)	100(19.3)	255(22.4)	156(21.8)	102(21.7)	98(20.5)	87(28.4)	53(23.3)	186(21.4)	30(11.7)
	Disagree	1048(62.9)	342(66.0)	701(61.5)	403(56.3)*	319(67.9)	326(68.1)	125(40.8)*	121(53.3)*	581(66.7)*	217(84.8)*
	χ^2; *p*-value		3.47, 0.482		40.6, <0.001			153.07, <0.001			
Punishment from God	Agree	783(45.1)	251(46.9)	528(44.3)	339(45.0)*	195(40.6)*	249(49.5)	211(63.6)*	126(51.4)	354(39.7)	90(34.4)
	Neutral	497(28.6)	151(28.2)	344(28.8)	239(31.7)	154(32.1)	104(20.7)*	82(24.7)	56(22.9)	271(30.4)	87(33.2)
	Disagree	456(26.3)	133(24.9)	321(26.9)	175(23.2)*	131(27.3)	150(29.8)	39(11.7)*	63(25.7)	267(29.9)	85(32.4)
	χ^2; *p*-value		1.3, 0.861		25.1, <0.001			82.83, <0.001			
Serious and fatal	Agree	880(50.7)	279(52.0)	598(50.1)	384(51.1)*	225(47.1)*	271(53.5)	205(63.9)*	116(47.3)	435(48.4)	120(44.9)*
	Neutral	376(21.6)	102(19.0)	271(22.7)	180(23.9)	120(25.1)*	76(15.0)	57(17.8)	64(26.1)	204(22.7)	50(18.7)
	Disagree	481(27.7)	156(29.1)	324(27.2)	188(25.0)*	133(27.8)*	160(31.6)	59(18.4)*	65(26.5)	259(28.8)*	97(36.3)*
	χ^2; *p*-value		5.09, 0.278		21.5, <0.001			82.82, <0.001			
Similar to seasonal influenza	Agree	329(19.2)	101(19.1)	225(19.1)	131(17.6)	92(19.2)	106(21.5)	70(21.9)	51(21.4)	151(17.0)	56(20.9)
	Neutral	401(23.3)	125(23.7)	275(23.3)	186(25.0)	121(25.2)	94(19.0)	73(22.9)	55(23.1)	223(25.1)	49(18.3)
	Disagree	988(57.5)	302(57.2)	681(57.7)	427(57.4)	267(55.6)	294(59.5)	176(55.2)	132(55.5)	514(57.9)	163(60.8)
	χ^2; *p*-value		1.57, 0.813		8.47, 0.076			9.96, 0.286			

Note: *Indicates adjusted residual >1.96 or <-1.96.

Table 2 Perception of Participants About Susceptibility to Severe COVID-19 Infection

Variables	Category	Total: N(%)	Gender		Age Groups			Education			
In Your Opinion, Who is Most Susceptible to Severe COVID-19 Infection			**Male**	**Female**	**18–29**	**30–39**	**>40**	**School**	**Diploma**	**Bachelor**	**Master/ PhD**
All individuals	Agree Neutral Disagree	1001(57.6) 306(17.6) 432(24.8)	333(61.4) 76(14.0) 133(24.5)	663(55.7) 229(19.2) 298(25.0)	413(55.5) 156(21.0) 175(23.5)*	292(60.0)* 84(17.2) 111(22.8)*	296(58.3) 66(13.0) 146(28.7)	198(61.7) 55(17.1) 68(15.7)*	148(61.4) 43(17.8) 50(20.7)	524(57.8) 169(18.7) 213(23.5)*	127(47.9) 37(14.0) 101(38.1)
	χ^2; *p*-value		8.52, 0.074		16.48, 0.002			33.67, <0.001			
Children	Agree Neutral Disagree	897(53.0) 368(21.7) 427(25.2)	266(50.4)* 99(18.8) 163(30.9)*	624(54.0) 269(23.3) 263(22.8)	400(54.7)* 185(25.3) 146(20.0)*	264(54.9)* 98(20.4) 119(24.7)*	233(48.5) 85(17.7) 162(33.8)*	182(59.7) 59(19.3) 64(21.0)	140(59.3) 45(19.1) 51(21.6)	466(52.7) 213(24.1) 206(23.3)	105(40.2)* 50(19.2) 106(40.6)*
	χ^2; *p*-value		17.83, 0.001		32.67, <0.001			48.1, <0.001			
Pregnant women	Agree Neutral Disagree	1211(71.2) 289(17.0) 200(11.8)	355(67.7)* 85(16.2) 84(16.0)*	848(72.7) 204(17.5) 115(9.9)	498(68.1) 155(21.2) 78(10.7)*	366(75.5)* 69(14.2) 50(10.3)*	347(71.7)* 65(13.4) 72(14.9)	201(67.0) 55(18.3) 44(14.7)	169(71.6) 39(16.5) 28(11.9)	652(72.8) 159(17.8) 84(9.4)	185(70.1) 35(13.3) 44(16.7)
	χ^2; *p*-value		15.22, 0.004		21.24, <0.001			11.48, 0.056			
Elderly	Agree Neutral Disagree	1685(95.0) 61(3.4) 28(1.6)	511(94.3) 18(3.3) 13(2.4)	1165(95.3) 43(3.5) 15(1.2)	695(92.2) 41(5.4) 18(2.4)	482(96.8)* 12(2.4) 4(0.8)*	508(97.3)* 8(1.5) 6(1.1)*	308(93.3) 15(4.5) 7(2.1)	238(95.2) 9(3.6) 3 (1.2)	866(94.5) 32(3.5) 18(2.0)	267(98.2) 5(1.8) 0(0.0)
	χ^2; *p*-value		3.82, 0.430		22.53<0.001			9.95, 0.268			
People with chronic illnesses such as heart diseases and diabetes	Agree Neutral Disagree	1632(92.5) 87(4.9) 45(2.6)	501(91.4) 31(5.7) 16(2.9)	1124(93.0) 55(4.6) 29(2.4)	671(90.2) 50(6.7) 23(3.1)	471(94.6)* 17(3.4) 10(2.0)	490(93.9)* 20(3.8) 12 (2.3)	287(90.5) 21(6.6) 9(2.8)	226(90.8) 17(6.8) 6(2.4)	851(92.6) 41(4.5) 27(2.9)	263(96.0) 8(2.9) 3(1.1)
	χ^2; *p*-value		2.59, 0.627		10.76, 0.029			10.23, 0.249			

Note: *Indicates adjusted residual >1.96 or <-1.96.

infection. Finally, the current analysis showed that participants with a master/PhD degree were the least likely to think that all individuals are susceptible to severe COVID-19 infections.

Perception of the Participants Regarding the Symptoms of COVID-19 Compared to Those of the Seasonal Flu

Table 3 shows the perception of participants about the symptoms of COVID-19 compared to seasonal influenza. Approximately, two-thirds of the participants (65.2%) felt that the symptoms of COVID-19 are to a large extent similar to those of seasonal influenza. In addition, the majority (82.7%) believed that only some COVID-19 patients develop symptoms that can be described as severe. Within the same lines, more than three quarters (80%) of the participants believed that patients with chronic illnesses develop severe symptoms.

The effect of the different demographic variables on the perceptions above is also shown in Table 3. Female participants were more likely to agree that some COVID-19 patients could develop severe symptoms. Moreover, it was observed that individuals younger than 30 were least likely to think that COVID-19 symptoms are to a large extent similar to seasonal flu; however, the above age group was also least likely to believe that COVID-19 patients with chronic illnesses may develop severe symptoms. Education also affected the above perceptions. Specifically, individuals with higher education degrees (Masters and/or PhD) were the most likely to believe that only some COVID-19 patients develop severe symptoms including patients with chronic illnesses.

Discussion

COVID-19 is a rapidly evolving pandemic that did not spare any of the inhabited continents of the globe.[17] The response of the public health systems of some countries did not match the rapidity of the spread of the virus which resulted in high fatality rates and the near collapse of the health care systems of these countries.[18,19] Accumulating data from around the world indicate that COVID-19 may affect all age groups.[20] However, elderly people,[19] pregnant women,[13] cancer and transplant patients[21] or those with chronic comorbidities[22] are more susceptible to infection and/or to more severe symptoms. The severity of COVID-19 could range from asymptomatic infection to a fatal disease.[23] The clinical manifestations vary from mild non-specific symptoms to influenza-like symptoms.[23] However, more severe cases may suffer from respiratory distress with multiple organ damage.[24]

Cumulative experience from other outbreaks of diseases primarily affecting the respiratory system such as SARS and H1N1 clearly showed that the success of any public health measure to manage the outbreak correlates with the level of knowledge of the public of the nature of the organism causing the outbreak including severity of the disease associated with infection and individuals at risk of the disease.[25] There is a growing consensus among epidemiologists around the world of a second, probably more severe, wave of COVID-19.[16] Considering the low number of cases in Jordan and the fact that COVID-19 is still spreading in neighboring countries and globally, Jordan may be particularly vulnerable to an incoming second wave.

The spread of a second COVID-19 wave into Jordan would necessitate a plethora of new public health measures to mitigate its effects. This investigation was thus conducted to establish a baseline understanding of the level of knowledge of a section of Jordanian citizens toward the nature of COVID-19. The findings of this investigation would help public health officials identify gaps in public knowledge on COVID-19 and take necessary measures to close these gaps. In general terms, the findings of this study indicated that sampled Jordanian citizens had a good level of knowledge of the nature of COVID-19 virus including high-risk groups of severe COVID-19 infections. Indeed, the majority of sampled participants knew that COVID-19 is caused by a virus (not by a bacteria), was not engineered in the lab and might be fatal if individuals catch the infection. Moreover, the majority of sampled participants were able to identify high-risk groups of severe COVID-19 as individuals with chronic disease conditions. These findings might help explain the success of early public health measures in suppressing the first wave of COVID-19. In agreement, a previous study among the residents of Kansas, USA, showed that those who had a good perception about the disease and the preventive measures were more willing to comply with recommendations from local authorities.[10] Another study done among Italians showed that raising population knowledge was associated with increased effectiveness of educational initiatives related to COVID-19 pandemic.[11]

Noteworthy from the finding that only a minority of participants knew that COVID-19 could be transmitted to humans through an intermediate animal host. Lack of

Table 3 Perception of Participants About the Symptoms of COVID-19 Compared to Seasonal Influenza

Variables	Category	Total: N(%)	Gender		Age Groups			Education			
What is Your Opinion Regarding the Followings			**Male**	**Female**	**18–29**	**30–39**	**>40**	**School**	**Diploma**	**Bachelor**	**Master/ PhD**
Symptoms of COVID-19 is similar to seasonal influenza to a large extent	Agree Neutral Disagree	1159(65.2) 236(13.3) 382(21.5)	354(64.0) 78(14.1) 121(21.9)	800(65.8) 156(12.8) 259(21.3)	462(61.6)* 130(17.3) 158(21.1)	348(68.9) 46(9.1) 111(22.0)	349(66.9) 60(11.5) 113(21.6)	229(68.4) 46(13.7) 60(17.9)	164(66.9) 29(11.8) 52(21.2)	589(64.0) 129(14.0) 202(22.0)	175(64.3) 31(11.4) 66(24.3)
	χ^2; *p*-value		1.38, 0.847		20.04, <0.001			6.92, 0.545			
Symptoms of COVID-19 is similar to seasonal influenza to some extent	Agree Neutral Disagree	837(48.9) 316(18.4) 560(32.7)	256(48.2) 100(18.8) 175(33.0)	577(49.1) 216(18.40 382(32.5)	365(50.0) 142(19.5) 223(30.5)	221(45.9) 97(20.1) 164(34.0)	251(50.1) 77(15.4) 173(34.5)	152(49.0) 67(21.6) 91(16.3)	124(53.0) 39(12.3) 71(30.3)	432(48.1) 171(19.0) 295(32.9)	126(47.4) 39(14.7) 101(18.0)
	χ^2; *p*-value		1.74, 0.783		6.75, 0.149			10.22, 0.250			
All COVID-19 patients develop severe symptoms	Agree Neutral Disagree	305(17.6) 223(12.9) 1206(69.6)	105(19.5) 76(14.1) 358(66.4)	198(16.7) 147(12.4) 843(71.0)	160(21.7)* 117(15.9) 459(62.4)*	69(14.1) 48(9.8) 372(76.1)	76(14.9) 58(11.4) 375(73.7)	93(29.2)* 49(15.4) 177(55.5)*	58(24.1)* 37(15.4) 146(60.6)*	135(14.9)* 118(13.1) 651(72.0)*	18(6.8)* 19(7.2)* 228(86.0)*
	χ^2; *p*-value		5.01, 0.286		31.96, <0.001			84.34, <0.001			
Some COVID-19 patients develop severe symptoms	Agree Neutral Disagree	1434(82.7) 132(7.6) 168(9.7)	427(78.8)* 53(9.8) 62(11.4)	999(84.4) 79(6.7) 106(9.0)	581(79.6)* 76(10.4)* 73(10.0)	410(84.4) 25(5.1)* 51(10.5)	443(85.5) 31(39.4) 44(8.5)*	231(73.8)* 35(11.2)* 47(15.0)*	196(81.3) 23(9.5) 22(9.1)	757(83.6) 66(7.3) 83(9.2)	246(91.8)* 7(2.6)* 15(5.6)*
	χ^2; *p*-value		10.17, 0.038		15.88, 0.003			36.43, <0.001			
COVID-19 patients with chronic illnesses develop severe symptoms	Agree Neutral Disagree	1404(80.0) 247(14.1) 104(5.9)	424(77.7) 86(15.8) 36(6.6)	972(80.9) 161(13.4) 68(5.7)	567(76.8)* 126(17.1) 45(6.1)*	392(79.4) 65(13.2) 37(7.5)*	445(85.1) 56(10.7) 22(4.2)*	251(78.0) 48(14.9) 23(7.1)	183(76.3) 37(15.4) 20(8.3)	740(81.0) 133(14.6) 41(4.5)	226(82.5) 29(10.6) 19(6.9)
	χ^2; *p*-value		4.53, 0.339		16.55, 0.002			13.08, 0.109			

Note: *Indicates adjusted residual >1.96 or <-1.96.

knowledge toward this piece of information might be reflective of a sparse media coverage of this specific statement or the necessity of relevant specialized background in microbial diseases to understand it. Regardless, this gap in knowledge did not seem to affect the success of public health measures mandated in Jordan during the first COVID-19 wave.

An interesting finding was the observation that participants who only hold a school degree with no formal college education had several misconceptions of the nature of the virus. Most of these respondents agreed that COVID-19 was engineered in the lab, bacterial in nature, or was a "punishment from God". These responses might be due to cultural beliefs and misconceptions about the diseases.[26]

Given the above finding, it could be concluded that better education correlates with better knowledge about COVID-19. In accordance, a previous study from Italy reported a good level of knowledge about the epidemic and its control among undergraduate students.[27] In China, residents of higher socioeconomic status are shown to be more knowledgeable about COVID-19, hold optimistic attitudes, and have appropriate practices towards COVID-19.[28] Such findings entail that Jordanian participants who only have a school degree are a good target group for specialized awareness and education campaigns designed to correct some of the misconceptions surrounding the nature of COVID-19. These campaigns could be organized by public health officials but may also include religious scholars and could even be conducted at places of religious worship.

The majority of individuals who responded to this survey were females (69%). This does not reflect the gender distribution in Jordan where there is a slight male predominance in the population (male to female ratio of 1.12 to 1.0).[29] This was one limitation of this study even this was also reported in other experiences performed by web-based questionnaires related to COVID 19. Another limitation was the sampling procedure used in this investigation which was not random and depended on the accessibility of participants to internet-based services and their willingness to participate in an online-based survey. A large portion of the sample held degrees beyond high school, particularly, bachelor degree, which is consistent with the education level of the Jordanian population. In addition, a good portion (40–49%) of the young, middle, and elderly participants believed the COVID19 is a "punishment of god". This might be due to cultural beliefs. In addition, the design of the questionnaire that provided the choice of responses to the questions may bias the respondent to given selections which they may never have initially chosen. Thus, including open questions in future investigations is recommended. Future studies should ensure eliminating this limitation.

In conclusion, the participants', in the current study, demonstrated good perception about the nature, cause, symptoms of COVID-19 disease, and its relationship to influenza. However, individuals with lower level of education might require additional educational campaigns to get them oriented with the disease. These campaigns should also involve religious scholars.

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