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Association between Patient Characteristics and Lifestyle and Symptoms in Saudi Confirmed COVID-19 Cases

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Abstract

***Background**: The most common symptoms being reported are fever, fatigue, dry cough, and other upper respiratory symptoms which are considered less common symptoms. Given that there is still a dire need to define a proper relationship between these risks and COVID-19; we also assessed the factors associated with the manifestations of these signs and symptoms.*

***Methodology**: It's an observational descriptive cross-sectional study based on a questionnaire sent to the participants via WhatsApp application focusing on COVID-19 related information between the end of 2020 and November 2021.*

***Results**: The most reported symptoms during COVID-19 infection were exhaustion (65.6%), fever and losing the sense of smell (57.7% each), pains/aches and losing the sense of taste (55.7% and 55.5%).*

***Conclusion**: The severity of the novel coronavirus ranges from mild symptoms (majority of cases) to severe respiratory tract infection. The most susceptible population involves the elderly and individuals with underlying medical conditions, especially obesity and diabetes. Symptoms in COVID-19 patients were mainly associated with presence of comorbidities, BMI, sex, and older age.*

Keywords:
COVID-19; SARS-CoV-2; obesity, diabetes mellitus, symptoms

Abbreviations

BMI: Body mass index
COVID-19: Coronavirus Disease 2019
ICU: Intensive care unit
MOF: Multi-organ failure
SARS: Severe Acute Respiratory Syndrome
SARS CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2
SPSS: Statistical Package for social sciences

Introduction

The novel COVID-19 pandemic, caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV-2), leads to severe respiratory diseases. The SARS CoV-2 belongs to a large family of coronaviruses that have been known to cause respiratory tract infections in humans [1]. Ever since its dawn in the city of Wuhan, China in December 2019, it has spread all over the world and has become a global health emergency [2].

The morbidity and mortality of SARS-CoV-2 are more prevalent in older subjects who present different comorbidities [3]. The clinical onset of SARS-CoV-2 infection is variable from mild self-limited influenza-like symptoms to a severe acute respiratory syndrome (SARS) with a conceivable relationship of multi-organ failure (MOF) as a result of cytokine storm or hemophagocytic syndrome [4]. The most common symptoms being reported are fever (some early cases may not have fever only respiratory symptoms), fatigue, dry cough, dyspnea, nasal congestion, runny nose or sputum, and other upper respiratory symptoms which are considered less common symptoms. All of the infected patients had at least one symptom. Fever and cough were the dominant symptoms whereas upper respiratory symptoms and gastrointestinal symptoms were rare [5]. Most reported cases experienced mild disease symptoms and may not present positive signs (have the coronavirus but are asymptomatic) [6]. Patients in severe conditions may have shortness of breath, moist rales in lungs, weakened breath sounds, and dullness on the percussion, septic shock, and irreversible metabolic acidosis in a matter of a short period of time [7]. It has also been noted that COVID-19 has detrimental effects, especially in patients suffering from other comorbidities like diabetes mellitus, hypertension, and malignancies [8]. Patients already suffering from cardiovascular diseases are at a higher risk of suffering from a serious adverse effect, those without pre-existing cardiovascular conditions are also predisposed to cardiovascular complications, one of the most common of which is a thrombotic complication [9].

During the rapid escalation of the COVID-19 pandemic in March and April 2020, we conducted an online survey on the lifestyle during COVID-19 pandemic and the symptoms by Saudi adults for acquiring COVID-19 information. Given that there is still a dire need for a substantial number of studies to be done so that a proper relationship between these risks and COVID-19 can be defined; we also assessed the factors associated with the manifestations of these signs and symptoms.

Materials and Methods

Study design and Participants

It's an observational descriptive cross-sectional study based on a questionnaire sent to the participants as a Google document via WhatsApp application focusing on COVID-19 related information between the end of 2020 (after the first wave of COVID-19) and November 2021. All adults aged more than 18

years and living in the western region of Saudi Arabia were included in this study.

Ethical considerations

The study was approved by our IRB committee (BIOMED-E-8-2020) on 17/9/2020. Due to the retrospective nature of the study, informed consent from the participating individuals was not required by the ethical review board. This research received no specific grant from any funding agency in public, commercial, or nonprofit sectors.

Data collection

Patients received a Google document via WhatsApp application using a newly developed questionnaire that inquired about:

- Socio-demographic and economic information: age, gender, education, occupation, income…
- Medical information: comorbidities, malaria, anxiety….
- Lifestyle information in the pandemic context: hand-washing, mask and gloves wear,…
- Different symptoms related to COVID-19 infection: fever, exhaustion, pain, and many others with duration, severity and recovery
- Information regarding COVID-19 infection: testing, diagnosis, transmission, and education.

Statistical analysis

All statistical analyses were performed by using SPSS (Statistical Package for social sciences version 24.0). Descriptive results are presented as mean ± standard deviation for all quantitative variables (such as age), whereas number (percentage) is reported for all categorical variables (such as gender). All statistical analysis was done using two-tailed tests and an alpha error of 0.05. A P-value less than 0.05 was considered to be statistically significant. Chi-squared analyses were used as appropriate to evaluate the relationships between participants' characteristics and different symptoms. Multinomial logistic regression was used to test the association between number of symptoms and risk factors while adjusting to multiple variables.

Results

Table 1 shows the socio-demographic characteristics of the patients with slightly higher proportion of men (56.1%). Almost half of the participants are aged between 21-40 years (48%) followed by those aged between 41-60 years (41.6%). The mean weight was 80.29±20.57 Kg. The majority is from Saudi Arabia (90%), married (71.7%) with no comorbidities (67.5%) (Figure 1). A total of 249 had their flu vaccination (Figure 2). Regarding lifestyle characteristics during COVID-19 pandemic presented in Figure 3, only 6% live in an isolated neighborhood and almost the half go out because of work. The majority reported that they are keen to wash their hands (80.2%), mostly by soap (74.2%). Similarly, 81% wear their mask regularly, 71.9% keep social distancing while only 17.6% keen wear gloves.

Table 1: Socio-demographic characteristics (N=519).

	Frequency	Percentage (%)
Gender		
Female	228	43.9
Male	291	56.1
Age (years)		
Less or equal to 20	28	5.4
21-40	249	48
41-60	216	41.6
More or equal to 61	26	5
Weight (Kg)	Min:34 Max:170	80.29±20.57
Height (cm)	Min:140 Max:202	167.3±10.29
Waist circumference	Min:15 Max:180	59.13±34.02
Nationality		
Algeria	1	0.2
Burma	2	0.4
Egypt	6	1.2
Ethiopia	2	0.4
Filipina	1	0.2
Indian	1	0.2
Indonesia	2	0.4
Jordan	3	0.6
Nigeria	1	0.2
Pakistan	6	1.2
Palestine	2	0.4
Saudi Arabia	467	90
Somali	2	0.4
South Africa	2	0.4
Sudan	1	0.2
Syria	3	0.6
Turkey	2	0.4
Educational level		
Less than secondary	26	5
Secondary	85	16.5

University	293	56.8
Postgraduate	112	21.7
Marital status		
Divorced or separated	18	3.5
Married	367	71.7
Single	117	22.9
Widow	10	2
Occupation		
Freelance	25	4.9
Government employee	188	36.6
Private sector employee	103	20
Retired	40	7.8
Unemployed	158	30.7
Monthly income		
1,000 Riyal or less per month	93	19.7
1,001-5,000 Riyal	78	16.5
5,001 - 10,000 Riyal	111	23.5
10,001-20,000 Riyal	138	29.2
More than 20,000 Riyal	52	11
Chronic diseases		
No	340	67.5
Allergic diseases	24	4.8
Cancer diseases	4	0.8
Diabetes	63	12.5
Heart diseases	5	1.0
Hypertension	44	8.7
Respiratory diseases	24	4.8
History of malaria		
No	502	98.2
Yes	9	1.8
Ever had flu vaccination		
No	264	51.5
Yes	249	48.5
Been diagnosed with any mental illness before COVID-19		
No	480	96.8
Has mental illness with same presentation	12	2.4
Has mental illness with worse presentation	39	0.8

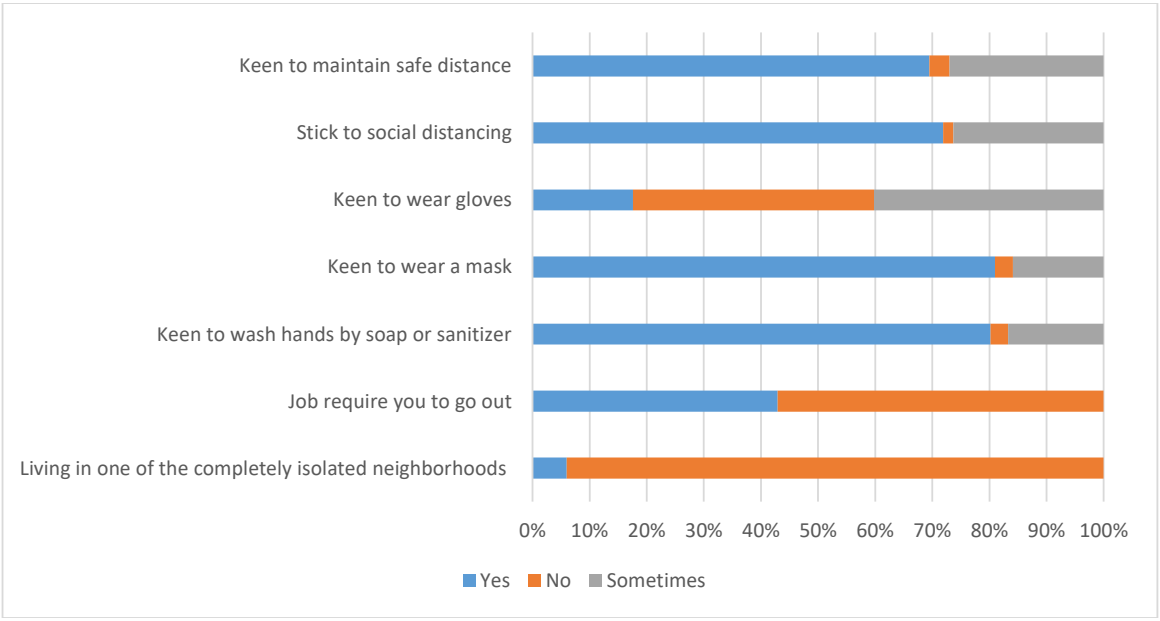

Figure 1: Lifestyle characteristics during COVID-19 pandemic

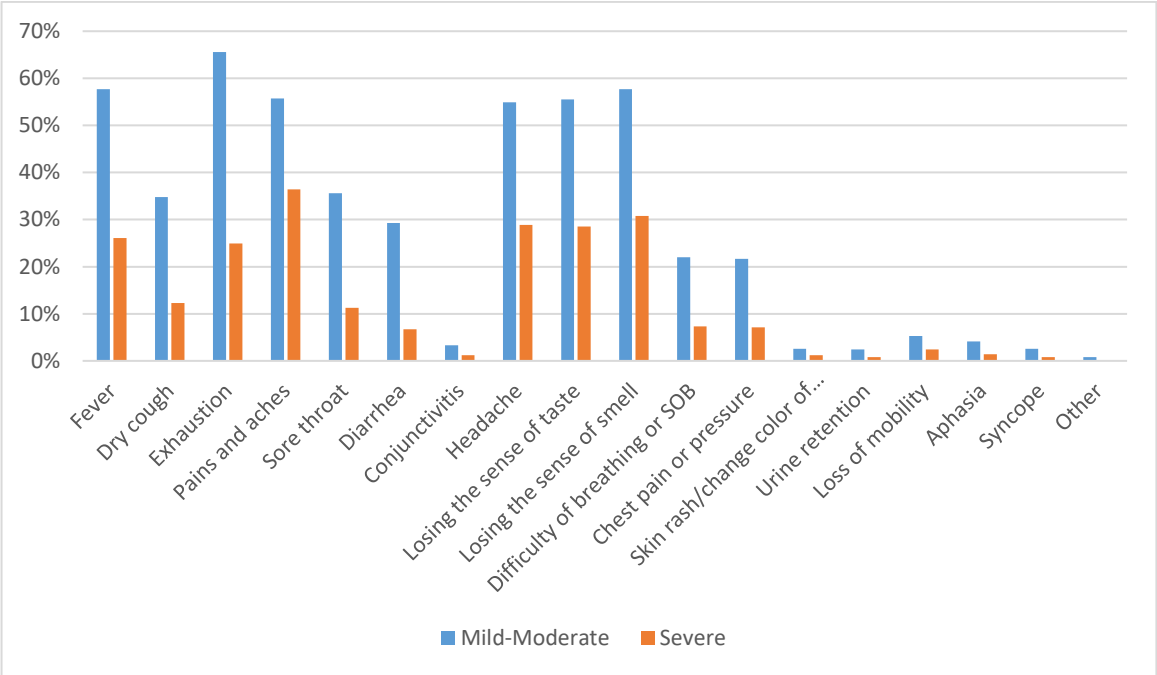

Figure 2: COVID-19 symptoms and severity.

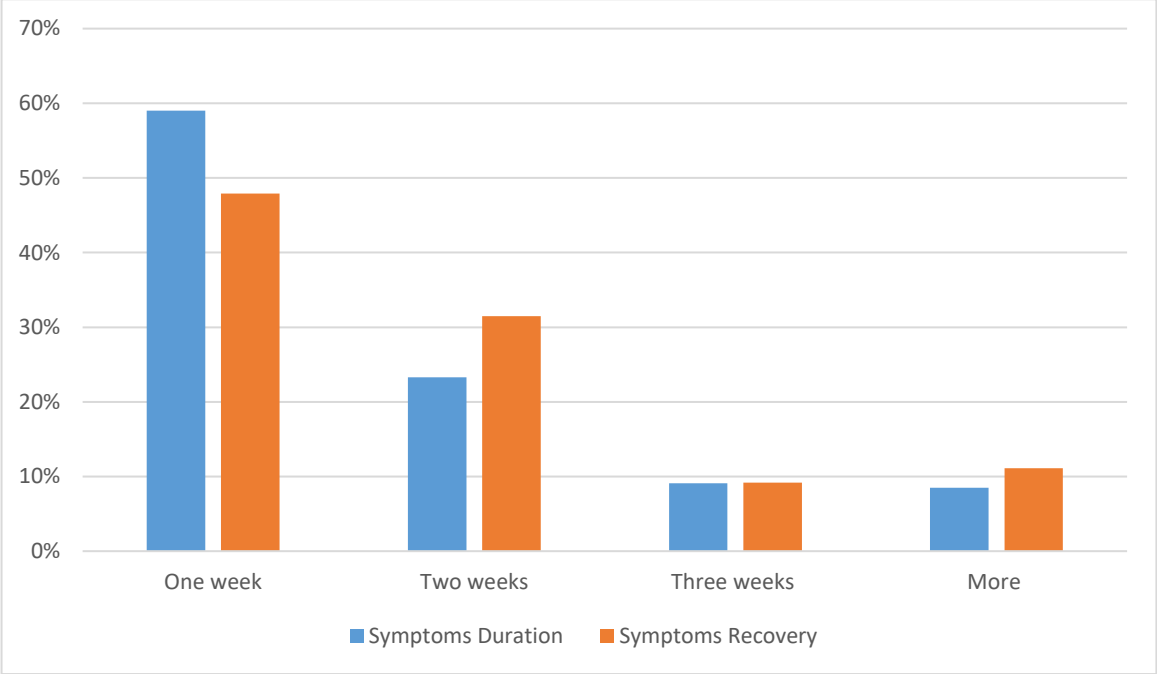

Figure 3: Symptoms evolution

The most reported symptoms during COVID-19 infection were exhaustion (65.6%), fever and losing the sense of smell (57.7% each), pains/aches and losing the sense of taste (55.7% and 55.5% respectively). Most of the symptoms were not very severe for majority of patients, the highest proportion suffered from severe aches and pain (36.4%). The symptoms lasted for one week mainly (59%) and resumed after one week for half of the participants (47.9%). Only 4 patients were admitted to the ICU (Figure 4-5).

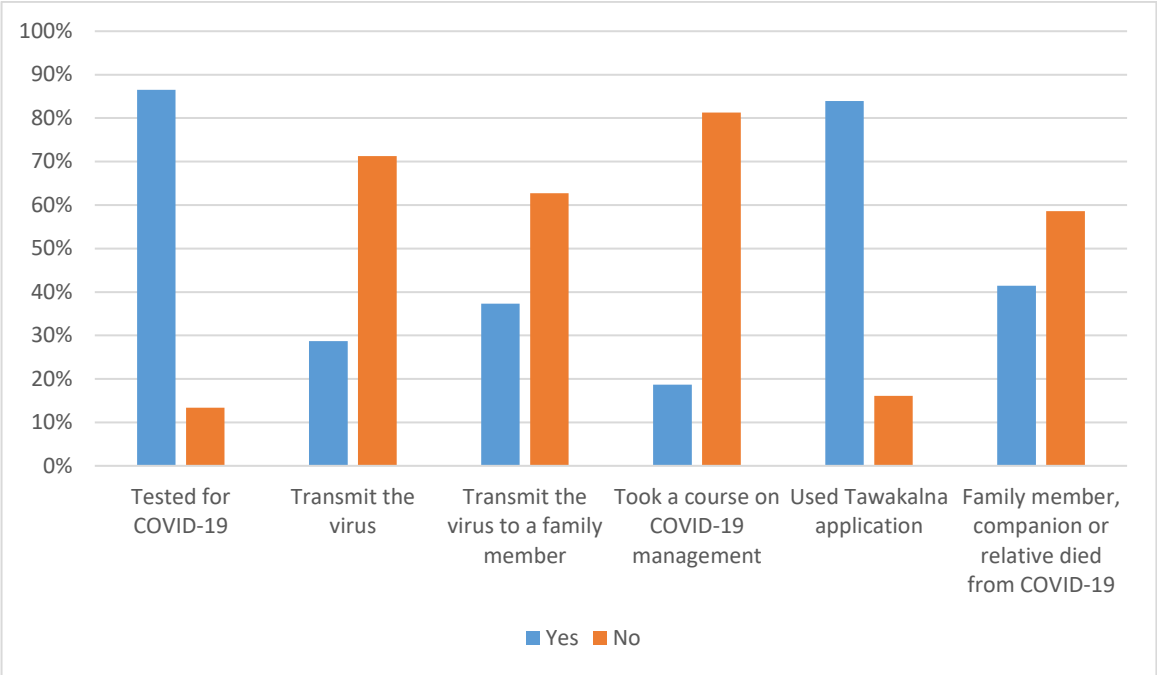

Figure 4: Additional COVID-19 characteristics

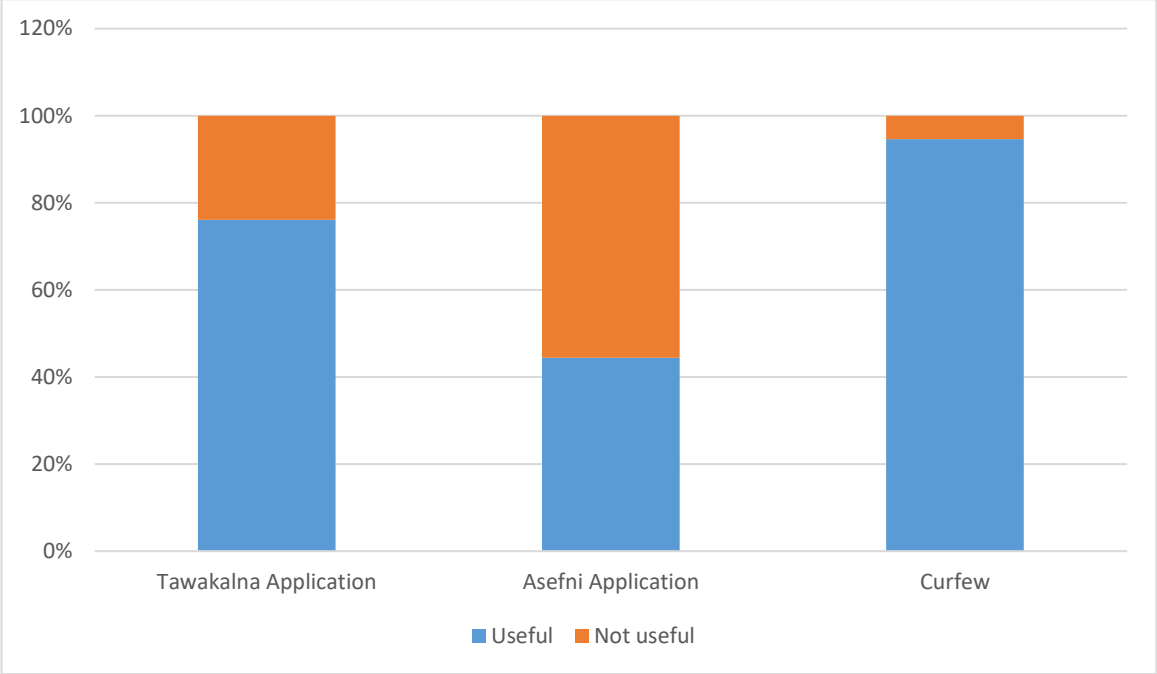

Figure 5: Usefulness of different types in reducing COVID-19 infection

Table 2 describes general information related to COVID-19. A large proportion did not suffer or suffered slightly from anxiety because of isolation (32.6% and 33.8% respectively). The majority were previously tested for COVID-19 (86.5%) and diagnosed with light symptoms (73.1%). A total of 273 participants were isolated due to COVID-19 infection where they mostly don't know its source (38%). More than the half-received health education from online and social networking (59.6%) followed by the Ministry of Health website (21.5%). Almost half of participants had one of their family members, relative or companion died from COVID-19 (Figure 6). The majority believed that Tawakalna and Asefni applications were useful (Figure 7).

Table 2: COVID-19 general characteristics.

	Frequency	Percentage (%)
Degree of anxiety during lockdown		
Never	164	32.6
Slightly	170	33.8
Average	116	23.1
Very much	26	5.2
A lot	27	5.4
Times of taking PCR	Min:0 Max:15	2.07±1.79
Been diagnosed or having symptoms of COVID-19		
Diagnosed with no symptoms	65	12.7
Diagnosed with light symptoms	373	73.1
Not confirmed by laboratory and no Symptoms	39	7.6
Diagnosed and condition is critical	33	6.5
Been isolated because of COVID-19		
No	170	33.7
Isolated due to COVID-19 suspicion	25	5
Isolated due to contact to infected person	27	5.3
Isolated due to COVID-19 infection	273	54.1
Isolated due to travel	10	2
Source of infection		
Don't know	185	38.0
Co-worker	30	6.2
Friends	34	7
Family member	153	31.4
Hospital or clinic	19	3.9
Relatives	58	11.9
Supermarket	8	1.6
Received Heath education from		
Ministry of Health website	108	21.5
Online and social networking	300	59.6
Paper publication	5	1
Television	90	17.9

Table 3 to 9 reported associations between different symptoms and patient characteristics and lifestyle. In all statistically significant associations between presence of comorbidities and different symptoms, those with comorbidities presented more symptoms except for losing sense of taste. Higher educational level was associated significantly with lower fever presentation (University 60%). As for dry cough, obese participants had higher presentation dry cough (49.1% vs 31.1%), in addition, those who had flu vaccination presented higher rate of fever (2.8% vs 0.9%) yet lower headache manifestations (43.2% vs 53.8%). In table 5, underweight and obese participants had higher presentation of exhaustion (2.9% vs 0.6% and 41.7% vs 28.8% respectively) and those living in isolated neighborhood had lower exhaustion signs. For pains and aches (Table 8) participants aged more than 40 years had significantly higher rate of manifestations (44.5% vs 38.7% and 7.1% vs 2.2%). Females have significantly suffered more of headaches (51.6% vs 34.5%) and losing sense of taste (48.9% vs 37.6%) and smell (48.5% vs 37.7%). In addition, keen to wear mask and gloves was associated with lower headache manifestation. Losing sense of smell was more seen in under/overweight and obese participants (Table 9).

Table 3: Association between Fever and different Characteristics.

	Absence of Fever	Presence of Fever	p-value
Socio-demographic variables			
Gender			
Female	91(42.3%)	132(45.1%)	0.541
Male	124(57.7%)	161(54.9%)	
Age (years)			
Less or equal to 20	12(5.6%)	16(5.5%)	0.234
21-40	109(50.7%)	133(45.4%)	
41-60	88(40.9%)	125(42.7%)	
More or equal to 61	6(2.8%)	19(6.5%)	
BMI			
Underweight	6(3%)	4(1.5%)	0.146
Normal	66(32.8%)	69(26.1%)	

Overweight	64(31.8%)	82(31.1%)	
Obese	65(32.3%)	109(41.3%)	
Educational level			
Less than secondary	7(3.3%)	19(6.6%)	**0.004**
Secondary	35(16.3%)	50(17.2%)	
University	111(51.6%)	175(60%)	
Postgraduate	62(28.8%)	47(16.2%)	
Monthly income			
1,000 Riyal or less per month	34(16.8%)	59(22.8%)	0.207
1,001-5,000 Riyal	31(15.3%)	45(17.4%)	
5,001 - 10,000 Riyal	52(25.7%)	55(21.2%)	
10,001-20,000 Riyal	57(28.2%)	77(29.7%)	
More than 20,000 Riyal	28(13.9%)	23(8.9%)	
Comorbidities			
No	153(73.6%)	180(62.9%)	**0.013**
Yes	55(26.4%)	106(37.1%)	
History of malaria			
No	208(99%)	285(%)	0.275
Yes	2(1%)	6(2.1%)	
Flu vaccination			
No	101(47.4%)	161(55.5%)	0.072
Yes	112(52.6%)	129(44.5%)	
Lifestyle variables			
Days to go out for shopping			
Every two weeks	73(35.1%)	91(32.4%)	0.925
Once a week	59(28.4%)	82(29.2%)	
Once every 3 days	45(21.6%)	66(23.5%)	
Every day or two	31(14.9%)	42(14.9%)	
Living in one of the completely isolated neighborhoods			
No	202(94.4%)	275(94.2%)	0.918
Yes	12(5.6%)	17(5.8%)	
Job require you to go out			
No	121(57.6%)	160(58%)	0.938
Yes	89(42.4%)	116(42%)	
Keen to wash hands by soap or sanitizer			
No	6(2.9%)	9(3.1%)	0.464
Sometimes	30(14.4%)	54(18.6%)	
Yes	172(82.7%)	228(78.4%)	
Keen to wear a mask			
No	6(2.9%)	10(3.4%)	0.108
Sometimes	25(12%)	55(18.8%)	
Yes	177(85.1%)	227(77.7%)	
Keen to wear gloves			
No	88(42.3%)	122(41.9%)	0.061
In the markets and hospitals	36(17.3%)	74(25.4%)	
Sometimes	47(22.6%)	44(15.1%)	
Yes	37(17.8%)	51(17.5%)	
Stick to social distancing			
No	4(2%)	5(1.7%)	0.089
Sometimes	43(21.3%)	87(30.2%)	
Yes	155(76.7%)	196(68.1%)	
Education on COVID-19			
Took a course on COVID-19 management			
No	167(81.1%)	241(82.5%)	0.675
Yes	39(18.9%)	51(17.5%)	
Received Heath education from			
Ministry of Health website	45(21.6%)	58(20.4%)	0.713
Online and social networking	123(59.1%)	174(61.1%)	
Paper publication	1(0.5%)	4(1.4%)	
Television	39(18.8%)	49(17.2%)	
Used Tawakalna application			
No	30(14.3%)	50(17.4%)	0.389
Yes	180(85.7%)	238(82.6%)	

Table 4: Association between Dry cough and different Characteristics.

	Absence of Dry cough	**Presence of Dry cough**	**p-value**
Socio-demographic variables			
Gender			
Female	135(40.8%)	88(49.7%)	0.053
Male	196(59.2%)	89(50.3%)	
Age (years)			
Less or equal to 20	18(5.4%)	10(5.6%)	0.129
21-40	170(51.4%)	72(40.7%)	
41-60	129(39%)	84(47.5%)	
More or equal to 61	14(4.2%)	11(6.2%)	
BMI			
Underweight	9(3%)	1(0.6%)	**<0.0001**
Normal	90(29.8%)	45(27.6%)	
Overweight	109(36.1%)	37(22.7%)	
Obese	94(31.1%)	80(49.1%)	
Educational level			
Less than secondary	15(4.6%)	11(6.2%)	0.829
Secondary	54(16.5%)	31(17.5%)	
University	186(56.7%)	99(55.9%)	
Postgraduate	73(22.3%)	36(20.3%)	
Monthly income			
1,000 Riyal or less per month	67(22.2%)	26(16.4%)	0.438
1,001-5,000 Riyal	46(15.2%)	30(18.9%)	
5,001 - 10,000 Riyal	72(23.8%)	35(22%)	
10,001-20,000 Riyal	87(28.8%)	47(29.6%)	
More than 20,000 Riyal	30(9.9%)	21(13.2%)	
Comorbidities			
No	232(72.5%)	101(58%)	**0.001**
Yes	88(27.5%)	73(42%)	
History of malaria			
No	321(99.1%)	172(97.2%)	0.138
Yes	3(0.9%)	5(2.8%)	
Flu vaccination			
No	183(56%)	79(44.9%)	**0.018**
Yes	144(44%)	97(55.1%)	
Lifestyle variables			
Days to go out for shopping			
Every two weeks	104(32.5%)	60(35.5%)	0.775
Once a week	97(30.3%)	44(26%)	
Once every 3 days	71(22.2%)	40(23.7%)	
Every day or two	48(15%)	25(14.8%)	
Living in one of the completely isolated neighborhoods			
No	309(93.9%)	168(94.9%)	0.646
Yes	20(6.1%)	9(5.1%)	
Job requires you to go out			
No	189(59.4%)	92(54.8%)	0.321
Yes	129(40.6%)	76(45.2%)	
Keen to wash hands by soap or sanitizer			
No	10(3.1%)	5(2.8%)	0.47
Sometimes	59(18.3%)	25(14.1%)	
Yes	253(78.6%)	147(83.1%)	
Keen to wear a mask			
No	9(2.8%)	7(4%)	0.59
Sometimes	49(15.2%)	31(17.5%)	
Yes	265(82%)	139(78.5%)	
Keen to wear gloves			

No	131(40.7%)	79(44.6%)	0.834
In the markets and hospitals	74(23%)	36(20.3%)	
Sometimes	60(18.6%)	31(17.5%)	
Yes	57(17.7%)	31(17.5%)	
Stick to social distancing			
No	8(2.5%)	1(0.6%)	**0.048**
Sometimes	94(29.2%)	36(21.4%)	
Yes	220(68.3%)	131(78%)	
Education on COVID-19			
Took a course on COVID-19 management			
No	261(81.1%)	147(83.5%)	0.494
Yes	61(18.9%)	29(16.5%)	
Received Heath education from			
Ministry of Health website	71(21.9%)	32(18.9%)	0.122
Online and social networking	201(62%)	96(56.8%)	
Paper publication	2(0.6%)	3(1.8%)	
Television	50(15.4%)	38(22.5%)	
Used Tawakalna application			
No	49(15.3%)	31(17.5%)	0.513
Yes	272(84.7%)	146(82.5%)	

Table 5: Association between Exhaustion and different Characteristics.

	Absence of Exhaustion	**Presence of Exhaustion**	**p-value**
Socio-demographic variables			
Gender			
Female	71(40.6%)	152(45.6%)	0.273
Male	104(59.4%)	181(54.4%)	
Age (years)			
Less or equal to 20	13(7.4%)	15(4.5%)	0.429
21-40	86(49.1%)	156(46.8%)	
41-60	69(39.4%)	144(43.2%)	
More or equal to 61	7(4%)	18(5.4%)	
BMI			
Underweight	1(0.6%)	9(2.9%)	**0.011**
Normal	53(34%)	82(26.5%)	
Overweight	57(36.5%)	89(28.8%)	
Obese	45(28.8%)	129(41.7%)	
Educational level			
Less than secondary	6(3.4%)	20(6.1%)	0.144
Secondary	37(21.1%)	48(14.5%)	
University	99(56.6%)	186(56.4%)	
Postgraduate	33(18.9%)	76(23%)	
Monthly income			
1,000 Riyal or less per month	37(22%)	56(19.1%)	0.904
1,001-5,000 Riyal	26(15.5%)	50(17.1%)	
5,001 - 10,000 Riyal	39(23.2%)	68(23.2%)	
10,001-20,000 Riyal	46(27.4%)	88(30%)	
More than 20,000 Riyal	20(11.9%)	31(10.6%)	
Comorbidities			
No	128(75.7%)	205(63.1%)	**0.004**
Yes	41(24.3%)	120(36.9%)	
History of malaria			
No	165(97.6%)	328(98.8%)	0.452
Yes	4(2.4%)	4(1.2%)	
Flu vaccination			
No	87(50.9%)	175(52.7%)	0.697
Yes	84(49.1%)	157(47.3%)	
Lifestyle variables			
Days to go out for shopping			

Every two weeks	53(32.1%)	111(34.3%)	0.718
Once a week	51(30.9%)	90(27.8%)	
Once every 3 days	34(20.6%)	77(23.8%)	
Every day or two	27(16.4%)	46(14.2%)	
Living in one of the completely isolated neighborhoods			
No	157(90.2%)	320(96.4%)	**0.005**
Yes	17(9.8%)	12(3.6%)	
Job require you to go out			
No	100(60.6%)	181(56.4%)	0.372
Yes	65(39.4%)	140(43.6%)	
Keen to wash hands by soap or sanitizer			
No	3(1.8%)	12(3.6%)	0.293
Sometimes	33(19.5%)	51(15.5%)	
Yes	133(78.7%)	267(80.9%)	
Keen to wear a mask			
No	4(2.4%)	12(3.6%)	0.73
Sometimes	26(15.5%)	54(16.3%)	
Yes	138(82.1%)	266(80.1%)	
Keen to wear gloves			
No	79(47%)	131(39.6%)	0.346
In the markets and hospitals	31(18.5%)	79(23.9%)	
Sometimes	31(18.5%)	60(18.4%)	
Yes	27(16.1%)	61(18.4%)	
Stick to social distancing			
No	4(2.4%)	5(1.6%)	0.815
Sometimes	45(26.6%)	85(26.5%)	
Yes	120(71%)	231(72%)	
Education on COVID-19			
Took a course on COVID-19 management			
No	140(84.3%)	268(80.7%)	0.323
Yes	26(15.7%)	64(19.3%)	
Received Heath education from			
Ministry of Health website	31(18.9%)	72(21.9%)	0.137
Online and social networking	110(67.1%)	187(56.8%)	
Paper publication	1(0.6%)	4(1.2%)	
Television	22(13.4%)	66(20.1%)	
Used Tawakalna application			
No	26(15.2%)	54(16.5%)	0.706
Yes	145(84.8%)	273(83.5%)	

Table 6: Association between Pains and aches and different Characteristics.

	Absence of Pains and Aches	**Presence of Pains and Aches**	**p-value**
Socio-demographic variables			
Gender			
Female	91(40.4%)	132(46.6%)	0.162
Male	134(59.6%)	151(53.4%)	
Age (years)			
Less or equal to 20	16(7.1%)	12(4.2%)	**0.015**
21-40	117(52%)	125(44.2%)	
41-60	87(38.7%)	126(44.5%)	
More or equal to 61	5(2.2%)	20(7.1%)	
BMI			
Underweight	6(3%)	4(1.5%)	0.335
Normal	63(31.5%)	72(27.2%)	
Overweight	64(32%)	82(30.9%)	
Obese	67(33.5%)	107(40.4%)	
Educational level			
Less than secondary	9(4%)	17(6%)	0.709
Secondary	38(17%)	47(16.7%)	
University	130(58.3%)	155(55%)	

Postgraduate	46(20.6%)	63(22.3%)	
Monthly income			
1,000 Riyal or less per month	44(21.1%)	49(19.4%)	0.555
1,001-5,000 Riyal	36(17.2%)	40(15.9%)	
5,001 - 10,000 Riyal	43(20.6%)	64(25.4%)	
10,001-20,000 Riyal	66(31.6%)	68(27%)	
More than 20,000 Riyal	20(9.6%)	31(12.3%)	
Comorbidities			
No	165(75.5%)	168(60.9%)	**<0.0001**
Yes	53(24.3%)	108(39.1%)	
History of malaria			
No	217(98.6%)	276(98.2%)	1
Yes	3(1.4%)	5(1.8%)	
Flu vaccination			
No	119(53.4%)	143(51.1%)	0.609
Yes	104(46.6%)	137(48.9%)	
Lifestyle variables			
Days to go out for shopping			
Every two weeks	74(34.6%)	90(32.7%)	0.877
Once a week	60(28%)	81(29.5%)	
Once every 3 days	46(21.5%)	65(23.6%)	
Every day or two	34(15.9%)	39(14.2%)	
Living in one of the completely isolated neighborhoods			
No	208(92.9%)	269(95.4%)	0.223
Yes	16(7.1%)	13(4.6%)	
Job requires you to go out			
No	127(59.1%)	154(56.8%)	0.619
Yes	88(40.9%)	117(43.2%)	
Keen to wash hands by soap or sanitizer			
No	5(2.3%)	10(3.6%)	0.616
Sometimes	35(16%)	49(17.5%)	
Yes	179(81.7%)	221(78.9%)	
Keen to wear a mask			
No	7(3.2%)	9(3.2%)	0.898
Sometimes	33(15.1%)	47(16.7%)	
Yes	178(81.7%)	226(80.1%)	
Keen to wear gloves			
No	95(43.6%)	115(40.9%)	0.601
In the markets and hospitals	42(19.3%)	68(24.2%)	
Sometimes	40(18.3%)	51(18.1%)	
Yes	41(18.8%)	47(16.7%)	
Stick to social distancing			
No	6(2.8%)	3(1.1%)	0.232
Sometimes	51(24.2%)	79(28.3%)	
Yes	154(73%)	197(70.6%)	
Education on COVID-19			
Took a course on COVID-19 management			
No	181(83.4%)	227(80.8%)	0.45
Yes	36(16.6%)	54(19.2%)	
Received Heath education from			
Ministry of Health website	45(20.9%)	58(20.9%)	0.796
Online and social networking	129(60%)	168(60.4%)	
Paper publication	1(0.5%)	4(1.4%)	
Television	40(18.6%)	48(17.3%)	
Used Tawakalna application			
No	40(18.1%)	40(14.4%)	0.269
Yes	181(81.9%)	237(85.6%)	

Table 7: Association between Headache and different Characteristics.

	Absence of Headache	**Presence of Headache**	**p-value**
Socio-demographic variables			
Gender			
Female	79(34.5%)	144(51.6%)	**<0.0001**
Male	150(65.5%)	135(48.4%)	
Age (years)			
Less or equal to 20	12(5.2%)	16(5.7%)	0.981
21-40	108(47.2%)	134(48%)	
41-60	97(42.4%)	116(41.6%)	
More or equal to 61	12(5.2%)	13(4.7%)	
BMI			
Underweight	4(2%)	6(2.3%)	0.601
Normal	54(26.3%)	81(31.2%)	
Overweight	70(34.1%)	76(29.2%)	
Obese	77(37.6%)	97(37.3%)	
Educational level			
Less than secondary	12(5.3%)	14(5%)	0.464
Secondary	35(15.4%)	50(18%)	
University	124(54.6%)	161(57.9%)	
Postgraduate	56(24.7%)	53(19.1%)	
Monthly income			
1,000 Riyal or less per month	39(18.1%)	54(22%)	0.702
1,001-5,000 Riyal	36(16.7%)	40(16.3%)	
5,001 - 10,000 Riyal	47(21.9%)	60(24.4%)	
10,001-20,000 Riyal	68(31.6%)	66(26.8%)	
More than 20,000 Riyal	25(11.6%)	26(10.6%)	
Comorbidities			
No	157(69.5%)	176(65.7%)	0.37
Yes	69(30.5%)	92(34.3%)	
History of malaria			
No	219(98.6%)	274(98.2%)	1
Yes	3(1.4%)	5(1.8%)	
Flu vaccination			
No	104(46.2%)	158(56.8%)	**0.018**
Yes	121(53.8%)	120(43.2%)	
Lifestyle variables			
Days to go out for shopping			
Every two weeks	75(34.1%)	89(33.1%)	0.413
Once a week	63(28.6%)	78(29%)	
Once every 3 days	55(25%)	56(20.8%)	
Every day or two	27(12.3%)	46(17.1%)	
Living in one of the completely isolated neighborhoods			
No	213(93.4%)	264(95%)	0.458
Yes	15(6.6%)	14(5%)	
Job require you to go out			
No	135(60.5%)	146(55.5%)	0.264
Yes	88(39.5%)	117(44.5%)	
Keen to wash hands by soap or sanitizer			
No	5(2.3%)	10(3.6%)	0.489
Sometimes	41(18.5%)	43(15.5%)	
Yes	176(79.3%)	224(80.9%)	
Keen to wear a mask			
No	6(2.7%)	10(3.6%)	**0.026**
Sometimes	25(11.3%)	55(19.8%)	
Yes	191(86%)	213(76.6%)	
Keen to wear gloves			
No	91(41.2%)	119(42.8%)	**0.026**
In the markets and hospitals	54(24.4%)	56(20.1%)	

Sometimes	48(21.7%)	43(15.5%)	
Yes	28(12.7%)	60(21.6%)	
Stick to social distancing			
No	5(2.3%)	4(1.5%)	0.697
Sometimes	59(27.4%)	71(25.8%)	
Yes	151(70.2%)	200(72.7%)	
Education on COVID-19			
Took a course on COVID-19 management			
No	179(81%)	229(82.7%)	0.629
Yes	42(19%)	48(17.3%)	
Received Heath education from			
Ministry of Health website	51(23.1%)	52(19.1%)	0.528
Online and social networking	126(57%)	171(62.9%)	
Paper publication	3(1.4%)	2(0.7%)	
Television	41(18.6%)	47(17.3%)	
Used Tawakalna application			
No	32(14.4%)	48(17.4%)	0.369
Yes	190(85.6%)	228(82.6%)	

Table 8: Association between losing sense of taste and different Characteristics.

	Absence of losing sense of taste	**Presence of losing sense of taste**	**p-value**
Socio-demographic variables			
Gender			
Female	85(37.6%)	138(48.9%)	**0.011**
Male	141(62.4%)	144(51.1%)	
Age (years)			
Less or equal to 20	11(4.9%)	17(6%)	0.504
21-40	101(44.7%)	141(50%)	
41-60	103(45.6%)	110(39%)	
More or equal to 61	11(4.9%)	14(5%)	
BMI			
Underweight	4(1.9%)	6(2.3%)	0.746
Normal	64(31.1%)	71(27.4%)	
Overweight	60(29.1%)	86(33.2%)	
Obese	78(37.9%)	96(37.1%)	
Educational level			
Less than secondary	12(5.4%)	14(5%)	0.82
Secondary	38(17%)	47(16.7%)	
University	130(58%)	155(55.2%)	
Postgraduate	44(19.6%)	65(23.1%)	
Monthly income			
1,000 Riyal or less per month	41(19.6%)	52(20.6%)	0.531
1,001-5,000 Riyal	28(13.4%)	48(19%)	
5,001 - 10,000 Riyal	52(24.9%)	55(21.8%)	
10,001-20,000 Riyal	63(30.1%)	71(28.2%)	
More than 20,000 Riyal	25(12%)	26(10.3%)	
Comorbidities			
No	137(62.6%)	196(71.3%)	**0.04**
Yes	82(37.4%)	79(28.7%)	
History of malaria			0.308
No	215(97.7%)	278(98.9%)	
Yes	5(2.3%)	3(1.1%)	
Flu vaccination			
No	116(52%)	146(52.1%)	0.978
Yes	107(48%)	134(47.9%)	
Lifestyle variables			
Days to go out for shopping			
Every two weeks	70(31.7%)	94(35.1%)	0.645
Once a week	61(27.6%)	80(29.9%)	
Once every 3 days	54(24.4%)	57(21.3%)	
Every day or two	36(16.3%)	37(13.8%)	

Living in one of the completely isolated neighborhoods			
No	208(92.4%)	269(95.7%)	0.126
Yes	17(7.6%)	12(4.3%)	
Job require you to go out			
No	123(56.4%)	158(59%)	0.581
Yes	95(43.6%)	110(41%)	
Keen to wash hands by soap or sanitizer			
No	6(2.8%)	9(3.2%)	0.549
Sometimes	41(18.9%)	43(15.2%)	
Yes	170(78.3%)	230(81.6%)	
Keen to wear a mask			
No	9(4.1%)	7(2.5%)	0.151
Sometimes	28(12.8%)	52(18.5%)	
Yes	182(83.1%)	222(79%)	
Keen to wear gloves			
No	95(43.6%)	115(40.9%)	0.827
In the markets and hospitals	44(20.2%)	66(23.5%)	
Sometimes	41(18.8%)	50(17.8%)	
Yes	38(17.4%)	50(17.8%)	
Stick to social distancing			
No	6(2.7%)	3(1.1%)	0.057
Sometimes	67(30.6%)	63(23.2%)	
Yes	146(66.7%)	205(75.6%)	
Education on COVID-19			
Took a course on COVID-19 management			
No	177(81.6%)	231(82.2%)	0.854
Yes	40(18.4%)	50(17.8%)	
Received Heath education from			
Ministry of Health website	42(19.3%)	61(22.2%)	0.17
Online and social networking	138(63.3%)	159(57.8%)	
Paper publication	0(0%)	5(1.8%)	
Television	38(17.4%)	50(18.2%)	
Used Tawakalna application			
No	38(17.2%)	42(15.2%)	0.539
Yes	183(82.8%)	235(84.8%)	

Table 9: Association between losing sense of smell and different Characteristics.

	Absence of losing sense of smell	**Presence of losing sense of smell**	**p-value**
Socio-demographic variables			
Gender			
Female	81(37.7%)	142(48.5%)	**0.015**
Male	134(62.3%)	151(51.5%)	
Age (years)			
Less or equal to 20	10(4.7%)	18(6.1%)	0.241
21-40	93(43.3%)	149(50.9%)	
41-60	100(46.5%)	113(38.6%)	
More or equal to 61	12(5.6%)	13(4.4%)	
BMI			
Underweight	1(0.5%)	9(3.3%)	**0.026**
Normal	68(35.1%)	67(24.7%)	
Overweight	56(28.9%)	90(33.2%)	
Obese	69(35.6%)	105(38.7%)	
Educational level			
Less than secondary	13(6.1%)	13(4.5%)	0.829
Secondary	37(17.4%)	48(16.4%)	
University	119(55.9%)	166(56.8%)	
Postgraduate	44(20.7%)	65(22.3%)	
Monthly income			
1,000 Riyal or less per month	45(23%)	48(18.1%)	0.141
1,001-5,000 Riyal	23(11.7%)	53(20%)	

5,001 - 10,000 Riyal	45(23%)	62(23.4%)	
10,001-20,000 Riyal	58(29.6%)	76(28.7%)	
More than 20,000 Riyal	25(12.8%)	26(9.8%)	
Comorbidities			
No	136(64.8%)	197(69.4%)	0.287
Yes	74(35.2%)	87(30.6%)	
History of malaria			
No	205(98.1%)	288(98.6%)	0.725
Yes	4(1.9%)	4(1.4%)	
Flu vaccination			
No	115(54.2%)	147(50.5%)	0.408
Yes	97(45.8%)	144(49.5%)	
Lifestyle variables			
Days to go out for shopping			
Every two weeks	65(31.3%)	99(35.2%)	**0.03**
Once a week	51(24.5%)	90(32%)	
Once every 3 days	51(24.5%)	60(21.4%)	
Every day or two	41(19.7%)	32(11.4%)	
Living in one of the completely isolated neighborhoods			
No	201(93.9%)	276(94.5%)	0.776
Yes	13(3.1%)	16(5.5%)	
Job require you to go out			
No	116(56.9%)	165(58.5%)	0.717
Yes	88(43.1%)	117(41.5%)	
Keen to wash hands by soap or sanitizer			
No	7(3.4%)	8(2.7%)	0.174
Sometimes	42(20.4%)	42(14.3%)	
Yes	157(76.2%)	243(82.9%)	
Keen to wear a mask			
No	8(3.8%)	8(2.7%)	0.765
Sometimes	34(16.3%)	46(15.8%)	
Yes	166(79.8%)	238(81.5%)	
Keen to wear gloves			
No	83(39.9%)	127(43.6%)	0.796
In the markets and hospitals	48(23.1%)	62(21.3%)	
Sometimes	41(19.7%)	50(17.2%)	
Yes	36(17.3%)	52(17.9%)	
Stick to social distancing			
No	6(2.9%)	3(1.1%)	0.113
Sometimes	62(29.7%)	68(24.2%)	
Yes	141(67.5%)	210(74.7%)	
Education on COVID-19			
Took a course on COVID-19 management			
No	167(80.7%)	241(82.8%)	0.54
Yes	40(19.3%)	50(17.2%)	
Received Heath education from			
Ministry of Health website	37(17.9%)	66(23.1%)	**0.046**
Online and social networking	137(66.2%)	160(55.9%)	
Paper publication	0(0%)	5(1.7%)	
Television	33(15.9%)	55(19.2%)	
Used Tawakalna application			
No	35(16.7%)	45(15.6%)	0.755
Yes	175(83.3%)	243(84.4%)	

When dividing the number of symptoms into 3 categories only gender and BMI in socio-demographic factors were significantly associated where females and obese individuals had higher number of symptoms (Table 10).

Table 10: Association between number of symptoms and other factors.

	No symptoms N=50	1-5 symptoms N=242	More than 6 symptoms N=227	p-value
Socio-demographic variables				
Gender				
Female	26(11.4%)	82(36%)	120(52.6%)	**<0.0001**
Male	24(8.2%)	160(55%)	107(36.8%)	
Age (years)				
Less or equal to 20	3(10.7%)	13(46.4%)	12(42.9%)	0.729
21-40	29(11.6%)	116(46.6%)	104(41.8%)	
41-60	16(7.4%)	103(47.7%)	97(44.9%)	
More or equal to 61	2(7.7%)	10(38.5%)	14(53.8%)	
BMI				
Underweight	1(10%)	5(50%)	4(40%)	**<0.0001**
Normal	28(19.7%)	58(40.8%)	56(39.4%)	
Overweight	9(6.1%)	77(52.4%)	61(41.5%)	
Obese	7(4%)	79(44.6%)	91(51.4%)	
Educational level				
Less than secondary	3(11.5%)	7(26.9%)	16(61.5%)	0.279
Secondary	9(10.6%)	37(43.5%)	39(45.9%)	
University	24(8.2%)	146(49.8%)	123(42%)	
Postgraduate	14(12.5%)	50(44.6%)	48(42.9%)	
Monthly income				
1,000 Riyal or less per month	8(8.6%)	45(48.4%)	40(43%)	0.242
1,001-5,000 Riyal	7(9%)	34(43.6%)	37(47.4%)	
5,001 - 10,000 Riyal	17(15.3%)	48(43.2%)	46(41.4%)	
10,001-20,000 Riyal	9(6.5%)	78(56.5%)	51(37%)	
More than 20,000 Riyal	7(13.5%)	22(42.3%)	23(44.2%)	
Comorbidities				
No	38(11.2%)	166(48.8%)	136(40%)	**0.016**
Yes	9(5.5%)	70(42.7%)	85(51.8%)	
History of malaria				
No	41(8.2%)	240(47.8%)	221(44%)	**0.015**
Yes	3(33.3%)	1(11.1%)	5(55.6%)	
Flu vaccination				
No	21(8%)	125(47.3%)	118(44.7%)	0.616
Yes	26(10.4%)	116(46.6%)	107(43%)	
Lifestyle variables				
Days to go out for shopping				
Every two weeks	13(7.8%)	80(48.2%)	73(44%)	**0.039**
Once a week	18(12.3%)	60(41.1%)	68(46.6%)	
Once every 3 days	16(13.9%)	53(46.1%)	46(40%)	
Every day or two	1(1.4%)	43(58.9%)	29(39.7%)	
Living in one of the completely isolated neighborhoods				
No	42(8.6%)	228(46.9%)	216(44.4%)	**0.03**
Yes	7(22.6%)	14(45.2%)	10(32.3%)	
Job require you to go out				
No	27(9.5%)	127(44.9%)	129(45.6%)	0.694
Yes	21(9.9%)	103(48.4%)	89(41.8%)	
Keen to wash hands by soap or sanitizer				
No	2(12.5%)	7(43.8%)	7(43.8%)	0.653
Sometimes	9(10.6%)	34(40%)	42(49.4%)	
Yes	33(8.1%)	198(48.4%)	178(43.5%)	
Keen to wear a mask				
No	1(6.3%)	9(56.3%)	6(37.5%)	**0.03**
Sometimes	5(6.2%)	27(33.3%)	49(60.5%)	
Yes	38(9.2%)	205(49.5%)	171(41.3%)	

Keen to wear gloves				
No	18(8.4%)	97(45.1%)	100(46.5%)	0.598
In the markets and hospitals	11(9.7%)	50(44.2%)	52(46%)	
Sometimes	9(9.8%)	50(54.3%)	33(35.9%)	
Yes	5(5.6%)	44(48.9%)	41(45.6%)	
Stick to social distancing				
No	1(5.6%)	5(27.8%)	12(66.7%)	0.401
Sometimes	11(8%)	67(48.6%)	60(43.5%)	
Yes	33(9.3%)	168(47.3%)	154(43.4%)	
Education on COVID-19				
Took a course on COVID-19 management				
No	30(7.2%)	197(47.6%)	187(45.2%)	0.219
Yes	12(12.6%)	44(46.3%)	39(41.1%)	
Received Heath education from				
Ministry of Health website	15(13.9%)	49(45.4%)	44(40.7%)	0.120
Online and social networking	22(7.3%)	153(51%)	125(41.7%)	
Paper publication	0(0%)	1(20%)	4(80%)	
Television	6(6.7%)	37(41.1%)	47(52.2%)	
Used Tawakalna application				
No	10(12.2%)	31(37.8%)	41(50%)	0.161
Yes	37(8.7%)	209(48.9%)	181(42.4%)	

Table 11 shows the multiple logistic regression after adjusting on multiple factors. Regarding clinical factors, having comorbidities or a history of malaria was associated with higher number of COVID-19 signs. Going out for shopping once a week or once every 3 days compared to other categories was more associated with lower score of symptoms (12.3% and 13.9% with no symptoms). Those living in an isolated neighbourhood had lower number of symptoms compared to those who are not. Interestingly, individuals who sometimes wear their mask were the most associated with more reported symptoms (60.5% had more than 6 symptoms).

Table 11: Multinomial logistic regression (Group with no symptoms was the reference group).

	1-5 symptoms N=242			**More than 6 symptoms N=227**		
	OR	**90% CI**	**p-value**	**OR**	**90% CI**	**p-value**
Gender						
Female	0.605	0.27-1.3	0.214	1.56	0.7-3.47	0.266
Male	Reference	-	-	Reference	-	-
BMI						
Underweight	0.2	0.01-2.8	0.236	0.3	0.02-3.33	0.327
Normal	0.23	0.08-0.62	0.004	0.16	0.06-0.45	<0.001
Overweight	0.8	0.26-2.47	0.7	0.51	0.16-1.59	0.251
Obese	Reference	-	-	Reference	-	-
Comorbidities						
No	0.684	0.26-1.78	0.437	0.42	0.16-1.08	0.074
Yes	Reference	-	-	Reference	-	-
History of malaria						
No	16.22	0.85-309.1	0.064	3.95	0.35-44.3	0.264
Yes	Reference	-	-	Reference	-	-
Days to go out for shopping						
Every two weeks	1.85	0.6-5.72	0.281	1.55	0.49-4.82	0.449
Once a week	0.43	0.16-1.16	0.097	0.53	0.19-1.44	0.214
Every day or two	7.11	0.7-71.82	0.096	7.16	0.7-72.4	0.095
Once every 3 days	Reference	-	-	Reference	-	-
Living in one of the completely isolated neighbourhoods						
No	2.63	0.71-9.64	0.144	3.21	0.86-11.95	0.082
Yes	Reference	-	-	Reference	-	-
Keen to wear a mask						
No	$5x10^7$	-	0.997	$2x10^7$	-	1
Sometimes	0.97	0.28-3.37	0.965	2.02	0.06-6.76	0.252
Yes	Reference	-	-	Reference	-	-
Used Tawakalna application						
No	0.54	0.2-1.46	0.231	0.77	0.03-2.01	0.606
Yes	Reference	-	-	Reference	-	-

Discussion

The world has been and is still involved with a pandemic created by the novel coronavirus where community transmission became an important issue as numerous countries forced progressive lockdown measures in response to the increasing number of COVID-19 cases. Currently, the novel coronavirus caused unprecedented alteration in lifestyle routines with a social significance, and beyond including mask wearing, quarantine, self-isolation when suspected of infection and disruption of personal and social activities.

Clinical manifestations of COVID-19 cases may progress rapidly, and severe cases may develop hypoxia, concomitant organ failure, and even death [10]. Despite the fact that early identification of potentially critical patients helps in controlling the disease, no definitive way to predict the prognosis and severity of the disease has been developed [11].

Females were significantly more affected by some symptoms such as headache as compared to males participants synchronizing with results of multiple studies while contrasting with the findings of a few [12]. More specifically, a previous study found that female sex and having comorbidities were more frequent in patients with headache which was also the case in our case [13].

All ages are susceptible; however, individuals with underlying medical conditions or the elderly are at a much higher risk [14]. This aligns with our results where, in almost all symptoms, participants with comorbidities presented more these signs and manifestations. Specifically, previous investigations reported diabetes and hypertension as the most distinctive comorbidities in COVID-19 cases [15,16]. It was also reported in present findings: the higher percentage of comorbidity was diabetes, and some symptoms (including dry cough, exhaustion, losing sense of smell) were more presented in obese participants. In addition, our results showed that those aged more than 40 years had significantly suffered more from pains and aches.

The most common symptoms being reported are exhaustion, fever, pains and aches and losing sense of smell and taste. Previous evidence showed that most of these manifestations were the dominant symptoms whereas upper respiratory symptoms and gastrointestinal symptoms were rare [5]. In this study sample, 55.5% and 57.7% of the participants reported taste and smell dysfunction slightly lower than previous evidence [17]. In accordance with some studies and dis-concordance with others in the literature, there was a significant association between losing sense of smell and taste and female domination that may be due to gender-related differences in the inflammatory reaction process [18-20].

Previous Saudi investigations provided similar finding with new insights on the impact of different factors on symptoms on the COVID-19 patients, yet, they focused on a group of factors such as comorbidities or radiographic and laboratory characteristics [21,22].

The most reported information source was online and social media, followed by ministry of health website, this was also seen in a previous cross-sectional study that showed the most common source of information was the internet (89.3%) including social media handles, websites, blogs, and social media [23].

The present study showed a descriptive scope of the current COVID-19 symptomatology and its associated factors on a representative sample. However, there are some limitations to our study. Our study's limitations include its cross-sectional design, which is less potent than a cohort study. For example, a follow-up longitudinal study can assess the causal relationship between risk factors and the symptoms. The most important limitation is that the information has been gathered by WhatsApp from the participants without direct access to medical records; therefore, clinical data may be misreported. In addition, some lifestyle questions such as keen to wash hands and wear masks can be biased due to social desirability bias therefore reporting more positive answers.

Conclusion

The severity of the novel coronavirus ranges from mild symptoms (majority of cases) to severe respiratory tract infection. The most susceptible population involves the elderly and individuals with underlying medical conditions, especially obesity and diabetes. Symptoms in COVID-19 patients were mainly associated with presence of comorbidities, BMI, sex, and older age.

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