

The impact of the coronavirus (COVID-19) pandemic on the development of obsessive-compulsive symptoms in Saudi Arabia

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ABSTRACT

الأهداف: دراسة تأثير جائحة (COVID-19) على تطور أعراض اضطراب الوسواس القهري وتقييم العلاقة بين أعراض الوسواس القهري ومستوى التوتر النفسي بين سكان المملكة العربية السعودية.

المنهجية: تم إجراء مسح مقطعي في يوليو 2020م بمشاركة 2909 شخص في المملكة العربية السعودية أثناء تفشي فيروس كورونا المستجد، حيث تم تقييم الخصائص الاجتماعية الديموغرافية وأعراض الوسواس القهري والتوتر النفسي.

النتائج: كان معظم المشاركين من الإناث (73.9%) وحاصلين على تعليم جامعي فأعلى (81%). بلغ معدل ظهور الوسواس 57.8% والسلوكيات القهرية 45.9% والتوتر النفسي المتوسط والمرتفع 72.4%. كان ظهور وسواس الأوساخ والجراثيم والفيروسات أعلى بشكل ملحوظ لدى الفئة العمرية 40-49 سنة، والموظفين، وربات البيوت، والطلبة، والمتزوجين بالحجر الصحي، والذين أمضوا 20 يوماً أو أكثر في الحجر. أما السلوكيات القهرية لغسل اليدين فقد كان ظهورها أعلى بشكل ملحوظ لدى 30-49 سنة. بالنسبة للتوتر النفسي فقد كان أعلى بشكل ملحوظ لدى الفئة العمرية 18-29 سنة، والإناث، والعزاب، والمشاركين الذين ليس لديهم أطفال، والطلبة، وغير المدخنين، والعاطلين عن العمل، والذين يعيشون مع أسرهم، والمشخصين باضطرابات نفسية، والذين يعيشون في المنطقة الشمالية بالمملكة، والمتزوجين بالحجر الصحي، ومن قضاوا 60 يوماً أو أكثر في الحجر.

الخلاصة: كشفت هذه الدراسة عن ارتباط التوتر النفسي العالي بظهور أعراض وسواس قهري في المملكة العربية السعودية خلال جائحة (COVID-19). مما يعني أنها كارثة بيولوجية مرتبطة بارتفاع معدلات الاضطرابات النفسية.

Objectives: To explore the impact of the COVID-19 pandemic on the development of obsessive-compulsive disorder (OCD) symptoms and its correlation with the level of perceived stress among the Saudi population.

Methods: In July 2020, a cross-sectional survey of 2909 participants in Saudi Arabia during the outbreak was conducted to collect data related to sociodemographic characteristics and scores on the Brief Obsessive-Compulsive Scale (BOCS) and Perceived Stress Scale (PSS).

Results: Most participants were female (73.9%) with a university level of education or higher (81%). The prevalence of new-onset obsessions was 57.8%, compulsions 45.9%, and moderate/high perceived stress 72.4%. New-onset dirt, germs, and virus obsessions were significantly higher among 40-49 age group, employees, housewives, students, quarantine discipliners, and those who spent 20 or more days in quarantine. New-onset hand-washing compulsions were significantly higher among the 30-49 age group. A significantly higher level of perceived stress was reported among those in the 18-29 age group, females, singles, participants with no children, students, non-smokers, those who were unemployed, living with families, diagnosed with a psychiatric disorder, living in the northern region, quarantine discipliners, and those who spent 60 or more days in quarantine.

Conclusion: This study revealed a significantly higher prevalence of high perceived stress in respondents with new-onset OCD contamination symptoms during the COVID-19 pandemic. This implies that a biodisaster is associated with high psychological morbidity.

Keywords: obsessions, compulsions, stress, COVID-19

Saudi Med J 2021; Vol. 42 (7): 750-760
doi: 10.15537/smj.2021.42.7.20210181

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Received 8th March 2021. Accepted 30th May 2021.

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The coronavirus disease (COVID-19) is a contagious disease caused by a newly-discovered coronavirus. The first human case of it was reported in China in December 2019.¹ Saudi Arabia confirmed its first case on March 2, 2020.² Most of COVID-19 patients have mild to moderate respiratory symptoms and will recover without needing specific treatment. However, elderly and patients with chronic medical conditions are more likely to suffer from serious symptoms.¹ The potential impact of COVID-19 could cause psychiatric symptoms, including anxiety, stress, and fear of being contaminated by germs and dirt, which may lead to disinfecting or washing hands repeatedly until the skin is harmed. Thus, researchers are considering the potential impact of COVID-19 on obsessive-compulsive disorder (OCD).³⁻⁵ Obsessive-compulsive disorder is a chronic psychiatric illness with symptoms that can appear throughout life. It is characterized by obsessions, which are recurrent, intrusive, unwanted thoughts that are time-consuming, distressing, impairing, and anxiety-increasing. Patients may attempt to relieve this anxiety by performing compulsions, which are repetitive behaviors or mental rituals. Obsessive-compulsive disorder has a lifetime prevalence of 2-3%⁶ and a recent study reported that the prevalence of OCD symptoms in Saudi Arabia was 3.4%.⁷ The risk factors of OCD include family history, stressful and traumatic events like the pandemic, or other mental health illnesses such as anxiety, depression and substance abuse and tic disorders.^{6,8} A recent Canadian study conducted among the general population showed that OCD symptoms were significantly more prevalent at the beginning of the COVID-19 outbreak during the pandemic compared to before the outbreak.⁹

The aim of our study was to investigate the development of OCD symptoms during the COVID-19 pandemic among the Saudi general population and explore its possible influencing factors. We also evaluated if the level of perceived stress is correlated with the development of OCD symptoms.

Methods. This is a cross-sectional study that was carried out according to the principles of Helsinki Declaration in Saudi Arabia in July 2020 during the coronavirus (COVID-19) outbreak. Ethical approval

was provided from the Institutional Review Board at Princess Nourah Bint Abdulrahman University (PNU), Riyadh, Saudi Arabia.

Convenience sampling included male and female Arabic speakers over 18 years of age living in Saudi Arabia. People who are previously diagnosed with OCD were excluded from this study. In 2019, the general population of Saudi Arabia was 34,218,169 according to the General Authority for Statistics in Saudi Arabia.¹⁰ The required sample size was 384 as calculated by Raosoft software.

Due to the COVID-19 precautions in Saudi Arabia, data were collected using an online survey distributed via social network platforms such as WhatsApp and Twitter. Participants received a message that contained the survey link, time to complete the survey, and purpose of the research. Participants were also encouraged to distribute the message. Consent was required from the participants before they could start the survey.

The online survey was composed of 3 sections. The first section included demographic data such as age, gender, level of education, occupation, nationality, region of residency, housing status, how many days spent in quarantine, smoker or non-smoker. The second section was composed of 2 modified questions from the Brief Obsessive-Compulsive Scale (BOCS), a short self-administered tool derived from the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), which is used to evaluate OCD symptoms.¹¹ The 2 items on the scale are: "I am worried about dirt, germs and viruses. For example "Fear of getting germs from touching door handles or shaking hands or sitting in certain chairs or seats or fear of getting COVID-19" and "I wash my hands very often or in a special way to be sure I am not dirty or contaminated. Washing one's hands many times a day or for long periods after touching, or thinking one has touched a contaminated object." A 3-point Likert scale was used to capture the responses to these items: "only during COVID-19 pandemic," "before and during COVID-19 pandemic" or "never".⁹ Arabic translation of these 2 items was obtained from the Arabic version of Y-BOCS.¹² Lastly, the third section focused on measuring the perception of stress using the Arabic-validated version of the widely-used Perceived Stress Scale (PSS).^{13,14} This scale is composed of 10 items with responses recorded in a 5-point Likert scale to measure the perception of stress during the past month. Responses range from "never" to "very often." Total mean scores of 0-13 indicate low stress, 14-26 are considered moderate, while 27-40 indicate high stress.

Statistical analysis. Data were analyzed using IBM SPSS Statistics for Windows, version 22 (IBM Corp.,

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

Armonk, N.Y., USA). Continuous variables were expressed as mean \pm standard deviation (SD) and categorical variables were expressed as percentages. T-test was used for continuous variables and the Chi-square test was used for categorical variables. A $p < 0.05$ was considered statistically significant.

Results. A total of 2909 participants completed the survey. **Table 1** shows the demographic characteristics of the sample participants. The majority were females (73.9%) with an education level of university or higher (81%). More than half (56.4%) were between 18-29 years of age. For occupational status, 35.1% were students and 33.3% were employed. As for marital status, 55.9% were single and 39.8% were married. More than half (58.3%) were central region residents. Three-quarters of the participants (75.6%) were always disciplined with quarantine and more than half (65.6%) spent 60 days or more in quarantine. Only 6.6% were previously diagnosed with a psychiatric disorder.

Table 2 presents the participant responses for each item in the PSS-10. Of the participants, 40.8% (fairly or very) often felt nervous and stressed; 27.3% often felt that difficulties were piling up so high that they could not overcome them; 39.1% were often angered due to things that happened outside of their control; 24% often felt that they were unable to control the important things in their life; 22.9% often found that they could not cope with all the things that they had to do; and 19.1% were often upset because of something that happened unexpectedly. Conversely, 34.9% often felt that things were going their way; 31.6% often felt that they were on top of things; 29.3% were often able to control irritations in their lives; and 22.4% of the participants often felt confident in their ability to handle personal problems. In this study, the mean score of the PSS-10 was 19.08 ± 5.655 , which indicates a moderate level of stress. More than half of the participants (55.3%) had moderate levels of perceived stress, and 17.1% had high levels of stress.

As shown in **Table 1**, there were significant associations between the stress level and multiple socioeconomic characteristics. The 18-29 age group had significantly more high-level stress compared to the other age groups (24.2% versus 11.5%, 7.8%, 6.5%, 4.5%, and 0%, respectively; $p < 0.001$). Females had significantly more high stress compared to males (20.3% versus 7.8%; $p < 0.001$). Regarding marital status, singles reported a high level of stress compared with married and divorced participants (22.9% versus 12.2% and 9.3%, respectively; $p < 0.001$). Participants who do not have children reported a high level of stress compared to

participants with children (22% versus 8.9%; $p < 0.000$). Students and unemployed participants had high stress levels compared to employees in medical or non-medical fields and housewives (24.9%, 20.3% versus 15.5%, 9.4%, and 12.4%, respectively; $p < 0.001$). Participants living with their families reported a high level of stress compared to those living in their own home, renting, and others (22.9% versus 12.2%, 16.2%, 10.5%, respectively; $p < 0.001$). Those who were previously diagnosed with a psychiatric disorder had a significantly higher level of stress compared with those who did not have a history of any psychiatric disorders (31.90% versus 16%; $p < 0.001$). In addition, those who were living in the northern region had a significantly higher level of stress compared to those living in other regions (27.8%, 15.2%, 18.7%, 21.6%, 14.7, respectively; $p < 0.001$). Regarding quarantine, participants who were always or often disciplined with quarantine had a higher level of perceived stress compared to those who were never disciplined (17.2% or 16.9% versus 8.6%, respectively) and those who spent 60 days or more in quarantine showed a significantly higher level of stress compared to participants who spent less than 60 days in quarantine (18.50% versus 15.90%, 14.4% and 11.80%, respectively; $p < 0.032$).

During and before the COVID-19 pandemic, one-quarter of the participants (26.1%) had worries about dirt, germs, and viruses; 13.8% had hand-washing compulsions. However, during the COVID-19 pandemic, more than half of the participants (57.8%) had new-onset worries about dirt, germs, and viruses, and 45.9% of them had new-onset hand-washing compulsions.

As shown in **Table 3**, there were significant associations between a number of sociodemographic characteristics and new-onset obsessive thoughts about dirt, germs, and viruses during the COVID-19 pandemic. Participants who were 40-49 years of age had significantly more new-onset obsessions compared to other age groups (63% versus 57.7%, 57.6%, 56% and 41.5%; $p < 0.001$). Regarding occupational status, participants who were employed, housewives, and students had significantly more new-onset obsessions compared to healthcare professionals and unemployed participants (60.3%, 59.6%, 58.2% versus 53.4% and 51.2%; $p = 0.047$). Participants who were often or always disciplined with quarantine measures had significantly more new-onset obsessions compared to those who were never disciplined (62.6%, 56.4% versus 48.6%, respectively; $p = 0.021$). Participants who spent 20 days or more in quarantine had significantly more new-onset

Table 1 - Demographic and clinical characteristic of respondents (n=2909).

Demographic and clinical characteristic	Low stress (%)	Moderate stress (%)	High stress (%)	Frequency (%)	P-value
<i>Age groups (years)</i>					<0.001
18-29	17.90	57.90	24.20	1640 (56.4)	
30-39	27.70	60.80	11.50	530 (18.2)	
40-49	40.20	53.40	6.50	386 (13.3)	
50-59	57.60	37.80	4.50	288 (9.9)	
≥60	67.70	32.30	0.00	65 (2.2)	
<i>Gender</i>					<0.001
Male	38.70	53.60	7.80	760 (26.1)	
Female	23.80	55.90	20.30	2149 (73.9)	
<i>Nationality</i>					0.163
Saudi	28.00	55.00	17.00	2787 (95.8)	
Non-Saudi	20.50	61.50	18.00	122 (4.2)	
<i>Region of residence</i>					<0.001
Central	28.80	56.50	14.70	1695 (58.3)	
Western	25.40	53.10	21.60	552 (19.0)	
Eastern	26.20	55.10	18.70	363 (12.5)	
Southern	34.60	50.30	15.20	191 (6.6)	
Northern	14.80	57.40	27.80	108 (3.7)	
<i>Level of education</i>					0.224
Below high school level	26.80	61.00	12.20	41 (1.4)	
High school level	25.90	54.10	20.00	486 (16.7)	
University level or above	28.00	55.40	16.50	2382 (81.9)	
<i>Marital status</i>					<0.001
Single	18.70	58.40	22.90	1627 (55.9)	
Married	39.30	51.40	9.30	1159 (39.8)	
Divorced/widow	37.40	50.40	12.20	123 (4.2)	
<i>Do you have children?</i>					<0.001
Yes	39.60	51.60	8.90	1094 (37.6)	
No	20.50	57.50	22.00	1815 (62.4)	
<i>Occupation</i>					<0.001
Healthcare professional	28.50	56.00	15.50	193 (6.7)	
Employed	35.00	55.50	9.40	965 (33.3)	
Housewife	40.40	47.20	12.40	322 (11.1)	
Unemployed	27.00	52.70	20.30	404 (13.9)	
Student	16.90	58.20	24.90	1017 (35.1)	
<i>Housing status</i>					<0.001
Own home	33.60	54.20	12.20	1183 (40.7)	
Living with family	21.20	55.90	22.90	1137 (39.1)	
Renting	28.20	55.60	16.20	532 (18.3)	
Other	28.10	61.40	10.50	57 (2.0)	
<i>Are you disciplined with quarantine?</i>					0.486
Always	28.30	54.50	17.20	2200 (75.6)	
Often	25.50	57.60	16.90	674 (23.2)	
Never	28.60	62.90	8.60	35 (1.2)	
<i>How many days spent in quarantine?</i>					0.032
Less than 20 days	31.40	54.10	14.40	229 (7.9)	
20-39 days	29.30	58.90	11.80	314 (10.8)	
40-59 days	21.10	63.00	15.90	459 (15.8)	
60 days and more	28.50	53.00	18.50	1907 (65.6)	
<i>Smoking</i>					0.004
Smoker	33.90	52.20	13.90	360 (12.4)	
Non-smoker	26.80	55.70	17.50	2549 (87.6)	
<i>Do you have any chronic disease?</i>					0.005
Yes	34.50	49.90	15.60	423 (14.5)	
No	26.50	56.20	17.30	2486 (85.5)	
<i>Are you diagnosed with any psychiatric disease?</i>					<0.001
Yes	13.60	54.50	31.90	191 (6.6)	
No	28.70	55.30	16.00	2718 (93.4)	

Table 2 - Responses to the perceived stress scale from participants (n=2909).

Perceived stress scale	Responses	n (%)
1. In the last month, how often have you been upset because of something that happened unexpectedly?	Never	763 (26.20)
	Almost never	586 (20.10)
	Sometimes	1004 (34.50)
	Fairly often	349 (12.00)
	Very often	207 (7.10)
2. In the last month, how often have you felt that you were unable to control the important things in your life?	Never	925 (31.80)
	Almost never	504 (17.30)
	Sometimes	782 (26.90)
	Fairly often	391 (13.40)
	Very often	307 (10.60)
3. In the last month, how often have you felt nervous and "stressed"?	Never	437 (15.00)
	Almost never	406 (14.00)
	Sometimes	878 (30.20)
	Fairly often	576 (19.80)
	Very often	612 (21.00)
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	Never	559 (19.20)
	Almost never	861 (29.60)
	Sometimes	837 (28.80)
	Fairly often	414 (14.20)
	Very often	238 (8.20)
5. In the last month, how often have you felt that things were going your way?	Never	235 (8.10)
	Almost never	628 (21.60)
	Sometimes	1030 (35.40)
	Fairly often	513 (17.60)
	Very often	503 (17.30)
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	Never	541 (18.60)
	Almost never	614 (21.10)
	Sometimes	1087 (37.40)
	Fairly often	411 (14.10)
	Very often	256 (8.80)
7. In the last month, how often have you been able to control irritations in your life?	Never	336 (11.60)
	Almost never	740 (25.40)
	Sometimes	980 (33.70)
	Fairly often	484 (16.60)
	Very often	369 (12.70)
8. In the last month, how often have you felt that you were on top of things?	Never	297 (10.20)
	Almost never	730 (25.10)
	Sometimes	964 (33.10)
	Fairly often	511 (17.60)
	Very often	407 (14.00)
9. In the last month, how often have you been angered because of things that were outside of your control?	Never	277 (9.50)
	Almost never	472 (16.20)
	Sometimes	1021 (35.10)
	Fairly often	641 (22.00)
	Very often	498 (17.10)
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	Never	697 (24.00)
	Almost never	689 (23.70)
	Sometimes	730 (25.10)
	Fairly often	430 (14.80)
	Very often	363 (12.50)

obsessions compared to participants who spent less than 20 days in quarantine (58.7%, 58.6%, 56% versus 52.4% respectively; $p=0.015$).

Table 4 shows one significant association between new-onset hand-washing compulsions and sociodemographic characteristics during COVID-19. Two age groups (30-39 and 40-49 years of age) had significantly more new-onset hand-washing compulsions

compared with other age groups (50% and 47.2% versus 45.5%, 41.7% and 30.8%, respectively; $p=0.05$).

Table 5 shows that high perceived stress was significantly correlated with new-onset obsessions and compulsions during the COVID-19 pandemic. Participants who had new-onset obsessions during the pandemic reported significantly more high-level perceived stress compared to those who had obsessions

Table 3 - Demographic characteristic of respondents with obsessive symptoms (dirt, germs, viruses).

Variables	Worried about dirt, germs, viruses.			P-value
	Only during COVID-19 pandemic n (%)	Before and during COVID-19 pandemic n (%)	Never n (%)	
Age groups (years)				<0.001
18-29	947 (57.7)	453 (27.6)	240 (14.6)	
30-39	297 (56.0)	156 (29.4)	77 (14.5)	
40-49	243 (63.0)	85 (22.0)	58 (15.0)	
50-59	166 (57.60)	56 (19.4)	66 (22.9)	
≥60	27 (41.5)	10 (15.4)	28 (43.1)	
Gender				0.763
Male	458 (60.3)	155 (20.4)	147 (19.3)	
Female	1222 (56.9)	605 (28.2)	322 (15.0)	
Nationality				0.979
Saudi	1604 (57.6)	739 (26.5)	444 (15.9)	
Non-Saudi	76 (62.3)	21 (17.2)	25 (20.5)	
Region of residence				0.587
Central	1002 (59.1)	423 (25.0)	270 (15.9)	
Western	315 (57.1)	144 (26.1)	93 (16.8)	
Eastern	197 (54.3)	106 (29.2)	60 (16.5)	
Southern	103 (53.9)	56 (29.3)	32 (16.8)	
Northern	63 (58.3)	31 (28.7)	14 (13.0)	
Level of education				0.390
Below high school level	24 (58.5)	8 (19.5)	9 (22.0)	
High school level	272 (56.0)	125 (25.7)	89 (18.3)	
University level or above	1384 (58.1)	627 (26.3)	371 (15.6)	
Marital status				0.319
Married	684 (59.0)	283 (24.4)	192 (16.6)	
Divorced /widow	68 (55.3)	26 (21.1)	29 (23.6)	
Single	928 (57.0)	451 (27.7)	248 (15.2)	
Do you have children?				0.556
Yes	649 (59.3)	263 (24.0)	182 (16.6)	
No	1031 (56.8)	497 (27.4)	287 (15.8)	
Occupation				0.047
Healthcare professional	103 (53.4)	57 (29.5)	33 (17.1)	
Employed	582 (60.3)	208 (21.6)	175 (18.1)	
Housewife	192 (59.6)	76 (23.6)	54 (16.8)	
Unemployed	207 (51.2)	121 (30.0)	76 (18.8)	
Student	592 (58.2)	294 (28.9)	131 (12.9)	
Housing status				0.700
Own home	702 (59.3)	290 (24.5)	191 (16.1)	
Living with family	638 (56.1)	323 (28.4)	176 (15.5)	
Renting	310 (58.3)	131 (24.6)	91 (17.1)	
Other	30 (52.6)	16 (28.1)	11 (19.3)	
Are you disciplined with quarantine?				0.012
Always	1241 (56.4)	606 (27.5)	353 (16.0)	
Sometimes	422 (62.6)	148 (22.0)	104 (15.4)	
Never	17 (48.6)	6 (17.1)	12 (34.3)	
How many days spent in quarantine?				0.015
Less than 20 days	120 (52.4)	51 (22.3)	58 (25.3)	
20-39 days	184 (58.6)	90 (28.7)	40 (12.7)	
40-59 days	257 (56.0)	129 (28.1)	73 (15.9)	
60 days and more	1119 (58.7)	490 (25.7)	298 (15.6)	
Smoking				0.607
Smoker	215 (59.7)	73 (20.3)	72 (20.0)	
Non-smoker	1465 (57.5)	687 (27.0)	397 (15.6)	
Do you have any chronic disease?				0.488
Yes	245 (57.9)	119 (28.1)	59 (13.9)	
No	1435 (57.7)	641 (25.8)	410 (16.5)	
Are you diagnosed with any psychiatric disease?				0.727
Yes	106 (55.5)	55 (28.8)	30 (15.7)	
No	1574 (57.9)	705 (25.9)	439 (16.2)	

Table 4 - Demographic characteristic of respondents with compulsive symptoms (Repeated hand washing).

Variables	Wash hands very often or in a special way to be sure I am not dirty or contaminated.			P-value
	Only during COVID-19 pandemic n (%)	Before and during COVID-19 pandemic n (%)	Never n (%)	
<i>Age groups (years)</i>				0.005
18-29	747 (45.5)	238 (14.5)	655 (39.9)	
30-39	265 (50.0)	63 (11.9)	202 (38.1)	
40-49	182 (47.2)	54 (14.0)	150 (38.9)	
50-59	120 (41.7)	41 (14.2)	127 (44.1)	
≥60	20 (30.8)	5 (7.7)	40 (61.5)	
<i>Gender</i>				0.279
Male	334 (43.9)	110 (14.5)	316 (41.6)	
Female	1000 (46.5)	291 (13.5)	858 (39.9)	
<i>Nationality</i>				0.865
Saudi	1280 (45.9)	382 (13.7)	1125 (40.4)	
Non-Saudi	54 (44.3)	19 (15.6)	49 (40.2)	
<i>Region of residence</i>				0.938
Central	791 (46.7)	217 (12.8)	687 (40.5)	
Western	239 (43.3)	90 (16.3)	223 (40.4)	
Eastern	170 (46.8)	51 (14.0)	142 (39.1)	
Southern	86 (45.0)	26 (13.6)	79 (41.4)	
Northern	48 (44.4)	17 (15.7)	43 (39.8)	
<i>Level of education</i>				0.328
Below high school level	21 (51.2)	10 (24.4)	10 (24.4)	
High school level	213 (43.8)	82 (16.9)	191 (39.3)	
University level or above	1100 (46.2)	309 (13.0)	973 (40.8)	
<i>Marital status</i>				0.227
Married	536 (46.2)	148 (12.8)	475 (41.0)	
Divorced \ Widow	65 (52.8)	17 (13.8)	41 (33.3)	
Single	733 (45.1)	236 (14.5)	658 (40.4)	
<i>Do you have children?</i>				0.368
Yes	522 (47.7)	132 (12.1)	440 (40.2)	
No	812 (44.7)	269 (14.8)	734 (40.4)	
<i>Occupation</i>				0.122
Healthcare professional	89 (46.1)	26 (13.5)	78 (40.4)	
Employed	480 (49.7)	109 (11.3)	376 (39.0)	
Housewife	148 (46.0)	42 (13.0)	132 (41.0)	
Unemployed	158 (39.1)	73 (18.1)	173 (42.8)	
Student	456 (44.8)	150 (14.7)	411 (40.4)	
<i>Housing status</i>				0.999
Own home	541 (45.7)	165 (13.9)	477 (40.3)	
Living with family	525 (46.2)	151 (13.3)	461 (40.5)	
Renting	241 (45.3)	79 (14.8)	212 (39.8)	
Other	27 (47.4)	6 (10.5)	24 (42.1)	
<i>Are you disciplined with quarantine?</i>				0.961
Always	999 (45.4)	317 (14.4)	884 (40.2)	
Often	317 (47.0)	83 (12.3)	274 (40.7)	
Never	18 (51.4)	1 (2.9)	16 (45.7)	
<i>How many days spent in quarantine?</i>				0.084
Less than 20 days	93 (40.6)	22 (9.6)	114 (49.8)	
20-39 days	148 (47.1)	43 (13.7)	123 (39.2)	
40-59 days	220 (47.9)	60 (13.1)	179 (39.0)	
60 days and more	873 (45.8)	276 (14.5)	758 (39.7)	
<i>Smoking</i>				0.058
Smoker	181 (50.3)	49 (13.6)	130 (36.1)	
Non-smoker	1153 (45.2)	352 (13.8)	1044 (41.0)	
<i>Do you have any chronic disease?</i>				0.988
Yes	189 (44.7)	68 (16.1)	166 (39.2)	
No	1145 (46.1)	333 (13.4)	1008 (40.5)	
<i>Are you diagnosed with any psychiatric disease?</i>				0.443
Yes	81 (42.4)	30 (15.7)	80 (41.9)	
No	1253 (46.1)	371 (13.6)	1094 (40.3)	

Table 5 - Chi-square test of association between obsessive-compulsive symptoms and perceived stress.

Variables	Perceived stress scale			Total
	Low	Moderate	High	
<i>I am worried about dirt, germs, and viruses</i>				
Only during COVID-19 Pandemic	453 (56.3)	942 (58.6)	285 (57.5)	1680 (57.8)
Before and During COVID-19 Pandemic	150 (18.6)	457 (28.4)	153 (30.8)	760 (26.1)
Never	202 (25.1)	209 (13.0)	58 (11.7)	469 (16.1)
<i>I wash my hands very often or in a special way to be sure I am not dirty or contaminated</i>				
Only during COVID-19 Pandemic	301 (37.4)	778 (48.4)	255 (51.4)	1334 (45.9)
Before and During COVID-19 Pandemic	76 (9.4)	243 (15.1)	82 (16.5)	401 (13.8)
Never	428 (53.2)	587 (36.5)	159 (32.1)	1174 (40.4)
Total	805 (100.0)	1608 (100.0)	496 (100.0)	2909 (100.0)

P-value <0.001. Effect size (Phi) = 0.167

that started before the pandemic and those who never had obsessions (57.5% versus 30.8% and 11.7%, respectively; $p < 0.001$). Also, participants who had new-onset compulsions during the pandemic reported significantly more high-level perceived stress compared to those who never had compulsions and those who had compulsions before the pandemic (51.4% versus 32.1% and 16.5%, respectively; $p < 0.001$).

Discussion. This study reported a significantly high prevalence (57.8%) of new-onset obsessions and compulsions, and moderate/high perceived stress at 45.9% and 72.4%, respectively. A similar prevalence of OCD symptoms was reported in earlier studies conducted during the pandemic among the general population in Saudi Arabia with 62.4% and in Canada with 60.3% for obsessions, and 53.8% for compulsions, and a prevalence of 43% among medical students in Iraq.^{9,15,16} Also, moderate/high perceived stress was reported in 84.9% of the Canadian general population and 85.2% of students in virtual classrooms in Saudi Arabia during the pandemic.^{5,9} It is possible that we might also observe an increase in the number of OCD patients in the upcoming period. However, there are other possible explanations for such a result. People were overwhelmed with a non-stopping catastrophic flow of information about preventive measures to avoid COVID-19, which might be stressful and, as a consequence, they may exhibit protective behaviors and follow the public health recommendations to ensure the health and safety of their own self and their families.¹⁷ In addition, previous research regarding the role of disgust in OCD found that the basic human emotion of disgust acts as a motivator in the avoidance of infectious disease, which overlaps with OCD symptoms, specifically the contamination/cleaning dimension of OCD. Thus, disgust could play a role in adaptations against infection

and OCD.^{18,19} Also, increasing numbers of confirmed cases and COVID-19-related deaths in Saudi Arabia may promote fear among the general population, eventually affecting mental health. In addition, this study found that perceived high stress was reported significantly more among participants with new-onset obsessions and compulsions (57.5% and 51.4%). The psychological symptoms associated with OCD that were reported in previous studies include stress, anxiety, depression, and sleep disorders.^{9,15,20} And OCD was generally linked to stressful life events.^{21,22}

In this study, we also found that new-onset dirt, germs, and virus obsessions were significantly higher among the 40-49 year-old age group (63%), employed (60.3%), housewives (59.6%), students (58.2%), quarantine discipliners (62.6%), and those who spent 20 or more days in quarantine (58.7%, 58.6% and 56%). We also found that new-onset hand-washing compulsions were significantly higher among the 30-39 and 40-49 year-old age groups (50% and 47.2%).

In contrast, the mean age of onset for OCD is generally 21 years,²³ which is much younger than the onset age reported in this study; however, this later onset age indicates a better prognosis of OCD symptoms during the COVID-19 pandemic.²⁴ Similarly, a recent Saudi study found that OCD symptoms were higher among older participants. This can be explained by their higher adherence to COVID-19 precautions to avoid medical complications that may be worse for their age group.

It was surprising to find that employees in the non-medical field had more obsessions compared to those in the medical field, which can be explained by the desensitization that can occur due to the healthcare professionals' repetitive exposure to the medical environment with a higher risk of infection.²⁵ Similarly, employees were found to have more OCD symptoms

during the pandemic is Saudi Arabia and Canada.^{9,16} Additionally, housewives were more strict about the protective measures to prevent COVID-19 transmission, which makes them more prone to having obsessions.²⁶ Students are expected to be negatively affected during the pandemic due to the sudden shift toward virtual learning, the quarantine, and the reduction in face-to-face communication.^{5,15} In addition, being disciplined in quarantine and spending more days in quarantine was found to be significantly associated with increased obsessions, which can be considered avoidance strategies to reduce anxiety associated with the obsession.

Moreover, this study found that high perceived stress was significantly higher among the 18-29 year-old age group (24.2%), females (20.3%), singles (22.9%), students (24.9%), unemployed (20.3%), non-smokers (17.5%), those without children (22%), living with families (22.9%), living in the northern region (27.8%), diagnosed with a psychiatric disorder (31.9%), quarantine discipliners (34.1%), and those who spent 60 or more days in quarantine (18.5%).

Indeed, we predicted that the age group 18-29 years would perceive a higher stress level compared to other age groups, which is in line with previous studies that reported higher levels of stress, anxiety and depression among young adults during the pandemic.^{4,5,27,28} This can be explained by their exposure to various stressors including concerns about their health, education, future, and social situations. Females were also expected to perceive higher stress levels compared to males, which is consistent with previous studies that reported higher levels of stress, anxiety and depression among females during the pandemic due to multiple factors including social and hormonal differences.^{4,5,27,29}

In this study, we found that being single is correlated with higher levels of stress, which is similar to earlier studies that reported a higher level of stress, anxiety and depression among singles during the pandemic in Saudi Arabia.^{4,30} It was also evident that being single is a risk factor for distress, anxiety and depression in a meta-analysis conducted during the severe acute respiratory syndrome (SARS) outbreak.³¹ In addition, it was found that having children was associated with lower levels of perceived stress. This finding is similar to a previous study that revealed having children at home during the COVID-19 pandemic is a protective factor from anxiety and depression.³²

Regarding occupations, we found that students perceived the highest level of stress. This was expected since earlier studies showed that this group is one of the most psychologically impacted populations during the pandemic, which is alarming and requires

serious intervention.^{4,5,33} In addition, unemployed participants perceived a high stress level, which may be due to the unstable economic status of the pandemic. Furthermore, healthcare professionals perceived higher stress compared to other non-healthcare workers, which is also similar to previous studies that attributed the psychological impact to the fact that healthcare professionals are working in an environment with a higher risk of being infected with the virus or transmitting it to their family.^{27,29,32,33}

Surprisingly, we found that smokers had perceived lower stress levels compared to non-smokers. It is generally known that nicotine improves mood and decreases stress, and people smoke to cope with stress. However, this finding highlights the lack of knowledge of the negative effects of smoking on lung function, which increases the likelihood of getting an infection, including influenza and Middle East respiratory syndrome (MERS). It also increases the likelihood of serious COVID-19 complications.³⁴⁻³⁶ A study that investigated interest in quitting smoking during COVID-19 pandemic found that there was no increase in the number of Google searches for smoking cessation in the early phase of the pandemic.³⁶ Therefore, the promotion of smoking cessation and stress coping strategies is needed.

Furthermore, participants with a history of psychiatric disorders perceived higher stress levels. Previous studies conducted during the pandemic revealed that people with mental illnesses are more prone to having high levels of anxiety, depression, stress, insomnia, and post-traumatic stress.³⁷

In addition, participants who were disciplined with the quarantine, especially those who spent 60 days or more in quarantine perceived higher stress levels. Currently, there is general agreement that quarantine is associated with negative psychological effects given that disruptions in daily routine and social life can lead to frustration and boredom.^{5,27,38}

Furthermore, regarding housing status, this study found that participants who were living with their family perceived higher stress levels. This can be explained by the fear of infection transmission, especially toward elderly people in the house and the difficulty in applying COVID-19 precautions with more people living in the house.

Study limitations. Despite the fact that this study is considered one of the few studies in Saudi Arabia evaluating the development of OCD during the COVID-19 pandemic, we acknowledge there are a few limitations. One is that we performed convenience sampling using an online platform due to circumstances

related to the COVID-19 curfew. This could limit the generalizability of the results. Another limitation is reporting bias. Since this study depends on certain tools to provide self-reporting information that could be affected by participants' misinterpretation of their conditions, which would require an objective clinical evaluation to confirm the condition. Also, selection bias is possible since the respondents to the survey are only people who had access to social media. Finally, the causal conclusions may not be estimated properly due to the cross-sectional design of this study.

In conclusion, this study revealed a significantly higher prevalence of high perceived stress in respondents with new-onset OCD contamination symptoms in Saudi Arabia during the COVID-19 pandemic. This implies that a biodisaster is associated with high psychological morbidity. The groups who were significantly associated with the development of OCD contamination symptoms included those in the 30-49 year age group, who were either employed, housewives, or students, and the respondents who were disciplined with quarantine, especially those who spent 20 days or more in quarantine. These findings highlight the need for psychological interventions toward vulnerable populations and the promotion of preventive strategies during the pandemic, as well as the need for conducting longitudinal studies during the next waves.

Acknowledgment. *This research was funded by the Deanship of Scientific Research at Princess Nourah bint Abdulrahman University through the Fast-track Research Funding Program. We would like to thank American Manuscript Editors (<https://americanmanuscripteditors.com>) for English language editing.*

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