

# Prevalence of post-COVID symptoms of obsessive-compulsive disorder in Saudi Arabia

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## ABSTRACT

**الأهداف:** تحديد مدى انتشار أعراض اضطراب الوسواس القهري في المرضى الذين نجوا من كوفيد 19.

**المنهجية:** استخدمت الدراسة تصميمًا مقطعيًا رصديًا بين شهري يوليو وأكتوبر 2021م. المشاركون المستهدفون هم المرضى البالغين الذين أكدوا إصابتهم بكوفيد 19 قبل الانضمام إلى الدراسة، وتم تقييم أعراض الوسواس القهري باستخدام مقياس الوسواس القهري العربي الذي أنشأه أبوهندى وزملاؤه، والذي تضمن 83 سؤالاً يغطي 12 مجالاً مختلفاً وتم إرساله عبر الإنترنت.

**النتائج:** تم تضمين 356 مريضاً في التحليل. ما يقرب من 9.0% و 1.7% من المرضى لديهم تاريخ من الأمراض النفسية وتشخيص الوسواس القهري (على التوالي). كانت النتيجة الإجمالية للأعراض 32.8%. المجالات التي تم الإبلاغ عنها بشكل متكرر كانت اجترار الأفكار (55.5%)، إعادة فحص الدوافع (37.0%)، والبطء (34.0%)، بينما أقل المجالات التي تم الإبلاغ عنها بشكل متكرر تضمنت النضات الوسواسية (26.3%)، الصور الوسواسية (26.5%) والقهر الديني (26.8%). على عكس المجالات الأخرى، كانت درجات النقاء والنظافة القهرية أعلى بكثير من السكان المرجعيين للمقياس. لوحظ ارتفاع إجمالي لدرجات الأعراض في المرضى النفسيين ( $p=0.004$ )، وبدرجة أقل، في مرضى الوسواس القهري ( $p=0.250$ ).

**الخلاصة:** بشكل عام، أعراض الوسواس القهري، بما في ذلك النظافة والخوف من هوس المرض، تميل إلى أن تكون أعلى في المرضى النفسيين والوسواس القهري، وهذه النتائج هي ذات قيمة للدراسات المستقبلية.

**Objectives:** To determine the prevalence of Obsessive-Compulsive Disorder (OCD) symptoms in patients who have survived COVID-19.

**Methods:** The study used an observational cross-sectional design between July and October 2021. The target population was adult patients who had confirmed COVID-19 infection prior to joining the study, OCD symptoms were assessed using the Arabic

OCD scale created by Abohendy and colleagues, which included 83 questions covering 12 different domains and was administered online.

**Results:** A total of 356 patients were included in the analysis. Approximately 9.0% and 1.7% of the patients had a history of psychiatric disease and OCD diagnosis (respectively). The total symptom score was 32.8%. The most frequently reported domains were rumination of ideas (55.5%), re-checking compulsions (37.0%), and slowness (34.0%), while the least frequently reported domains included obsessive impulses (26.3%), obsessive images (26.5%), and religious compulsions (26.8%). Unlike other domains, the purity and cleanliness compulsions scores were significantly higher than the scale reference population. A higher total symptom score was observed in psychiatric patients ( $p=0.004$ ) and, to a lesser extent, in OCD patients ( $p=0.250$ ).

**Conclusion:** Overall, OCD symptoms, including cleanliness and fear of disease obsessions, tend to be higher in psychiatric and OCD patients, these findings are valuable for future studies.

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The current coronavirus disease (COVID-19) pandemic is by far the largest pandemic ever recorded, with more than 630 million confirmed patients and 6.3 million deaths by the end of May 2022.<sup>1</sup>

It affects persons of all ages, causing acute respiratory symptoms in varying degrees that last for approximately one to three weeks.<sup>2,3</sup> COVID-19 could lead to death in 0.5% to 2.7% of infected patients within 5 to 5 weeks from the start of symptoms, with a progressive solid increase in the case of fatality with increasing age.<sup>4</sup>

A condition known as post-COVID syndrome or extended COVID may occur in 10-35% of patients 3 months following the onset of many symptoms, including exhaustion, mental health issues, and chest discomfort.<sup>5,6</sup> Moreover, long-term psychiatric symptoms, mainly depression and post-traumatic stress disorder (PTSD), have been reported in approximately 20% of the patients for up to a year.<sup>7</sup> Mental illness developing after an epidemic/pandemic of acute infectious disease has been documented in the existing literature.<sup>8,9</sup> It has been suggested that post-COVID mental symptoms may be related to both biological and environmental factors.<sup>10,11</sup> These included a reduction in the levels of neurotransmitters as a result of COVID-associated neuroinflammatory changes as well as adverse reactions to medications.<sup>5,10</sup> Additionally, factors associated to the pandemic such as stretched medical care services, lockdowns, travel and activity restrictions, fears of infection/re-infection, and public/family stigma are believed to have had a negative impact on mental functioning.<sup>11</sup> One of the most prominent and common mental health issues during a pandemic is an individual's constant worry about the health and safety of oneself and one's loved ones.<sup>8</sup> However, when these reactive worries become without reasonable boundaries or are excessive, they may develop to Obsessive-Compulsive Disorder (OCD) or, more commonly, worsening and exacerbatting pre-existing OCD.<sup>12-15</sup> According to the DSM V, obsessions can be summarized as recurrent and persistent thoughts, images, and urges that are intrusive and unwanted which are accompanied by feelings of anxiety and distress.<sup>16</sup> Compulsions, on the other hand, are repetitive mental or physical acts that the individual feels forced to perform in order to alleviate the obsessions along with the associated anxiety and distress.<sup>16</sup> A similar but non-epidemic example has been observed in children after a common bacterial infection, PANDAS (Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections), were experts concluded

that the subgroup of children with obsessive-compulsive disorder presented an unusually unanticipated onset of symptoms, accompanied by a variation of comparably severe and acute neuropsychiatric symptoms.<sup>15</sup> In Saudi Arabia and other Middle Eastern countries, the prevalence of OCD symptoms meeting clinical diagnosis was estimated at 2.8% (ranging between 0.1% to 12.2%),<sup>17,18</sup> where symptoms are associated with a significant negative impact on social activities and quality of life.<sup>19-21</sup> Local studies focusing on OCD symptoms during the pandemic are limited in number and scope,<sup>22-24</sup> the studies primarily focused on contamination and cleaning aspects of OCD symptoms<sup>22</sup> and did not include targeted COVID-19 patients or a focus on the more comprehensive and exhaustive OCD symptoms.<sup>23,24</sup> Therefore, a gap in literature exists on the link between COVID-19 infection and the development of comprehensive OCD symptoms in Saudi Arabia. The objective of the current study was to determine the prevalence of different OCD symptoms in patients who survived COVID-19 infection in Saudi Arabia.

**Methods. Study design.** The study used an observational cross-sectional design between July and October 2021. The Institutional Review Board approved the study of the College of Medicine of King Saud University, IRB reference number E-21-6022.

**Population.** The study targeted adult patients who had COVID-19 infection prior to joining the study. Patients had been previously confirmed with COVID-19 infection using PCR-RT completed at King Khalid University Hospital, Riyadh, Saudi Arabia. There were no exclusions based on post-COVID duration, place of residency, previous diagnosis with OCD, or taking psychiatric medications. Patients below the age of 18 years and those with missing information about age and COVID-19 infection were excluded.

**Sample size and sampling.** After conducting a thorough web based research, previous studies confirmed a wide variability in the prevalence of OCD symptoms among the general population during the COVID-19 pandemic.<sup>22-28</sup> Assuming a symptoms frequency of 35% with two-sided confidence limits of 5%, a sample size of 350 patients was estimated, using an 80% power level and 95% two-sided significance level.

**Recruitment and data collection.** Non-random convenient sampling technique was used to recruit eligible patients online. Patients who tested positive for COVID-19 at King Saud University Medical City were contacted through text messages, followed by an online link to the study questionnaire using google forms via

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**Table 1** - Demographic and clinical characteristics of patients who survived COVID-19 infection.

Characteristics	n	(%)
<i>Do you live in Riyadh?</i>		
No	47	(13.2)
Yes	308	(86.8)
Total	355	(100)
<i>Have you been diagnosed with obsessive-compulsive disorder?</i>		
No	348	(98.3)
Yes	6	(1.7)
Total	354	(100)
<i>Have you been referred to psychiatric services or are you using any psychiatric medications?</i>		
No	324	(91)
Yes	32	(9)
Total	356	(100)

SMS text message. Out of 630 patients contacted, 441 positively responded (70% response rate). Additionally, 85 patients were excluded of the study because of missing information or age ineligibility. These included data on the city of residence, previous diagnosis with OCD, psychiatric medications, and 83 questions covering different symptoms of OCD. The study falls in accordance with the Helsinki Declaration and only participants who signed the informed consent were permitted to answer the study questions. No patient contacts or medical record numbers were collected.

**The OCD assessment tool.** The study used Arabic OCD scale created by Abohendy and colleagues.<sup>29,30</sup> It has been validated and standardized on patients with (N=301) and without (N=113) clinical OCD using the criteria of the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5).<sup>16</sup> The Arabic OCD scale includes 83 questions covering 14 different OCD domains; rumination of ideas (7 questions), sexual obsessions (4 questions), aggressive obsessions (5 questions), religious obsessions (9 questions), cleanliness and fear of disease obsessions (9 questions), obsessive impulses (8 questions), obsessive images (4 questions), general and miscellaneous compulsions (5 questions), religious compulsions (4 questions), purity and cleanliness compulsions (7 questions), slowness (4 questions), re-checking compulsions (4 questions), touch rituals (5 questions), the effect of obsessive-compulsive disorder on daily activities (8 questions). Each question was scored between one to 5 points with a total score of 83 and 415 points.

**Statistical methods.** Categorical variables were presented as frequencies and percentages, while

continuous variables were presented as means and standard deviations. The responses to each question were given numbers; 5 for “always”, 4 for “frequently”, 3 for “sometimes”, 2 for “rarely”, and one for “never”. Total and domain scores of the Arabic OCD scale were calculated by summing up the scores of all or relative questions. Total scores were converted to a T-score, a Z-score with a mean of 50 and a standard deviation of 10. The domain scores were converted to a standardized score, a Z-score with a mean of 10 and a standard deviation of 3. Total T-score and standardized domain scores obtained from the current patients were compared with the reference population of the Arabic OCD scale using a one-sample Wilcoxon signed-rank test.

Additionally, the Mann-Whitney test compared total and domain scores of the OCD scale were compared to demographic and clinical characteristics. All *p*-values were two-tailed. A *p*-value <0.05 was considered significant. Statistical Package for the Social Sciences software (SPSS Version 27.0. Armonk, NY: IBM Corp) was utilized for statistical analysis.

**Results.** A total of 356 patients who survived COVID-19 infection were included in the current analysis, Table 1 shows the demographic and clinical characteristics of the respective sample. The majority (86.8%) of the patients reside in Riyadh and only 6 (1.7%) patients have been diagnosed with OCD. A total of 32 (9.0%) patients have been referred to psychiatric services or were using psychiatric medications.

Tables 2, 3, 4 and Figure 1 represent the responses to the Arabic OCD scale questions. The most frequent symptoms which were answered as always or frequently felt, included thinking back to what he/she has been told (36.5%), focusing very intensely and for a long time in certain situations (35.9%), thinking of every little thing (30.8%), having pressing thoughts when going to sleep (26.5%), must take a bath after defecation and urination (26.2%), and bothered by remembering very boring details (24.2%). The least frequent reported symptoms included having a whisper in the direction of the qiblah during prayer (0.6%), suffering from a compulsive insult to the religion, the Messenger, or the holy books (0.9%), feeling the urge to hit the person in front of him/her when he/she stands in line for prayer (1.1%), feeling afraid that he/she puts poison in food instead of salt (1.4%), having whispers about religion, the Messenger, or the holy books (1.4%), and getting mixed up with ugly words whenever he/she remembers the Divine Self (1.4%).

**Table 2** - Responses of patients (N=356) in domain 1: rumination of ideas, sexual obsessions, aggressive obsessions, and religious obsessions.

	Responses of patients	Never	Rarely	Sometimes	Frequently	Always
1	It bothers me to remember very boring details	51 (14.4)	73 (20.6)	145 (40.8)	53 (14.9)	33 (9.3)
2	I have thoughts from which I cannot escape, even though I know that they are not true or trivial	110 (31.0)	78 (22.0)	95 (26.8)	47 (13.2)	25 (7.0)
3	I think back to what I am told	33 (9.3)	58 (16.3)	135 (37.9)	77 (21.6)	53 (14.9)
4	I focus very deeply and for a long time in certain situations	48 (13.6)	62 (17.5)	117 (33.1)	81 (22.9)	46 (13.0)
15	I feel very afraid while driving my car that I have hit or run over someone	290 (82.6)	27 (7.7)	18 (5.1)	8 (2.3)	8 (2.3)
16	I have aggressive dreams that bother me	232 (65.5)	63 (17.8)	41 (11.6)	13 (3.7)	5 (1.4)
17	I fear that I have fallen into polytheism or disbelief	249 (70.5)	49 (13.9)	40 (11.3)	10 (2.8)	5 (1.4)
18	I no longer feel the sweetness of faith or reverence in my prayer to God	138 (39.2)	66 (18.8)	85 (24.1)	47 (13.4)	16 (4.5)
5	I have pressing thoughts when I go to sleep	79 (22.3)	93 (26.2)	89 (25.1)	52 (14.6)	42 (11.8)
6	The tape of events that occurred during the day haunts me in a disturbing way	96 (27.2)	106 (30.0)	92 (26.1)	42 (11.9)	17 (4.8)
7	I think of every little thing	66 (18.6)	59 (16.7)	120 (33.9)	67 (18.9)	42 (11.9)
8	I am occupied with the idea of the sexual act with incest	301 (85.5)	23 (6.5)	16 (4.5)	3 (0.9)	9 (2.6)
19	I ask myself who and where is our God?	283 (80.2)	31 (8.8)	24 (6.8)	9 (2.5)	6 (1.7)
20	I doubt the prophets and the heavenly religions	316 (89.5)	16 (4.5)	12 (3.4)	8 (2.3)	1 (0.3)
21	I have whispers about religion, the Messenger, or the heavenly books	309 (87.3)	21 (5.9)	19 (5.4)	4 (1.1)	1 (0.3)
22	Whenever I remember the Divine Self, I get mixed up in horrible images that I cannot stand	314 (89.7)	17 (4.9)	13 (3.7)	5 (1.4)	1 (0.3)
9	I have bossy thoughts about masturbation or the hymen	239 (68.1)	43 (12.3)	37 (10.5)	23 (6.6)	9 (2.6)
10	I have some immoral thoughts	202 (56.9)	64 (18.0)	63 (17.7)	17 (4.8)	9 (2.5)
11	I think about disturbing sexual things	214 (60.5)	59 (16.7)	53 (15.0)	23 (6.5)	5 (1.4)
17	I fear that I have fallen into polytheism or disbelief	249 (70.5)	49 (13.9)	40 (11.3)	10 (2.8)	5 (1.4)
18	I no longer feel the sweetness of faith or reverence in my prayer to God	138 (39.2)	66 (18.8)	85 (24.1)	47 (13.4)	16 (4.5)
24	I doubt the validity of my fasting	251 (71.1)	51 (14.4)	35 (9.9)	12 (3.4)	4 (1.1)

Figure 2 shows the percentage of total and domain scores out of their maximum possible scores. The total score was 32.8%, which indicated the overall burden of OCD symptoms. The most frequently reported domains included rumination of ideas (55.5%), re-checking compulsions (37.0%), slowness (34.0%), general and miscellaneous compulsions (33.4%), and the effect of obsessive-compulsive disorder on daily activities (32.2%). The least frequently reported domains included obsessive impulses (26.3%), obsessive images (26.5%), religious compulsions (26.8%), religious obsessions (29.4%), and aggressive obsessions (29.6%).

Table 5 shows the comparisons of the total and domain scores between the patients who survived COVID-19 infection and the reference population of the Arabic OCD scale. The purity and cleanliness compulsions scores were significantly higher than corresponding scores in the scale reference population. On the other hand, the total score and scores of all other domains (except for the sexual obsessions domain) were significantly lower than those of the scale reference population. For the latter group, the magnitude difference was most prominent in religious compulsions, general and miscellaneous compulsions,

and touch rituals but smallest in obsessive impulses, sexual obsessions, and rumination of ideas.

Table 6 shows total and domain scores by demographic and clinical characteristics. Patients referred to psychiatric services or were using psychiatric medications had significantly higher total scores ( $156.5 \pm 50.1$  versus  $130.9 \pm 43.7$ ,  $p=0.004$ ). The higher score was manifested in 6 domain scores; rumination of ideas, aggressive obsessions, obsessive impulses, general and miscellaneous compulsions, re-checking compulsions, and the effect of obsessive-compulsive disorder on daily activities. Patients who have been diagnosed with OCD had higher but non-significant total scores ( $143.8 \pm 29.3$  versus  $133.1 \pm 45.1$ ,  $p=0.250$ ). On the other hand, religious obsessions and obsessive image scores in these patients were significantly higher ( $p=0.033$  and  $p=0.026$ , respectively). Patients living in Riyadh had lower total scores ( $130.5 \pm 42.1$  versus  $150.8 \pm 57.4$ ), which was marginally significant ( $p=0.058$ ). The lower score was manifested in the following domains; sexual obsessions, obsessive impulses, general and miscellaneous compulsions, purity and cleanliness compulsions, and slowness.



**Table 3 -** Responses of patients (N=356) in domain 2: cleanliness and fear of disease obsessions, obsessive impulses and images, general and miscellaneous compulsions, and religious compulsions.

Responses of patients		Never	Rarely	Sometimes	Frequently	Always
25	I think of doubts related to the faith	262 (74.9)	46 (13.1)	32 (9.1)	10 (2.9)	0 (0.0)
26	I have thoughts about purification, purity and impurity	238 (68.0)	53 (15.1)	33 (9.4)	20 (5.7)	6 (1.7)
27	I have doubts about hygiene	232 (66.1)	62 (17.7)	34 (9.7)	18 (5.1)	5 (1.4)
28	I doubt my intention or my readiness for prayer and others	244 (69.3)	51 (14.5)	35 (9.9)	14 (4.0)	8 (2.3)
29	I think that my obsessions about hygiene are exhausting me	259 (73.8)	50 (14.2)	27 (7.7)	8 (2.3)	7 (2.0)
30	I doubt the impurity of water	285 (80.7)	40 (11.3)	18 (5.1)	7 (2.0)	3 (0.8)
31	I am afraid of infection and contamination with germs	167 (47.6)	71 (20.2)	78 (22.2)	22 (6.3)	13 (3.7)
32	It bothers me that many things cause my uncleanness/contamination	235 (67.3)	56 (16.0)	39 (11.2)	11 (3.2)	8 (2.3)
33	I doubt that ablution is invalidated	187 (53.1)	82 (23.3)	56 (15.9)	22 (6.3)	5 (1.4)
34	I'm afraid of reading doctors' signs	293 (83.7)	23 (6.6)	22 (6.3)	10 (2.9)	2 (0.6)
35	I am occupied with the idea of committing a specific crime, such as murder and others	289 (82.8)	30 (8.6)	18 (5.2)	9 (2.6)	3 (0.9)
36	I feel compelled to masturbate	236 (67.8)	49 (14.1)	39 (11.2)	14 (4.0)	10 (2.9)
37	I feel like I'm about to hurt myself or others	290 (82.6)	28 (8.0)	17 (4.8)	11 (3.1)	5 (1.4)
38	Involuntarily I feel that I have to look at certain things, such as the private parts of others	241 (69.1)	45 (12.9)	38 (10.9)	15 (4.3)	10 (2.9)
39	When I stand in line for prayer, I feel the urge to hit the person in front of me	333 (95.7)	7 (2.0)	4 (1.1)	3 (0.9)	1 (0.3)
40	I suffer from a compulsive insult to the religion, the Messenger, or the heavenly books	336 (96.6)	5 (1.4)	4 (1.1)	2 (0.6)	1 (0.3)
41	I have intrusive idea of raising my voice with ugly words	274 (79.0)	39 (11.2)	23 (6.6)	9 (2.6)	2 (0.6)
42	When I hold a knife or scissors, I have intrusive idea of killing or hurting	308 (88.3)	20 (5.7)	10 (2.9)	9 (2.6)	2 (0.6)
43	I have disturbing pictures that impose themselves on me very much	271 (77.7)	39 (11.2)	24 (6.9)	9 (2.6)	6 (1.7)
44	I imagine immoral scenes that annoy me during prayer	241 (69.5)	73 (21.0)	24 (6.9)	7 (2.0)	2 (0.6)
45	I have sexual images (such as homosexuality) that bother me	280 (80.5%)	32 (9.2)	21 (6.0)	11 (3.2)	4 (1.1)
46	Whenever I remember the Divine Self, I get mixed up with ugly words	323 (93.1)	14 (4.0)	5 (1.4)	4 (1.2)	1 (0.3)
47	I do things that don't make sense to others	246 (70.7)	60 (17.2)	32 (9.2)	8 (2.3)	2 (0.6)
48	People get annoyed by my repetitive questions	225 (64.8)	60 (17.3)	53 (15.3)	8 (2.3)	1 (0.3)
49	People get annoyed when I get caught up in details	204 (58.6)	58 (16.7)	64 (18.4)	17 (4.9)	5 (1.4)
50	I do certain things to escape a certain damage	177 (51.5)	48 (14.0)	79 (23.0)	30 (8.7)	10 (2.9)
51	I feel compelled to count certain things, such as electricity poles in the street, steps in the house, or trees on the road	223 (64.5)	59 (17.1)	40 (11.6)	17 (4.9)	7 (2.0)

**Discussion.** This study is among the very few studies addressing mental health in Saudi Arabia post COVID-19 pandemic, and is the first to explore the prevalence of OCD symptoms among a group of COVID-19 survivors. According to the literature, the COVID-19 pandemic is causing unusual disturbance and is seen to lead to aggravating pre-existing psychiatric illnesses.<sup>34</sup> In particular, more contemporary perspectives have raised the possibility that COVID-19 may be particularly poignant for individuals with OCD.<sup>35</sup> In our study, the overall prevalence of OCD symptoms was 32.8%. Comparing the current findings with previous studies is challenging due to the different settings, populations, and different OCD assessment

tools. Nevertheless, the current prevalence is considered higher than the prevalence of OCD symptoms reported before the COVID-19 pandemic, which was estimated between 20% and 23% in college or secondary school students in Saudi Arabia.<sup>25,31</sup> On the other hand, it is considered much more minor than that reported locally during the pandemic.<sup>22-24</sup> For example, 58 to 82% of the participants in Saudi Arabia who responded to online questionnaires reported OCD symptoms.<sup>22-24</sup> Several differences may explain the probable overestimation of OCD symptoms in these studies. Unlike the current study, the participants in the above studies were recruited through social media early in the pandemic (July to November 2020) when the public suffered

**Table 4 -** Responses of patients (N=356) in domain 3: purity and cleanliness compulsions, slowness, re-checking compulsions, and touch rituals.

	Responses of patients	Never	Rarely	Sometimes	Frequently	Always
52	In prayer, I re-read Al-Fatihah more than once	211 (61.5)	82 (23.9)	35 (10.2)	7 (2.0)	8 (2.3)
53	In my prayer I have a whisper in the direction of the qiblah	283 (81.1)	47 (13.5)	17 (4.9)	1 (0.3)	1 (0.3)
54	I do not pray in the clothes I entered the bathroom with	308 (88.8)	25 (7.2)	8 (2.3)	4 (1.2)	2 (0.6)
55	When I ask a cleric, I repeat the question many times and for different people	270 (77.6)	49 (14.1)	21 (6.0)	7 (2.0)	1 (0.3)
56	I repeat washing the parts of ablution more than necessary	264 (76.1)	42 (12.1)	35 (10.1)	5 (1.4)	1 (0.3)
57	I take a shower more than once	286 (82.4)	36 (10.4)	19 (5.5)	6 (1.7)	0 (0.0)
58	I spit a lot so as not to swallow my saliva that is contaminated with dust and pollutants	284 (82.1)	28 (8.1)	18 (5.2)	12 (3.5)	4 (1.2)
59	Re-clean things a set number of times	255 (73.9)	54 (15.7)	23 (6.7)	8 (2.3)	5 (1.4)
60	When I clean myself after defecation and urination, I must wash my feet	260 (75.8)	35 (10.2)	26 (7.6)	7 (2.0)	15 (4.4)
61	Wash the soap several times before using it	211 (61.0)	64 (18.5)	42 (12.1)	16 (4.6)	13 (3.8)
62	I must take a bath after defecation and urination	204 (59.5)	29 (8.5)	20 (5.8)	11 (3.2)	79 (23.0)
63	I take a long time to perform ablution	255 (73.5)	53 (15.3)	28 (8.1)	7 (2.0)	4 (1.2)
64	I spend too much time cutting my nails	258 (75.0)	45 (13.1)	28 (8.1)	6 (1.7)	7 (2.0)
65	I'm getting too slow	187 (54.4)	67 (19.5)	62 (18.0)	18 (5.2)	10 (2.9)
66	I am very slow in carrying out duties and responsibilities	143 (41.2)	83 (23.9)	77 (22.2)	28 (8.1)	16 (4.6)
67	I re-check things more than once until feel comfortable	115 (33.1)	74 (21.3)	88 (25.4)	44 (12.7)	26 (7.5)
68	Whenever I throw something in the garbage, I am afraid that it will contain what interests me	189 (54.8)	88 (25.5)	50 (14.5)	7 (2.0)	11 (3.2)
69	I check my wallet several times daily	216 (62.8)	62 (18.0)	38 (11.0)	20 (5.8)	8 (2.3)
70	I repeat cleaning things many times	226 (65.3)	69 (19.9)	30 (8.7)	7 (2.0)	14 (4.0)
71	There are certain things in my house that I cannot touch	290 (84.1)	35 (10.1)	9 (2.6)	5 (1.4)	6 (1.7)
72	Be careful not to be touched by anyone in the street	219 (63.3)	47 (13.6)	47 (13.6)	13 (3.8)	20 (5.8)
73	I avoid touching or having my clothes touch certain things (such as the walls of the house, the floor, shoes, etc.)	251 (72.5)	40 (11.6)	35 (10.1)	9 (2.6)	11 (3.2)
74	I am afraid of touching gas pipes	257 (74.3)	45 (13.0)	20 (5.8)	15 (4.3)	9 (2.6)
75	I am afraid of touching certain things	205 (59.2)	60 (17.3)	45 (13.0)	24 (6.9)	12 (3.5)
76	My pressing thoughts take several hours a day	203 (59.0)	66 (19.2)	56 (16.3)	14 (4.1)	5 (1.5)
77	I waste in my rituals (such as prayer) several hours a day	253 (73.8)	56 (16.3)	23 (6.7)	6 (1.7)	5 (1.5)
78	My persistence in thoughts affects my daily activities to a large extent	182 (52.9)	60 (17.4)	60 (17.4)	31 (9.0)	11 (3.2)
79	The rituals I perform affect my daily activities to a great extent	225 (64.8)	60 (17.3)	42 (12.1)	12 (3.5)	8 (2.3)
80	My daily rituals negatively affected my relationships with others	239 (68.7)	49 (14.1)	33 (9.5)	21 (6.0)	6 (1.7)
81	My pressing thoughts negatively affected my relationship with people	251 (72.3)	44 (12.7)	26 (7.5)	18 (5.2)	8 (2.3)
82	My daily ritual annoys my family	237 (68.3)	49 (14.1)	43 (12.4)	15 (4.3)	3 (0.9)
83	My compulsive actions negatively affect my achievement in my work or study	238 (68.8)	50 (14.5)	33 (9.5)	16 (4.6)	9 (2.6)

widespread lockdowns, a high disease burden, and much uncertainty, which are significant factors that might have led to the exacerbation of their symptoms.

Consistent with the current findings, several studies that were conducted during the pandemic estimated the prevalence of OCD symptoms at 28% in public participants in Egypt,<sup>26</sup> 31% in public participants in the United Arab Emirates,<sup>27</sup> and 43% in medical

students in Iraq.<sup>27</sup> It has been suggested that the worries and stressors suffered during the pandemic may have increased OCD symptoms, both developed and pre-developed ones.<sup>12-14</sup> This may be related to the pandemic-associated worries from exposure to infection, need for frequent hand hygiene, wearing masks, social distancing, limited work/income opportunities, limited

**Table 5 -** Comparisons of the total and domain scores of OCD scale in patients who survived COVID-19 infection and reference population of the Arabic OCD scale.

characteristics	Min	Max	Mean	SD	Reference <sup>1</sup>	Mean difference <sup>2</sup>	P-value <sup>3</sup>
Rumination of ideas	4	35	19.3	6.7	9.49	-0.51	0.005
Sexual obsessions	3	20	6.4	3.2	9.55	-0.45	0.626
Aggressive obsessions	4	24	7.4	3.2	8.19	-1.81	<0.001
Religious obsessions	6	37	13.2	5.3	8.22	-1.78	<0.001
Cleanliness and fear of disease obsessions	3	39	14.0	6.1	8.06	-1.94	<0.001
Obsessive impulses	4	32	10.5	4.0	9.91	-0.09	<0.001
Obsessive images	2	18	5.3	2.3	7.84	-2.16	<0.001
General and miscellaneous compulsions	4	20	8.3	3.6	6.75	-3.25	<0.001
Religious compulsions	1	15	5.3	1.9	6.69	-3.31	<0.001
Purity and cleanliness compulsions	6	29	10.8	4.5	14.36	4.36	<0.001
Slowness	3	20	6.8	3.1	8.28	-1.72	<0.001
Re-checking compulsions	2	20	7.4	3.4	7.94	-2.06	<0.001
Touch rituals	4	25	7.8	3.7	7.34	-2.66	<0.001
The effect of obsessive-compulsive disorder on daily activities	4	39	12.8	6.2	8.37	-1.63	<0.001
Total OCD scale	22	343	133.2	44.8	43.0	-7.0	<0.001

Min - minimum, max - maximum, SD - standard deviation, <sup>1</sup>Reference indicates the standardized value of the Arabic OCD scale that corresponds to the raw values obtained in the current study; <sup>2</sup>Mean difference indicates the difference between the standardized (or T score in total only) value of the Arabic OCD scale and the standardized value (or T score in total only) obtained in the current study. Standardized values in both the reference and study have mean of 10 and standard deviation of <sup>3</sup>T score in both the reference and study have mean of 50 and standard deviation of 10, <sup>3</sup>p-value indicates the statistical differences between the standardized (or T score in total only) obtained in the current study and reference. They were calculated using non-parametric test; one-sample Wilcoxon signed rank test

**Table 6 -** Total and domain scores of Obsessive-Compulsive Disorder (OCD) scale by demographic and clinical characteristics of patients who survived COVID-19 infection.

characteristics	Have you been diagnosed with obsessive-compulsive disorder?			Have you been referred to psychiatric services or are you using any psychiatric medications?			Do you live in Riyadh?		
	Yes	No	P-value	Yes	No	P-value	Yes	No	P-value
Rumination of ideas	20.5±6.7	19.3±6.7	0.639	23.3±5.5	19.0±6.7	<0.001	19.1±6.8	20.8±6.1	0.077
Sexual obsessions	6.2±3.0	6.4±3.2	0.907	7.6±4.3	6.3±3.1	0.172	6.1±3.0	8.0±4.1	0.003
Aggressive obsessions	9.7±6.7	7.3±3.1	0.846	9.2±3.8	7.2±3.1	0.001	7.2±3.1	8.2±3.8	0.120
Religious obsessions	17.0±6.4	13.1±5.3	0.033	17.2±8.4	12.8±4.8	0.006	13.1±5.2	13.7±6.1	0.589
Cleanliness and fear of disease obsessions	17.3±5.5	13.9±6.1	0.070	15.9±6.8	13.8±5.9	0.072	13.7±5.7	15.8±7.7	0.093
Obsessive impulses	11.5±4.5	10.4±4.0	0.569	11.9±4.2	10.3±4.0	0.025	10.1±3.5	12.5±6.3	0.036
Obsessive images	6.8±2.5	5.3±2.2	0.026	5.7±2.4	5.2±2.2	0.144	5.2±2.1	5.9±2.9	0.205
General and miscellaneous compulsions	8.2±4.0	8.3±3.5	0.805	9.7±3.8	8.2±3.5	0.032	8.0±3.3	10.2±4.7	0.004
Religious compulsions	5.5±1.6	5.3±1.9	0.555	5.4±2.0	5.3±1.9	0.723	5.2±1.8	5.9±2.5	0.072
Purity and cleanliness compulsions	10.2±4.6	10.8±4.6	0.705	11.7±5.0	10.7±4.5	0.275	10.5±4.3	12.5±5.5	0.018
Slowness	6.2±3.1	6.8±3.1	0.533	7.4±2.9	6.7±3.1	0.120	6.5±2.9	8.4±4.0	0.003
Re-checking compulsions	6.7±2.2	7.4±3.5	0.874	8.5±3.6	7.3±3.4	0.031	7.2±3.3	8.3±4.2	0.176
Touch rituals	7.3±1.4	7.8±3.7	0.570	8.2±3.1	7.7±3.7	0.194	7.7±3.7	8.4±3.6	0.139
The effect of obsessive-compulsive disorder on daily activities	10.8±3.4	12.8±6.2	0.741	16.7±8.1	12.4±5.8	0.002	12.5±5.8	15.1±7.8	0.055
Total OCD scale	143.8±29.3	133.1±45.1	0.250	156.5±50.1	130.9±43.7	0.004	130.5±42.1	150.8±57.4	0.058

healthcare service, and home confinement during lockdown.<sup>12-14</sup> These implications have been seen in a study completed in Egypt during the pandemic, were participants reported that the lockdown negatively

impacted their social life, family income, and family obligations.<sup>26</sup>

Unlike almost all other domains, the current study's purity and cleanliness compulsions scores were

significantly higher than the corresponding scores in the scale reference population. Similar to the current findings, a recent review of multiple studies completed in 2020 and 2021 showed a significant impact of the COVID-19 pandemic on OCD symptoms. For example, 20% to 65% of OCD patients experienced worsening of OCD symptoms, especially contamination and washing, during the pandemic.<sup>13</sup> A similar but less intense impact was observed in the general population, especially early in the pandemic.<sup>13,32</sup> Additionally, a cross-sectional survey in Saudi Arabia early in the pandemic showed that 58% and 46% of the public had new pandemic-related contamination and washing worries (respectively). In comparison, 26% and 14% had the continuation of pre-pandemic contamination and washing worries respectively.<sup>22</sup>

In the current study and according to our findings, those who have OCD have greater concerns about the spread of pandemic diseases like COVID-19, our findings also add to the understanding of how COVID-19 has specifically impacted people with OCD symptoms. Cleanliness and fear of disease obsessions and overall OCD symptoms were higher in patients with a history of psychiatric disease and to less extent in those with a history of OCD diagnosis, which interestingly refutes the general assumption that obsessional cleanliness will be more frequent in patients suffering from OCD. Increased OCD symptoms in these groups of patients are expected and have been reported before.<sup>13,33</sup> However, the non-significance of some related results in the current study may be related to the fact that psychiatric and OCD patients represented only 9.0% and 1.7% of the total study population respectively. Similarly, previous local studies were not consistent regarding the increased OCD symptoms among psychiatric patients, probably due to the smaller sample size.<sup>22,23</sup>

The current study is considered the only local and regional study to estimate the burden of post-COVID on OCD symptoms as it presented data about all OCD domains, not only contamination and washing symptoms as in most prior research. Nevertheless, our study has some limitations. First, as the study used a cross-sectional design, the causal association cannot be determined, and recall bias cannot be excluded. Being a single-center experience with convenient sampling may limit the generalizability of the findings. Second, the use of an online questionnaire for assessing OCD symptoms post-COVID-19 could instill a reporting bias; therefore, the participants' self-reported levels of obsessions and compulsion may not be aligned with the assessment performed by mental health professionals, raising the need for clinical interviews in future studies.

However, we believe that these limitations have a minor impact on the study finding. Additionally, the number of psychiatric and OCD patients in the current study was within the expected range,<sup>18</sup> which negates the possibility of selection bias and supports the findings' generalizability.

In conclusion, the current study presented us with new data on how the COVID-19 pandemic has impacted people with OCD symptoms in Saudi Arabia. The overall prevalence of OCD symptoms was common, precisely 32.8% among a group of patients who survived COVID-19 infection in Saudi Arabia. Purity and cleanliness compulsions were significantly higher than expected in the reference population of the OCD scale. Overall, OCD symptoms, including cleanliness and fear of disease obsessions, tend to be higher in psychiatric and OCD patients. Although responses have varied, yet COVID-19 appears to have had considerable mental health implications for many individuals with OCD. The current findings are of added value to the accumulating evidence of post-COVID syndrome and call for further follow-up studies that are necessary to evaluate the long-term mental health impact that the pandemic may press within patients diagnosed with OCD. With the pandemic still ongoing, additional analysis of different samples and populations may be needed for better understanding of mental health changes and specifically on OCD symptoms. Additionally, interventional approaches to diminish the gist of the pandemic on mental health can contribute to the enhancement of strength and mental well-being of individuals suffering from OCD in Saudi Arabia.

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