Psychosocial impacts of coughing in public places during the COVID-19 pandemic: a cross-sectional study in the western region of Saudi Arabia

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ABSTRACT

BACKGROUND Dry cough is a prevalent symptom of COVID-19. During the pandemic, people may mistake this cough for symptoms associated with other respiratory diseases. This increases the risk of individuals with a cough being falsely judged as having COVID-19. This study aimed to investigate the impact of coughing in public places on adults' mental and social well-being during the COVID-19 pandemic and to explore the role of demographic factors in the relationship between coughing and psychosocial life in public places in the western region of Saudi Arabia.

METHODS This cross-sectional study was conducted in the western region of Saudi Arabia, targeting healthy adults aged ≥18 years. The participants were randomly selected using a cluster sampling technique. Data were collected through a self-administered validated questionnaire to explore the psychosocial impact of coughing in public places during the COVID-19 pandemic. Additionally, the questionnaire collected demographic information, smoking habits, cough frequency, consumption of cough medications, history of mild respiratory diseases, and family history of chronic respiratory illnesses. The mean and standard deviation were used to calculate continuous variables, and frequency and percentages were used to present categorical variables. We analyzed the relationships between study variables using the analysis of variance test.

RESULTS 288 adults participated in the study, with a 67.2% agreement score. 82.0% of the participants avoided people who coughed in public, while 51.8% felt angry and frustrated when someone coughed in public during the pandemic.

CONCLUSIONS COVID-19 has changed how people react to coughing in public. Mild coughs can be mistaken for COVID-19, leading to avoidance.

KEYWORDS cough, COVID-19, psychosocial factors, public, stress

Coughing is a natural defense mechanism as an innate primitive reaction that indicates how the immune system helps maintain health and eliminate foreign bodies.[1,2] It may occur because of chronic obstructive pulmonary disease and other respiratory diseases. Moreover, it has become one of the major causes of hospital visits, accounting for 30 million clinical visits per year, and 40% of these cases are referred to pulmonology clinics.[3]

Due to its direct effect on the quality of life (QoL), coughing is a significant health problem and poses many clinical challenges.[2] There are several etiologies of cough, which most commonly involve upper airway cough syndrome, known primarily as postnasal drip, smoke-associated chronic bronchitis, or an adverse effect of angiotensin-converting enzyme inhibitors.[4] In the long term, chronic cough can cause advanced stages of asthma, trauma to the larynx,

and tracheobronchial injuries.[5] Some medications for coughs include antihistamines, corticosteroids, and decongestants. Occasionally, allergic reactions and postnasal dripping may also trigger coughing. Ideally, chronic cough due to asthma should be treated with inhaled antiasthmatic drugs. Antibiotic treatment would be beneficial in coughs associated with pneumococcal infection.[6] Irrespective of the cause, coughing can interfere with several elements of daily life, including communication, social interactions, and psychological status.[7] A study conducted in Italy revealed that 83% of the respondents felt anger or frustration resulting from cough, 80% were upset, and 76% were worried about what others would think about them. Additionally, 64% of the respondents felt that coughing affected their social life, and 19% felt that it affected them psychologically when they visited friends or relatives.[8]

The coronavirus disease 2019 (COVID-19) is caused by the novel coronavirus or severe acute respiratory syndrome coronavirus 2 and is highly contagious.[9] It primarily spreads through large respiratory droplets when an infected person coughs or sneezes. Symptoms range from mild to severe, including fever, cough, and breathing difficulty.[9] It is essential to take necessary precautions like wearing face masks, practicing good respiratory hygiene, and isolating at home for suspected individuals to prevent the spread of the virus. Dry cough is one of the most common symptoms of COVID-19.[10] Coughing can contribute to the transmission of viruses, highlighting the need for preventative measures to safeguard public health. During the COVID-19 pandemic, there was a significant risk that people might misinterpret cough due to other respiratory diseases as a symptom associated with COVID-19, leading to individuals suffering from coughing being misjudged as having COVID-19. Persistent cough has been reported to negatively impact mental health and QoL.[11] However, no studies have been conducted on the psychological and social effects of coughing in public places during the COVID-19 pandemic in Saudi Arabia and its association with COVID-19. This study aimed to investigate the perceptions and psychosocial factors of individuals who experienced coughing in public places in the western region of Saudi Arabia during the COVID-19 pandemic. The study's outcomes are expected to guide healthcare professionals in shaping public health strategies and creating effective measures to mitigate risks while enhancing mental health support.

METHODS

Study design

A cross-sectional survey was conducted on participants from hospitals, companies, and universities in five cities (Jeddah, Makkah, Madinah, Yanbu, and Taif) in the western region of Saudi Arabia from August to October 2021. The inclusion criteria were adults aged ≥18 years. Individuals with chronic lung disease were excluded.

Sample size calculation

The equation of simple random sampling, which depends on population proportion, was used to determine the sample size.[12] With 95% confidence, a 10% margin of error and a *p* of 50%, the estimated initial sample size was 96 adults. Random sampling was adopted for the actual data collection clusters. Therefore, the initial sample size was multiplied by three to obtain a final sample of 288 adults.

Questionnaire and validation

Subsequently, we developed a self-administered questionnaire. Four health professionals assessed the content validity of the questionnaire, and independent medical educationists assessed its face validity before administering it to the study population. The reliability of the questionnaire was assessed in a pilot study involving 37 participants who were not part of the study population. Cronbach's alpha was calculated to be 0.83. The questionnaire was divided into two parts: demographic data and the psychosocial effects of coughing during the COVID-19 pandemic. Basic information included gender, age, city of residence, educational level, smoking status, and respiratory diseases. The participants were also asked about their, cough frequency, any cough medication, diagnosis of any mild respiratory diseases, and family history of chronic respiratory illnesses. Psychological effects were assessed using 10 five-point Likert scale items from "strongly disagree" (point 1) to "strongly agree" (point 5). A higher score for each item indicated a stronger intention and practice to avoid coughing. The survey questionnaire allowed participants to choose between English and Arabic before answering questions.

Ethical clearance

The Ethics Committee and Institutional Review Board of King Abdullah International Medical Research

Center (KAIMRC) approved the research protocol, questionnaires, and consent forms for study number SP21J/078/03. The questionnaire was then transferred to a Google Form (Google, USA) and disseminated to the study population via WhatsApp (Meta-Platforms, Inc., USA). Informed consent was obtained from all participants. The online survey took place between September and October 2021.

Data analysis

Differential statistical analyses established whether associations existed between the demographic data and psychosocial effects of coughing during the COVID-19 pandemic and investigated any differences among participants. Data were organized and coded in an Excel spreadsheet (Microsoft Corporation, USA) and evaluated using John's Macintosh Project statistical software version 16.1 (SAS Institute, USA). Means and standard deviations were calculated for continuous variables. Categorical variables are presented as frequencies and percentages. The percentage of agreement for each item was calculated by dividing the mean of the item by the maximum value on

Table 1. Demographic data and psychosocial effects of coughing

Characteristics		n (%) (N = 288)	Psychological effects* (mean)	$p^{\dagger}$
Gender	Male	203 (70.5)	3.35	0.25
	Female	85 (29.5)	3.46	
City	Jeddah	144 (50.0)	3.39	0.44
	Makkah	59 (20.5)	3.50	
	Madinah	42 (14.6)	3.20	
	Yanbu	36 (12.5)	3.38	
	Taif	7 (2.4)	3.29	
Age (years)	18–28	222 (77.1)	2.27	**<0.0001**
	29–39	42 (14.6)	2.62	
	40–50	16 (5.6)	3.91	
	≥51	8 (2.8)	4.1	
Workplace	University	192 (66.7)	3.26	**<0.001**
	Hospital	17 (5.9)	3.50	
	Government office	29 (10.1)	3.80	
	Private office	50 (17.4)	3.61	
Educational level	High school	119 (41.3)	3.18	**<0.0011**
	Bachelor's degree	149 (51.7)	3.52	
	Master's degree	18 (6.3)	3.66	
	Doctoral degree	2 (0.7)	2.75	
Smoking status	Regular smoker	46 (16.0)	3.20	0.16
	Smokes rarely	32 (11.1)	3.51	
	Non-smoker	210 (72.9)	3.40	
Frequent coughing	Yes	68 (23.6)	3.53	0.07
	No	220 (76.4)	3.34	
Cough medications	Yes	10 (3.5)	3.77	0.11
	No	278 (96.5)	3.37	
Having respiratory diseases	Yes	32 (11.1)	3.18	0.28
	No	228 (79.2)	3.41	
	Maybe	28 (9.7)	3.35	
Family history of respiratory diseases	Yes	79 (27.4)	3.44	**0.02**
	No	162 (56.3)	3.44	
	Not sure	47 (16.3)	3.1	

*The score was ranged from 0 to 10. A higher score on each item indicated a stronger intention and practice to avoid coughing in public; †analysis of variance (ANOVA) test

Table 2. Psychosocial effects of cough in public places during the COVID-19 pandemic

Statement	Mean	Percentage of agreement (%)
I feel embarrassed when I cough in public places.	3.25	65.0
I feel angry/frustrated when I cough in public places.	2.59	51.8
During the COVID-19 pandemic, I tend to suppress coughing in public to avoid embarrassment.	3.6	72.0
During the COVID-19 pandemic, I usually avoid people who frequently cough in public.	4.1	82.0
I feel anxious all the time if I am around someone who is frequently coughing during the COVID-19 pandemic.	4.06	81.2
During the COVID-19 pandemic, I tend to avoid things that trigger coughing to avoid embarrassment (such as smoke and perfume).	2.99	59.8
During the COVID-19 pandemic, I found working from home made me feel more comfortable because of my cough.	3.2	64.0
During the COVID-19 pandemic, I became more aware of my cough than before.	3.66	73.2
During the COVID-19 pandemic, I have the intention to change my behaviors to stop frequent coughing.	3.3	66.0
I think my frequent coughs changed my lifestyle.	2.82	56.4
Total	3.35	67.2

COVID-19=coronavirus disease 2019

the scale (5). This percentage is interpreted as the likelihood of agreement with an item point. The relationships between the study variables were examined using an analysis of variance. $p \leq 0.05$ was considered significant.

RESULTS

Table 1 presents the basic characteristics of the participants. This study revealed significant differences ($p<0.05$) in the scale based on factors such as age, workplace, educational level, and family history of respiratory diseases among participants. Older participants, those working in the government sector, and those with a master's degree were more likely to experience a higher psychological effect of coughing than others.

Table 2 presents the results of adult participation in the psychosocial effects of coughing in public places during the COVID-19 pandemic. The item with the highest percentage of agreement (82.0%) was "During the COVID-19 pandemic, I usually avoid people who frequently cough in public" followed by "I feel anxious all the time if I am around someone who is frequently coughing during the COVID-19 pandemic." The item with the lowest agreement (51.8%) was "I feel angry/frustrated when I cough in public places," followed by "I think my frequent coughs changed my lifestyle." The overall agreement rate was 67.2%.

DISCUSSION

This study investigated the psychosocial effects of coughing among adults from the western region of Saudi Arabia during the COVID-19 pandemic. The results revealed significant differences in age group, workplace, educational level, and family history when surveying the psychosocial effects of coughing in public places during the COVID-19 pandemic. There was a substantial variation in the mean age of the participants. Participants aged 18–28 had a lower psychosocial impact of coughing in public places than older adults. In contrast, a previous study on the psychological impact of the COVID-19 pandemic on the general Saudi population revealed that participants aged 18–30 years were more vulnerable to adverse mental health effects.[13] Another study on the epidemiological characteristics of chronic cough in the general adult population indicated that the prevalence of regular cough did not increase with age.[14]

The differences in the low psychosocial impact of coughing among the public during the COVID-19 pandemic in the present study could be due to the involvement of a larger number of study participants from various health science universities in the western region of Saudi Arabia. Participants with a health science background better understood COVID-19 symptoms and the mode of disease transmission. Our observations are consistent with studies from the

United Arab Emirates[15] and Nepal,[16] which reported that health science students had better knowledge of COVID-19.

In the present study, many master's degree holders had a non-health science background, and most were employees of various government offices. Therefore, their understanding of COVID-19 may not be as good as that of health science graduates or postgraduates. The observed high degree of agreement with the psychosocial effects in the survey could be attributed to the non-health science degrees achieved during education.

The present study found a significant difference in the means of the participants' educational levels. Participants with master's degrees showed a higher psychosocial effect than those with other educational qualifications. These findings align with another study from Saudi Arabia, which reported a high percentage of psychosocial effects on those who were master's degree holders.[17] However, a previous study found that participants with high school degrees had a greater psychological impact on mental health status during the pandemic, such as stress, depression, and anxiety, than others.[13]

The present study found a significant difference between participants who did not have a family history of respiratory disease and those who were not fully aware of the disease. Participants with or without a family history of respiratory diseases agreed to the same extent. Still, the proportion of those who answered "yes" was almost 50% lower than those who responded "no." This observation is consistent with the findings of another study that measured the impact of COVID-19 on patients with cystic fibrosis, a hereditary condition. They reported that most participants experienced some psychological impacts, such as feeling sad and depressed.[18]

Based on a questionnaire about the psychosocial effects of coughing during the COVID-19 pandemic in the present study, most participants gave a positive moderate score with a mean of 3.35. Most participants avoided people who frequently coughed in public, implying that people should follow protective measures, such as social distancing. This finding agrees with that of Zhong et al[19] who reported that most people in China avoided crowded places during the COVID-19 pandemic. According to a study from the Czech Republic, the COVID-19 outbreak caused anxiety, rage, and emotional anguish in its early phases among its citizens.[20] In the present study, having a subjective feeling of anger or frustration while coughing in public places had the lowest mean and percentage ratings, implying that people have become more accustomed to their environment and learned how to respond during the pandemic.

This study had some limitations. First, the geographical location only focused on the western region of Saudi Arabia. A comparative study of the psychosocial effects between the Saudi Arabian population and other countries in the Middle East or other continents would be ideal for understanding cultural and regional differences in the perception and psychosocial effects among various populations. Second, this study focused on individuals aged 18 years and above and excluded those aged <18 years. Research with minors needs additional approvals and precautions to ensure informed consent and protect vulnerable populations. Third, there was an imbalance in the proportion of male and female participants. Data were gathered randomly from public hospitals, companies, and universities in five major cities in the western region of Saudi Arabia, where males are more readily available and accessible. However, the uneven distribution of male and female frequencies did not impact the generalizability of the results or violate the assumptions of the conducted statistical tests. Further research with a larger sample size, including more regions of Saudi Arabia and a wider range of age groups, is warranted.

In conclusion, the COVID-19 pandemic has altered how people respond to coughing in public places. People who have a moderate cough may frequently be mistaken as having COVID-19 and, hence, may be avoided by others, resulting in negative effects on their psychosocial well-being. Avoiding coughing may impact their physical and mental well-being. Addressing the implications of these issues requires a multifaceted approach that includes public awareness campaigns, education initiatives, and support systems to foster understanding and mitigate the social impact on the affected individuals.

Conflict of Interest

The authors affirm no conflict of interest in this study.

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