

















Original Research

A cross-sectional survey on the experience of people with allergic rhinitis amidst COVID-19 pandemic: The impact of the facemask: A pilot study

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Abstract

Background: Since outbreak of COVID-19 pandemic, almost whole world asked to wear the facemask especially in the public areas as a precaution to avoid the transmission of the disease, and curbs the pandemic. Looking from another perspective, we need to consider the effect of the facemask in reducing allergic rhinitis symptoms. **Objective:** The current study objective was to assess the impact of facemasks on the symptoms of allergic rhinitis in subjects who were obligatory using facemask due to the COVID-19 pandemic. **Methods:** The current study was ethically approved self-administered validated survey (Cronbach Alfa 0.81) comprised of 28-items to assess the impact of wearing the facemask, and whether there was an improvement in symptoms of allergic rhinitis. The outcome measure was the responses to the four domains (knowledge, attitude, symptoms, and help/advice) measured on Likert scale to assess the responses of subjects with allergic rhinitis during the COVID -19 pandemic. **Results:** 82 respondents (mean age was 22.59 \pm 2.77 years) have completed the survey, of which 73 females (89%) and (52/82, 63.4%) university students. 29 (35.4%), stated that the fabric facemask is useful in reduction of symptoms. 44 (53.7%) believe that the surgical mask N95 is very beneficial in the reduction of symptoms. There was a significant difference in knowledge levels for both eye and nasal symptoms' reduction responses ($P < 0.001$). Tukey's HSD (honestly significant difference) used to determine the specifics of the variances (differences in multiple means) in symptom reduction. For eye symptoms, the analysis revealed that respondents who reported that they had reduced symptoms had higher knowledge scores (6.74 \pm 2.7) than those who reported no reduction in allergic symptoms (mean \pm SD: 4.96 \pm 3.2). The lowest score was associated with respondents that were uncertain regarding their symptom alleviation (mean \pm SD: 4.53 \pm 3.1). For nasal symptoms, the analysis revealed that respondents who reported that they had reduced symptoms had higher knowledge scores (7.03 \pm 2.7) than those who reported no reduction in allergic symptoms (3.94 \pm 2.5). **Conclusion:** Our results reveal that facemask usage may reduce allergic rhinitis symptom severity in chronically affected individuals with intermittent disease. The study supports the hypothesis that facemask may reduce atopic allergic responses.

Keywords: allergic rhinitis; COVID-19; eye symptoms; facemask; nasal symptoms

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usage during the COVID-19 pandemic.⁴ The common thing between allergic rhinitis and COVID-19 is that they affect the respiratory tract. As the pandemic started to affect the whole world, the WHO addressed the people to wear the facemask for protection.⁵ Since the nose is the central affected part for allergic rhinitis, an opportunity to assess the effect of using the facemask on people who suffer from allergic rhinitis. The use of the facemask may help to reduce the symptoms or at least reduce the usage of the medications.⁶

Study rationale

We already know the symptoms of allergic rhinitis, how it affects people, and how sometimes it affects their daily activities. The main goal of allergic rhinitis is to prevent the allergens from passing through the respiratory tract's mucosa by following prevention methods, such as reducing exposure to allergens. From another perspective, we need to consider looking through the mask's effect in reducing allergic rhinitis symptoms, as it may have an additional benefit. The current cross-sectional study surveyed various people to assess the impact of the facemask on subjects with allergic rhinitis, taking into consideration the multiple types of masks, the symptoms before and after the COVID-19 pandemic, and the healthcare education regarding the usage of the face mask during the allergic rhinitis episode. Mainly, the study aims to evaluate and see the impact of using facemasks on allergic rhinitis symptoms in people who were obligatory using facemasks due to the COVID-19 pandemic that affected the whole world.

Rationale

We already know the symptoms of allergic rhinitis, how it affects people, and how sometimes they become severe, affecting people's daily activities. The main goal of managing allergic rhinitis is to prevent allergens and minimize allergy exposure. There is an opportunity to investigate the causal relationship between the effect of the face mask on subjects

BACKGROUND

The global prevalence of allergic rhinitis varies between 10 and 30%;¹ however, the majority is 7% in the United Arab Emirates-UAE.² Since the outbreak of the COVID-19 pandemic, almost the whole world has been required to wear the facemask. This is particularly important in public areas as a precaution to avoid the transmission of the COVID-19 pandemic. The World Health Organization approved the facemask to curb the transmission of COVID-19 infection. Several researchers have investigated the relationship between the use of facemasks and the reduction in allergic rhinitis during COVID-19. One multicentre study questionnaire found a decrease in allergic rhinitis symptoms using facemasks reported by nurses with chronic allergic rhinitis.³ Facemasks may or may not help people who did not use their allergy medication or reduce their

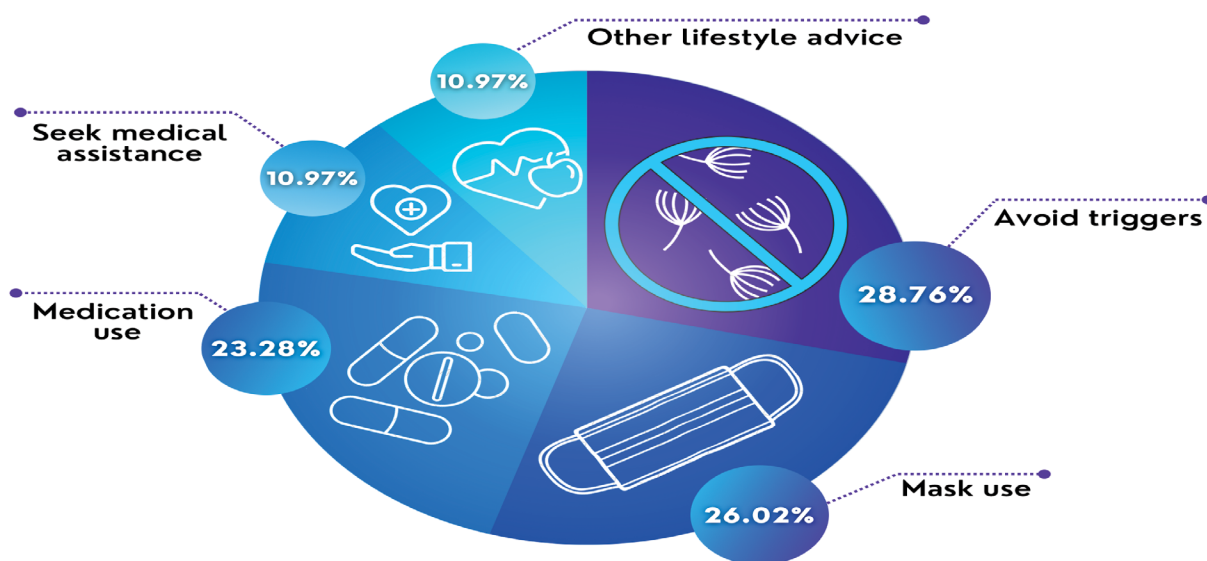


Figure 1. Graphical abstract for allergic rhinitis



who suffer from allergic rhinitis and if the face mask helped them reduce the symptoms or at least use the medications.

Research question

What is the relation between allergic rhinitis and COVID-19? How does using facemasks during the COVID-19 pandemic influence individuals with allergic rhinitis to reduce their symptoms?

Objective

The current study objective was to examine and assess the impact of facemasks on allergic rhinitis symptoms in people with allergic rhinitis who were obligatory using facemasks due to the COVID-19 pandemic.

Ethics approval

The study was approved by the Al Ain University (AAU) research ethics committee at the College of Pharmacy in AAU dated 6 April 2022.

METHODS

The current study was an anonymous/confidential self-administered validated survey comprised of a 28-item questionnaire to explore the impact of wearing a facemask on allergic rhinitis symptoms during the COVID-19 pandemic. The survey was launched through Google document, and a link was sent through social media. The survey was administered in English language only. The survey's multiple statements consisted of four domains that have elaborated on the knowledge, attitudes, symptoms, and help/advice for allergic rhinitis during COVID-19. The four domains were comprised of 28 statements, distributed as ten in the knowledge domain (Q1 to Q10), nine in the attitude domain (Q11 to Q19), four in the symptom domain (Q20 to Q23) and five in the help and advice domain (Q24 to Q28). The individual scores for the knowledge domain were 50, 45 for the attitude, 20 for the symptoms, and 25 for the help/advice. The reliability of each part showed different values of scores. The associated individual statements with the four survey domains are outlined in [Appendix 1].

Each domain consists of multiple questions (sum scores) that reflect the knowledge, attitude, symptoms, and help/advice relevant to allergy rhinitis subjects during COVID-19. The survey responses were reported on a five-graded Likert scale (strongly disagree/disagree/neutral/ agree/strongly agree). The student's responses to each statement were scored from 1 to 5 (strongly disagree = 1; disagree = 2; neutral = 3; agree = 4; strongly agree = 5). Knowledge: Q1 to Q10 (domain total maximum score 50); Attitude: Q11 to Q19 (Domain total full score of 45); Symptoms: Q20 to Q23 (domain total top score 20); Help & Advice: Q24 to Q29 (Domain total maximum score 25).

The final version of the survey was posted to Google Drive (Google Forms), and a link was sent (officially via the documentation office) to all the pharmacy students across the university campus (Abu Dhabi campus) at the Pharmacy College in AAU-UAE. We have included both genders in the survey with different age groups to obtain more results for the

survey. We have collected the participant's age, gender, city of residence, and occupation.

Outcome measures

The outcome measure was the responses to the four domains (knowledge, attitude, symptoms, and help/advice) measured on a five-point Likert scale to assess the responses of subjects with allergic rhinitis during the COVID-19 pandemic.

Statistical analysis

The research team conducted a thorough analysis of a survey collected via a Google Form, which was downloaded as an Excel sheet. The data were cleaned, coded, and then imported into the Statistical Package for Social Sciences (SPSS) version 27 (IBM, Armonk, NY, USA) for descriptive and inferential statistical analyses. Demographic data of the respondents were reported in terms of frequencies and percentages. One-way ANOVA was used to evaluate variations in knowledge scores among levels of rhinitis symptoms' reduction for both eye and nasal symptoms. The correlation between the facemask type and symptom reduction was examined using Pearson correlations. Pieces of advice from respondents for allergic rhinitis symptom reduction based on their personal experience are reported as frequencies and percentages. A chi-square test of independence was performed to examine the relationships between various types of masks and the improvement of allergic symptoms. Tukey's HSD (honestly significant difference) was used to determine the specifics of the variances (differences in multiple means) in symptom reduction. We have used one sample t-test for the knowledge domain (1 is knowledgeable, and 0 is unknowledgeable). The results are considered statistically significant at a p-value of less than 0.05.

RESULTS

Eighty-two respondents completed the survey, of which 73 were females (89%) and 9 were males (11%). The mean age (years) was 22.59 ± 2.77 ; most of them, 97.6%, were single (unmarried). The vast majority were university students (52/82, 63.4%), while the rest (30/82, 36.6%) were healthcare providers (12/82, 14.6%), office workers (5, 6.1%), engineers (4/82, 4.9%), and (9, 11%) looking for a job. All of the sample (82, 100.0%) were UAE residents, and most of them (76/82, 92.7%) comprised residents in Abu Dhabi city, the capital of UAE [Table 1].

In the knowledge domain, 53 (64.6%) of the respondents reported that they were aware of the allergic rhinitis symptoms that may develop during the allergy episode; the exact number of respondents (53, 64.6%) agree that people should refer to a doctor when they think they are developing allergic rhinitis. More than half of the respondents (52, 63.4%) disagreed with the easiness of knowing what type of allergic rhinitis they have by doing a skin prick test. 44 (53.7%) of the respondents disagree with the statement that there were few awareness lectures and events regarding the reduction of allergic rhinitis symptoms. However, 47 (57.3%) respondents reported being



unknowledgeable about foods that may induce allergic rhinitis symptoms. In comparison, 55 (67.1%) said they knew about airborne allergens that may cause allergic rhinitis. As per personal safety requirements against COVID-19, more than half (49, 59.8%) of respondents reported adherence to wearing a facemask whenever they go to public areas. Furthermore, slightly more than half of the respondents (43, 52.4%) claimed that they were unaware that wearing a facemask due to the COVID-19 epidemic helped to reduce their allergic rhinitis

symptoms. More than half, 48 (58.5%) of the respondents, disagreed that wearing a facemask aided in the reduction of allergic rhinitis symptoms when a trigger is nearby, and 44 (53.7%) of the respondents were unaware that wearing a facemask in conjunction with a decongestant nasal spray can help them with their allergic rhinitis [Table 2].

In the attitude domain, 23 (28%) respondents reported using a nasal corticosteroid and a facemask daily during an allergy episode. 49 (59.8%) of the respondents agree that subjects should be taught that if the allergy is not treated, it may develop into a chronic disease. Precisely 41 (50%) respondents advised people to do a skin prick test to determine the type of allergic rhinitis and wear a facemask around a trigger based on the test results. Less than half, 34 (41.5%) of the respondents, feel satisfied with their physician counseling regarding the benefit of facemasks. Only 23 (28.1%) respondents reported receiving instruction from a physician to wear a facemask through an allergic rhinitis episode. 36 (43. %) of the respondents stated that using a face mask reduced their symptoms, and they could continue their daily work. At the same time, 37 (45.1%) of the respondents agree that the type of facemasks available in the market has a role in giving them the desired reduction of symptoms. Slightly more than one-third of the respondents, 29 (35.4%), believed the fabric mask benefits symptom reduction. In comparison, 44 (53.7%) believe that the surgical mask N95 is beneficial in removing allergic rhinitis symptoms [Table 2].

In the symptom domain, respondents were asked if their eye and nasal symptoms before the COVID-19 pandemic could be defined as having no symptoms; 22 (26.8%) of respondents indicated having no eye symptoms, 21 (25.6%) reported negatively, and 39 (47.6%) were unsure. As for the nasal symptoms, only 14 (17.1%) respondents reported having no nasal symptoms before the pandemic; 24 (29.3%) of the respondents responded negatively, while 44 (53.7%) of respondents were uncertain. The respondents also requested

Table 1. Demographics and anthropometrics of the respondents (N =82 respondents)

Demographic		F (%)
Age (years)	18-22	57 (69.5) *
	23-27	20 (24.4)
	28-32	5 (6.1)
Gender	Female	73 (89.0) *
	Male	9 (11.0)
UAE Resident	UAE resident	76 (92.7) *
	Not a UAE resident	6 (7.3)
Residence City	Abu Dhabi (capital city)	76 (92.7) *
	Outside the capital city	6 (7.3)
Marital Status	Single	80 (97.6) *
	Married	2 (2.4)
Occupation	Engineer	4 (4.9)
	Health care provider	12 (14.6)
	Working in an office	5 (6.1)
	University student	52 (63.4) *
	Looking for a job	9 (11.0)

Keys: * The highest percent achieved in rows; F: Frequency; (%): Percent

Table 2A. Responses to the four domain statements based on Likert scale (N=82)

Survey domain statements	Knowledgeable/ Unknowledgeable	
	Knowledge Domain (Q1 – Q10)	
	Knowledgeable F (%)	Unknowledgeable F (%)
Q1. I am aware of the allergy symptoms that I may develop during the allergy episode:	53 (64.6%)	29 (35.4%)
Q2. People should refer back to the doctor when they think they are developing allergy rhinitis:	53 (64.6%)	29 (35.4%)
Q3. It's easy to know what allergy rhinitis type I have by doing a skin prick test:	30 (36.6%)	52 (63.4%)
Q4. There are few awareness lectures/ events regards the reduction of allergic rhinitis symptoms:	38 (46.3%)	44 (53.7%)
Q5. There are few foods that may induce the allergic rhinitis symptoms such as Rice, citrus fruits, black grams and banana that I am aware not to have during the episode:	35 (42.7%)	47 (57.3%)
Q6. I am aware that the triggers are airborne allergens that may cause rhinitis are dust mites, pollen and spores, and animal skin, urine and saliva:	55 (67.1%)	27 (32.9%)
Q7. I always wear my face mask whenever I go out to the public areas:	49 (59.8%)	33 (40.2%)
Q8. Did you ever realized that the face mask that you are wearing in this pandemic helped you in reduction of the symptoms?	39 (47.6%)	43 (52.4%)
Q9. The face mask helped my allergy rhinitis symptoms to be reduced especially when I am near a trigger:	34 (41.5%)	48 (58.5%)
Q10. The usage of face mask and a decongestant nasal spray helped me during the allergy rhinitis in this pandemic:	38 (46.3%)	44 (53.7%)



Table 2B. Pharmacy students' responses to the four domain statements based on the Likert scale (N=82)					
Survey domain statements	Likert scale				
	Attitude Domain (Q11 – Q19)				
	Strongly disagree F (%)	Disagree F (%)	Neutral F (%)	Agree F (%)	Strongly agree F (%)
Q11. I am using a nasal corticosteroid in the allergy episode in addition to face mask (e.g. Every day or so):	18 (22.0%)	12 (15.6%)	29 (35.4%)	16 (19.5%)	7 (8.5%)
Q12. Patients should be taught that if the allergy was not treated it may be developed into chronic disease:	8 (9.8%)	6 (7.3%)	19 (23.2%)	25 (30.5%)	24 (29.3%)
Q13. I advise people to do a skin prick test to determine the type of allergy so whenever I am in a trigger zone, I will be wearing my face mask:	10 (12.2%)	6 (7.3%)	25 (30.5%)	22 (26.8%)	19 (23.2%)
Q14. I feel satisfied by what the physician counselled me regards the benefit of face mask and its role in my allergy:	9 (11.0%)	10 (12.2%)	29 (35.4%)	24 (29.3%)	10 (12.2%)
Q15. I have received instructions to wear my face mask through the allergy rhinitis episode by my physician:	19 (23.2%)	19 (23.2%)	21 (25.6%)	14 (17.1%)	9 (11.0%)
Q16. Face mask usage reduced my symptoms and I was able to do my work:	7 (8.5%)	10 (12.2%)	29 (35.4%)	26 (31.7%)	10 (12.2%)
Q17. The types of face masks available in the market have a role in giving me the desired reduction:	10 (12.2%)	9 (11.0%)	26 (31.7%)	25 (30.5%)	12 (14.6%)
Q18. I feel that the fabric mask is very helpful in reduction of symptoms:	12 (14.6%)	12 (14.6%)	29 (35.4%)	19 (23.2%)	10 (12.2%)
Q19. I feel that the surgical mask N95 is very helpful in reduction of symptoms:	8 (9.8%)	8 (9.8%)	22 (26.8%)	25 (30.5%)	19 (23.2%)
	Symptoms Domain (Q20 – Q23)				
			No	Uncertain	Yes
Q20. I describe my allergic eye symptoms before the pandemic as no symptom:			21 (25.6%)	39 (47.6%)	22 (26.8%)
Q21. I describe my allergic nasal symptoms before the pandemic as no symptom:			24 (29.3%)	44 (53.7%)	14 (17.1%)
Q22. My eye symptoms were reduced after the pandemic and the usage of face mask:			25 (30.5%)	38 (46.3%)	19 (23.2%)
Q23. My nasal symptoms were reduced after the pandemic and the usage of face mask:			18 (22.0%)	35 (42.7%)	29 (35.4%)
	Help & Advice Domain (Q24 – Q28)				
	Strongly Disagree F (%)	Disagree F (%)	Neutral F (%)	Agree F (%)	Strongly Disagree F (%)
Q24. My doctor does not advise me to use face mask in my allergy episode:	11 (13.4%)	15 (18.3%)	37 (45.1%)	13 (15.9%)	6 (7.3%)
Q25. The pharmacist did not inform me to use face mask in my allergy episode:	10 (12.2%)	15 (18.3%)	35 (42.7%)	16 (19.5%)	6 (7.3%)
Q26. There are no events or lectures that persuades patients to wear face masks during allergy episodes:	7 (8.5%)	14 (17.1%)	38 (46.3%)	16 (19.5%)	7 (8.5%)
Q27. I can't give up on the treatments given to me and I think that face mask won't reduce my symptoms:	5 (6.1%)	11 (13.4%)	41 (50.0%)	19 (23.2%)	6 (7.3%)
Q28. I am not sure that I could give it a try to go into a trigger zone while wearing a face mask as a precaution due to the fear that I may develop symptoms:	7 (8.5%)	12 (14.6%)	33 (40.2%)	16 (19.5%)	14 (17.1%)

Keys: e.g.: etc.: other similar examples are included; F: frequency; %: percent; Q: question statement

to report if they found a reduction in their eye and nasal symptoms after the COVID-19 pandemic and usage of face masks. 19 (23.2%) of the respondents found a reduction in their eye symptoms, 25 (30.5%) respondents reported negatively, while most of the respondents (38, 46.3%) were uncertain. As for nasal symptoms, 29 (35.4%) of the respondents reported a reduction in their nasal symptoms after the pandemic and usage of facemasks; 18 (22%) of respondents said negatively, while 35 (42.7%) were uncertain [Table 2].

In the help and advice domain, only 19 (23.2%) respondents agreed that their doctor does not advise them to use a facemask in an allergy episode, while 63 (76.8%) disagreed. However,

22 (26.8%) respondents agreed that the pharmacist did not inform them to use a facemask in an allergy episode, while 60 (73.2%) disagreed. 59 (71.9%) of the respondents disagreed with the statement that there are no events or lectures that persuade subjects to wear face masks during allergy episodes. More than half of the respondents (57, 69.5%) disagreed with the statement that they could not give up on the treatment given to them and thought that the facemask would not reduce their symptoms. Due to the fear of developing symptoms, 52 (63.3%) of respondents disagreed with the assertion that they were not convinced they could give it a go and go into a trigger zone while wearing a facemask as a precaution [Table 2].



Regarding asking responders for advice, only 73 (89%) of the respondents provided advice based on their personal experiences to reduce allergic rhinitis symptoms during the pandemic. Slightly over a quarter of 21 respondents (25.6%) suggested that avoiding triggers might help relieve symptoms, including avoiding allergies, dusty settings, and crowded areas. Nineteen of the respondents (23.2%) indicated that wearing a mask was a valuable strategy for reducing allergic symptoms, along with wearing eye protection. Additionally, 17 (20.7%) respondents said using drugs to alleviate allergy symptoms is appropriate, whether prophylactic before symptoms begin or management during symptoms. Nasal sprays, allergy injections, and antihistamines are among the recommendations. Both seeking medical assistance and other lifestyle advice had nearly the same rate of 8 (9.8%). When seeking medical help, advice includes consulting specialists or going to experienced healthcare professionals, such as pharmacists or doctors. Additionally, recommendations for additional lifestyle advice included healthy eating, raising awareness, using air purifiers, and switching out blankets [Table 3].

Advice	Frequency (%)
Avoid triggers	21 (25.6%)
Masks use	19 (23.2%)
Medications use	17 (20.7%)
Seek medical assistance	8 (9.8%)
Other lifestyle advice	8 (9.8%)
Total	73 (89.0%)

We used a one-way ANOVA to compare respondents' knowledge levels with the degree of improvement in their eye and nasal symptoms. Responses included a reduction in symptoms, unsure, and no symptom reduction. There was a significant difference in knowledge levels for both look and nasal symptoms' reduction responses ($P < 0.0001$). Tukey's HSD (honestly significant difference) was used to determine the specifics of the variances (differences in multiple means) in symptom reduction. For eye symptoms, the analysis revealed that respondents who reported reduced symptoms had higher knowledge scores mean \pm SD (6.74 \pm 2.7) than those who reported no reduction in allergic symptoms (4.96 \pm 3.2). The lowest score was associated with respondents who were uncertain regarding their symptom alleviation (4.53 \pm 3.1). The knowledge levels of respondents who stated that their symptoms had not been lessened did not differ substantially from either of the other two groups. Similarly, for nasal symptoms, the analysis revealed that respondents who reported that they had reduced symptoms had higher knowledge scores (7.03 \pm 2.7) than those who reported no reduction in allergic symptoms (3.94 \pm 2.5). Respondents unsure about their symptom relief had lower knowledge scores (4.26 \pm 3.2). The differences between knowledge scores were significant, but not between those who reported no reduction and those who were uncertain about their symptom reduction [Table 4].

Eye Symptoms reduction	Knowledge Mean scores (\pm SD)	P value
Reduction in symptoms	6.74 \pm 2.7	0.039*
Uncertain about reduction	4.53 \pm 3.1	
No reduction in symptoms	4.96 \pm 3.2	
Nasal Symptoms Reduction	Knowledge Mean scores (\pm SD)	P value
Reduction in symptoms	7.03 \pm 2.7	<0.0001*
Uncertain about reduction	4.26 \pm 3.2	
No reduction in symptoms	3.94 \pm 2.5	

Key: SD: standard deviation, P-value: <0.05*

A chi-square test of independence was performed to examine the relationships between various types of masks and the improvement of allergic symptoms. It was observed that wearing an N95 mask type was significantly associated with both nasal and ocular symptom reduction, whereas wearing a fabric mask was significantly associated with just the visual symptom reduction ($P < 0.0001$). 73.0% of the respondents agreed that their eye symptoms were reduced and decided that wearing an N95 facemask would be beneficial in doing so. While 78.6% of people who said their nasal symptoms improved felt that using an N95 mask helped. On the other hand, 72.2% of individuals who reported that using a fabric mask reduced their eye symptoms stated that their eye symptoms reduced. However, just 56.0% of those who agreed with their nasal reduction believed that using fabric masks was beneficial [Table 5].

Association elements	P value
Association between fabric mask and eye symptoms reduction	0.031*
Association between fabric mask and nasal symptoms reduction	0.278
Association between N95 Mask and eye symptoms reduction	0.016*
Association between N95 Mask and nasal symptoms reduction	0.043*

Key: P-value: <0.05*

DISCUSSIONS

Main findings

The outbreak of the COVID-19 virus is an exceptional chance to assess the relationship between facemasks and allergic rhinitis symptoms, as they are a mandatory safety precaution to limit disease transmission. The current study aimed to investigate the allergic rhinitis patients' knowledge and attitude toward using facemasks during the COVID-19 pandemic and its impact on allergic rhinitis symptoms. We have explored the advice respondents would give to others suffering from allergic rhinitis symptoms. Our study was conducted during the global pandemic after the lockdown was lifted, specifically during the spring season in the United Arab Emirates (UAE). The study's main findings were that nearly half of our respondents generally distinguished between the percentage of symptom reduction and the type of facemask available in the market. The majority of respondents stated that they always wear



facemasks in public areas. Respondents also noticed a decrease in their allergic rhinitis symptoms when using a facemask while an allergy trigger was nearby. It's also worth noting that many physicians and pharmacists recommend patients use a facemask when they are experiencing an allergic reaction to alleviate symptoms and prevent exacerbations. Additionally, wearing masks was among the respondents' top pieces of advice.

Knowledge domain

Allergic rhinitis can compromise one's quality of life⁷⁻⁹ and cognitive function,^{10,11} and negatively influence work performance. It is characterized by unpleasant symptoms, and the most common treatment choices are sedating over-the-counter (OTC) drugs that limit productivity,^{12,13} resulting in an economic burden.¹⁴ Although the most common allergic rhinitis triggers are airborne, such as dust mites, pollen, and spores. It was recently discovered that some foods might cause allergic rhinitis symptoms.¹⁵ According to our findings, respondents 24.4% knew more about airborne allergic rhinitis causes than they do about food triggers. This may be impacted by the general understanding of food reaction types, categorized as adverse reactions and food intolerances¹⁶ but not widely recognized as a probable cause of allergic rhinitis. Most of our respondents were aware of face masks in public places, owing to the country's restrictions on their use during the COVID-19 pandemic. Therefore, even if using face masks in public places was necessary, respondents knew less about the benefits of using them when suffering from allergic rhinitis.

Attitude domain

According to COVID-19 safety rules in the UAE, which state that face masks must be worn indoors and out, most respondents work indoors, limiting their exposure to outdoor environmental allergens. More than 40% of respondents reported that face mask usage reduced their symptoms, and they could do their work. A possible reason the rest of the respondents did not answer positively could be the type of allergen that triggers their symptoms. Studies have shown that those sensitized to outdoor allergens benefit from face mask usage.^{17-19,22,24,25,27} In contrast, those sensitized to indoor allergens showed indifference when wearing a face mask and worsening symptoms during lockdown.^{2,18,19,25} More than 45% of respondents agreed/ strongly agreed that the type of face mask available in the market has a role in giving them the desired reduction of symptoms. The filtration efficiency of N95 masks depends on the particle size; 30 they can filter greater than 95% of particles larger than 0.04 μm .³¹ Inhaled allergens have greater size than 0.04 μm , such as pollen (10-100 μm), fungal spores (2-50 μm),³² and house-dust mites feces (10-40 μm),³³ which means the chances of allergens penetrating an N95 face mask are very low. The filtration efficiency of fabric masks depends on the type of material used, the number of layers, and the degree of moisture in the mask.³⁴ When comparing the degree of symptom reduction of the N95 face masks and fabric face masks, most respondents agreed/ strongly agreed that the N95 face mask is more helpful in reducing the symptoms than the fabric face mask.

Symptoms of allergic rhinitis domain

Previous studies have shown that during the COVID-19 global pandemic, there has been a decrease in allergic rhinitis symptoms among patients^{2,6,17-29} This can be attributed to two possible reasons: first, the reduced exposure to allergens because of the COVID-19 lockdown and avoidance of crowded places. Second, the use of face masks as per COVID-19 safety guidelines. Our study was done during the spring season after the lockdown was lifted, with a mask adherence rate of almost 60% in public areas. As per our results, more than 40% of respondents reported that the face mask reduced their allergic rhinitis symptoms when a trigger was nearby. This finding is consistent with the intended function of face masks in filtering out unwanted particles, including allergens. Additionally, our respondents' experiences with allergic rhinitis symptoms were noteworthy; while most were unaware, a small number reported no nasal symptoms. The subjective nature of both symptom perception and symptom reduction may explain this. Thus, our respondent's claim that symptoms had decreased was also inaccurate. Yet, it's interesting that our study finding resonates with Mengi and his team's findings that wearing face masks notably lessens nasal and ocular allergic rhinitis symptoms.

Help/advice domain

Only 73 (89%) of the 82 respondents who asked for advice on how to lessen the symptoms of allergic rhinitis during the pandemic shared their recommendations. Surprisingly, most responders ranked avoiding triggers as the most excellent strategy for symptom relief. The use of face masks and taking medications came in second and third. It was demonstrated that the Coronavirus impacted allergy diseases before the pandemic.³⁵⁻³⁷ This led to the issuance of several recommendations and guidelines by medical professionals for individuals with allergy disorders to heed to prevent the deterioration of their symptoms. For instance, Lee and his team published a review article regarding how allergic patients were managed during the COVID-19 pandemic.³⁸ Face masks made up a significant portion of the recommendations in our study. This may be because of the country's restrictions on using face masks during COVID-19. This was in line with the vast majority of research that stressed the value of face mask use during COVID-19. The use of medications came third, proving that even the public believed that safety measures and prevention are much better than taking drugs. The last piece of advice on the list included suggestions for further lifestyle advice, such as swapping out bedding and using air purifiers.

ANOVA analysis results

Understanding an illness impacts how well a patient can cope to improve well-being.³⁹ It's noteworthy that the symptoms were less significant in the respondents with more knowledge of allergic rhinitis. This finding displays how understanding and gaining knowledge can result in better protection, compliance, and outcomes [Table 4].

Association between face mask type and symptom reduction

Not all types of masks are made equally, and not all have the filtration requirements to filter out allergic rhinitis airborne



triggers. Our study found an association between the use of face masks and a reduction in allergic rhinitis symptoms and a significant association between the type of face mask and the reduction in a specific type of allergic rhinitis symptoms, as in ocular or nasal symptoms. Previous research has argued that reduced ocular allergic rhinitis symptoms and nasal symptoms accompany improved small particle filtration. A study conducted in an allergen exposure chamber found that FFP2 face masks, which have a similar filtration performance to N95 face masks, are slightly more effective than surgical masks in reducing nasal and ocular symptoms.²² On the other hand, a study conducted by Amiel and his team found that N95 face masks provided no additional reduction in allergic rhinitis symptoms over surgical face masks and no change in ocular allergic rhinitis symptoms regardless of face mask type.¹⁷ Despite no prior research examining the efficacy of fabric masks for people with allergies during COVID-19, they were a common form of protection throughout the pandemic. We found a strong correlation between fabric masks and decreased ocular allergy symptoms. There was a decrease in nasal and ocular symptoms when using N95 face masks, in line with Karl-Christian and his team's findings.²² [Table 5]

The study's strengths and weaknesses

The current study's principal strength is based on the fact that our results demonstrated that wearing a face mask is regarded as an efficient tool for protection when suffering from allergic rhinitis, making it likely to be introduced as a component of future safety recommendations for allergic rhinitis. The study has some drawbacks in evaluating face mask types used to determine how face masks affect the remission of allergic rhinitis symptoms.

Limitations

The current study had some limitations; even though the respondents agreed that using a facemask reduced the severity of the symptoms of allergic rhinitis, a more extensive study that emphasizes the role of facemask use and allergic rhinitis symptoms is needed to confirm this finding. Given these limitations, more research embracing a broader perspective is required.

Prospects

Further research is required to delineate the different factors that can enhance better improvement and protection against allergic rhinitis during viral infections, such as the COVID-19 pandemic. Updated and improved approaches to treating allergic rhinitis will be encouraged by research on the impact of COVID-19 on the severity of the condition. Further, research on face mask types and allergens on a controlled sample is needed to provide adequate, stringent recommendations for face mask fitting since wrong face mask fitting lowers the quality of mask filtration. This can produce improved health outcomes. Considering patients' adherence and comfort, healthcare organizations must establish strategies, such as using facemasks during allergy seasons, to ensure better allergic rhinitis management plans.

CONCLUSION

Our results reveal that facemask usage may reduce allergic rhinitis symptom severity in chronically affected individuals with intermittent disease. The study supports the hypothesis that facemasks may reduce atopic allergic responses. In conclusion, this study recommends using a facemask to protect individuals with allergic rhinitis from viral infections, specifically COVID-19. It also illuminates the significance of expanding our understanding of a medical condition to encourage better treatment. The value of facemasks deserves further investigation by researching other types of allergies.

The clinical implications of the present study

The current study has shown the impact of facemasks on allergic rhinitis symptoms during the COVID-19 pandemic.

There is a reduction in eye and nasal symptoms with facemask usage, indicating the potential benefit of facemask for subjects with allergic rhinitis.

If found valid, using facemasks in subjects with allergic rhinitis may be offered in managing allergic rhinitis.

ABBREVIATIONS

FFP2	facemask characteristics follow the European EN 149 standard
N95	facemask characteristics follow the American NIOSH standard
SD	standard deviation
Tukey's HSD	Tukey's honestly significant difference
UAE	United Arab Emirates
WHO	World Health Organization

AUTHORS' CONTRIBUTIONS

We declare that all authors have contributed substantially to the conception and design of the work, the acquisition, analysis, and interpretation of data, drafted the work, and revised it critically for important intellectual content. In addition to approval of the version to be published, and agreed to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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