Impact of prolonged use of facemask in COVID-19 pandemic on the health of the population of Jeddah, Saudi Arabia

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Abstract

Background: Face masks have become a crucial part of everyday life across the globe since COVID-19 was declared a pandemic.

Objectives: To study the impact of prolonged use of facemasks on the health of the population of Jeddah, Saudi Arabia

Method: This was a cross sectional study; the non-probability convenient sampling method was used to collect data on 248 subjects via online-Google form questionnaire. The questionnaire provided information on the personal, sociodemographic characteristics, and clinical aspects of the studied subjects. Statistical analysis: data were analyzed using SPSS version 23. The Chi square test of significance was used. The level of significance was 0.05.

Results: Respiratory tract infection (RTI) is common in Saudi Arabia. About 25% of the subjects did not use facemasks. Almost all the subjects who used facemasks knew how to wear them and the reason for their use, and were worried about catching RTI. A minority of the studied subjects didn't know the association between chronic diseases and RTI.

Males significantly felt more than females that wearing facemasks would make them embarrassed, and would affect critically their social communication. The majority of the studied subjects did not want to wear a mask when they had flu, and they thought that others should protect themselves. Facemasks interfere with smoking habits and practicing exercise. Wearing masks was associated with a feeling of difficulty of breathing when walking, causing headache, skin problems and sore throat. Also the majority could not handle wearing masks for 3 hours straight. About 60% of the subjects felt uncomfortable when they sit with people who do not wear masks. The females significantly felt that the surgical mask is better than the cloth mask, compared to males. The majority prefer to wear one mask only, and use it several times.

Conclusion: Respiratory tract infection is common in Jeddah city. A great proportion of the subjects do not wear facemasks in public places, particularly when they have flu. Wearing of facemasks is associated with several clinical adverse effects. The knowledge about types and use of the facemasks is deficient in a great proportion of the population. These points will help the health care planners when they design health education programs to educate the public about use of facemasks and the ways to avoid physical side effects

Keywords: Face Masks, Jeddah, Covid-19 pandemic, respiratory symptoms.

Introduction

The government of Saudi Arabia was among the first countries in the world to take quick and serious precautions introducing decisive social distancing measures early before the first case of COVID-19 was confirmed in the Kingdom (1-3). Community face masking is possibly of great value in reducing COVID-19 transmission. Their use, however, is deeply connected to social and cultural practices and has acquired a variety of personal and social meanings (2).

Acute lower respiratory tract infection is a major health problem that affects more than 15% of the total population of Saudi Arabia each year. The epidemiology of respiratory viruses in Saudi Arabia is proposed to be affected mainly by the presence and mobility of large numbers of foreign workers and the gathering of millions of Muslims in Mecca during the Hajj and Umrah seasons (4).

Face masks overturn these assumptions by allowing the wearer to look like an entirely different person. If unnoticed, these masks break the link between facial appearance and personal identity, with clear implications for applied face recognition (5).

Facemasks serve primarily as a dual preventive purpose; protecting oneself from getting viral infection and protecting others (6,7). Correct and consistent mask use is a critical step everyone can take to prevent getting and spreading COVID-19. Masks work best when everyone wears them, but not all masks provide the same protection. When choosing a mask, one needs to look at how well it fits, how well it filters the air, and how many layers it has (8).

The prevalence of chronic obstructive pulmonary disease in Saudi Arabia is 4.2% among the general population and 14.2% among smokers (9).

Mental Health has become a very serious personal, social and economic threat, especially in light of the COVID-19 pandemic and the negative ripple effect it has brought onto millions of people world-wide (10). Lower accuracy and lower confidence in one's own assessment of the displayed emotions indicate that emotional reading was strongly irritated by the presence of a mask (11-15). The CDC recommends that if not fully vaccinated for COVID-19, additional precautions may be required such as wearing a cloth face mask in public places to reduce the risk of catching or spreading the COVID-19 virus (16).

Some have expressed concern that these measures may affect the cardiopulmonary system by increasing the work of breathing, altering pulmonary gas exchange and increasing dyspnea, especially during physical activity, and particularly among asthmatics (17-24).

Feelings of anxiety or panic, when covering the mouth and nose might affect breathing. This can cause symptoms like feeling dizzy or sick, which may be associated with the wearing of a mask (21,23).

The appropriate use, storage and cleaning or disposal of masks is essential to make them as effective as possible (25). WHO and UNICEF advise that children aged 12 and over should wear a mask under the same conditions as adults (26,28).

The claim that the prolonged use of face masks can cause oxygen deficiency, carbon dioxide intoxication, dizziness, or other health challenges is not grounded in science (29-30).

Skin problems can develop beneath a mask. Common problems include acne breakouts, excessive dryness, and irritated skin (31).

Wearing a face mask can cause symptoms of a sore throat. Whether a wearer will get a sore throat from wearing a mask depends on several factors, most of which the wearer has control over. (32)

Face mask "air hunger" —the feeling that the wearer cannot get enough air, is a common sensation, often exacerbated by anxiety and stress. (33)

Methodology

This was a cross sectional study; the non-probability convenient sampling method was used to collect data through online-Google forms.

Sample size: Using the G*Power statistical power analysis to calculate the sample size; it was found that the minimal sample size according to Effect size = 0.3, alpha = 0.05, and Power = 95%,, and 5 degrees of freedom the minimal sample size according to alpha 5%, and beta 20%, and 5 degrees of freedom was 385.

Thus the present study enrolled 416 adult subjects from Jeddah city, in Saudi Arabia.

Information on the studied subjects was collected using a structured questionnaire which provided information on personal and socio-demographic information; medical history, and pattern of use of Face mask, and possible health effects associated with its use.

Statistical analysis: Data was analyzed using SPSS version 23. The Chi Square test of significance was used to assess the different associations. The level of significance was 0.05.

Results

Table 1 reveals that the majority of the subjects were from the central region, They were mainly Saudis (95%), with educational level of university or more (68.5%). The majority were non-smokers (75.2%) and living mainly in cities (96.2%). Table 2 reveals that 18% of the subjects had respiratory tract infection in the past 5 years. Over 75% of the subjects have used facemasks to prevent RTI. Almost 90% of the subjects think that wearing a mask would reduce the RTI. Almost all the subjects knew why

they wear facemasks and over 94% knew how to wear the facemask. About one fifth of the subjects knew that chronic diseases make the subject susceptible for RTI. About 70% of the subjects were worried about catching RTI.

Table 3 reveals that males significantly felt that facemasks cover their faces and make it difficult for others to see how they feel and it might increase the likelihood that others would misinterpret how they felt, moreso than females. Also males feel more embarrassed than females regarding the wearing of masks, and they felt that they would be criticized by others ($p < 0.05$). The majority did not want to wear facemask when they had flu, and they thought that others should protect themselves. Almost 80% of the subjects felt difficulty of breathing when walking while wearing facemasks. Table 4 shows that only 40% of the subjects could handle to wear a mask for 3 hours straight. About 60% of the subjects felt uncomfortable when they sit with people who didn't wear masks. The females significantly felt that the surgical mask was better than the cloth mask compared to males ($p<0.05$). A greater proportion of males were smokers compared to females and felt that wearing masks in public places reduced their desire to smoke ($p<0.05$). About 61% of the subjects practiced exercise; the majority were males ($p<0.05$). However, only a minority (13%) agreed that a facemask should be worn while exercising. Wearing a mask, caused changes in the performance of exercise in 18% of the subjects. About two thirds of the subjects used the mask multiple times, particularly among females ($p<0.05$). Table 5 shows that a minority of the subjects (12.7%) agreed that wearing two masks was better than one. About two thirds of the subjects felt that it was risky to wear two masks at the same time. And 6% of the subjects agreed that children with chronic health problem should wear masks. About one fifth of the subjects believed that wearing masks affected their concentration particularly males ($p<0.05$). Greater proportions of the subjects believed that wearing masks may cause headache, and difficulty of breathing (35% and 65%, respectively). A greater proportion of females believed that wearing a mask might cause skin problems while a greater proportion of males believed that wearing masks may cause sore throat ($p < 0.05$). Table 6 reveals that a greater proportion of the subjects who wore facemasks, were more knowledgeable about the reason for wearing a facemask, and believed that facemasks reduce the risk of getting RTI ($p<0.05$). Getting RTI's in the last 5 years was significantly more prevalent among those who wore masks ($p < 0.04$). Those who wore facemasks felt more embarrassed compared to those who didn't ($p<0.05$).

Table 1: Distribution of studied subjects by gender and sociodemographic characteristics

Variable	Categories	Gender		Total	X2 (p- value)
		Female	Male		
		N %	N %	N %	
Area of residence	Central region	25 11.5%	20 10.1%	45 10.8%	4.637a .327
	Eastern region	4 1.8%	7 3.5%	11 2.6%	
	Northern region	7 3.2%	10 5.1%	17 4.1%	
	Southern region	10 4.6%	16 8.1%	26 6.3%	
	Western region	172 78.9%	145 73.2%	317 76.2%	
Nationality	Non-Saudi	8 3.7%	11 5.6%	19 4.6%	847a. 358
	Saudi	210 96.3%	187 94.4%	397 95.4%	
Educational level	Less than University	61 28.0%	70 35.4%	131 31.5%	2.614a .106
	More than University	157 72.0%	128 64.6%	285 68.5%	
Occupational level	Non-Worker	119 54.6%	83 41.9%	202 48.6%	6.666a .010
	Worker	99 45.4%	115 58.1%	214 51.4%	
Smoking habit	Non-Smoker	192 88.1%	121 61.1%	313 75.2%	40.490a .000
	Smoker	26 11.9%	77 38.9%	103 24.8%	
Your living area is	City	211 96.8%	189 95.5%	400 96.2%	.500a .480
	Village	7 3.2%	9 4.5%	16 3.8%	

Table 2: Distribution of studied subjects by gender and sociodemographic characteristics

Variable	Categories	Gender		Total	X^2 (p- value)
		Female	Male		
		N %	N %	N %	
Have you had a respiratory infection in the past five years?	No	175 80.3%	166 83.8%	341 82.0%	.891a .345
	Yes	43 19.7%	32 16.2%	75 18.0%	
Have you ever worn a face mask in public places to prevent you from catching a respiratory infection?	No	51 23.4%	51 25.8%	102 24.5%	.313a 576
	Yes	167 76.6%	147 74.2%	314 75.5%	
Do you think that wearing a mask would reduce the risk of respiratory infection? *	No	19 8.7%	19 9.6%	38 9.1%	.097a 756
	Yes	199 91.3%	179 90.4%	378 90.9%	
Do you know the reason for wearing a mask?	No	3 1.4%	4 2.0%	7 1.7%	.260a .610
	Yes	215 98.6%	194 98.0%	409 98.3%	
Do you know the correct way to wear a mask?	No	15 6.9%	9 4.5%	24 5.8%	1.041a .308
	Yes	203 93.1%	189 95.5%	392 94.2%	
Do you have chronic diseases that make you more susceptible to respiratory infections?	No	179 82.1%	160 80.8%	339 81.5%	.117a .733
	Yes	39 17.9%	38 19.2%	77 18.5%	
Do you worry about catching a respiratory infection?	No	61 28.0%	60 30.3%	121 29.1%	.271a 603
	Yes	157 72.0%	138 69.7%	295 70.9%	

Table 3: Distribution of studied subjects by gender and sociodemographic characteristics

Variable	Categories	Gender		Total		X^2 (p- value)
		Female		Male				
		N	%	N	%	N	%	
Wearing a face mask covers my face, and will make it difficult for others to see how I feel	No	122	50.0%	82	41.4%	204	49.0%	8.789a .003
	Yes	96	44.0%	116	58.6%	212	51.0%	
Wearing a face mask may increase the likelihood that others will misinterpret how I feel:	Agree	86	39.4%	104	52.5%	190	45.7%	7.150a .007
	Disagree	132	60.6%	94	47.5%	226	54.3%	
Wearing a mask makes me feel embarrassed	No	210	96.3%	178	89.9%	388	93.3%	6.836a .009
	Yes	8	3.7%	20	10.1%	28	6.7%	
Wearing a face mask when symptoms appear and then going out to public places may expose me to criticism of others	Agree	0	0.0%	1	0.5%	1	0.2%	8.646a .013
	No	145	66.5%	105	53.0%	250	60.1%	
	Yes	73	33.5%	92	46.5%	165	39.7%	
It is important to wear a face mask to protect others from catching the flu	No	25	11.5%	23	11.6%	388	11.5%	.002a .962
	Yes	193	88.5%	175	88.4%	368	88.5%	
You do not need to wear a face mask if you have the flu, other people should take care of themselves and avoid getting sick	No	185	84.9%	161	81.3%	346	83.2%	.934a .334
	Yes	33	15.1%	37	18.7%	70	16.8%	
Have you noticed difficulty breathing while walking or exercising while wearing a face mask?	No	50	22.9%	36	18.2%	86	20.7%	1.430a .232
	Yes	168	77.1%	162	81.8%	330	79.3%	

Table 4 : Distribution of studied subjects by gender and sociodemographic characteristics

Variable	Categories	Gender		Total		X^2 (p-value)
		Female		Male				
		N	%	N	%	N	%	
Can you handle wearing a mask for 3 hours straight	No	129	59.2%	125	63.1%	254	61.1%	683[a] .408
	Yes	89	40.8%	73	36.9%	162	38.9%	
Do you feel uncomfortable when you sit with people who do not wear masks	No	86	39.4%	77	38.9%	163	39.2%	.014[a] .907
	Yes	132	60.6%	121	61.1%	253	60.8%	
Do you find that the surgical mask is better than the cloth mask	No	70	32.1%	89	44.9%	159	38.2%	7.244[a] .007
	Yes	148	67.9%	109	55.1%	257	61.8%	
Are you a smoker?	No	86	39.4%	125	63.1%	318	76.4%	37.175[a] .000
	Yes	25	11.5%	73	36.9%	98	23.6%	
If yes, did you find wearing a mask in public places reduced your desire to smoke	No	54	24.8%	76	8.4%	76	38.4%	36.698[a] .000
	Yes	22	10.1%	59	29.8%	81	19.5%	
Do you exercise	No	107	49.1%	54	27.3%	318	76.4%	20.804[a] .000
	Yes	111	50.9%	144	72.7%	255	61.3%	
Should a mask be worn while exercising	No	187	5.8%	175	88.4%	362	87.0%	.623[a] .430
	Yes	31	14.2%	23	11.6%	54	13.0%	
Have you noticed any changes in your exercise performance before and after wearing the mask	No	185	84.9%	156	8.8%	341	82.0%	2.591[a] .107
	Yes	33	15.1%	42	21.2%	75	18.0%	
Do you wear the same mask multiple times.	No	113	51.8%	49	24.7%	162	38.9%	32.018[a] .000
	Yes	105	48%	149	75%	254	61.1%	

Table 5 : Distribution of studied subjects by gender and sociodemographic characteristics

Variable	Categories	Gender		Total	X² (p-value)
		Female	Male		
		N %	N %	N %	
Wearing two masks is better than one:	No	195 89.4%	168 84.8%	363 87.3%	1.976a .160
	Yes	23 10.6%	30 15.2%	53 12.7%	
Are there risks from wearing multiple masks? (Two masks at the same time)	No	71 32.6%	77 38.9%	148 35.6%	1.808a . 179
	Yes	147 67.4%	121 61.1%	268 64.4%	1.808a . 179
Should children with health problems wear a mask?	No	49 22.5%	50 25.3%	99 23.8%	.441a .507
	Yes	169 77.5%	148 74.7%	317 76.2%	.441a .507
Does wearing a mask cause poor concentration	No	183 83.9%	131 66.2%	314 75.5%	17.730a .000
	Yes	35 16.1%	67 33.8%	102 24.5%	
Does wearing a mask cause headaches	No	142 65.1%	126 63.6%	268 64.4%	.102a .749
	Yes	76 34.9%	72 36.4%	148 35.6%	
Does wearing a mask cause skin problems	No	122 56.0%	147 74.2%	269 64.7%	15.172a . 000
	Yes	96 44.0%	51 25.8%	147 35.3%	
Does wearing a mask cause throat pain	No	205 94.0%	168 84.8%	373 89.7%	9.451a .002
	Yes	13 6.0%	30 15.2%	43 10.3%	
Does wearing a mask cause difficulty breathing	No	81 37.2%	64 32.3%	145 34.9%	1.067a .302
	Yes	137 62.8%	134 67.7%	271 65.1%	

Table 6 Significant differences between subjects who wear masks and those who do not

Variable		Wear a mask		Total	X² P
		No	Yes		
		N %	N %	N %	
Have you had a respiratory infection in the past five years?	No	90 88.2%	251 79.9%	341 82.0%	3.58
	Yes	12 11.8%	63 20.1%	75 18.0%	0.050
Wearing a mask would reduce the risk of infection	No	21 20.6%	17 5.4%	38 9.1%	21.36
	Yes	81 79.4%	297 94.6%	378 90.9%	0.000
Do you know the reason for wearing a mask	No	6 5.9%	1 0.3%	7 1.7%	14.41
	Yes	96 94.1%	313 99.7%	409 98.3%	<0.000
Wearing a face mask when symptoms appear and then going out to public places may expose me to criticism of others	No	73 71.6%	177 56.4%	250 60.1%	11.12
	Yes	28 27.5%	137 43.6%	165 39.7%	<0.004

Discussion

KSA started introducing decisive social distancing measures early, before the first case of COVID-19 was confirmed in the Kingdom (1). Community face masking is possibly of great value in reducing COVID-19 transmission. Their use, however, is deeply connected to social and cultural practices and has acquired a variety of personal and social meanings (1,2). The present study aimed at investigating the use of face mask and its impact on the health of the Saudis in Jeddah city. Regardless of the type, setting, or who wears the facemask, it serves primarily a dual preventive purpose; protecting oneself from getting viral infection and protecting others. Therefore, if everyone wears a facemask in public, it offers a double barrier against COVID-19 transmission (6). In the present study just over 75% of the subjects did wear facemasks when they went to public places. The Saudi Ministry of Health (MOH) has made the public aware of the virus transmission patterns and the importance of quarantine and curfew(3). In the present study, the majority of the subjects knew the reason for wearing masks and their importance in reducing the risk of RTI, particularly among those who wore face masks. Acute lower respiratory tract infection is a major health problem that affects more than 15% of the total population of Saudi Arabia each year. This is proposed to be affected mainly by the presence and mobility of large numbers of foreign subjects and the gathering of millions of Muslims in Mecca during the Hajj and Umrah seasons (4). In the present study, 18% of the subjects had respiratory tract infection in the past 5 years. Wearing facemasks allows the wearer tobe unidentifiable. If unnoticed, these facemasks break the link between facial appearance and personal identity, with clear implications for applied face recognition (5). In the present study compared to females, males significantly felt that facemasks cover their faces and made it difficult for others to see how they feel and it might increase the likelihood that others would misinterpret how they felt. Males, also, may feel more embarrassed than females, and they felt that they would be criticized by others, particularly those who wore facemasks.

Correct and consistent facemask use is a critical step everyone can take to prevent getting and spreading COVID-19. This is in line with the present study. Masks work best when everyone wears them, but not all masks provide the same protection. Masks need to fit well, , filter the air well, and should have several layers (8). In the present study a greater proportion of females knew the correct way to wear a mask. The prevalence of chronic obstructive pulmonary disease in Saudi Arabia is 4.2% among the general population and 14.2% among smokers (8). This prevalence rate is in line with findings from the present study.

Lower accuracy and lower confidence in one's own assessment of displayed emotions indicate that emotional reading was strongly irritated by the presence of a mask. We further detected specific confusion patterns, mostly pronounced in the case of misinterpreting disgusted faces as being angry, plus assessing many other emotions (11).

The CDC recommends avoiding contact with anyone if they are ill with the flu or other respiratory infection. Generally, the best way to prevent this is by taking precautions such as getting vaccinated, washing hands regularly and avoiding people who are sick (16). In the present study that the majority of participants did not want to wear a mask when they havea respiratory infection, and they think that others should protect themselves. Some have expressed concern that the use of masks may affect the cardiopulmonary system by increasing the work of breathing, altering pulmonary gas exchange and increasing dyspnea, especially during physical activity. The effects on work of breathing, blood gases, and other physiological parameters imposed by face masks during physical activity are however small. For people with very mild or well-controlled asthma, wearing a face mask should not be an issue. For those who have trouble breathing, or severe or poorly controlled asthma with frequent flare-ups, or for those with COPD who are coughing and experiencing significant breathlessness, then it is possible that wearing a face mask could cause discomfort. especially during very heavy exercise (17). This is in line with the present study. Masks should not be worn during vigorous physical activity because of the risk of reducing your breathing capacity. It is recommended to keep at least 1 metre away from others, and if exercising indoors, en sure there is adequate ventilation (19). This is in line with the present study.

It is recommended that everyone makes wearing a mask a normal part of being around other people during times of infection. The appropriate use, storage and cleaning or disposal of masks is essential to make them as effective as possible.

Tobacco compromises lung function, and COVID-19 primarily affects the lungs. Smoking tobacco is also a known risk factor for severe disease from many respiratory infections, including coronaviruses and SARS. Smoking also impairs the immune system and previous studies have established that tobacco use is linked with poorer outcomes for people with TB and pneumonia (23). In the present study a greater proportion of males were smokers compared to females and felt that wearing masks in public places reduces their desire to smoke ($p<0.05$).

WHO and UNICEF advise that children aged 12 and over should wear a mask under the same conditions as adults, in particular when they cannot guarantee at least a 1-metre distance from others and there is widespread transmission in the area (26). This is in line with the present study.

Greater proportions of the subjects believe that wearing masks may cause headache, and difficulty of breathing (35% and 65%, respectively). Greater proportions of females believe that wearing mask may cause skin problems while a greater proportion of males believe that wearing masks may cause sore throat ($p <0.05$).
This is in line with previous studies (30 – 33)

Limitations

There are some limitations to this study. As this study is cross-sectional, the causal relationship remains unknown, and we do not know if the effects of these variables on wearing of masks acceptance of COVID-19 vaccine during the COVID-19 pandemic will persist in the long term. It is also a non-probability convenient sample, and its generalization to the population may be defective; however, it is an exploratory study.

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We thank all the participants for their cooperation throughout the study.

Conclusion

Respiratory tract infection is common in Jeddah city. A great proportion of the subjects do not wear facemasks in public places, particularly when they have flu. Wearing of facemasks was associated with several clinical adverse effects. The knowledge about types and use of the facemasks is deficient in a great proportion of the population. These points will help the health care planners when they design health education programs to educate the public about use of facemasks and the ways to avoid physical side effects

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