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Study of the Prevalence of Face Mask Related Disturbances in Health during the COVID-19 Pandemic in an Urban Population through an Online Survey

Hasitha Jannavada[1], Pranav Arun Bharadwaj[2]

Abstract: ***Objectives: 1. To determine the prevalence of health disturbances due to the usage of face masks during the COVID-19 pandemic. 2. To study the presence of aggravation of pre-existing respiratory illnesses due to the usage of face masks. Justification: The COVID-19 pandemic is an ongoing global pandemic caused by Severe Acute Respiratory Syndrome coronavirus 2 (SARS- CoV-2). The transmission of SARS CoV- 2 can occur through direct, indirect or close contact with infected people through infected secretions. To prevent the spread of the infection, the usage of face masks has become the norm in society irrespective of vaccination status or prior history of exposure. They aid primarily in source control and further for filtration of the droplets for wearer protection. While the benefits have been established, recent studies have also shown a relationship between the usage of masks with certain disturbances in health and daily activities. Our study aims to recognise any patterns of disease and discomfort, the cause of which could be attributed to the use of face masks, as well as to understand people's perspectives on the importance of masks during the pandemic. Methodology: An online survey was administered through social media platforms among India's general urban population. The effects of the usage of masks were studied through several open and closed-ended questions. The development of symptoms following the usage of masks and aggravation of symptoms in individuals with pre-existing medical conditions were also assessed. Quantitative data was assessed through percentages. Result and Implication: A significant strata of the population have experienced the effects of the usage of face masks in the form of various physical manifestations. While there is growing dissent regarding its functionality, people did express their understanding over a lack of a feasible alternative to the use of face masks, with the closest equivalent being vaccination and social distancing.***

Keywords: COVID-19 Pandemic, Face Masks, Respiratory Diseases, Online Survey

1. Aim and Objectives

a) To determine the prevalence of health disturbances due to usage of face masks during the COVID-19 pandemic.
b) To study the presence of aggravation of pre-existing respiratory illnesses due to usage of face masks.

2. Research Hypothesis

What is the prevalence of face mask related disturbances in health during the COVID-19 pandemic in an urban population?

3. Introduction and Justification

The COVID-19 pandemic is an ongoing global pandemic caused by Severe Acute Respiratory Syndrome coronavirus 2 (SARS- CoV-2).

The possible modes of transmission for SARS-CoV-2, including contact, droplet, airborne, fomite, faeco-oral, blood borne, mother-to-child, and animal-to-human transmission. Infection with SARS-CoV-2 primarily causes respiratory illness ranging from mild disease to severe disease and death, and some people infected with the virus never develop symptoms.

The transmission of SARS CoV- 2 can occur through direct, indirect or close contact with infected people through infected secretions such as the saliva and respiratory secretions or their respiratory droplets, which are expelled when an infected person coughs, sneezes or talks or sings.

The CDC India recommends community use of masks to prevent transmission of SARS-CoV-2. Masks are primarily intended to reduce the emission of virus-laden droplets by the wearer (source control), which is especially relevant for asymptomatic or presymptomatic infected wearers who feel well and may be unaware of their infectiousness to others (estimated to account for more than 50% of SARS-CoV-2 transmissions). Masks also help reduce inhalation of these droplets by the wearer (filtration for wearer protection). The community benefit of masking for SARS-CoV-2 control is due to the combination of these two effects, and individual prevention benefit increases with increasing numbers of people using masks consistently and correctly.

As COVID-19 has emerged as a dynamic disease of public health importance, it is imperative that we gain a thorough understanding on the modalities of disease control and the response of the community towards it.

4. Review of Literature

Several studies have been conducted to assess the effects of masks on health. For instance, a study conducted to review the literature for newly emerging dermatological conditions as a result of occupational mask-wearing during the COVID-19 pandemic observed that a number of dermatological conditions were found to increasingly occur owing to prolonged and frequent use of face masks. Pressure-related injuries were often the most serious complaint with the

following consequences of prolonged mask-wearing including the following: pressure-related injuries, various dermatoses, skin dryness, skin erythema, acne, eczema, urticaria, rosacea, secondary infections, nasal bridge ulceration, and exacerbation of known skin disorders. (Yan Y et al., 2020) (Zhang B et al., 2020) (Wilcha R. J., 2021)

In a cross-sectional study conducted in the department of ENT in Chettinad Hospital and Research Institute, Kelambakkam. A self-constructed questionnaire containing 21 queries regarding the effects of prolonged use of face masks, after being analysed by the experts of the institution, were distributed to 124 ENT professionals all over India. All answered questionnaires were sent for statistical analysis.

- 63.71% experienced difficulty in breathing while wearing a face mask, 37.10% experienced dry nose, 46.77% experienced dry mouth. About 80.65% people believed there are side effects due to wearing masks.
- Wearing masks for a prolonged period of time causes a host of physiologic and psychologic burdens and can decrease work efficiency. And it also affects the wearer's whole body thermal sensation. Prolonged use of face masks causes physical adverse effects such as headaches, difficulty breathing, acne, skin breakdown, rashes, and impaired cognition. It also interferes with vision, communication, and thermal equilibrium.
- The results of the study also suggest that continuous usage of facemasks can lead to a wide variety of nasal discomfort and side effects pertaining to the nasal skin and mouth due to its prolonged usage. There is a decrease in the humidification of air beneath the facemask and decrease in transpiration of skin around the nasal and perioral region. (Priya, K. et al., 2021)

When breathing, there is an overall significantly reduced possible gas exchange volume of the lungs of minus 37% caused by the mask (Lee 2011) (Lee, H. P. & Wang, d., 2011). Therefore, the dead space amassed by the mask causes a relative reduction in the gas exchange volume available to the lungs per breath by 37% (Lee, H. P. & Wang, d., 2011). This largely explains the impairment of respiratory physiology reported in our work and the resulting side effects of all types of masks in everyday use in healthy and sick people (increase in respiratory rate, increase in heart rate, decrease in oxygen saturation, increase in carbon dioxide partial pressure, fatigue, headaches, dizziness, impaired thinking, etc.). (Johnson A.T., 2016) (Johnson A.T. et al., 2000) (Kisielinski, K. et al., 2021)

Prolonged use (≥12 h) of masks (N95 respirator or N95 respirator with a surgical mask overlay) has been associated with complaints of headaches, light-headedness, as well as an increase in perceived exertion and perceived shortness of breath.

- Many factors may contribute to the increased number of new headaches while wearing a mask, including the design of masks which rely on tight elastic straps. (Ong, J.J.Y. et al., 2020)
- Elastic straps in combination with a tight fit may result in face pain behind the ears or other contact points (Ong, J.J.Y. et al., 2020). Indirect factors may also contribute to headaches while wearing masks, for example, inadequate hydration and irregular eating patterns. (Ong, J.J.Y. et al., 2020)
- Additionally, unrelated factors to wearing masks, such as sleep deprivation, and physical and emotional stress (Ong, J.J.Y. et al., 2020), are also thought to possibly contribute to headaches, especially during pandemic situations. (Scheid JL et al., 2020)

5. Methodology

Study Design: Cross-sectional study

Study Type: Online survey

Survey Method: Online Questionnaire with open-ended and closed-ended questions

Duration of Project:
a) Period required for data collection: 2 months
b) Period required for analysis of data: 1 month

Sample Size: Convenient Sample

Inclusion criteria: Subjects are literate and between the ages 16 and 90, inclusive of all despite previous medical diagnoses.

Exclusion criteria: All who refused to sign the informed consent form.

Method of analysis: An online survey was administered through social media platforms among India's general urban population based in 4 cities (Bengaluru, Chennai, Mumbai, Hyderabad). The sample included participants who agreed to the informed consent form. The effects of the usage of masks were studied through several open and closed ended questions. The development of symptoms following the usage of masks and aggravation of symptoms in individuals with pre-existing medical conditions were also assessed.

The total number of participants have been categorised into:
a) Subjects previously diagnosed with respiratory illnesses.
b) Subjects previously not diagnosed with respiratory illnesses.

The quantitative data was assessed through percentages. Open ended questions were analysed based on the available literature and proformas on clinical presentation of respiratory illnesses.

6. Informed Consent Form (English)

Consent Type: Informal Written Consent with a right to anonymity provided along with the link to the questionnaire. (Link to questionnaire: https://forms.gle/hvraxmP5UUJvK1Nc9)

Justification: As the survey was conducted online, the subjects could participate in it by agreeing to the statement given below. As it is targeted towards the general population, an informal approach to consent was chosen.

Their identity would remain anonymous, while maintaining the sanctity of the survey. There was an attempt to reduce manual errors.

Informed consent:

"This informed consent form is for the general population, who we are inviting to participate in a research project on mask usage during the pandemic.

The title of our research project is "Study of the Prevalence of Face Mask Related Disturbances in Health during the COVID-19 Pandemic in an Urban Population through an Online Survey".

Purpose: This research project has been initiated by medical students, to study the public opinion and perception about face masks, and the disturbances and difficulties that have arisen due to their use.

Survey Plan: This survey has been divided into 5 sections.
Section 1: Informed consent
Section 2: Demographic details
Section 3: Pattern of Mask Usage
Section 4: (Only for members with previously diagnosed respiratory diseases)
Section 5: Opinion Column

Your participation in this research is completely voluntary. You may change your mind and stop participating at any point during the survey.

We will not be sharing the identity of those who participated in this survey. Your responses will be kept confidential.

By giving consent to the survey being conducted, you are hereby contributing to the field of science out of free will. There will be no reward provided for your responses. Information that is being given below will be used for research purposes alone and will not be forwarded to anyone. The organising team will not be held responsible for any hindrances that may be caused along the way.

Please read all instructions carefully to ensure the most accurate outcome. There are 15 questions and then an opinion column.

Please answer all of the questions as honestly as you can and in as much detail as possible."

7. Statistics and Data Interpretation

The data that has been collected by an online survey has been represented through tables, graphs and charts

a) Demographic Details (N = 150)

Age (In Years)	Number of Responders	Percentage
20 or under	25	16.67%
21 - 45	65	43.33%
46 - 65	47	31.33%
65 +	13	8.67%
Gender	Number of Responders	Percentage
Female	89	59.33%
Male	60	40%
Transgender	0	0%
I do not wish to disclose my gender	1	0.67%
Occupation	Number of Responders	Percentage
Student	59	39.33%
Employed	62	41.33%
Unemployed	0	0%
Homemaker	16	10.67%
Retired	13	8.67%

b) Pattern of Mask Usage

Closed Ended Questions Response Representation (N=150)

Q. Do you think the face mask is a requirement in this pandemic?

Options	Number of Responders	Percentage
Yes	138	92%
No	6	4%
I Don't Know	6	4%

Q. Do you feel safe being in public / at a large gathering without a face mask?

Options	Number of Responders	Percentage
Yes	22	14.67%
No	128	85.33%

Q. a. Which face masks do you use?

Type of Mask	Number of Responders	Percentage
None	1	0.66%
Surgical mask	27	18%
2 ply Cloth face mask	39	26%
N-95 Mask	40	26.67%
More than one or all of the above	43	28.67%

Q. b. How often do you change / replace your mask?

Options	Number of Responders	Percentage
Only when it becomes dirty	24	16%
After every use	63	42%
Every 3-5 days	46	30.67%
Every month	14	9.33%
Never	3	2%

Q. How often in a day do you use a mask?

Options	Number of Responders	Percentage
< 1 hour	46	30.67%
1 - 6 hours	70	46.67%
7 - 12 hours	32	21.33%
> 12 hours	2	1.33%

a) Data representation of health disturbances observed among the general population

Q. Are you comfortable using a face mask?

Options	Number of Responders	Percentage
Always	40	26.67%
Sometimes	85	56.67%
Never	25	16.66%

Q. Do you think the mask physically restricts you from breathing normally?

Options	Number of Responders	Percentage
Yes, the mask obstructs my breathing	91	60.67%
No, the mask does not obstruct my breathing	59	39.33%

Q. Do you feel suffocated or stuffy while wearing the face mask?

Options	Number of Responders	Percentage
Always	27	18%
Sometimes	107	71.33%
Never	16	10.67%

Q. Do you feel wheezy or breathless while wearing the face mask?

Options	Number of Responders	Percentage
Always	14	9.33%
Sometimes	82	54.67%
Never	54	36%

Q. Do you feel lightheaded or dizzy while wearing the face mask?

Options	Number of Responders	Percentage
Always	3	2%
Sometimes	53	35.33%
Never	94	62.67%

Q. Do you feel nauseated while wearing the face mask?

Options	Number of Responders	Percentage
Always	3	2%
Sometimes	42	28%
Never	105	70%

Q. a. Do you experience any other symptoms while wearing a face mask?

Options	Number of Responders	Percentage
Yes	43	28.67%
No	107	71.33%

Q. b. Symptoms noted if the answer to the above question is yes

Symptoms Observed	Number of Responders
Itching and redness	17
Increase in acne	24
Ear irritation and pain	29
Runny nose	7
Excessive sneezing	7
Coughing	6
Foul breath	25
Fogging of spectacles / goggles / sunglasses	49
Infection of the masked area	11

Q. While performing a task with the face mask, do you feel more tired, fatigued, or exhausted than usual?

Options	Number of Responders	Percentage
Always	36	24%
Sometimes	81	54%
Never	33	22%

Q. Do you avoid tasks to prevent using face masks?

Options	Number of Responders	Percentage
Always	6	4%
Sometimes	55	36.67%
Never	89	59.33%

Q. How often do you remove the face mask, to get relief from these symptoms?

Options	Number of Responders	Percentage
Within minutes of wearing it	26	17.33%
After an hour or so of wearing it	62	41.34%
Long periods without removing it	21	14%
Usually don't remove the mask till the task is complete	41	27.33%

A. Data Representation from Subjects Diagnosed with Respiratory Diseases (N=8)

Q. Has the usage of a face mask further aggravated your condition?

Options	Percentage of Responders
Yes	12.50%
No	25%
I'm not sure	62.50%

Q. Did you approach a doctor and / or have received medication after the appearance of the aggravated symptoms?

Options	Percentage
Yes	25%
No	75%

8. Summary of Data Interpretation

A. Interpretation of the pattern of mask usage

1) Following the demographic details, the questionnaire began by assessing the level of awareness among the surveyed individuals regarding the importance of the usage of masks. This question required answers in a graded manner, with 'Yes' being the highest likelihood, 'No' with the least likelihood and 'I Don't Know'.
2) Among those surveyed, 92% agreed that masks were essential during the pandemic.
3) The type of mask used by the surveyed individuals is diverse ranging from surgical mask, 2 ply cloth face mask, N95 mask and those using more than one of the above types. The mask is replaced with a new one regularly (after every use or within 3 to 5 days) by a majority of those surveyed (72.66%).
4) Among those surveyed, 30.66% of individuals use it for less than an hour, 46.67% use it for 1 - 6 hours, and 22.66% of individuals use it for greater than 7 hours. A considerable portion thus use face masks for a large portion of the day.

B. Interpretation of data representing the health disturbances observed among the general population

1) Most of the questions required answers in a graded manner, with the options being 'Always', 'Sometimes' and 'Never'.
2) Among the subjects surveyed, 16.66% experienced discomfort each time they wore a mask while 56.66% of the subjects experienced it sometimes. 60.66% of the subjects express that the mask has been physically restricting them from breathing normally. A significant 89.33% of the subjects have complained of feeling suffocated following the usage of masks (18% experiencing it always and 71.33% experiencing it sometimes). Wheeze is another symptom noted in 9.33% of all subjects at all times and sometimes in 54.66% of the subjects surveyed.
3) Symptoms of light-headedness and nausea (37.33% and 30% of subjects surveyed have either always or sometimes experienced the respective symptoms) have been noted in fewer individuals as opposed to the respiratory symptoms which have been experienced by a significant portion of the subjects surveyed.
4) Among the subjects surveyed, 28.66% of individuals observed other symptoms following the usage of masks which include Fogging of spectacles or other eye wear leading to discomfort, Ear irritation and pain, Foul breath, Increase in acne, Itching and redness, Infection of the masked area, Runny nose, Excessive sneezing and coughing, which have been written in the order of most noted to least noted symptom among the subjects surveyed.
5) Subjects also expressed feeling more tired than usual, with 24% subjects experiencing it always and 54% subjects experiencing it sometimes. This could affect the individual's efficiency at work and reduce their productivity. Subjects have expressed avoiding tasks to prevent using the masks.

C. Interpretation of data from subjects previously diagnosed with respiratory diseases

1) Among the subjects surveyed, those previously diagnosed with respiratory diseases like Allergy, Asthma, Upper Respiratory tract infections, Pneumonia etc were asked if the Usage of masks has aggravated their condition. 12.5% of the subjects observed an aggravation of the condition while 62.5% of the individuals seemed unsure about the same. 75% of the subjects under this category have not approached a doctor or received medications after the appearance of the aggravated symptoms.

9. Implications

The pandemic has necessitated the use of masks as one of the primary modes of preventing contraction or spread of the disease. While the use of the masks has helped achieve the primary goal, the disturbances observed following the use of masks have been studied as a part of the project to help take an appropriate step towards reducing such disturbances. The use of masks is essential and hence other preventive measures need to be taken to reduce the occurrence of the observed symptoms and to make the duration of usage of masks more comfortable.

10. Solutions and Recommendations

The usage of masks is required during the pandemic and has been effective in preventing the spread of the disease among the individuals. The disturbances caused by the mask are to be prevented and controlled by means which do not involve the discontinuation of masks to limit the occurrence of new cases. The solutions which can be considered during this time include:

- Choosing the appropriate masks following the consideration of criteria (such as optimal performance, breathability, filtration, fit and reusability) as explained by WHO is essential to ensure less discomfort. Usage of masks with vents and valves have been discouraged by the global health organisations as they bypass the filtration function of exhaled air by the wearer.
- Method of wearing masks: Clean your hands before you put your mask on, as well as before and after you take it off, and after you touch it at any time. Make sure it covers your nose, mouth and chin.
- Disposability of masks: When you take off a mask, store it in a clean plastic bag, and every day either wash it if it's a fabric mask, or dispose of a medical mask in a trash bin.
- The fabric masks need to be regularly washed (at least once a day) in hot water and are to be kept hygienic to avoid certain dermatological conditions.
- Disposable triple layered masks are not to be reused.
- Distribution of masks: As reported by 27 State Rural Livelihood Missions (SRLMs), around 1.96 crore masks have been produced by the Self Help Group (SHG) members (as on 8 April 2020). Around 78,373 SHG members are presently involved in manufacturing of masks. Jharkhand SHGs were among the first to respond and have produced about 78,000 masks since March 22, 2020. These masks were being sold at the premises of various district collectorates and subsidised medical stores at an affordable price of Rs. 10. In Andhra Pradesh, 2254 groups of 13 sub-blocks of the district have followed the guidelines of the government for the manufacturing of cloth face masks. Similarly, Karnataka rural self-help groups have produced 1.56 lakhs face masks just in 12 days with their dedication to prevent the spread of disease in the state.

11. Scope for Further Research

- The survey was conducted online which limits the number of participants to those having access messaging platforms. The possibility of random errors is thus not eliminated. A personal mode of discussion could've enabled a reduction in the margin of error.
- The study aims to highlight the ill effects noted with the use of masks among the general population but doesn't put forth the cause of the same. This could thus be a topic for further research.
- An expansion of the number of subjects previously diagnosed with a respiratory illness could facilitate a greater understanding of the topic.

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