
A REVIEW OF MOST COMMONLY USED FACE MASKS DURING COVID 19

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ABSTRACT

An analysis of types of face masks that are available in the market. There is numerous research available regarding face masks, but choosing the best one is a tedious process. This analysis shows the ups and downs of face masks. This study covers only masks that are widely used in COVID times. A review of various research is compared to make this study. This study states the effectiveness of various face masks and how it causes trouble.

Keywords: Face Mask, COVID, N95, Surgical, WHO, KN95, Types, Activated Carbon.

I. INTRODUCTION

After the breakout of COVID SARS-2 in 2020, a new normal is introduced that includes wearing of face mask or face shield, hand gloves and healthcare workers sometimes in the situation of wearing Personal Protective Equipment (PPE). In these three, using a face mask is high since the nose plays an important role in carrying atmospheric oxygen to the body. So, there is a huge possibility of pathogens entering through the nose. Hence mask usage is increased incredibly but people face many discomforts when using prolonged time. The air that is inspired should have an optimal temperature with high oxygen concentration. Enough oxygen is also needed to get inside the body. Approximately an average adult breathes up to 10000 litres of air every day. By naturally, the nose has fifty percentage of airway resistance for entering the airway, but when wearing the mask, it will be affected. All of these parameters help for the homeostasis of the human body [1].

The temperature of breathing air can range from -50°C to 50°C [1]. It is usually based on the temperature of the surrounding area. Since this survey only covered south India, the local temperature may range from 24°C to 47°C. The breathing air also contains water, it is called absolute humidity. This varied depending on atmospheric temperature and barometric pressure [2]. The body heat helps to raise inhaled air to make higher absolute humidity [2]. This is a common respiratory mechanism of the human body. All these natural acts of the human body may be changed by wearing a face mask but the face mask is vitally important to prevent SARS-COV-2 and for protecting people from this deadly virus. Since SARS-COV-2 spread rapidly through the air, it is much important to wear a face mask. The World Health Organisation (WHO) also suggest people for wearing a face mask to avoid the widespread of disease [3].

By Antonio Scarano and his study, facial discomfort and increase in facial skin temperature are higher in N95 masks when compared to surgical masks. Hence there is a huge possibility of high temperature below the face mask which can lead to dry airflow [4]. According to Raymond Roberge and his study, an increase in thermal perception is the main reason for the hardship of wearing an N95 mask [5]. A study in SRM Medical College Hospital by Purushothaman and his team, states that prolonged wearing of face masks can make considerably high discomfort to the user which can also lead to decreased efficient use of a mask [12]. Based on these types of previous studies and for providing wholesome data about all masks, we made an analysis regarding good and bad about the face mask that is currently available in the market.

II. BODY'S NATURAL DEFENCE SYSTEM

A moderately active person in a daytime breathes the air of weight that is more or less equal to 20 Kg or 44 Pounds. This may contain dangerous particles and gases including pollen, viruses and bacteria or any other allergens [6]. One of the human body's respiratory mechanisms is cilia. Cilia is a tiny hair-like structure that is present in the track of the airway which moves/propels pathogens and mucus in that way [8]. Mucus traps particles like dust and microbes for preventing them to reach the lungs. A trapped particle is moved out of the body with help of ciliary movement. A type of leukocyte (White Blood Cells) that is present in alveoli is called

alveolar macrophages. These macrophages in alveoli will trap foreign particles and ingest them in order to kill them [6]. The ingested particle is eliminated as toxic-less components. The body's heat mechanism is also the response of foreign particles in the body, sneezing and coughing are also part of the defence mechanism.

III. TYPES OF FACE MASKS

The face mask is one of the most using things nowadays. It is used by all types of people like Doctors, Medical workers, Students, Academic professionals, etc. There are different types of face masks available in the market at different filtering sizes, levels, and shapes. Every mask has its own advantages and disadvantages. The following are the types of marks available in the market.

1. Cloth or Fabric Face Mask

A cloth face mask is made of common textiles, usually cotton. The World Health Organization (WHO) recommends the public to wear a three-layer cloth face mask. In the three-layer fabric face mask, the inner layer should be absorbent material, like cotton. The middle layer is made of non-woven material like polypropylene generally a type of non-woven used as a filter or barrier. The outer layer must be non-absorbent material, like polyester or polyester blend. The WHO also recommends not to use fabric face mask which has poor filtration ability or sensitivity to washing and which is made of silk or gauze [7]. One of the advantages of using a cloth face mask is it is comfortable to wear as well as for breathing. It is reusable; washable; this makes fabric face masks can be used again and again and the cloth mask is an eco-friendly one. Particularly it protects the user from bacteria and viruses by filtering the air we breathe. The disadvantages of cloth mask are it creates high respiratory illness. It protects partially from the microorganisms that cause infections.

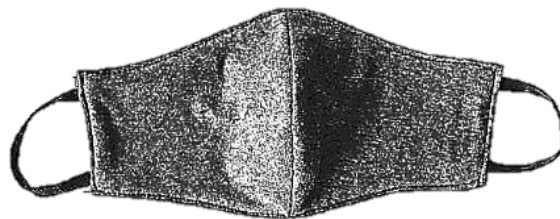


Figure 1: Example of Cloth Mask.

2. Surgical Face Mask

A Blue surgical mask is one that is widely used by medical professionals. The surgical face mask is recommended to the public for preventing the spread of SARS-COV-2 and other air-borne diseases. It is one of the safest masks to wear. It is made of non-woven fabric, which gives better bacteria filtration and airflow when compared to woven cloth. This type of mask helps to block large-particle droplets, sprays, and splashes that contain infection-causing micro-organisms. It also reduces the exposure of the user's saliva and respiratory secretions to the environment. The important feature of a surgical face mask is it easy to breathe through it and wear. But it has poor shielding and doesn't give protection for the user from the viruses or bacteria that are smaller than the sizes of the pores in the mask. It can't be used again and again; it is a single-use mask. Another main disadvantage of a surgical face mask is all surgical masks are disposable, and not reusable.

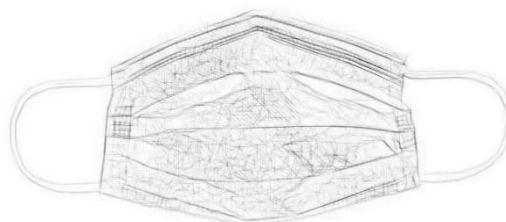


Figure 2: Example of Surgical Mask.

3. N95 Respirators

An N95 respirator mask is a highly used mask in this covid 19 pandemic days. N95 respirators are capable of filtering 95% of microorganisms that spread in the air [10]. This face mask removes over 90% of the dust

particles in the inhaled air [9]. It is used in high-risk healthcare areas where people are exposed to airborne or droplet transmission. This mask consists of two layers of spun-bound propylene and melt-blown propylene or polyester/cellulose. It can filter 99.7% of airborne microorganisms that are larger than 0.1 microns. The best face mask for healthcare workers who work in the most contaminated areas is N95 [9].

The main advantage of the N95 respirator mask is its design which leads to achieving a very close facial fit and very efficient filtration of bacteria and viruses that cause infections [11]. The edges of the mask are designed to form a complete seal around the nose and mouth. This type of mask is non-reusable, it must be disposed of after the loose seal or any deformation in the mask design. While wearing an N95 mask the user has little discomfort with breathing when compared to other masks. And it is a high cost compared to other masks available in the market. It doesn't give protection against oily aerosols and fumes.



Figure 3: Example of N95 Respirator.

4. KN95 Mask

The KN95 mask possesses the same characteristics as the N95 mask. The KN95 mask is authorized by the Food and Drug Administration (FDA). Basically, KN95 is manufactured by a Chinese company whereas N95 is from the United States. These undergo various testing that proves the KN95 mask gives 95% protection from particulate matters.

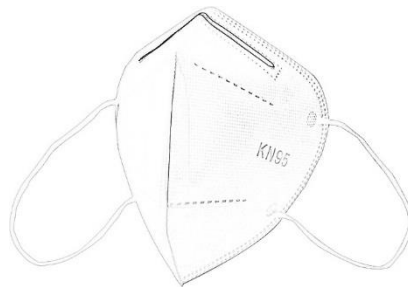


Figure 4: Example of KN95 Respirator.

5. Activated carbon mask

An activated carbon mask is a very high filtration 3-to-4-layer surgical mask that is made of electrostatically charged filters and implanted with activated carbon. Activated Carbon is added to a surgical or N95 mask or an additional layer in a cloth mask to make an activated carbon mask. The main advantage of an activated carbon mask is it filters the bacteria and viruses effectively and it absorbs Odors, formaldehyde, and slightly toxic gases. But the biggest disadvantage is the permeability of air inside the mask is very low. An activated Carbon mask may induce an allergic reaction in some people's nasal and facial areas.

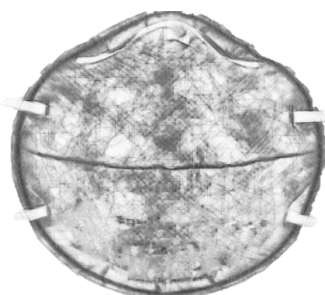


Figure 5: Example of Activated Carbon Mask.

IV. CONCLUSION

Currently, there is no mask in the market that can provide 100% efficiency against viruses. In addition to the body's defence and immune mechanism, face masks provide extra support. Every mask has its own advantage and disadvantage. Dependent on the user's situation, place, surroundings, environment, body adaptation, allergic reaction, breathing capability and ability to wear a face mask for a long time, they can choose the best suit mask for them.

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