

FACE MASK HEALTHY OR UNHEALTHY- A REVIEW

¹N.Naveenaa, ²Leslie Rani, ³M.P.Brundha

¹*Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India.*

²*Lecturer, Department of General Pathology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India.*

³*Associate professor, Department of General Pathology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai, Tamil Nadu, India.*

¹151801079.sdc@saveetha.com

²leslieranis.sdc@saveetha.com

³brundha.sdc@saveetha.com

ABSTRACT:

The facemask is a personal protective equipment which is used to prevent the droplet or aerosol spread. Due to the pandemic spread like SARS, COVID-19 the mask is recommended to be worn by all the people to prevent the infection. It is one of the non-pharmaceutical ways of prevention, it helps in controlling the spread but not in complete eradication of the disease. This is a widely used way of prevention, which is cheap, non-invasive and has capacity to reduce the mortality rate due to respiratory infection. The major problem associated with these equipment are, they are commonly misused and they go out of stock even before the health care sector receives these equipment. So proper selection of masks is required to prevent the infection and also to reduce the demand of masks in the health sector. The aim of this review is to understand the importance of masks and needs of the personal protective equipment during the onset of any pandemic conditions. A systematic search strategy was done and the articles were found using keywords. Literature was taken from databases like PubMed and Google Scholar. The articles which discussed face masks were included and other articles which had the different types, advantages and disadvantages were also included. The review summarises the needs and the urge to use a face mask at the onset of pandemic condition. Selection of proper mask is emphasised to reduce the demand of masks.

KEYWORDS: Control; Infection; Protection; Personal Protective Equipment

INTRODUCTION:

Personal Protective equipment includes masks, gloves, gowns, goggles, face shield which are used to prevent the spread of infection, blood spill [1] and contamination. Masks are generally a protective wear which functionally protects us from airborne contamination. It acts as a key in controlling the respiratory droplets infection released via coughing[2]. This non-pharmaceutical way of prevention helps in the control of early spread of disease in the population where the pharmaceutical way of prevention includes vaccines [3,4], medicines, which are more effective than the non-pharmaceutical interventions [5]. Facemask application, hand hygiene were highly preferred as a primary protection from diseases like influenza [6]. Now due to the COVID-19 pandemic the use of facemask is highly recommended by the general population [7] which was widely seen in countries like the United States, Canada. The WHO recommends the importance of facemask and it must be used even by the general population for protection [8].

This is a widely used way of prevention, which is cheap, non-invasive and has capacity to reduce the mortality rate due to respiratory infection. There is increased evidence of people with either showing no

symptoms or pre-symptomatic conditions, who act as a major contributors of the infection [9]. The facemask helps in minimizing the risk of community spread by protecting against the respiratory droplets which are transferred from the infected and the symptomatic ones [10]. For a viral disease, it can be identified 1-2 days before the onset of symptoms in the respiratory tract where the severity of the disease could prolong from 8 days -2 weeks [11] so it is better to wear a mask as the symptoms could be late even on the early onset of the disease. As there were many pre symptomatic, asymptomatic transmissions have been reported in China and in the USA [12]. Each country has provided their own recommendation for the use of facemask when they go out in public areas.

Even though the mask being a personal protective equipment, it still doesn't reduce the transmission of disease to the general population as well as the healthcare workers [13][14]. It is also important to note that there must be a focus on preventing the cross infection which occurs from the poor infection control of these equipment [15]. In the COVID-19 pandemic, the standard precautions for infection control were not initially stabilized as the rate of the spread increases due to the lack of personal protective equipment and infection control, the government has themselves made a mask as a certain one for the protection of droplet spread [16]. The major problem associated with these equipment are, they are commonly misused and they go out of stock even before the health care sector receives these equipment. So the rational use must be done so that the resources reach everyone. It is also very important that once if a person shows any symptoms of infection they mustn't hesitate or shouldn't have anxiety or fear [17] to approach a doctor as that could result in a huge spread of infection so checking oneself's health regularly by visiting a doctor is very important [18]. And one should also not hesitate to take a blood test [19] to confirm the presence of any kind of infection [20,21].

This review is done to analyze the need, importance of facemask and whether they play a role in protection of infection during a pandemic outbreak. As there are many personal protective equipment like masks, gowns, gloves and each one has its own protective action against the infectious agents. So this review will emphasize more on the mask, who and why do they need it and the benefits and challenges faced.

NECESSITY OF A FACEMASK:

Due to the severe outbreak of Severe Acute Respiratory Syndrome (SARS) and the COVID-19 the use of facemask has become national guidelines all over the world and the importance of using masks is recognized not only by the health care workers but also by the general population [22]. The facemask is an effective protective agent against respiratory infection which is commonly used by medical workers, which is used to prevent them from droplet infection which is a common mode of spread for respiratory infection [23]. The theory behind the mask is to prevent the viral spread from the infected person via inhalation the virus spreads, even from an uninfected person [24]. This facemask prevents even an airborne disease like pulmonary tuberculosis and also influenza. The scholars have recommended that a mask is necessary but on the other hand WHO doesn't recommend a mask due to lack of evidence.

The Centers for Disease Control(CDC) classifies the mask as the levels of operational status as conventional form, contingency and crisis [25]. The World Health Organization (WHO) recommends facemask for those who are active in sneezing, cough, respiratory infection and even a COVID-19 suspect and very importantly the health care workers [26]. It is very obvious that the need of a mask can't be reached by each and every person so the Centers for Disease Control(CDC) recommends making homemade masks which are used as a self-care protective measure which is used to prevent community spread [27]. The homemade face mask must satisfy certain needs that includes the shielding of the entire face and the side face which are guided by CDC.

In China during Covid-19 and SARS in December 2019 the transmission of droplets was avoided by the wide usage of masks and personal protective equipment [28]. Similarly in South Korea after the pandemic the positive cases were reduced by using facemask only. In Italy the face mask was not recommended earlier but then later it was recommended in the general population as the casualty was more [29]. Mask can't prevent infection completely but it can reduce the risk of being exposed. Health recommendations in Germany and Uk advices that the protective effect of a mask at community level is rare [30]. Due to the hike in face mask the ordinary mask can be reused and can be kept under sunlight to make sure that the wastage is not done [31].

WHO NEEDS A MASK? :

Mask is a protective agent which is used by the symptomatic or the one who is affected and most commonly by the health care officials, but now the CDC recommends even the common public to use, to protect the community spread and there might be individuals who could be asymptomatic, for their self-protection as well as for the prevention of the community spread mask is worn [32]. The vulnerable people who belong to the categories like the old people with different heart rate and respiratory rate, diabetic [33][34], hypertensive, immune compromised individuals must wear a mask when being exposed in crowded areas [35]. The World Health Organization (WHO) recommends the need of a mask for those with respiratory symptoms and a healthy person who might actually be a carrier [36]. The use of facemask must be discussed to meet the needs of people.

The facemasks are widely being used by the medical care workers to avoid the droplet infection and protect themselves from the infected ones. The infected ones must wear a facemask to reduce the risk of spread of infection to family, health care, even the general population. The Centers for Disease Control recommends the symptomatic ones to wear a mask and perform a self-isolation and self-hygiene to reduce the risk of spreading of infection. The World Health Organization (WHO) recommends the usage of medical masks for those who are symptomatic and also recommends not to use one when the person is isolated in a room [37]. N95 respirators and Filtering Facepiece (FFP) are commonly used by healthcare workers which has a better filtration capacity so helps in prevention of infection. The application of cotton masks in public is to avoid the community spread and is not used by the health care officials as the risk of exposing themselves to the infection would be higher, but they are used unless there is a high demand or shortage of masks. The usage of wrong masks by the public often results in the shortage of masks which reflects the health care as they would run out of supply.

DIFFERENT MASKS AVAILABLE:

In general the masks are available as medical and non-medical masks [38]. The masks are made up of different materials based on the needs which includes better filtration capacity, based on the material which includes a simple cotton mask which belongs to the category of non-medical ones, based on the fit of the mask and breathability of the material used.

COTTON MASK/ CLOTH MASK:

The cotton mask can be easily manufactured at home and used in community setting level of infection prevention [39]. The features which are considered in making a non-medical mask like a cloth mask includes the number of layers of materials used, the proper fit shape and even the breathing quality of the material. It is also shown that according to the current scenario the cloth mask is now used in the middle and low income countries to prevent the infection [40]. The most terrifying fact was that cloth masks were used by Chinese healthcare workers during the outbreak of severe acute respiratory syndrome(SARS) [41]. But still there is a lack of evidence which proves that cloth masks are not extensively used in high income countries but it is used during the adverse effects of using respirator for a long period of time.

MEDICAL FACEMASK:

They are widely used by the health care workers to avoid droplet infection and protect oneself from the infected ones while treating them [42]. These masks create a barrier between mouth and nose which are further classified as surgical, isolation, dental and medical masks [43]. They are available in different thickness which acts as a shield in prevention of entry of particles.

N95 RESPIRATORS:

N95 respirator on the other hand is a synthetic polymer based material which is designed earlier for industrial purpose. N95 respirator is an effective personal protective equipment which is featured to have a tight close facial contact and facial fit and better filtration of particles and also more efficient [44]. CDC recommends N95 respirator only for health care workers and must not be used in the generalized population [45]. This mask prevents the influenza[46], tuberculosis, SARS, ebola.

MASK MANAGEMENT:

Mask management is very important, similar to wearing a mask for infection control. So masks must be worn properly and disposal of these masks is very important [47]. The management of masks has certain protocols which includes touching the mask must be avoided when using it. While placing it, it should cover the entire mouth, nose and tie in such a way that there is a minimal gap. Single use masks mustn't be reused. Immediately dispose the single use mask after removing it. After removing the mask, hands must be washed by using alcohol based soap/hand wash. Don't wear the same mask for more than 6 hours.

MASK HEALTHY OR UNHEALTHY:

In a pandemic crisis like Covid-19 it is highly recommended to wear a mask but there are certain cases where masks must be avoided. It is not necessary to wear a mask during exercise as it restricts the flow of oxygen into our body which could result in shortness of breath and also tiredness [48]. Due to heavy exercise, our body increasingly sweats a lot and results in wetting of the mask. The adverse effect of the mask can trap carbon dioxide which results in suffocation, increased heart rate, and vertigo [49]. In Wuhan city of china, a 26 year old man experienced chest pain and when taken to hospital was diagnosed with lung collapse. It was later found that it was due to the application of a mask during jogging, which resulted in shortness of breath. On April 23, a driver from New Jersey crashed his car into a pole and it was found that the accident that occurred was due to N95 mask, which the driver wore for a long time and he lost his control due to insufficient oxygen and inhaling carbon dioxide for a long time. This mask can affect the immune system also causing acute carbon dioxide poisoning. So a proper test wear can be done to ensure proper breathing [50]. And most importantly people with lung disease are contraindicated in wearing a face mask as it can cause difficulty in breathing and asthma. So proper awareness must be created when to wear a mask, which is done to maintain social distancing to avoid the spread of disease but not during exercise. It is unnecessary to wear a mask when riding alone or even during a self isolation.

LIMITATIONS:

Though facemask is widely used as personal protective equipment it has various limitations which includes, the shortage of masks which is more common as the mask is wrongly used by the public as the need is still undetermined [51]. There exists a specific time duration in using a mask the more we use the same mask for more than 6 hours and treating patients without changing it results in infection only [51]. So in high risk exposure levels the wearing time must be reduced. There are higher chances that a symptomatic person wearing a mask could spread infection so in that condition self-isolation is important. Changing masks more often and hand hygiene and proper disposal which is hardly difficult for humans to practise. The higher filtering capacity needs a full fit of mask which is not seen in normal cotton and single use masks. Reusing the single use mask is commonly done. Frequently touching the face and the mask is irresistible by humans which causes high frequency of infection spread.

FUTURE SCOPE:

The pandemic conditions urge people to wear masks. The reusable mask has been attracted widely as there is a hike in production as well the cost of these masks. These masks can simply be washed and can be reused which plays a huge protective role at the level of community spread. The N95 mask and the medical masks can also be disinfected by using alcohol, dry heat method of sterilization, steam wet heat, ultraviolet disinfection. It's shown that the dry heat method of sterilization is optimally good as it does not damage the filter mechanism and the filtering capacity was also resorted. And the other methods aren't as effective as dry heat sterilization. If there aren't enough masks these methods can be considered and can be done to improve the conditions at the time of crisis. And proper awareness [52] of usage of mask must be done and the most vulnerable group which includes immunocompromised patients, prevalence [53] of illness, cancer conditions [54][55][56,57], diabetes and people having bacterial infections [58] and other oral and dental infections [59][60], anomalies [61] and abnormal physiological and pathological [62,63] conditions. Rational use can prevent all these problems and can help to cope up with the condition.

CONCLUSION:

Masks are the protective equipment which are extensively used to prevent the aerosol spread during the pandemic conditions like SARS and COVID-19. It becomes more healthier when it's widely used at the time of outbreak but there are people even after knowing the adverse effects of not using the mask, aren't so serious in wearing it. It is very important to know where masks must be used, how it should be handled and finally disposal of them. And the rational usage of masks is so important as there is an acute demand for masks even in the health care sector. So precise selection of masks is very important to avoid such demands. So it is important to use these personal protective equipment in order to stay healthy and avoid the spread of disease.

ACKNOWLEDGEMENT:

We thank Saveetha Dental College for providing a platform to express our knowledge.

AUTHOR CONTRIBUTION:

N.Naveenaa executed the research work, data collection and drafting of manuscript. Dr.Leslie Rani.S contributed to the concept and design of the study and validation of the data as well as did the proof-reading of the manuscript. Dr.Brundha M.P was involved in revision and proof- reading of the review.

CONFLICT OF INTEREST:

None to declare

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