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A Step to Overcoming Mask Crisis in India during COVID-19 Pandemic

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ABSTRACT

The advent of the coronavirus in India has forced several with its third month in India. The coronavirus has made several changes in the country be it new policies and guidelines for health departments or educational material for the general public. The tragic condition especially in Italy and china due to COVID-19 has created a worldwide panic and India is not exempt. This has led to a shortage of essential items including the facemasks and hand sanitizers. Irrespective of the actual need people tend to buy, collect, and store the best available masks for themselves leaving a huge scarcity of the N-95 and surgical masks in the market for the health care providers. Despite the number of advisories on the use of masks by the health care providers and the general public the consternation among the latter doesn't seem to end. The data for writing this review paper has been taken from various government websites, WHO int., journals, reports, published and unpublished data. Several guidelines and teaching videos for making homemade masks by the national and international organizations have been made in an attempt to curb the panic among people regarding the masks. The N95 masks being scarce in quantity should be left for use by the health care providers and the general public can use the home-made cloth masks. This paper is to review the existing masks available and the guidelines by different organizations regarding the use of masks.

Keywords: coronavirus, facemask, pandemic, policies, respirators, mask crisis, COVID-19

INTRODUCTION

The world got its first case of novel coronavirus also known as COVID 19 on 30th December 2019 from Wuhan city of China when a case of pneumonia from unknown origin was notified by China to the World Health Organization. [1,2] India registered its first corona virus-positive case on 30th January 2020 from Kerala. [3] The WHO declared the coronavirus infection as a public health emergency of international concern on 30th January 2020. [2] By 8th April 2020 the country had registered 5194 cases (4643 active cases, 401 cured/discharged, 149 deaths and 1 migrated). [4]

With the exponential rise of cases in India, the panic among people regarding the essential items has been seen. [5] Despite the nationwide address by the honorable prime minister of India regarding the list of things that will remain operational during the 21 days lockdown the people are still apprehensive about the COVID 19 pandemic and are making every effort to hoard the things which have led to a shortage of some of the things such as face mask, hand sanitizers, etc. [6,7]

From time to time the Advisories by World Health Organization, Government of India and Ministry of Health and Family Welfare has been there on the internet and social media groups for educating the

people regarding the containment of the spread of transmission of Coronavirus infection. The WHO has released advice regarding basic protective measures against new coronavirus which includes washing hands frequently, maintaining social distancing of 1 meter, avoiding touching eyes, nose and mouth, practicing respiratory hygiene and seeking medical care in case if one has a fever, cough and difficult breathing. [8]

Sources for review articles: The authors have tried their best search for the authentic data to be reviewed and published for adding to the existing knowledge regarding the use of the mask in COVID 19 pandemic. Following sources were taken into consideration while writing the current review paper such as, the website of Ministry of Health and Family Welfare, Government of India, website of World Health organization, the website of Centre for Disease Control and Prevention, advisories by the Government of India released from time to time, the website of Canadian centre for occupational health, various online newspaper for daily changes in advisories and current situation of logistics in the country.

Review of existing mask in India: India is the second-largest populous country in the world and hence the demand for personal protective equipment in the current COVID 19 pandemic is also more as compared to other nations. People are panic- buying these PPE especially the face masks which led to the out stock of masks in the Indian market. Currently, there are three main types of masks available for use in India respirators (N95, N99), surgical masks and cloth masks.

Respirators: These are the single-use respiratory protective devices that are highly efficient in preventing the particle size up to0.3 micron to enter the respiratory system. They include the N-95,N-99,N-100. N; is a respirator rating letter class. N-stands for the non-oil (these can be used in presence of non-oil particulates) others are R (resistant to oil) and P (oil proof). The numerical value following the name represents the efficiency of the respirator e.g. the N95 respirator can efficiently block 95% of the particles. The edges are designed in a way that the respirator achieves the close facial fit. The filtration material on the mask is an electrostatic non-woven polypropylene fiber. These are recommended for use in case of respiratory diseases. The disadvantage with these masks is that they are uncomfortable to wear, breathing difficulties, costly and non-reusable. Some respirators now come with an optional exhalation valve which reduces the exhalation resistance and makes breathing easier. [9,10]

Surgical masks: These are the single-use facemasks routinely worn by the health care providers in health facilities. They can act as a physical barrier between the mouth and nose of the wearer and potential contamination in the environment. They have different thicknesses and different abilities to protect one from contact with liquids. If worn properly a surgical mask blocks large-particle droplets, splashes, sprays or splatters. They catch the bacteria shed in droplets and aerosols from the wearer's mouth and nose. They are not designed to protect the wearer from inhaling airborne bacteria or viruses and are less effective than the respirators. Usually, the masks are three-layered and are made up of a melt-brown polymer, mostly polypropylene placed between the non-woven fabric. The disadvantage of these masks is that they are used only once, breaks easily on pulling the strings, and don't snuggly fit around the face which leaves gaps for air to flow through them. [9]

Cloth mask: These are the masks made up of cotton or other similar fabric from household items with four strings attached to the rectangular piece of cloth used for protection against microorganisms. These can be washed and reused again and again. The masks can be made at home and are recommended as the last option for use when other sources deplete. The disadvantage with this type of mask is that

their pore size is large enough to let pass the big microbes also but it is still a beneficial protective gear to prevent the entry of big droplets, splashes etc. [11]

The efficiency of masks can be increased when combined with frequent hand cleaning with an alcohol-based rub or soap and water. For wearing masks one should know the proper method of using and disposing of**.** [12]

A study by Davies et al 2013 tried to sequence the household material to be used as masks against the bacterial and virus aerosols. The study isolated the number of microorganisms from coughs of healthy volunteers wearing the homemade mask, surgical mask, and no mask. Two parameters were considered which rating the material 1) percentage of particles passed through the material 2) breathing comfort with that material on the face. The median fit factor for homemade masks was half that of the surgical mask. And the surgical mask was three times more effective in blocking transmission than the home-made mask. The study concluded that a two-layered pillowcase and 100 percent cotton t-shirt (2 layers) are the two best materials close to the surgical mask for which can be used as the material for making masks and it would be better to wear homemade e masks than no protection. [13] A systematic review of the scientific evidence on the use of the mask and respirators to prevent transmission of influenza by Bin-Reza et al found that six out of eight Randomized control trial found no significant difference between control and intervention group (mask with or without hand hygiene; N95/P2 respirators. [14]

A study by Yan et al used the risk assessment model developed earlier in general form to estimate the effectiveness of different types of protective equipment in reducing the rate of infection in an influenza outbreak. They concluded that with 50% compliance in the donning the devices the risk can be decreased for fitted and unfitted N95 respirators, high-filtration surgical masks and both low- filtration and high-filtration pediatric masks. Further, they found that an 80% compliance rate can eliminate the influenza outbreak. [15]

Tracht et al constructed and analyzed a mathematical model for the population in which some wore facemask during the pandemic to quantified the impact of these masks on the spread of influenza using available data for studies on N95 respirators and surgical masks. The study found that N95 masks are 20% effective in reducing susceptibility and infectivity and only 10 % of the population has to wear the N95 respirators to reduce the number of influenza cases by 20%. Further, the study concluded that if worn properly facemasks are an effective intervention strategy in reducing the spread of the pandemic. [16] A systematic review and meta-analysis by Offeddu et al found that N95 respirators provide superior protection against clinical respiratory illness and laboratory-confirmed bacterial infections nut not against lab-confirmed viral infection and influenza-like illness. [17]

The centre for disease control and prevention has not recommended the general public to use the N95 mask for protecting themselves against respiratory infections including coronavirus due to critical supplies of these items and they must be reserved for use by the health care workers and other health care providers. [18] Further, the CD has recommended the use of cloth face mask in areas where there is significant community transmission. [19]

The Government of India and the CDC have issued the manuals showing steps for making masks using homemade material at home which has been recommended by these authorities for use in this COVID-19 pandemic. The CDC has given steps for making sewn cloth mask (10*6 inches rectangular cotton fabric, two 6 inches pieces of elastic, needle and thread, scissor and sewing machine) quick cut T-shirt cloth mask (t-shirt and scissor), no sewn method of bandana cloth mask (20*20* inches bandana, coffee filter, rubber bands and

scissors if you are cutting your cloth). [20]

A manual for the homemade mask was issued by the office of the principal scientific advisor to the Government of India on March 30, 2020 for making homemade masks. The manual has described sewn method (100% cotton fabric, four pieces if cloth strip, scissor, and sewing machine) and unsewn method (100% cotton material or a men's cotton handkerchief and two rubber bands) of making masks which can be used repeatedly after washing and drying in sunlight. The manual has also mentioned precautionary steps for wearing handmade masks. [11] Similarly, guidelines have been issued by the WHO on when and how to use mask. [8]

CONCLUSION

Knowledge about masks in the current COVID-19 Pandemic situation is important for everyone for the optimum and sagacious use of the masks. The use of masks by the general public should be rational and need-driven to ensure enough resources for the people having the first-hand contact with the COVID-19 patients. Any kind of mask is better than not having any for preventing the spread of COVID-19. The knowledge thus generated can be implied for similar future outbreak.

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