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Mask Mouth: A Silent Threat to Oral Health

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ABSTRACT

Today, the world is facing the deadliest global pandemic, and somehow, everyone is fighting for their lives. The coronavirus being an airborne communicable disease, has created havoc among the population. The best possible way suggested to protect one is by staying indoors and using protective gear such as mouth masks, face shields, etc. As we cannot stay indoors forever, the one possible solution left to keep oneself safe while working outside is through protective gear. Among them, the most economical and easily available product is mouth masks. Mask culture has taken its place in daily life, and it is not known how long it will continue. During this pandemic, the oral health of the individual is highly neglected. However, due to negligence and poor hygiene practices, this protective tool poses another hidden threat. This opportunistic condition known as *Mask Mouth* is a rising global threat in the world of dentistry. Every individual harbors a biome for a variety of oral flora. Irregular and improper usage of masks provides this flora to bloom and causes various oral conditions. The long-term wearing of masks, mouth breathing, and poor mask hygiene provide adequate moisture and temperature for oral bacteria to grow, leading to different oral diseases. It can be stopped because it is preventable because the threat is real and needs to be addressed at the right time.

Keywords: Coronavirus, mask, oral health



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INTRODUCTION

Face masks were earlier utilized only by healthcare workers to defend themselves from airborne diseases and as a sanitary practice.^[1] In recent times, due to the widespread of the coronavirus, mouth masks and face shields have turned out as clothing accessories, worn every day and everywhere. As recommended by the Centre for Disease Control (CDC), masks should cover the nose and mouth and secure under the chin and fit snugly to the sides of the face. Masks covering the mouth are quoted as mouth nose covering or mouth masks.^[2] Respiratory masks are shielding devices covering a major part of the face. They are designed such as to defend both the one who wears them and the proximate environment from respiratory pollutants (respiratory poisons or bacterial/viral pathogenic organisms). However, its prolonged use has resulted in a new oral condition known as "Mask Mouth."^[3] The maintenance of oral health has always been a matter of concern over the years. People often face different oral problems like bad breath eventually, but the wearing of masks has made it more rampant. Not just bad breath but it also causes other dental problems such as tooth decay, xerostomia, and gingival inflammation. Even people with no past dental history are confronting the problem of gingival inflammation and cavities. In the latest study, it was found that 62.3% of the study population experienced trouble breathing due to excess wearing of mouth masks, while 37.9% sensed dry mouth (xerostomia), 34.7% bad breath (halitosis), and 2% bleeding gums. In addition, 33.4% noted a reduction in the volume of water consumption (dehydration) after wearing the mask.^[3-4]

This review is aimed to evaluate the increasing incidence of mask mouth, symptoms, and preventive measures.

HISTORY AND EVOLUTION

In 17th Century Europe, with an extended cloak and grotesque bird-like mask, the “plague doctor” was a distressing sight.^[5] The unconventional headpiece served as a primitive “gas mask” for physicians designed to guard its wearer against the unpleasant smell associated with the plague. In 1910-1911, the pneumonic plague hit Manchuria. Lee et al., a Chinese doctor, was assigned by the Chinese court to head anti-plague efforts.^[6] The researcher concluded that the disease was transmitted through airborne contact and recommended the usage of masks as a prophylactic measure that should be sported by everyone to defend themselves from the plague.

The Spanish Flu epidemic reached India in 1918 as the Bombay fever.^[7] People started the practice of covering their faces with rags and covers to protect themselves. In the early 1920s, masks became compulsory in operating rooms. Since then, medical researchers continued to experiment with designs and materials. Masks are crafted by layers of cotton gauze, occasionally with an additional layer of impermeable material held by a metal frame. Most masks are washable, and therefore the metal parts might be sterilized and “thus permit the utilization of the mask for an extended time,” the US inventor explained. During the influenza epidemic in 1934, those infected wore masks to stop the spread.^[8] Masks became a figure of social courtesy. After World War II, the damming air pollution took over Britain, especially in London, forcing Britons to wear “smog masks.”

TYPES

Cloth Masks

These are non-medical masks manufactured from a range of woven and non-woven fabrics.^[9] They can be of various combinations of materials and layering sequences and are available in diverse shapes, which end up in variable filtration and breathability. A non-medical mask is not a medical device or a piece of personal protective equipment.

Medical Masks

Medical masks are surgical or procedural masks that are flat or pleated; they are attached to the top with bands that go around the ears or head or both.^[10] A disposable surgical mask acts as a fence between the mouth/nose and polluted air. These masks protect from numerous types of contaminants, counting on the thickness of the fabric used.

Filtering Facepiece Respirators (FFR) or Respirators

Respirators can be categorized as disposable half masks, elastomeric half-piece face masks, or elastomeric full-piece face masks.^[11] A widely used type in health-care setups is disposable half-mask FFRs.^[12] These are not habitually used. They play a key role in high-risk conditions, like during aerosol-generating procedures on patients with respiratory infections.^[13]

N95 Respirator

It is a disposable half-mask filtering facepiece respirator that is the most extensively used FFR.^[14] CDC has suggested N95 masks, along with other protective gear to be used by health-care professionals while performing on the front lines.^[15] It should not be worn below the nose or chin or tugged on the head. In doing so, the inner portion of the mask gets contaminated, elevating the risk of getting infected once it is worn back.^[16]

Half Piece and Full Piece Face Mask Respirators

These are tight-fitting elastomeric respirators, in which the face pieces are made of artificial or organic rubber material and can be cleaned, sanitized, stored, and reused.^[10] The filter media is adequate to eliminate droplet and viral size particles when worn properly for the extent of the contact.

Edelweiss Virustatic Shield

The shield has an exclusive Viruferrin antiviral coating which in combination with the base material forms a protective face covering.^[17] The protein overlay imitates the body's immune system to deceive and inactivate viruses. It can be worn 50 times more than a disposable single-use mask. It can be cleaned and reused. The Virustatic Shield can be handled from both sides.^[10,18]

Mask Mouth

Mask mouth describes the variability of oral diseases caused by wearing a mask for a prolonged period.^[19] Mask mouth includes xerostomia, halitosis, caries, and even gum diseases. It is not an official diagnosis but has developed as a common phrase used to describe the rise in dental problems resulting from increased mask-wearing. Mask mouth was termed after “Meth mouth.”^[20] By some estimates, almost 50% of dental patients reporting for treatments are experiencing indications of mask mouth. Patients that have had a history of healthy teeth and gums are now showing problems, but they are not due to deprived dental hygiene. Instead, they are immediate results of mask-wearing. The principal trigger is increased dry mouth due to diminished salivary flow and amplified mouth breathing beneath the mask. Mouth breathing

causes dryness of oral mucosa and diminished salivary flow. A recent study showed that of the people who use mouth masks, 16% dealt with bad breath, while 22% experienced dry mouth. It also stated that if the number of participants had been more, the percentage might have been higher.

SIGNS AND SYMPTOMS

Xerostomia

Xerostomia is described as dryness of the oral cavity resulting from reduced or absence of salivary flow.^[19] It is a symptom of numerous medical conditions. It may or may not be associated with reduced salivary gland function. It is an ordinary complaint found among mature adults, but due to current trends, it is also seen in the young population. When we wear a mask, our nose gets partially closed, and we tend to breathe from the mouth, which successively results in a dry mouth. Most teenagers and adults have a habit of mouth breathing and which adds up to this condition.^[21] Diminished salivary flow triggers adversities in savoring, chewing, engulfing, and speaking. It also increases the prospect of developing caries, demineralization of teeth, tooth sensitivity, and/or oral infections. In addition to keeping tissues moist and helping to digest food, saliva cleanses the mouth, makes it possible to masticate and swallow food, eases oral sugar clearance, and aids as a buffer that protects oral mucosa against orally ingested acids or regurgitated stomach acid.

In patients with Xerostomia or dry mouth, an oral inspection may look dry and frangible oral mucosa, and the tongue may appear dry and fissured.^[22,23] Patients may usually have caries (especially the root, cervical, or incisal/cuspal tips), plaque accumulation, gingivitis, and/or periodontitis. Opportunistic infections (e.g., oral candidiasis) and enlargement of salivary glands from sialadenitis can also be present. Other oral manifestations evident on examination may include angular cheilitis, mucositis, traumatic oral lesions, and/or difficulty in wearing/retaining oral prosthesis.

Tooth Decay

Patients having dry mouths are at a greater risk for progressing caries due to loss of salivation.^[24] Decreased salivation leads to an increase in the acidity of the mouth, which upsets many dynamics such as the rise of acid-generating bacteria, failure to buffer the acid formed by bacteria or from consumed foods, demineralization of tooth surfaces, and incompetence to replace the lost minerals and loss of lubrication which ultimately results in the advancement of caries.

Periodontal Diseases

The scarcity of saliva triggers the surge of periodontal disease in patients.^[25] Along with helping us speak, digest our food, and keep our mouth lubricated, saliva cleanses the oral cavity from harmful bacteria, including periodontal pathogens. There is a direct cause-and-effect affiliation between the shortage of saliva and the rise in oral bacteria. As one study found, xerostomia is associated with dental plaque formation.^[26] The plaque results in gingivitis which, if deferred treatment, can lead to periodontitis. The saliva also aids in keeping the tissues of the oral cavity healthy and unharmed by retaining moisture and staying hydrated.^[27] Without it, they are vulnerable to damage and can cause ulcers, abrasions/cuts, and seldom ripping of the external layer of epithelium.

Bad Breath or Halitosis

Halitosis has multifactorial origins and is found in 90% of cases.^[28,29] While wearing masks, the temperature in the oral cavity may surge to 37°C (and altered between 34°C and 37°C), and also humidity may reach up to 96% (and altered between 91% and 96%) in exhalations. These conditions provide an appropriate atmosphere for bacterial progression. Around 500 bacterial species are instituted in the oral cavity and a maximum of them are proficient in producing odoriferous compounds which cause halitosis. In such circumstances, deprived oral hygiene plays a significant role in the progression of halitosis, causing bacteria and increased oral malodor.^[30] These bacteria comprise mostly Gram-negative species and proteolytic obligate anaerobes, which mainly retain in tongue crust and periodontal pockets.^[31] Among fit individuals with no record of halitosis and periodontal diseases, few display halitosis due to the retention of bacteria on the tongue coat.^[32] These bacteria decompose organic substrates (such as glucose, mucins, peptides, proteins existent in saliva, crevicular fluid, oral soft tissues, and debris) and yield odorous compounds.^[33]

Dehydration

Trying to stay hydrated and often drinking water while sporting a mask can be a troublesome compromise.^[34] It becomes just another reason to overlook the consumption of fluids all day long. Based on some recent studies, 53% of healthcare workers report dry mouth and 66% stated a sense of dehydration.^[35] Another study conducted showed the consequence of wearing the mask on the volume of drinking water consumed, in which 32.1% feel that they consumed less water during the usage of mouth masks, 16% were not certain of the volume of water they drink, 51.9% people felt sporting a mask did not affect the volume of water consumption. After wearing a mask, 33.7%

of individuals felt that they drank less water than without a mask, 31.4% drank the same volume of water as with a mask, 20% did not notice any significant change in the volume of water consumption, and 14.7% felt that they drank more water.^[3]

Headaches and Altered Breathing Pattern

Headaches associated with extended usage of masks are often attributed to mechanical factors, hypercapnia, and hypoxemia.^[36] Tight-fitting masks cause scarce ventilation and elevated concentration of carbon dioxide (CO₂), which is referred to as hypercapnia. As CO₂ is an identified respiratory stimulant, accumulation of respired CO₂ between the mask and face causes enhanced lung ventilation and respiratory activity. The increased level of CO₂ promotes the progression of anaerobic bacteria flora of the mouth resulting in various oral discomforts.^[37] Mouth breathing decreases the volume of saliva, which plays an essential role in sustaining oral health by washing away food debris and protecting teeth from cavities.^[38] The habit of mouth breathing while sporting a mask seems reasonable because this kind of breathing pattern balances the increased breathing resistance, particularly when inhaling through the masks.^[39]

A present study showed that the most frequent ailment reported was trouble in breathing as experienced by 62.3%, tailed by dry mouth at 37.9%, halitosis at 34.7%, and bleeding gums at 2%.^[3] A total of 400 people participated in that study, of which 69% were females, whereas 31 % of the total study group was male.

PREVENTION

Even if certain symptoms are experienced, wearing masks are advised. Because wearing masks slows the dispersion of the virus and helps protect the vulnerable in the community.^[1]

Implementing some of these preventive measures can help curb the evolution of this condition.

- Focus on the oral care routine: Brushing the teeth for 2 min twice a day and cleaning between the teeth with floss or other interdental aids once a day is recommended.^[40] Make sure to use the correct brushing methods to clean all the mouth's nooks and crannies.
- Regular use of mouthwash to refresh breath and combat bacteria between cleanings: Ask the dentist to suggest a mouthwash that does not intensify dry mouth.^[41]
- Chewing sugar-free gum helps eradicate food debris and thus mends bad breath.

- Stay hydrated: Drink water during the day to help prevent dry mouth and dehydration.^[37]
- Use a clean mask: Frequently change or clean masks to avoid bacterial growth.^[42]
- Cleansing the mask regularly or throwing the mask after each use.

CONCLUSION

Oral health is considered the mirror of a healthy body.^[43] Throughout the coronavirus pandemic, the oral health of the individual has been highly neglected. Mask usage, which originated as a protective tool, has become an obligation for everyone, and its improper usage is playing the part of the risk factor for many opportunistic health conditions. Mask culture has taken its place in daily life, and it is not known how long it will continue. The need of the hour is to recognize this threat today as it will affect our health tomorrow. Mask mouth is real and is affecting us silently as people are ignorant and turn a blind eye towards this common condition. As the saying goes "Prevention is better than cure," mask mouth is a preventable condition and can be prevented by one's own efforts to maintain his/her mask and oral hygiene. If experiencing any oral problems from the prolonged use of the mask, contact a dentist immediately. General awareness about this hidden evil should be created. The shield (mask) should be made in use to defend ourselves rather than help the enemy (mask mouth) to harm us.^[1,2]

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