Role of Molecular Iodine in SAARS Cov2 prevention

Introduction

Ocular tropism of respiratory viruses is a well-known fact and is reported in cases of a wide range of viruses, e.g., adenovirus, respiratory syncytial virus, influenza virus, rhino virus, and corona viruses Conjunctivitis is present in 3.175% of patients with COVID-19

However, only 0.703% of patients present with conjunctivitis as the first presenting feature and 1.949% of patients demonstrate the virus in tear/conjunctival specimen. These findings indicate ocular tropism of SARS-CoV-2

However, there is also a possibility of local replication of the virus followed by systemic involvement, especially in cases of droplet or aerosol transmission through the ocular route.

Importance of ocular and facial protection against SAARS CoV2

The anatomical and molecular link between the ocular system and the respiratory tract is already well-established .The nasolacrimal duct (NLD) serves as an anatomical link between ocular system and respiratory tract.

Regarding molecular link, various cellular proteins such as α2-3-linked sialic acid (expressed in lower respiratory tract and ocular tissue) serves as an interaction site for diverse range of influenza viruses.

Presence of an ocular rennin angiotensin system (RAS) and ACE (angiotensin converting enzyme) activity is already demonstrated in retinal tissue, choroid, and sclera as early as 1988.

This was followed by the demonstration of ACE and Ang-II receptor expression in ciliary body (non-pigmented epithelium), cornea (epithelium and endothelium), conjunctiva (epithelium), trabecular meshwork cells, retinal ganglion cells, photoreceptor cells, nuclear layer of retina, and endothelial cell layer of chorio-retinal vessels.

In vitro studies demonstrate corneal and conjunctival expression of ACE2, thus suggesting a link between the ocular system and respiratory system in case of COVID-19.

Another route of entry of SARS-CoV-2 to human host is through its interactions with CD147, which is present in tear and human ocular tissues, e.g., corneal epithelium, endothelium, keratocytes, conjunctiva, and retinal pigment epithelium.

Thus, the conjunctival route may play a major route in establishment of infection of any flu virus including Covid-19.

Molecular Iodine

It has been well documented that molecular iodine is one of the most effective of all antimicrobials available. Hospitals and medical facilities worldwide use povidone-iodine (Betadine) as a standard of care in infection control, even though it contains very small amounts of I_2.

Betadine (PVP-1) has been in commercial use since 1955 and is on the World Health Organization's list of essential medicines.

PVP-1 contains 31,600 ppm of iodine compounds, but it is only I_2 that is the biocidal species responsible for its antimicrobial activity. I_2 occurs in trace quantities of 2–3 ppm, but even at these levels, it is considered the best at destroying bacteria, viruses, and fungi.

All the other aspects of PVP-1 only contribute to its toxicity, staining, and unpleasant taste. PVP-1 has also been shown to be highly effective in the treatment of periodontal disease. Jorgen Slots wrote that it is a valuable antiseptic in its treatment of periodontal disease and a variety of other oral infections. His research has shown that it kills all periodontal pathogens in vitro within 15–20 seconds.

Fortunately, there is a new generation of recently patented iodine-based antiseptics that overcome the negative side effects of PVP-1.

A new aqueous formulation with 100 times more I_2 than contained in PVP-1 is now available, and the non-biocidal content has been reduced from 31,600 ppm to a few hundred ppm.

This new formulation increases its effectiveness, safety, and shelf life, while also reducing staining, toxicity, bad taste, and potential irritancy.

It is now available in mouth rinses, concentrates, nasal sprays, and hand sanitizers offered by IoTech International.

These new products have the potential to become a frontline defence against the COVID-19 pandemic.

Advantages of the new molecular Iodine.

Though the face is covered with a mask by health care professionals, police, and frontline workers during their interaction with suspected or confirmed COVID-19 patients, the ocular route usually remain uncovered.

Though protective goggles are available as a part of personal protection equipment (PPE) kits, however, their scarce availability is a concern even in the developed countries.

Thus, ocular route remains unprotected and unattended.

Accidental ocular exposure to SARS-CoV-2 can occur in many conditions:

- Accidental hand-eye contact among persons working in COVID-19 environment.
- This issue becomes complicated when news of some incidences like intentional spitting on doctors and police personals by suspected or confirmed COVID-19 patients, which also can result in accidental ocular exposure.
- However, until date, no post-exposure prophylaxis is available in case of accidental ocular exposure with SARS-CoV-2.

Precautionary note

Clinically applied at present is a great number of medications containing molecular iodine complexes with biopolymers and having a wide range of antiviral effect, inclusive of HIV infection.

Drugs containing molecular iodine complexes with organic ligands are highly toxic, and are therefore for external use only.

The distinctive feature of the drugs is that their active substance includes not only iodine-containing polymeric complex, but also potassium and lithium halogenides.

Using X-ray data for iodine-dextrin complexes and the results of quantum chemical studies, it is shown that the active centre contains molecular iodine located inside the α-dextrin helix and coordinated by lithium halogenides and peptides (complex LiCl (I)-I2 -a-dextrin-peptide).

The oral cavity, an essential part of the upper aero-digestive tract, is believed to play an important role in the pathogenicity and transmission of SARS-CoV-2.

The identification of targeted antiviral mouth rinses to reduce salivary viral load would contribute to reducing the COVID-19 pandemic.

While awaiting the results of significant clinical studies, *which to date do not exist*, the commercial availability of mouth rinses leads us to search among them for reagents that would have specific antiviral properties with respect to SARS-CoV-2.

The challenges facing this target were examined for 7 reagents found in commercially available mouth rinses and listed on the ClinicalTrials.gov website: povidone-iodine, chlorhexidine, hydrogen peroxide, cyclodextrin, Citrox, cetylpyridinium chloride, and essential oils.

Because SARS-CoV-2 is an enveloped virus, many reagents target the outer lipid membrane. Moreover, some of them can act on the capsid by denaturing proteins.

Until now, there has been no scientific evidence to recommend mouth rinses with an anti–SARS-CoV-2 effect to control the viral load in the oral cavity.

This critical review indicates that current knowledge of these reagents would likely improve trends in salivary viral load status. This finding is a strong sign to encourage clinical research for which quality protocols are already available in the literature.

In addition, saliva is an important source of transmission during the COVID-19 pandemic. When a person coughs, sneezes, breathes, or converses, he or she produces saliva droplets containing microorganisms.

The quantity and the size of saliva droplets differ between individuals. Therefore, the risk of transmission also varies.

- One cough or 5 min of conversation produces approximately 3,000 saliva droplets.
- One sneeze produces approximately 40,000 saliva droplet nuclei that can be disseminated several meters in the air.
- Saliva droplets (>60 μm) allow the transmission of SARS-CoV-2 when persons are in close contact (1 m and 3 m)
- Moreover, even if it is not yet clearly established, virus-laden aerosols (droplets <60 μm) can contribute to the spread of SARS-CoV-2 and allow contamination at a distance of up to 7 to 8 m.

Summary

- Molecular iodine is a promising new generation of historical Betadine.
- However its toxic elements restrict its use at present.

- Health-carerers & other public servants can use it externally on face, especially in uncovered areas by masks.
- Oral rinsing may also be done but may be dangerous as the amount etc are not yet certified.
- Generalised body use is still under research.
- *However all said and done any new thing should be based on authentic scientific research and approved by bodies like WHO, or US-FDA before use, as of date these are all experimental.*

Regular Betadine

Molecular iodine
