SHORT COMMUNICATIONS

POSSIBLE DESTRUCTION OF SARS-COV-2 BY SODIUM DEOXYCHOLATE

ABSTRACT

The objective of this study was to focus on the antiviral activity of a bile salt, namely sodium deoxycholate. There is a possibility of killing severe acute respiratory syndrome corona virus-2 due to the destruction of its protein and lipid overcoat by sodium deoxycholate alone or with drugs those showing response against severe acute respiratory syndrome corona virus-2. Destruction of inner viral constituents and hence disintegration of the virion is possible at very small concentration. This study can be an important platform for further investigations.

Keywords: SARS-CoV-2, sodium deoxycholate, COVID-19, destruction

Background

The new Corona virus has been declared by WHO as an international public health emergency due to highly contagious infection spreading very fast all over the world. At 13th June 2020, positive cases all over the world were 7,767,390, deaths 428, 780 and recovered patients were 3,983,800. Currently, the research on the novel corona virus is still in the primary stage. But, considering that the current allopathic treatments are just working on certain patients, exploring different medicine is a good idea. SARS-CoV-2 is covered with a fatty layer and usually appears spherical with crowns on the surface, as viewed under an electron microscope and size less than 160 nm. Its genetic material consists of very large single stranded RNA, it causes serious illnesses like pneumonia or bronchitis, especially in pediatrics and geriatrics. Its initial symptoms are dry cough, runny nose, sore throat, reduction in the sensation of taste buds and in severe infections, it causes breathing problems and patient depends on oxygen cylinders. Some cases are fatal due to organs' failure[1].

Methods and findings

The literature review was done using PubMed/MEDLIN,Science Direct, Google Scholar to find out the antiviral capacity of various bile salts and their trial in animal and human models. Sodium deoxycholate has been reported as an antiviral compound[2] but the experiment was conducted in the animal model only and no human trials were done. It was complexed with many antimicrobial drugs as ion-pair complex; mode of administration was oral[3], intravenous[4], ocular[5] and nasal[6].

DISCUSSION

Sodium deoxycholate 14 mg kg^{-1} was injected in B alb/C mice. Sodium deoxycholate reduces symptoms caused by Rauscher leukemia virus multiplying in the spleen and replication of the influenza virus in the respiratory area.

Electron microscopy was performed to observe the penetration of dye (phosphor tungstate) to the virion inside and it was found that sodium deoxycholate damages virion lipid membrane of the influenza virus, thus allowing the dye to penetrate. Sodium deoxycholate destroyed the virus and partial removal of the envelope glycoprotein HA or NA spikes at 500 µg mL^{-1} concentration. It was virucidal against influenza A, influenza B, Rauscher leukemia and HIV-1 viruses[2].

We assume that it can be used alone or with those drugs showing response against SARS-CoV-2, like chloroquine, hydroxychloroquine[7], and azithromycin[8], to provide additive effects. Thus, we assume that destruction of COVID-19 by sodium deoxycholate is possible at low concentration without any side effect to host. It was reported in combination with some drugs like furazolidone (against *Klebsiella pneumoniae*)[9], ciprofloxacin (tested in mice for antimicrobial activity)[3] and ofloxacin[4] for improved *in vitro* antimicrobial activity and at 0.3 % concentration, it was non-irritant to the chorioallantoic membrane which is equivalent to the ocular surface[10]. As it was ion paired with ciprofloxacin and ofloxacin, so here also a possibility exists to add this with hydroxychloroquine or azithromycin during the compression process to provide an additive effect if compatible. However, the use of sodium deoxycholate in humans is not available in the literature but animal models have shown its powerful virucidal and antibacterial activities. This communication may help the scientist and provide a reference for further studies in preclinical and clinical evaluation.

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Durga Pandey[a]*, Deepti Jain[a], Girijesh Pandey[b] and Surendra Jain[c]

[a] School of Pharmaceutical Sciences, Rajiv Gandhi Proudyogiki Vishwavidyalaya Airport Road, Gandhi Nagar, Bhopal – 462 033, Madhya Pradesh, India

[b] VNS Group of Institutions - Faculty of Pharmacy, Neelbud, Bhopal - 462 044, Madhya Pradesh, India

[c] Department of Pharmacy, Sagar Institute of Research and Technology-Pharmacy, Bhopal - 462 041, Madhya Pradesh, India

***For Correspondence: E-mail: durga.pandey9@gmail.com**

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