Research Article

First report of reduced severe acute respiratory syndrome coronavirus 2 viral load after nasopharyngeal wash with hypertonic water

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Importance: SARS coronavirus 2 (SARS-CoV-2) is spread mainly through airborne transmission and colonizes the human upper respiratory tract. It causes coronavirus disease 2019 (COVID-19), which has major therapeutic challenges as there are no treatments to prevent the infection from spreading or the development of the disease in a severe form.

Objective: COVID-19 is diagnosed through identification of viral genetic material from nasopharyngeal swabs using PCR. The quantification of viral RNA using the cycle threshold (Ct) values is of great diagnostic importance. Nasal wash with saline or hypertonic saline is very important for the hygiene of the nose and sinuses. The aim of this research was to investigate the effect of an intense nasal wash on the viral load in patients with a SARS-CoV-2 infection.

Design: A case-control study investigating the association of a nasopharyngeal wash and viral load in adult patients who tested positive for COVID-19 and were hospitalized was performed. All patients were treated with the standard protocol of care for COVID-19. Group A (n = 20) patients were each provided with a 25 mL bottle of hypertonic solution for a nasopharyngeal wash to be performed for 20–30 s, thrice within 6 h. Group B (n = 5) patients served as negative controls (no intervention). Nasal swabs were taken before and after the 6-h period by the same doctor and RT-PCR followed.

Results: There was a 23.6% (median value) and 17.3% (mean value) reduction in the viral load after nasopharyngeal washing. On the other hand, Ct values remained practically stable for the negative control patients within the same 6-h period.

Conclusion: To the best of our knowledge, this is the first study which demonstrates the potential effect of hypertonic water on the reduction of SARS-CoV-2 viral load in hospitalized patients with COVID-19. Further randomized, controlled studies are needed to confirm the effects of hypertonic

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water on the prevention and clinical outcome of SARS-CoV-2-infected patients.

First report of reduced severe acute respiratory syndrome coronavirus 2 viral load after nasopharyngeal wash with hypertonic water

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Introduction

SARS coronavirus 2 (SARS-CoV-2) is a typical coronavirus which is spread mainly through airborne transmission and colonizes the human upper respiratory tract.[1] It causes coronavirus disease 2019 (COVID-19), which has major therapeutic challenges as there are no treatments to prevent the infection from spreading or the development of the disease in a severe form. COVID-19 is diagnosed through identification of viral genetic material from nasopharyngeal swabs using PCR. Since the beginning of the COVID-19 pandemic, there has been intense discussion about the importance of viral

load; nasopharyngeal viral loads seem to contribute to secondary transmission of COVID-19.[2] Realtime PCR using nasopharyngeal swab samples is the main COVID-19 diagnostic tool.[3] The quantification of viral RNA using the cycle threshold (Ct) values is of great diagnostic importance and allows for conclusions on the viral load and infectivity[4] as well as the fate of medication. Many studies report that viral load is significantly associated with disease severity and eventual patient outcome.[5]

Nasal wash with saline or hypertonic saline is very important for the hygiene of the nose and sinuses. Nasopharyngeal wash has been proposed as a method for preventing or treating COVID-19 by the reduction of the viral load.[6]

The aim of this research was to investigate the effect of an intense nasal wash on the viral load in patients with a SARS-CoV-2 infection.

Methods

A case-control study investigating the association of a nasopharyngeal wash and viral load in adult patients who tested positive for COVID-19 and were hospitalized in the Patras University hospital was performed. The Ethical Commitee of the hospital approved the study and all the patients provided informed consent after a clinician explained in detail the clinical intervention and the purpose of the trial to these patients. The inclusion criteria were laboratory-confirmed COVID-19-positive patients, male or female, in the age range of 18–80 years, with mild to moderate disease and already admitted to the University hospital. All patients were treated with the standard protocol of care for COVID-19 and had respiratory support with 35-60% oxygen supplies via Venturi face mask. A total of 25 adult patients were enrolled in the study. The patients and the samples were given a code to ensure patient anonymity and confidentiality.

Group A (n=20) patients were each provided with a 25 mL bottle of hypertonic solution for a nasopharyngeal wash to be performed for 20–30 s, thrice within 6 h. The hypertonic 5% Sodium Chloride solution is sterile, non-pyrogenic, not containing any antimicrobial agent. The use of the bottle was thoroughly explained by the data collection officer beforehand. Group B (n=5) patients served as negative controls (no intervention). Before and after each use, the patient was asked not to eat, drink, or rinse their mouth for the next 30 min. Nasal swabs were taken before and after the 6-h period by the same doctor and RT-PCR followed. RNA extraction was performed by using QIAamp Viral RNA Mini Kit (Qiagen, Hilden, Germany) according to the manufacturer's instructions. For Reverse Transcription and RT-PCR amplification, RdRp IP2 and IP4 assays from Institut Pasteur,

Paris (France) were multiplexed and SuperScript® III Platinum (Invitrogen, USA) was used, in a Stratagene Mx3005P Real-Time PCR System (Agilent).

Results & Discussion

Figure 1 shows the percentage change of Ct values before and after the intervention. There was a 23.6% (median value) and 17.3% (mean value) reduction in the viral load after nasopharyngeal washing. On the other hand, Ct values remained practically stable for the negative control patients within the same 6-h period. To the best of our knowledge, this is the first study which demonstrates the potential effect of hypertonic water on the reduction of SARS-CoV-2 viral load in hospitalized patients with COVID-19. Taking into account that SARS-CoV-2 transmission is airborne[7], we propose that all the patients who are PCR-positive for COVID-19 undergo extensive nasal washing to reduce the viral load. Further randomized, controlled studies are needed to confirm the effects of hypertonic water on the prevention and clinical outcome of SARS-CoV-2-infected patients.

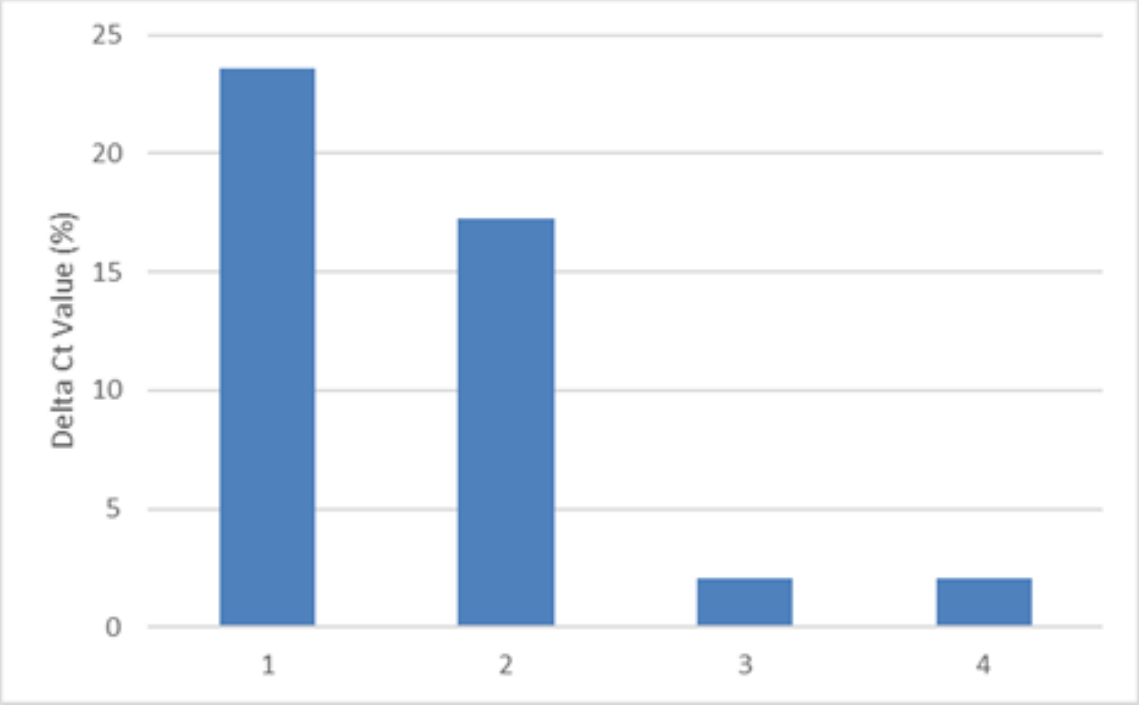

Figure 1: Cycle threshold (Ct) values before and after the nasal wash. 1= median value, after nasal wash; 2 = mean value, after nasal wash; 3 = median value, without nasal wash; 4 = mean value, without nasal wash.

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Declarations

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