

Effects of a low concentration hypochlorous Acid nasal irrigation solution on bacteria, fungi, and virus.

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Abstract

OBJECTIVES/HYPOTHESIS: Saline irrigation would be more effective for chronic sinusitis patients if it had bactericidal effects. Low concentrations of hypochlorous acid may be used as a nasal irrigation solution. First, we developed a 0.85% NaCl solution by adding NaCl to tap water (pH 7.0 and 8.4) and measuring the concentration of free chlorine and hypochlorous acid after giving the solution a short electrical impulse of 20 seconds. Then we investigated whether the derived hypochlorous acid had a toxic effect on human primary nasal epithelial cells, if and what effect it had on the expression of mucin genes, and, finally, if it had bactericidal, fungicidal, or virucidal effects.

STUDY DESIGN: In vitro biochemical experiment.

METHODS: We treated human primary nasal epithelial cells with 3.5 ppm of hypochlorous acid and then examined the cells for cytotoxicity. We also investigated the bactericidal, fungicidal, and virucidal effects by challenging the cells with the following microorganisms *Aspergillus fumigatus*, *Haemophilus influenzae*, *Klebsiella pneumoniae*, *Rhizopus oryzae*, *Candida albicans*, Methicillin-resistant *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Streptococcus pyogenes*. To study the virucidal effects of HOCl, we used the human influenza A virus to challenge the cells.

RESULTS: In the cytotoxicity assay and in the morphological examination, the cells did not show any toxicity at 30 minute or 2 hours after treatment with HOCl. More than 99% of bactericidal or fungicidal activity was noted for all species, except for *Candida albicans*, in tap water at either pH 7.0 or 8.4. In addition, a 3.2-log₁₀ reduction was achieved in cells challenged with the human influenza A virus.

CONCLUSIONS: A low concentration HOCl solution can be used as an effective nasal irrigation solution.