Strong humming for one hour daily to terminate chronic rhinosinusitis in four days: A case report and hypothesis for action by stimulation of endogenous nasal nitric oxide production

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Summary Rhinosinusitis is an inflammation or infection of the nose and air pockets (sinuses) above, below and between the eyes which connect with the back of the nose through tiny openings (ostia). Rhinosinusitis can be caused by bacteria, viruses, fungi (molds) and possibly by allergies. Chronic rhinosinusitis (CRS) is an immune disorder caused by fungi. The immune response produced by eosinophils causes the fungi to be attacked, which leads to damage of the sinus membranes, resulting in full-blown rhinosinusitis symptoms. Gaseous nitric oxide (NO) is naturally released in the human respiratory tract. The major part of NO found in exhaled air originates in the nasal airways, although significant production of NO also takes place in the paranasal sinuses. Proper ventilation is essential for maintenance of sinus integrity, and blockage of the ostium is a central event in pathogenesis of sinusitis. Concentrations of NO in the healthy sinuses are high. Nasal NO is known to be increased 15- to 20-fold by humming compared with quiet exhalation. NO is known to be broadly antifungal, antiviral and antibacterial. This case report shows that a subject hummed strongly at a low pitch (~130 Hz) for 1 h (18 hums per minute) at bedtime the first night, and hummed 60–120 times 4 times a day for the following 4 days as treatment for severe CRS. The humming technique was described as being one that maximally increased intranasal vibrations, but less than that required to produce dizziness. The morning after the first 1-h humming session, the subject awoke with a clear nose and found himself breathing easily through his nose for the first time in over 1 month. During the following 4 days, CRS symptoms slightly reoccurred, but with much less intensity each day. By humming 60–120 times four times per day (with a session at bedtime), CRS symptoms were essentially eliminated in 4 days. Coincidentally, the subject's cardiac arrhythmias (PACs) were greatly lessened. It is hypothesized that strong, prolonged humming increased endogenous nasal NO production, thus eliminating CRS by antifungal means.

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Introduction

Rhinosinusitis is an inflammation or infection of the nose and air pockets (sinuses) above, below and between the eyes which connect with the back of the nose through tiny openings (ostia). Rhinosinusitis can be caused by bacteria, viruses, fungi and possibly by allergies, inducing secretion of mucus from goblet cells, which is condensed. Upon secretion, mucus expands in volume tremendously and almost instantaneously 500-fold during a period of only 20 ms [1]. Proper ventilation is essential for maintenance of sinus integrity, and blockage of the ostium is a central event in pathogenesis of sinusitis. Acute rhinosinusitis last 7–10 days and often responds to antibiotics.

About 37 million Americans have chronic rhinosinusitis, with most lasting longer than a month, and with some cases lasting a year or longer. Chronic rhinosinusitis (CRS) is the chronic human disease that is most frequently refractory to treatment. CRS is an immune disorder caused by fungi for which there is no FDA-approved therapy. The immune response, caused by eosinophils, results in the fungi being attacked, which leads to damage of the nose and sinus membranes, resulting in full-blown, CRS goblet cell-activated symptoms. There may be only be a single symptom, such as a post-nasal drainage, stuffiness, or pressure around the nose, or there can also be a combination of these symptoms associated with a runny nose, clear or colored mucus, a cough, a sore or irritated throat, pain in the teeth, headache, or fever. Additional symptoms which sometimes can occur are hoarseness, a decreased sense of smell, and fullness of the ears.

In this first case report, the subject, a 64-year-old, white male weighing 80 kg had severe rhinosinusitis with post-nasal drainage, pressure, severe headache and a productive cough, requiring 24-hour-a-day management for 1 month. Loss of sleep due to the severity and frequency of the symptoms was severe. Steroid shots, guaifenesin, aspirin, zinc acetate lozenges (antirhinoviral and antitherpetic) [2], intranasal antihistamines, oral decongestants and oral antibiotics were either marginally beneficial or ineffective.

Candida was the most common cultured fungi in the lavaged specimens in CRS patients according to Jiang et al. [3]. Coconut oil, a natural antiCandida albicans agent [4], was deeply instilled into the nose by the subject where it was temporarily beneficial in stopping mucus production and drainage, but recurrence of symptoms required repeated treatment each 4 h. Efficacy of coconut oil and resistance to both an antibiotic and an antiviral further suggested a C. albicans rhinosinusitis infection, especially since it was known that the subject had a severe allergic hypersensitivity to it.

A more effective, more natural, longer lasting antifungal agent was needed. Nitric oxide (NO) is known to be broadly antifungal, antibacterial and antiviral. For example, potent antifungal activity was observed by Ghaﬃari et al. [5] at 200 ppm gaseous NO, killing 100% of these fungi within 4 h contact time, and 90% within 2 h.

Gaseous NO is naturally released in the human respiratory tract. The major part of NO found in exhaled air originates in the nasal airways, although signiﬁcant production of NO also takes place in paranasal sinuses. Sinuses communicate with the nasal cavity through ostia, and gas exchange between these cavities is dependent largely on the size of the ostia. The concentrations of NO in healthy sinuses are high, sometimes more than 20 ppm. Nasal nitric oxide is known to be increased 15- to 20-fold by humming compared with quiet exhalation according to Weitzberg and Lundberg [6]. According to Maniscalco et al., low frequency (~130 Hz) humming produces the greatest amount of NO [7].

Because nasal NO production by humming was measured in exhaled air and not in nasal tissues, and even though Maniscalco et al. [7] reported that repeated humming reduced gaseous NO concentration, it was decided to test strong, repeated humming in the hope that NO concentrations in nasal and sinus linings, but not necessarily in exhaled air, would be increased to a concentration sufﬁcient to treat CRS effectively. It was hypothesized that humming would produce sufﬁcient nasal tissue NO to kill fungi locally and effectively treat chronic rhinosinusitis without being harmful.

After explaining the possible role of nasal NO in treating CRS possibly by antifungal means, the apparent lack of toxicity, and getting informed consent, the subject proceeded to "hum" his way to rhinosinus health.

Methods and procedures

The subject hummed strongly for 1 h (18 hums per minute) at bedtime the first night, and hummed strongly at a low pitch (~130 Hz) 60–120 times in four sessions per day for the following 4 days. The humming technique was described as being one that maximally increased intranasal vibrations, but less than that required to produce severe dizziness. Inhaling through the nose between humming...
efforts was viewed as an important feature to gain maximum respiratory benefit from NO produced by humming.

Results

The morning after the first 1-h humming session, the subject awoke with a clear nose and found himself breathing easily through his nose for the first time in over 1 month. During the following 4 days, minor rhinosinusitis symptoms reoccurred, but with much less intensity each day. By humming 60–120 times four times per day (with a session at bedtime) all rhinosinusitis symptoms were essentially eliminated within 4 days. Occasional one to ten minute humming sessions as needed afterward maintained sinus health.

Even though he slept soundly the first night, nasal inhalations between humming efforts were not possible due to severe nasal congestion, consequently mouth breathing was required at the beginning of sleep. All following inhalations between humming efforts were conducted through the nose since the nose remained essentially clear.

The only side effect noted was dizziness upon excessively strong humming, which was prevented by slightly reducing the frequency and strength of humming.

Discussion

This research was stimulated by the comment that the concentrations of NO in healthy sinuses are very high, sometimes more than "20 ppm" according to the online introduction of Weitzberg and Lundberg [6]. However, this is a value vastly larger than their actual observed data. The "20 ppm" comment coupled with their findings that nasal NO could be increased 15- to 20-fold raised hopes that nasal nitric oxide could be increased to antifungal levels (200 ppm) or above. Although there is an apparent 1000-fold discrepancy there, these results of efficacy in treating chronic sinusitis stand as evidence that CRS can be effectively treated by repeated, strong, low pitch (~130 Hz) humming, apparently by NO generation.

Since 96% of all CRS is believed to be caused by fungus [8], and because NO is antifungal, especially to C. albicans, there is now hope that the humming method will be highly effective in treating CRS by patients with little or no other medical or surgical treatment required after diagnosis. Intranasal instillation of antifungals, such as coconut oil [4] or amphotericin B [9], with humming might increase efficacy.

The ability to strongly vibrate the nose by humming may be diminished by small facial features, suggesting that small women and children may need to work harder than men in managing CRS with humming.

Increased generation of nasal nitric oxide during rhinovirus infections (common colds) is associated with fewer symptoms and more rapid viral clearance. Nitric oxide can inhibit human rhinovirus-induced epithelial expression of several pro-inflammatory cytokines and can inhibit viral replication in epithelial cells in vitro [10]. Consequently, treatment of common colds using half an hour humming sessions each two wakeful hours for a few days may be beneficial.

Although nasal NO measurements in the treatment of allergy and asthma have been used to assess the severity of these illnesses, allergy and asthma might also be effectively treated by humming. Humming for a few minutes as needed daily seemed useful in this subject to manage his acute nasal allergy symptoms.

Another disease coincidentally responding to humming in the same subject was cardiac arrhythmias (pre atrial contractions), which disappeared on the fourth day of humming. Prior to treatment by humming, many fifth beats were abnormal, although taurine [11] had also been helpful in regulating these beats. When PACs occur, this subject now converts them to normal with a 1–5 min humming effort.

Reduced NO concentrations have been noted in a number of cardiac diseases, and treatment with NO has been shown to be beneficial. For example, Chen et al. [12] found in dogs that inhaled nitric oxide led to significant decreases in pulmonary vascular impedance. They also demonstrated effects of inhaled nitric oxide in improving pulmonary hemodynamics which were also associated with an increase in pulmonary blood flow, transpulmonary efficiency, and right ventricular contractility in drug-induced pulmonary hypertension. Augmenting endogenous NO may be of therapeutic benefit in humans as a means of favorably modifying the pattern of reduced parasympathetic and elevated sympathetic cardiac tone that contributes to mortality in cardiac disease [13]. Nitric oxide (NO) is thought to reduce blood pressure by evoking vasodilatation either directly by causing relaxation of vascular smooth muscle or indirectly by acting in the brainstem to reduce central sympathetic outflow, which decreases the release of norepinephrine from sympathetic nerve terminals. Nitric oxide pathways are new drug targets for refractory
hypertension [14]. Also, NO may regulate exocytosis in a variety of physiological processes, including vascular inflammation, neurotransmission, thrombosis, and cytotoxic T lymphocyte cell killing [15]. Humming might find utility in treating and preventing cardiovascular and other health issues, especially cardiac arrhythmias.

The idea of humming to treat and prevent rhinosinusitis is reminiscent of yogis clearing their heads by chanting ‘‘Ommmm’. Clearly, yogis are humming, and they may be ‘‘clearing their heads’’ by keeping nasal NO output high, thus clearing their sinuses.

The side effect of excessively strong and frequent humming, dizziness, precludes humming from being used while driving a motor vehicle or doing activities that requires full concentration.

In environmental studies, NO is considered an atmospheric pollutant, but research with elderly asthma patients failed to demonstrate significant harm by NO even though exposure to elevated atmospheric NO did increase exhaled NO [16]. On the other hand, nitric dioxide (NO₂) atmospheric pollution is well known to increase cardiovascular hospital admissions, mortality and life-threatening arrhythmias [17]. Nitrous oxide (N₂O) is also known as laughing gas.

The hypothesis that strong low pitch (~130 Hz) humming to greatly increase tissue nasal NO production as an effective means of treating CRS and, coincidentally, cardiac arrhythmias is supported by these observations. Additional studies are suggested and merited.

References


