

The Psychological and Physiological Effects of Sodium Chloride's Passage Through the Circulatory and Respiratory System

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In this study, the viability of insufflating iodized sodium chloride up the nasal passage and the psychological and physiological effects of the NaCl's passage into the brain-blood barrier is tested through theoretical and experimental research. The data collected by a survey of participants insufflating both a control and variable substance is statistically analyzed, using normalization and mean to average data, the Pearson correlation coefficient to find correlation, and its resultant p-value to test uncertainty in the calculations.

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Sodium Chloride, commonly known as table salt, is, in the aqueous form NaCl_{aq} , a household remedy for congestion in the nasal passage, often caused by forms of the common cold, including, but not limited to: acute coryza, nasopharyngitis, and rhinopharyngitis. Nasal irrigation works by flooding the nasal cavities and effectively flushing out mucous discharge. Studies were conducted to test the effectiveness of insufflating NaCl and its influence physiologically as well as psychologically on the circulatory/respiratory system and neurotransmitters in the prefrontal cortex, respectively.

located in Brooklyn, NY², ingesting coffee through the nasal passage leads not only to unexpected afflictions but also does not successfully pass a significant concentration of caffeine through the mucous membrane to the brain. Therefore, the concentration is crucial to determining the relative effectiveness of any psychoactive drug when sufflating.

A. Effective Concentration of Sodium Chloride

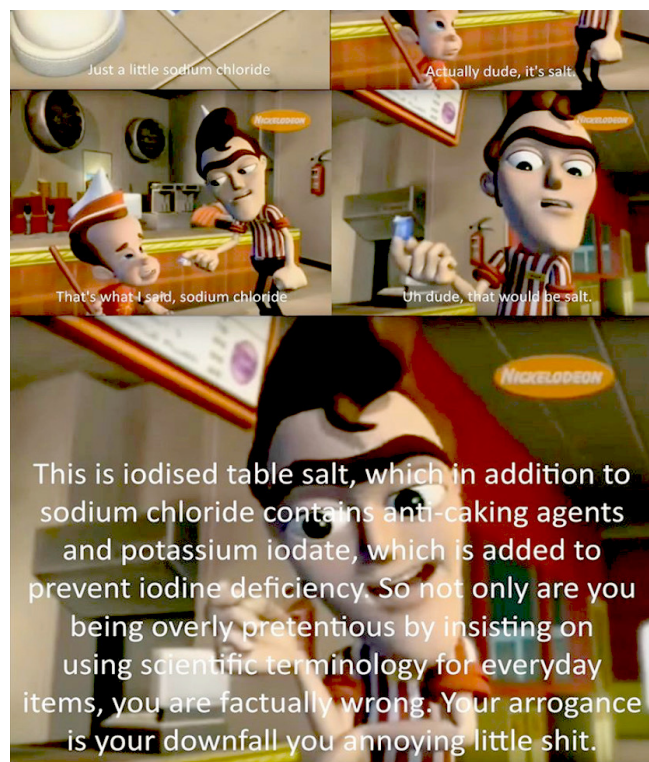
As mentioned previously in the page, in order for insufflation of a stimulatory or hallucinogenic drug to be effective in influencing neurotransmitters, the substance must be reasonably pure, with a purity of 80% being the accepted standard. The study focuses on the effects of common table salt intake, which is not purely sodium chloride but also a mixture of other compounds in order to add nutrients, preserve the solid, among other reasons. Iodine, one of two elements on the periodic table that sublime from solid form, is also an essential micronutrient, and table salt is often iodized in order to introduce it in the common diet at reasonable amounts. This iodization process is most frequently done by spraying the sodium chloride with potassium iodide; 1 ton of NaCl requires 60 mL of KI in order for effective iodization³ to take place. Of course, potassium iodide can oxidize so dextrose is added to stabilize it and prevent it from oxidizing and evaporating. Anti-caking agents, like calcium silicate, sodium ferrocyanide, sodium aluminosilicate, and magnesium carbonate are also added to prevent clumping.

Quoting Chemistry.StackExchange.com, the ONLY place where valid chemistry information is found (which does not include those those communist "peer-reviewed" pseudo-democratic academic research journals), 'the certificate of analysis for "ultra pure NaCl" from American Bio shows *trace* amounts of aluminum, arsenic, bromides, heavy metals, iron, magnesium, phosphates, and sulfates. Therefore, all the aforementioned impurities may well be expected in table salt.

I. INSUFFLATION

The ingestion of a substance is not always linked to its expected corporeal and cognitive effects, with widely varied results dependent on the methodology of consumption. Insufflation, more commonly known as snorting, involves sniffing substances up the nasal passage and through the mucous membrane lining the inside of the frontal sinus, therein entering the bloodstream and passing through the blood-brain barrier. It is thought to be the fastest passage to the blood-brain barrier, in where it can influence neurotransmitters in the Central Nervous System. This assumption does not hold for every drug, i.e. benzoylmethylecgonine¹, which reaches the cerebrum faster through respiration than sufflation, but nonetheless is preferred by many subjects in the study. Note, however, that certain parameters need to be fulfilled in order for psychological effects to be induced by insufflation: the substance must possess psychoactive components and consist of at least an 80% purity, with resultant strength positively correlated with increasing purity. Through examination of a particular case study

^{a)}but he still isn't old enough to party hard and chug white claws



From the given information, the assumption that table salt will be far less pure than needed to sufflate can be made. In order to test this hypothesis, our purely academic journal, which would never accept sponsorships from any major corporation who becomes a pseudo-monopoly on modern day commodities, tested the impurity of Morton's Iodized Table Salt, the only sodium-rich table-top addition that will make your soups, salads, sandwiches, and Gatorade Chew Bars, taste so much better! Given the sodium chloride in the table salt did not oxidize, the purity of the sample can be found by:

$$\frac{0.590 \text{ g Na}^+}{1.5 \text{ g table salt}} \cdot \frac{1 \text{ mol Na}^+}{22.989769280 \text{ g Na}^+} \cdot \frac{1 \text{ mol NaCl}}{1 \text{ mol Na}^+} \cdot \frac{58.44277 \text{ g NaCl}}{1 \text{ mol NaCl}} \cdot 100\% = 99.99\% \text{NaCl}$$

Note there are other sodium salts present in edible salt (anti-caking estimates such as Tivolex contain sodium), which means the calculated purity is a slight overestimate. WA Salt supply lists purities for the table salt it provides at 99.72%; this salt contains uses Tivolex. Morton Salt claims that their iodized table salt contains 0.04% dextrose and "less than 0.5% calcium silicate"; therefore, after factoring in extraneous variables, the final calculation for table salt purity is 99.46%. This is well in the previously given range of purities in which to successfully induce insufflation-based changes in cognition.

B. Psychological Effects of Sodium

Though not considered to be an abused substance that can be classified under the eight recognized drug nomenclature, sodium and its excess or deficiency have been correlated with changes and dependencies of mood, cravings, and other side-effects often realized with anti-depressants and stimulants. Sugar is often touted as more dangerous than cocaine but drinking seawater might just be the real killer⁴.

A 1936 study explored the effects of sodium deficiency via sodium-free diets and induced sweating over the span of one week. In the study, participants reported "a loss of appetite, an inability to feel pleasure, difficulty concentrating, and a feeling of exhaustion." Also monitored in the study were 21 patients with chronic fatigue syndrome and postural hypotension⁵, who given a sodium-retaining drug and encouraged to not limit sodium intake. In 16 of the patients, the treatment was reported to improve CFS symptoms, low blood pressure, and make them be happy.

Though no formal conclusions were made from the study, many questions stemmed from the results, including an interest in the correlation between depression, hormones, and sodium. A contention for the positive correlation is that people with depression were shown to have increased levels of a hormone that causes the body to retain sodium; furthermore, people with a condition that exhibits this hormone often report symptoms of depression.

From the studies shown, sodium exhibits properties of stimulants, which allow for the possibility of an insufflation-route high for NaCl_s . Through the collection of experimental data, conclusions about the cognitive impacts of table salt are made, though skeptical.

II. EXPERIMENTAL DATA AND CONCLUSIONS

In the study, three individuals were given both a control group and variable substance to insufflate. The control group substance consisted of crushed Altoid mints, with a negligible purity of $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, a known stimulant. The variable substance consisted of Morton's Iodized Table Salt, the only sodium-rich table-top addition that will make your soups, salads, sandwiches, and Gatorade Chew Bars, taste so much better! The participants were given 20 mg of the control and variable substance each to insufflate separately.

A. Qualitative Results

When asked to compare the experience of nasal intake of the variable substance in relation to the control substance, each participant reported the control substance was much easier to insufflate due to its fine granulation

but both did not stimulate any significant psychological effects. One participant reported the control substance did feel "chunkier", probably due to its lack of anti-caking agents, like the calcium silicate, sodium ferrocyanide, sodium aluminosilicate added to iodized table salt. Physiologically, each participant reported the insufflation of salt caused physical pain to the nasal passage; though no significant effects were noted. Participants all unanimously agreed there was not any benefit to salt intake through the nasal passage; all agreed conventional oral consumption is less painful and more satisfying.

B. Quantitative Results

Through a survey of increased stimulation observed after insufflating both the control group and variable substance, participants ranked stimulation on a scale from 0-10, with 0 being none observed and 10 being coked up. The Pearson Correlation Coefficient, r_{xy} , found by

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}} \quad (1)$$

between the substance and observed stimulation was then calculated. The mean stimulation with the control group was 0, with a correlation of 0.99978 and a p-value of 0.26; the mean stimulation with the variable substance was 0.1128, with a correlation of 0.995863 and a p-value of 0.95.

1. Limitations

Though a strong correlation was found to support the mean stimulation, the p-values calculated for both control and variable substances were atrociously uncertain, and a larger participant count would help stabilize the p-value and support the results.

C. And Them's the Facts

Through theoretical and experimental research, iodized table salt was shown to theoretically cause psychological effects similar to stimulants when insufflated and experimentally verified, shown to cause small magnitudes of stimulation in participant cognition, though limited in certainty due to a small participant sample size. Physiological effects were experimentally negligible and determined trivial. With further research, the effects of insufflating Iodized Sodium Chloride will be better known and understood.

III. CITATIONS

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IV. ACKNOWLEDGMENTS

Special thanks to Q. Kelley, G. Sadler, and J. Grabnar for their participation and involvement with the experimental data.

Also thanks to this girl named Loren who slapped me because I snorted salt this one time but turned out to be a good project.

I also didn't put in-text citations because it's currently 1:14 A.M., I have a physics test in less than 7 hours, and I definitely meant to go to bed 3 hours ago. This definitely was a fun day project so thanks for the inspiration Loren (much love!!) and maybe I'll actually make this into a true abstract who knows?

Paul, if you're reading this...I didn't cite any of my sources⁶ for a lot of this so you should definitely send it to your colleagues over at C(opy) A(nd) S(teal) E(verything) Western Reserve University; I think it'd be a hit.

¹But everyone who isn't a NERD calls it cocaine.

²Orange is the New Black, S5E11/12.

³60 mL of potassium iodide cost \$1.15 in 2006, but with inflation shooting to the moon higher than every bitchmade first singles player's lobs, who knows how expensive it is now?

⁴And definitely not because it's just fish doo-doo and pollution.

⁵Their blood pressure be yeeting outta there when they be standing up very quick.

⁶I actually didn't but that StackOverflow section was pretty much a copy/paste so I'd need to fix that haha.