

THE EFFECT OF SPICE ON THE AMOUNT OF SALT ADDED IN FOOD

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Abstract- Various government and private organizations have been working on the strategies for the reduction of salt intake in food around the world after the World Health Organization's (WHO) announcement on the excessive salt intake and its association with cardiovascular diseases almost 2 decades back and various methods were and are being implemented to do the same. Excessive salt and spice intake are said to causes diseases like hypertension, renal disorder, and gastric cancer. This work was set to establish a relationship between the amount of salt added to that of the amount of spices added to a dish and to help reduce both through carefully implemented steps. This was performed using vegetable broth and a few commonly used local spice and table salt. It was established through this study that the amount of salt added will increase with the amount of spices added because of the ability of the added spice to suppress the perception of the so added salt and hence it results in the excessive use of both. This in-turn results in the consumption of both beyond the recommended quantity. The government must join hands with the public and other organizations and by educating people and spreading awareness, we can reduce the per capita consumption of salt gradually.

Keywords: Salt, Spice, Hypertension, Gastric cancer, quantity

I. INTRODUCTION

The WHO more than a decade ago stated that the average salt consumption of every individual is about twice as much as the recommended amount of salt intake per person per day, which is 6g/person per day.¹ Some countries consume as much as 18g salt/person per day.² Whereas most country's per capita salt intake was between 9-12g/ person per day. In a few countries, due to the increase in salty snack intake in adolescence, the salt intake was twice as high as the recommended levels.³ Since then there are many government initiatives undertaken in many countries across the globe but, there is a long way to go as most countries don't have a policy or any organization to create awareness about this and even in countries that have taken some type of measure, it is mostly a private organization.²

Various studies were being carried out around the world both in the past and in the present on how to reduce and to understand the consumption of salt. One study state that the longer the time in the mouth, the maximum is the perception of salt which means, we are consuming a lot of salt just to taste the bare minimum of it.⁴ The strategies that exist until now allows us to reduce the salt consumption only up to 30% and there is no loss of acceptability among consumers.⁵ To reduce salt consumption and diseases caused by it, there must be clear guidelines from the government, and industries must also cooperate and bring in the change.⁶ While there are studies that show how shape, size, morphology, and texture affects the perception.⁷ For dry foods, the smaller the size of the salt crystal, the greater is the perception of salt and so it reduces the salt consumption.⁸ But, there are not as many methods for dishes where salt dissolves.

One of the countries that don't have a program in both government and a private sector to spread awareness about the effects of excessive salt intake, is India. India is known to use high amounts of spice in its food which is known to cause stomach cancer which, being one of the most common deaths causing factors.^{8,9} Surprisingly high amounts of salt are in their daily dietary intake.¹⁰ This high intake of sodium is the cause of many cardiovascular diseases like hypertension.¹¹ High sodium intake can also cause many other non-cardiovascular problems like Asthma, its effects on bone density and renal stones.¹²

While there are adverse effects due to excessive consumption of both salt and spices, this paper concentrates on the question, how does the addition of spices affect the amount of salt added to make the food pleasant. This

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study is done with vegetable stock and a few commonly used spices in Indian cuisine. This study is expected to establish a relationship between the amount of spices and salt in food and in turn will help researchers and policymakers to hypothesize methods to reduce both in the future.

II. MATERIALS AND METHODS

SENSORY PANEL

A group of 80 unexperienced panelists was chosen from the college campus consisting only of undergraduate students. The group consisted of an equal number of male and female subjects and an equal number of subjects from different origins based on geographical background.

STIMULI

Three samples were prepared for the sensory tests. The samples being, i) only salt ii) same amount of salt in sample one with spices iii) the same spices in sample two with extra amount salt from the two other samples. The spices used were being, peppercorn, garlic, ginger, cumin seeds, and cinnamon. Since this is not a topical salt application, we are using the most used FCC structured NaCl crystals. Each component was specifically weighed before adding. Spices are said to bring out the aroma and in-turn cause change in the flavor profile of the food but, we are not considering the aroma and its effects on the flavor due to the addition of spices as the influence of flavor compounds and its effect on flavor perception is still not clear¹³.

Three samples of vegetable stock were prepared using 10 w% of cabbage, 2w% of beans, 2w% of carrot, and 1w% of tomato and onion each. The first sample contained 5 w% of salt, the second contained 5 w% of salt and 7.5 w% of ginger and garlic each along with 5 w% of cumin seeds and peppercorn each and 0.5 w% of cinnamon and the final sample contained 7.5 w% of salt, the second contained 5 w% of salt and 7.5 w% of ginger and garlic each along with 5 w% of cumin seeds and peppercorn each and 0.5 w% of cinnamon.

III. EXPERIMENT AND RESULT

PROCEDURE

The subjects or the panelists were provided with all the three samples in an identical beaker and the first sample was named S1, and the second sample as S2 and the third sample as S3. The experiment was carried out in 8 batches with 10 subjects per batch. Each sample was served at a temperature of $75 \pm 2^\circ\text{C}$. The vegetables were heated in about two liters of water and the solution obtained was mashed and filtered using a normal filter like the ones used for any home-cooked liquids like tea before further processing according to what has to be added in each sample. The filtration was done to eliminate any differences caused by the appearance of the sample while being served.

The subjects were asked to taste each sample and was given RO-UV purified water at about 40°C as a palate cleanser to avoid interference of the previous sample with the perception of the next sample. The subjects were asked to write their name on a given space and were asked to mark the sample they feel was desirable to drink. The same procedure was performed for each batch with a different sample code. These results were recorded and then analyzed.

DISCUSSION:

There is a range of problems caused by the increased salt and spice intake and even after about a decade since the WHO's announcement about excessive salt intake and after several measures by various organizations, we still have a long way to go to bring the salt consumption within the acceptable daily values. This experiment is a step towards understanding the influence of spices in the amount of salt added and to hypothesize various measures to reduce the same. Excessive intake of both salt and spice can be harmful in various ways.

The results from the entire subject population were obtained and since it was with different variables, all were brought in terms of S1, S2, S3, and the percentage was shown in figure 1. Below is the representation of the percentage of people preferring different samples with S2, the sample containing spice and salt less than the amount in the other sample containing spice, being the lowest and S3, the sample containing higher and what is considered the optimum amount of salt in the cooking process and the same amount of spice as S2.

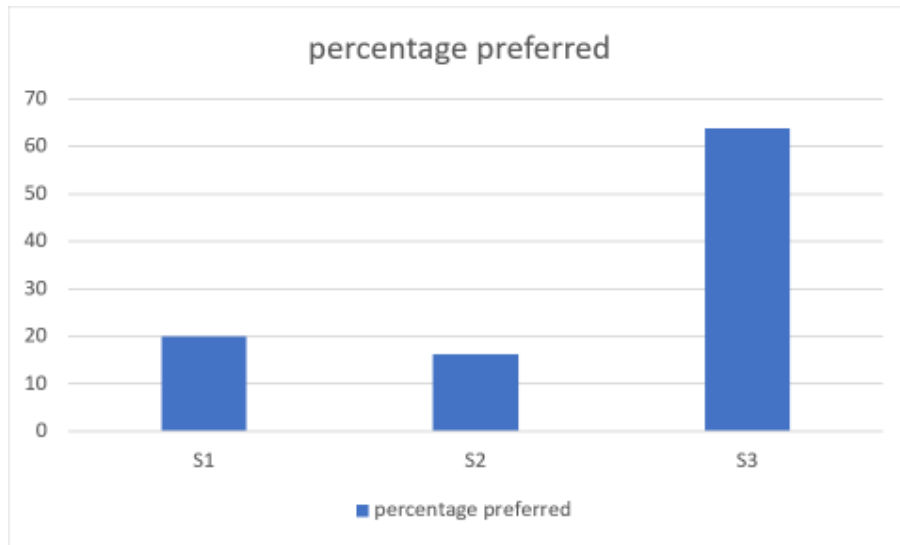


Table 1. Representation of the percentage of people preferring different samples.

The results clearly show that the sample, with more quantity of both salt and spices, was preferred by the panel of students. This factor can be because the people from India are generally used to foods that have high spice content, and by this, we establish that the amount of spice added does affect the amount of salt, proportionally.

The added spices did increase the amount of salt added to the vegetable stock. The concentration of salt was found to be proportional to that of the amount of spices added thus, confirming the initial hypothesis. This experiment uses only a small range of spices, and the study was done with a panel of inexperienced people.

Even though there are various limitations to this study, since the relationship is established clearly, the study has to be further carried out with different parameters like, using a variety of different and a broad category of spices and performing the study using more complex food. Various previous studies have proven that the complexity of the food used influences the degree to which the taste of individual components included in the dish is affected. We can further broaden the understanding of the influence of each spice with the amount of salt by just using those two in the stock.

Various factors have the potential to influence the study which, ranges from the type of food the panelist is used to from their birth, their salt preferences in food intake, and it is a proven conclusion that the mental state of a person also will affect the taste receptors of a person. A person who is depressed or stressed tend to prefer spicy, salty, and fatty food more than when they are normal or even happy. We should also consider the fact that the taste preference varies with age, and it can be strongest between 30 and 60-year-olds, and various other drugs like anti-depressants can also influence taste. It is a common factor of what you consumed can affect your taste, like the influence of alcohol, things like smoking or drugs which, is popular among teenagers and college students, will make the consumers want to have more spicy food.

These factors along with the conclusion from various research saying that the flavor doesn't affect the amount of salt added can be a factor to explore in the further work of this topic.

IV. CONCLUSION

These results suggest that the spice added to the food tend to suppress the perception of salt and making it feel as if there is less salt. On the other hand, the sample with only salt was better preferred. While that might be a bit better, the sample containing more salt and spice was the best preferred. We can conclude that the amount salt and spice used while cooking food goes hand in hand. When the amount of spice added increases, so does the salt consumption.

The consumption of salt and more spice triggers various problems and sometimes, fatal diseases and this is an important issue to concentrate on. There are many methods through which many foreign governments are coping with the problem with UK being one of the most active countries and Japan having achieved a huge reduction in salt consumption already.² The United States have agreed to reduce the per capita salt intake by at least 30% within 2025, there are many countries that still doesn't have a policy or a program in place to start

with and there are even more countries that actually are yet to even realize there is such a problem. The existing technologies can reach up to 30% salt reduction.^{5,14} Further developments must be made. Government should, with the help of other private organizations those are interested in public health, should set and achieve salt reduction targets.⁶ This should happen over a period of time to achieve the 5 to 6g/person per day goal set by the WHO which is considered to be the maximum necessary amount of salt to be consumed. We can clearly see a sensory relationship between the amount of salt consumed and the amount of spices added in food and further study must be done on to what extent to which this the addition of spice affect the amount of salt to further understand and help reduce the dietary intake of these substances for a better quality of life.

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