Effects of Cooking on B12 Presence in Nori

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Introduction

When food is cooked, its nutrients can be affected by factors such as water and high temperatures. Nori, an edible dried seaweed made from algae, is one of the rare non-animal foods with cobalamin, making it a very valuable source of nutrition to individuals with dietary restrictions (Huang et al.). The purpose of this research is to investigate the optimal preparation of nori for its b12 value. This experiment used Ocean’s Halo Sushi Nori and tested solutions from microwaved, oven-baked, boiled, and plain nori samples via a UV-Vis Spectrophotometer.

Question and Hypothesis

Research Question: How do different cooking methods influence the cobalamin value of nori?

Hypothesis: If a sheet of nori is cooked, especially if it is boiled, it will present lower cobalamin content than an uncooked sheet. This is because cooking procedures such as boiling, baking, and microwaving compromise certain vitamins within foods, and boiling removes water-soluble vitamins such as cobalamin.

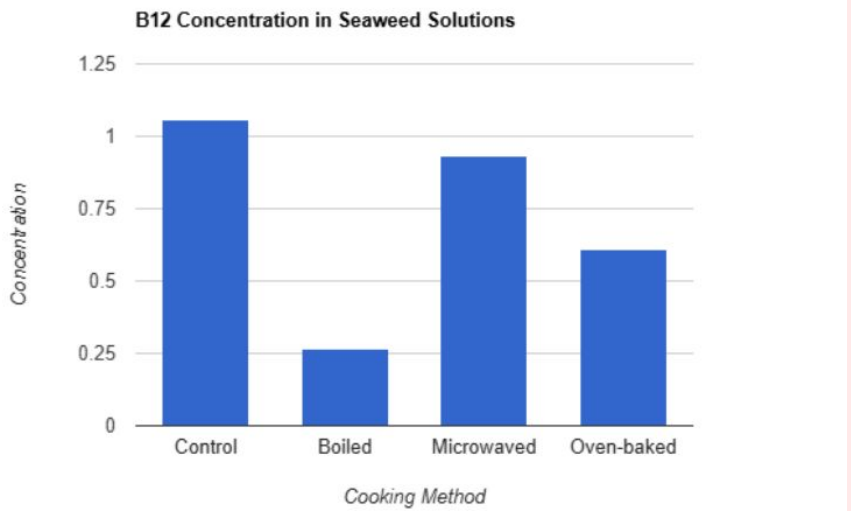
Methodology - Preparation

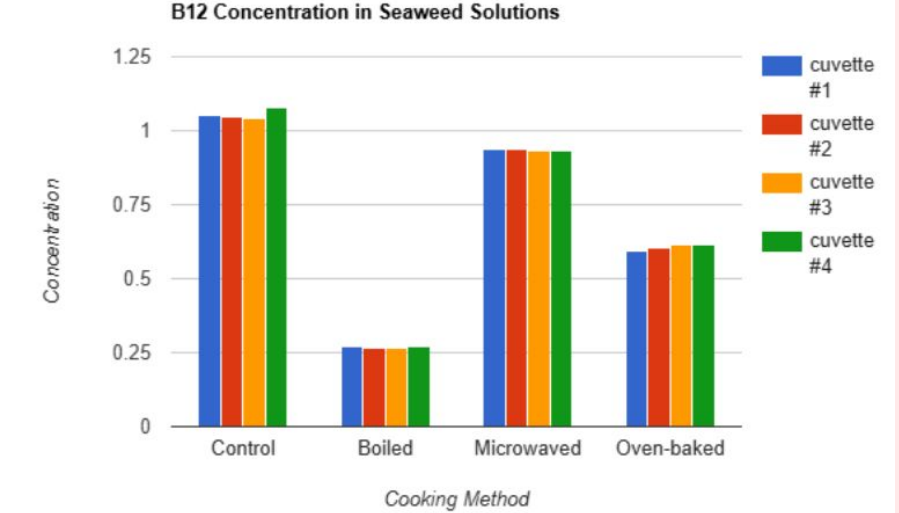
- Separate four sheets of Ocean’s Halo sushi nori (dried seaweed).
- Set one sheet off to the side, folded and secured in labeled plastic tupperware. This is the control sample.
- Place a second sheet on a plate and microwave it for 90 seconds. Remove it and store it the same way as the prior sample in a separate container. Label this the microwaved sample (or use any preferred method of labeling specimen preparation).
- Cover one oven tray with parchment paper. Place a third nori sheet on the tray. Cook in the oven at 400 degrees Fahrenheit (approximately 205 degrees Celsius) for ten minutes. Store prepared sample in the same way as previous samples in a separate plastic container. Ensure that this is clearly labeled.
- Fill a cooking pan with one cup of water. Place it on the stove. Set the stove to moderate heat until water begins to boil. Place a fourth sheet of nori in the pan and boil it for five minutes. Once complete, store prepared sample in the same way as previous samples in a separate plastic container. Ensure that this is clearly labeled.

Methodology - Testing

- Using a mortar and pestle, grind each nori sample (separately) and mix each with 250mL of water to form a solution.
- Using different pipettes for each sample, siphon 50 mL of each solution into covered/light protected glassware to prevent light damage to cobalamin (this procedure used amber glassware) to store between tests.
- Siphon specimens to fill four UV-Vis compatible cuvettes each.
- Fill one cuvette with water. Place this in the first slot. Run this as the baseline.
- Fill each sequential slot with your sample cuvettes. Run a Multiple Wavelength scan set to 360 nm.
- Print results.

Data


B12 Concentration in Seaweed Solutions
1.25
1
0.75
0.5
0.25
0
Concentration
Control
Boiled
Microwaved
Oven-baked
Cooking Method


B12 Concentration in Seaweed Solutions
1.25
1
0.75
0.5
0.25
0
Concentration
Control
Boiled
Microwaved
Oven-baked
Cooking Method
cuvette #1
cuvette #2
cuvette #3
cuvette #4

Analysis

The data shows that the highest concentration of cobalamin was present in the uncooked nori solution. The microwaved sample had the second greatest concentration, and the third was in the oven-baked sample. The smallest concentration of cobalamin was detected in the boiled sample, approximately ¼ of that seen in the control sample. These data points appear to support the hypothesis that any cooked samples would present a lower concentration than the food left uncooked, as the uncooked sample showed the highest B12 concentration amongst the four nori preparations. Out of the samples that underwent any of the processes, the microwaved sample retained the highest value of cobalamin.

Future Research and Continuation

In the future, this study could be expanded to test on a greater variety of foods with high cobalamin content, such as meats, fish, and fortified foods. In addition, research could explore the difference in these effects on food with naturally-occuring cobalamin (meats and other animal products) versus content in foods that have been fortified with the vitamin.

This experiment could also be extended to examine various cooking methods against other vitamins and minerals. Similar methods could be used to investigate which cooking procedure eliminates harmful molecules of food most efficiently.

Conclusion

The hypothesis of this study was supported. In hindsight, there are areas in this experiment where there may have been sources of error. Nori is made from dried seaweed in general, but it is commonly made from the red algae variant (pyropia). The species used was not specified in the nori packaging. It stands a possibility that the red wavelengths picked up at 360 nm may have been natural dyes in the seaweed rather than the vitamin B12. Nori, however, is known to have a high cobalamin content, with even five grams daily significantly improving the b12 in a vegetarian diet (Huang et al.). Additionally, mortar and pestle is a flawed and inexact method of emulsification, which could have resulted in an inequality of true nori content in the solutions. This investigation aims to give direction in how to preserve the most cobalamin content in one’s food when preparing in the home, especially for those lacking in the vitamin.

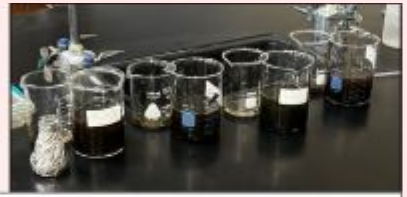
Photographs

Varied concentrations of pure b12 solutions used as reference for the wavelengths.

The UV-Vis spectrophotometer used for examination.

*All taken by student researcher.

Fully diluted nori samples ready to be scanned.



Nori sample solutions in preparation, partially diluted.