Research Proposal on Vitamin C

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Contents

Introduction

Vitamin C is one of the most essential vitamins for the human body and is chemically termed ascorbic acid (Carr and Maggini, 2017; Kumar et al., 2022). It is primarily found in citrus foods; however, other fruits and vegetables also contain vitamin C (Schlueter and Johnston, 2011). The literature conducted on the investigation of different parameters on vitamin C states that the content of vitamin C in fruits or vegetables can be partially affected by the process of freezing. This is fundamentally due to the action mechanism of an enzyme called ascorbate oxidase (Grosso et al., 2013; Pehlivan, 2017). Fundamentally, the effect of freezing is dependent upon time temperature, duration, and the nature of the fruit; however, extensive research pertaining to this (Njus et al., 2020). Considering the fact that vegetables such as carrots also contain ascorbic acid and are comparatively more eaten than fruits, it is important to assess the vitamin C content in vegetables after they have been frozen. Hence, the research has been proposed below which is primarily aimed at determining the content of vitamin C in carrots and comparing them to fresh carrots to evaluate the vitamin C level that is available in carrots after they are frozen.

Literature review

Vitamin C is one of the most important micronutrients which are responsible for performing different important functions in the body (Unlu et al., 2016). In order to maintain health and well-being, a nutritionist diet that is rich in high-quality sources of vitamin C is of immense significance. Traditionally, ascorbic acid is widely known for preventing scurvy due to being a cofactor in multiple physiological reactions. It significantly enhances intestinal absorption of iron in the body and acts as an antioxidant.

The antioxidant properties of vitamin C are pivotal as it donates electrons to free radicals generated from oxidation and inhibits them from reducing beneficial molecules in the body which may result

in the disruption of functional molecules and essential physiological reactions (Mousavi, Bereswill and Heimesaat, 2019). Other than the antioxidant properties of vitamin C, it is also responsible for decreasing the levels of CRP and reducing inflammation in the body (Chaitanya et al., 2018). The high levels of vitamin C present in blood reduce the risk of heart diseases, arteriosclerosis, and different kinds of cancer (Gonzalez et al., 2014). The action mechanism of ascorbic acid assists in the growth and repair of tissues, ligaments as well as blood vessels with the formation of collagen (Iqbal, Khan and Khattak, 2004).

Aims and objectives

Aim

- To ascertain the effect of freezing on the vitamin C content of carrots.

Objectives

1. To perform extraction of nutrients from frozen and fresh carrots by the use of trichloroacetic acid.
2. To ascertain the absorbance of the colour produced once the extract reacts with folin ciocalteu.
3. To measure the difference in the level of vitamin C content in the samples of fresh and frozen carrots.

Research Methodology

This research proposal is predicated on laboratory experiments which will be performed via the colorimetric method. Primarily the aim of the project is to determine if there is a difference in the vitamin C level of fresh and frozen carrots. Hence, fresh carrots will be selected randomly and

tested with frozen carrots (Isaacs, 1942). In order to cater to the reproducibility of the results, each experiment will be performed three times. The colorimetric method is based on the law of Beer Lambert law which entails concentration and the absorbance of the carrots (Basha, 2020). The rationale behind choosing this method is that there are no interferences in the method as other available compounds in carrots might interfere in the experiment and influence the result generated.

Reagents

- Trichloroacetic acid (80%)
- Folin-ciocalteu
- Extracts of frozen carrots from 3 brands
- Extracts of Fresh carrots

Procedure

- In order to perform the research, 10g of each carrot will be taken and 15 ml of 80% trichloacetic acid will be added to the centrifuge tube.
- Next, approximately 0.2 ml of extract of the frozen and fresh vegetable will be taken in the test tube and shaken.
- The test tubes will be placed in an ice bath for around 5 minutes and then centrifuged at around 3000 rpm for 5 minutes.

- The material in the test tube will separate due to the difference in density and the supernatant will be separated in the quantity of about 0.2 ml.
- A quantity of 2 ml distilled water will be added to the extract and shaken.
- Folin reagent of about 0.2 ml will also be added to the extract which will be prepared by adding a similar amount of Folin ciocalteu in 2 Molar Folin with the addition of around 2 ml distilled water.
- The mixture will be allowed to stand at room temperature for the duration of 10 minutes.
- At the wavelength of 760 nm, the absorbance of light will be measured to determine the amount of vitamin C present.
- The data obtained pertinent to the absorbance of colour will then be used to perform colourimetric procedure followed by statistical analysis.
- For colourimetric procedure, the standard solution of ascorbic acid will be prepared by adding 0.6 ml in around 60 micrograms of water.
- The absorbance of light at a specific wavelength will be plotted to demonstrate the concentration of ascorbic acid.

Data Evaluation and Statistical Procedure

The colourimetric method will assist in determining the concentration of blue colour generated as it will absorb light at a specific wavelength. The values obtained will be plotted on a graph and assist in determining the vitamin C content in each sample (Basha, 2020; Dadi and Yasir, 2022). Once an estimation has been done from the curve above, the values will be entered into an excel

sheet with the aim to perform a statistical evaluation. The data collected will be represented by the values of the mean and standard deviation of the samples while ANOVA will be used with a p-value of 0.05, to ascertain the difference in the vitamin C content of the fresh and the frozen carrot samples.

Ethical Considerations

To secure the research from bias and comply with the ethical guidelines of the ethical research, the samples will be procured anonymously while the confidentiality of the brand owner will be maintained throughout the research (Connelly, 2014).

	Time			
Activity	Week 1	Week 2	Week 3	Week 4
Extraction of stock from samples.	→			
Colorimetric procedure		→		
Sample analysis			→	
Statistical analysis				→

Figure: Gantt chart for the research experimentation and analysis.

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