



Vitamin C Levels and Ph Values in Various Types of Ginger Infused Water

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Abstract. Infused water is a drink produced by infusing water with bits of spices or fruits, allowing the flavor of the spices or fruits to be absorbed into the water. This study aimed to find out how much vitamin C is in various varieties of ginger-infused water and what the pH levels are. Red ginger (*Alpinia purpurata*), emprit ginger (*Zingiber officinale* Var. *Amarum*), and elephant ginger (*Amorphophallus paeonifolius*) were the three types of ginger used in this study, with long soaking times varying from 6, 9, and 12 h. Vitamin C levels were determined using UV-Vis spectroscopy, while pH levels were determined using a pH meter. The highest concentrations of vitamin C were discovered in elephant ginger infused water after a 12-h soaking period, at 72.44 ppm, while the lowest concentrations were discovered in elephant ginger-infused water after a 6-h soaking period, at 52.72 ppm. Red ginger, which had been soaking for the longest time (12 h), had 3,48 pH value, while elephant ginger, which had been soaking for the shortest time (6 h), had the 3,66 pH value.

Keywords: Infused Water · Ginger · Vitamin C · pH

1 Introduction

Instead of plain water, infused water can be used to keep the body's fluid balance after physical activity. When one drinks this, his or her body reaps the benefits of the spices or fruit that were used to prepare the infused water. Drinking water that has been infused with fruit, vegetables, or spices releases their juices, adds flavor, and has a number of health benefits [1]. The process of making infused water involves soaking bits of vegetables, fruit, or spices in water. A beverage's type known as infused water is created by fusing high-concentration fruits or herbs with low-concentration water. By-passing a semi-permeable membrane, diffusion is the direct transfer of a chemical from a high to a low concentration. Drinks with infused water will quickly absorb vitamins and minerals that are water soluble. Vitamins, minerals, and fiber are the key nutrients that come from drinking infused water. Spa water or infused water is prepared by combining water and fruit and letting them soak for a number of hours [2].

Infused water is created with components that are often found in the home. The two main elements used to make infused water are fruits and spices. On sometimes, other ingredients are included. Because each ingredient has a variable amount of content and because the elements in the ingredients will be removed throughout the soaking period, especially those compounds that are water-soluble variations in the ingredients have an impact on the quality of the water's infused. In this project, infused water would be created using a mix of fruits and spices. The recipe used many varieties of ginger, along with leaves and lemon.

Red ginger, elephant ginger, and emprit ginger are the three different forms of ginger that are distinguished by the size, shape, and color of the rhizome. The smallest type of ginger, red ginger has coarse fibers, a reddish-orange color, and a pungent fragrance. Medium sized of emprit ginger, white or yellow, soft fibrous, slightly flattened ginger with a faint scent. Elephant ginger, on the other hand, has the biggest rhizomes, is yellow or light yellow in color, is soft, has little fiber, and subtle aroma [3].

Ginger contains 6.9% fiber, 66.5% carbs, 5.7% ash, 0.1% calcium, 0.15% phosphorus, 0.03% sodium, and 1.4% potassium. It also contains 8.6% protein, 6.4% fat, and 66.5% fat. 175 IU of vitamin A per 100 g, 0.05 mg of vitamin B per 100 g, 0.13 mg of vitamin B2 per 100 g, 12 mg of vitamin C per 100 g, and 1.9 mg of niacin per 100 g of calories [4]. In addition to Vitamin E, ginger also includes the antioxidants gingerol, shogaol, and zingerone. With 53 mg of vitamin C/100 g of raw, seedless lemons and 50 mg/100 g of edible weight, lemons are high in vitamin C [5, 6]. This investigation's goal was to assess the vitamin C content and pH of ginger-infused water that had been steeped for 6, 9, and 12 h in a mixture of lemon and mint leaves.

2 Material and Methods

2.1 Tools and Materials

UV-Vis spectrophotometry, a funnel, a beaker, a pH meter, a measuring flask, a digital scale, a goiter pipette, an oven, and aluminum foil are the instruments utilized in this study. At the same time, emprit ginger, red ginger, elephant ginger, mint leaves, lemon, aqua, and regular ascorbic acid dest were employed as ingredients (distilled water).

2.2 Methods

2.2.1 Preparation of Infused Water

In this study, lemon and mint leaves were combined with red, elephant, and elephant ginger to create infused water. The skin of the ginger was removed after it had been washed. After that, it weighed 14 g + 0.5 g. Running water was used to wash the lemon and mint leaves. Lemons were chopped and weighed at 14 g + 0.5 g, while mint leaves were weighed at 1 g + 0.5 g. Ginger, lemon, and mint leaves were added to 200 ml of water at a temperature of 37–40 °C to make infused water. Infused water was stored in glass bottles with aluminium foil linings to protect the infused water. The infused water was left out at room temperature for five minutes before refrigerating for six, nine, and twelve hours.

2.3 Measurement of Vitamin C Levels

UV-Vis's spectrometry was utilized to determine the amounts of in infused water's Vitamin C. Ascorbic acid (standard) was employed as a reference compounds, with 265 nm of a wavelength (maximum) and an absorbance of 0.471. Ascorbic acid (standard) solutions should be freshly prepared and protected from light. To measure levels of in the ginger infused water used in this study, the linear regression equation of standard ascorbic acid was determined by constructing a standard solution curve of ascorbic acid at various concentrations and obtaining the linear regression equation with a correlation coefficient (r) of 0.9956 at $y = 0.07807x + 0, 01844$. Each sample of infused water's absorbance was measured in order to estimate the amount of vitamin C present. To obtain the absorbance value in compliance with the absorbance value limit requirements, the dilution in infused water was carried out 10 times. In this study, the average absorbance value in infused water was computed after the measurement of absorbance values in infused water was conducted three times. The absorbance value was extracted from the infused water and then fed into the regression equation $y = 0.07807x + 0.01844$ to calculate the absorbance value. The infused water's absorbance value is represented by the value of y , while its concentration is shown by the value of x .

2.3.1 pH Measurement

The pH of the infused water was measured using a pH meter. The style palette found in the template can be used to apply styles.

3 Result

From the research that had been conducted, the results are as follows:

3.1 Vitamin C Levels in Infused Water

UV-Vis spectrophotometry was utilized to determine how much vitamin C was present in the infused water at a wavelength of 265 nm and an absorbance of 0.471. Figure 1 shows the levels of vitamin C in the obtained infused water.

With long soaking times of 6, 9, and 12 h, the graph above shows that water with lemon and mint leaves and red ginger infused water contained levels of vitamin C of 42.94 ppm, 50.54 ppm, and 71.72 ppm, respectively. In essence, 12 h of soaking led to the greatest amounts of vitamin C, which were measured at 71.72 ppm. The lemon and mint leaves in the emprit ginger infused water showed vitamin C levels of 68.81 ppm, 70.35 ppm, and 72.44 ppm, respectively, after soaking for 6, 9, and 12 h. In other words, 12 h of soaking at 72.44 ppm produced the maximum quantities of vitamin C. Water with lemon and mint leaves and elephant ginger infused water exhibited vitamin C levels of 52.72 ppm, 56.004 ppm, and 56.77 ppm after soaking for 6, 9, and 12 h, respectively. In conclusion, soaking for 12 h produced the maximum concentration of vitamin C, measuring 56.77 ppm.

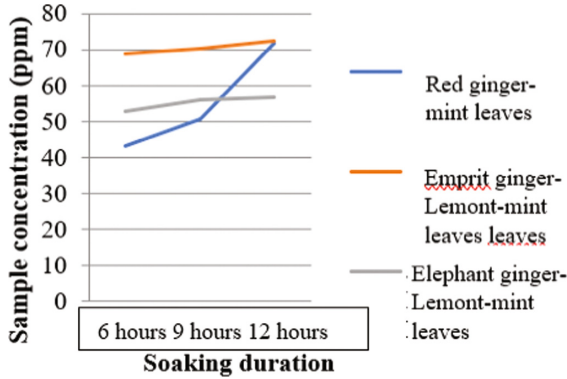


Fig. 1. Graph of Infused Water Level

3.2 PH Value in Infused Water

A pH meter was used to determine the pH of the infused water. The findings of the study are as follows (Fig. 2):

The pH values of the water with lemon and mint leaves and red ginger infused water after soaking for 6, 9, and 12 h, respectively, are depicted in the graph above at 3.59, 3.57, and 3.48. In a nutshell, after 12 h soaking, pH value of 3.48 (lowest) was discovered. The pH of water that had been steeped with lemon, mint leaves and ginger for 6, 9, and 12 h, respectively, was 3.66, 3.65, and 3.5. In other words, after a 12-h soak, the pH value that was lowest was 3.5. After soaking for 6, 9 and 12 hours lemon and mint leaves in the elephant’s ginger-infused water had a pH of 3.66, 3.63, and 3.57, respectively. In a nutshell, pH value, 3.57 (lowest), was discovered after soaking for 12 h.

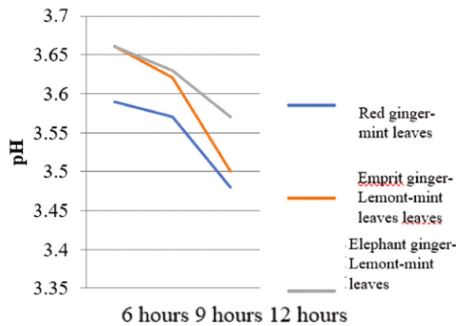


Fig. 2. Graph of pH Value in Infused ater

4 Discussion

4.1 Vitamin C Levels in Infused Water

Water that has been infused to release the juices of additional pieces of fruit, vegetables, or spices, improve flavor, and offer a host of health advantages to those who consume it is known as infused water [1] (Soraya, 2014). Ginger is a spice plant that is frequently utilized in medicine by the community, one of which is in the form of infused water. Because of how easy it is to absorb ginger in the form of infused water, it has become a popular trend in society. Additionally, the ginger's content can be extracted through this effort. Ginger falls into three categories: red ginger, elephant ginger, and spirit ginger are separated based on the shape, size, and color of the rhizome. In this study, red ginger, elephant ginger, and emprit ginger were utilized to flavor water together with lemon and mint leaves. Based on how frequently individuals consume flavored water, this one was created. To prevent harm to the structural integrity of vitamin C, infused water was produced with three distinct soaking times: 6 h, 9 h, and 12 h. The refrigerator would then be used to store it. Oxidation of vitamin C by oxygen is quick and can be sped up at high temperatures [7].

UV-Vis spectrophotometry was utilized in this work to assess the quantities of vitamin C in the infused water, with regular serving of ascorbic acid as a comparison substance. To gauge vitamin C levels, an ascorbic acid standard solution curve was produced. After obtaining the ascorbic acid regression equation, amounts of vitamin C in infused water would be determined. The derived linear regression equation, has an r-value of 0.9956, the correlation coefficient, is $y = 0.07807x + 0.01844$ Very good linearity is indicated by A correlation coefficient (r) of greater than 0.99 and acceptance criterion [8] (Dewi, 2019). The results showed that elephant ginger infused water with a 12-h soak duration had the highest levels of vitamin C in infused water at 72.44 ppm, and elephant ginger-infused water with a 6-h soaking time had the lowest levels at 52.7 ppm. This result contrasts significantly from that of previous studies, which revealed that red ginger had the lowest levels of vitamin C while emprit ginger-infused water had the highest levels after soaking for 12 h (158.72 mg/100 g vs. 116.29 mg/100 g, respectively) [9].

The amount of vitamin C dissolved in the water is primarily influenced by the time spent soaked in infused water. Since vitamin C is a water-soluble vitamin, the amount dissolved in infused water is dictated by the amount of time spent soaked. During the preparation of a food ingredient, all water-soluble compounds such as minerals, sugar, protein, and vitamins are leached from the tissue of these materials. Leaching is the process of one or more compounds in a solid dissolving when it comes into contact with a liquid solvent [10]. Vitamins are organic compounds that, even in small amounts, are needed by the human body to maintain life and health. A vital coenzyme or cofactor in the organism, Water-soluble vitamins include vitamin C that helps to speed up metabolic processes [8, 11].

4.2 pH Value of Infused Water

The amount of acid or base can be determined with a pH meter, which is often expressed as a pH value. The pH level is crucial to daily living and needs to be measured for food,

cosmetic, and pharmaceutical quality control [12]. In this investigation, The pH of the infused water was measured using a pH meter. The lowest pH value, 3.48, was found in red ginger infused water after a 12-h soaking period, according to the study's findings. The amount of acid or base can be determined with a pH meter, which is often expressed as a pH value. The pH level is crucial to daily living and needs to be measured for food, cosmetic, and pharmaceutical quality control [12]. In this investigation, the pH of the infused water was measured using a pH meter. The lowest pH value, 3.48, was found in red ginger-infused water after a 12-h soaking period, based on the study's conclusions. The highest a pH measurement was made in elephant ginger, which had been soaked for 6 h and had a pH of 3.66. Since bacteria may thrive at a certain pH, the pH of a food or beverage product has a significant impact on its shelf life [13].

Ginger contains folic acid and pantothenic acid. Ginger also contains oxalic acid, malic acid, apple acid, and other organic acids. Citric acid, a naturally occurring organic acid in lemons, has a high number of organic acids. As the soaking time lengthens, the pH level that is produced tends to fall. This situation is most likely caused by the ease with which Chemicals dissolve in acidic substances. The level of vitamin C is related to the pH value. Foods with high vitamin C content typically have a lower pH. In this study, lemon is one of the constituents in the infused water. Due to the high vitamin C content of lemons, the pH of the water becomes lower with time [14].

5 Conclusion

The results showed that the infused water with elephant ginger with a 12-h soaking Having the highest levels of vitamin C throughout that time, at 72.44 ppm, and the elephant ginger-infused water with a 6-h soaking period had the lowest pH at 52.7 ppm. The pH value of 3.48 in red ginger-infused water after a 12-h soaking period was the lowest. Elephant ginger, on the other hand, had the highest pH level (3.66) after 6 h of soaking. The soaking period and the substance utilized have an impact on the vitamin C concentration and the water's pH after infusion.

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