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Estimation of Thiamin and Ascorbic Acid Contents in Fresh and Dried *Hibiscus sabdarriffa* (Roselle) and *Lactuca sativa* (Tettuce)

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Abstract: The utilization of locally available vegetables is limited due to lack of information and knowledge on their nutritive values. The thiamin and ascorbic acid content of both fresh and dried leaves of *Hibiscus sahdarriffa* and *Lactuca sativa* was investigated. The result revealed that the thiamin content of dried and fresh *Hibiscus sabdarrjffa* was 0.00194mg/g and 0.75mg/g respectively. The thiamin content of dried and fresh *Lactuca sativa* were 0.00139mg/g and 15.08mg/g respectively. The ascorbic acid content of dried and fresh *Hibiscus sahdarrjffa* were 0.0736mg/g and 0.1802mg/g respectively. The ascorbic acid contents of dried and fresh *Lactuca sativa* were 0.0319mg/g and 0.11095mg/g respectively. All the values obtained were found to be below the recommended daily intake. The analysis revealed that *Hibiscus sahdarrjffa* contained higher amount of ascorbic acid in both dried and fresh leaves than *Lactuca saliva.* The comparative analysis also revealed that *Hibiscus sabdarriffa* has higher nutritive values of the vitamins than lettuce. It is there fore recommended that vegetables should be cooked fresh so as to retain their vitamin contents.

Key words: Ascorbic acid, *Hibiscus sabdarriffa*, *Lactuca sativa*, Thiamin, vegetables and vitamins

INTRODUCTION

Vitamins are very important to our survival and are actually crucial in building of our bodies. Approximately 97 % of our body is being replaced each year by the food we eat. Our bodies need approximately fifty or more nutrients in order to maintain good health. These include thirteen essential vitamins among which are the eight B vitamins, amino acid, two essential fatty acids and five co-factors, which are vitamin-like substance that the body required (Don, 2001). Vitamins are organic nutrients that are required in small quantity for a variety of biochemical functions and which generally cannot be synthesized by the body and must therefore be supplied in diet (Peter, 1990). The thirteen essential vitamins include Vitamin A (Retinol), Vitamin C (Ascorbic acid). Vitamin D (Cholecalciferol), Vitamin E, (Tocopherol), and Vitamin K (Napthaquinone) along with the eight B-Complex Vitamins which are Vitamin B_1 (thiamine), Vitamin B_2 (Riboflavin), Vitamin B_3 (niacin), Vitamin B_5 (Pentatonic acid), Vitamin B_6 (pyridoxine), Vitamin B_7 (Biotin), Vitamin B_9 (folic acid) and Vitamin B_{12} (Cyanocobalamin).

Vitamins do not give instant energy; they function in the body with carbohydrates, proteins and fats to supply energy. In other words, they are components of an enzymes system that function to create energy. We only need small amount of most vitamins to maintain good health. However, our bodies in the amount necessary to sustain life cannot synthesize them. Therefore, we must get them from our foods and multi-vitamin supplements. The existence of vitamins as an essential food factor in vegetables, and other plant sources, and their importance to human survival is the major aspiration governing the choice of this research. In fact, many nutritional strategies are currently being investigated in order to improve on them. Modem nutritional research work on the major sources of vitamins in vegetables were critically analyzed, with respect to quantitative and qualitative determination of the concentration of vitamins from the extract of leaves of different species, and with a view to improve or maintain the highest vitamin sources in today's global market.

Vitamin C helps to regulate blood pressure, contributes to reduce cholesterol levels and aids in the removal of cholesterol deposits from arterial walls, thus preventing arteriosclerosis. The easily destroyed nutrient also protects us from the revenges of free radicals, dangerous unpaired oxygen fragment that are produced in huge number as a normal bi-product of human metabolic processes (Addo, 2004). Left unchecked, free radicals can roam the body, destroying cell membranes on contact and damaging DNA strands, leading to degenerative diseases and contributing to accelerated aging, The antioxidant activity of vitamin C can also protect us from the damaging effects of air pollution and radiation, and aid in preventing cancers (Frederick and Klenner, 1971). Vitamin C also inhibits the conversion of nitrites; chemicals found in foods and processed meats, into nitrosomines, dangerous cancer causing compound that

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can lead to cancer of the stomach, bladder and colon (John, 2004). Furthermore, vitamin C also aids in the metabolism of folic acid, regulates the uptakes of Iron, and is required for the conversion of amino acids; L-phenylalanine into nor adrenaline. The conversion of tryptophan into seratonin, the neurohormone responsible for sleep, pain control and well being also requires adequate supplies of vitamin C (Smart and Crawford, 1991).

Vitamin B_1 participates in the structure of the enzyme carboxylase. If this vitamin is lacking, conversion of pyruvic acid to acetylcoA is reduced, consequently carbohydrates cannot participate in the kreb cycle and carbohydrate metabolism slow down. Some disorders of the nervous system have been observed due to lack of vitamin B_1. Many disorders including heart condition are all symptoms of disease beriberi (John, 2004). Vitamin B_1 is required for the production of hydrochloric acid, and for maintaining healthy circulation (Alfieri and Grace, 1998).

The main objectives of this research work are; To quantify the amount of thiamin and Ascorbic acid content in leaves of *Hibiscus sabdarriffa* and *lactuca sativa,* to see if the consumption of these plants will provide the recommended daily intake. And to find out whether drying has effect on the nutritional values of thiamin and ascorbic acid contents in leaves.

MATERIALS AND METHODS

Sample collection: All the vegetable samples were purchased directly from the Kaduna central market in June, 2007 Fresh samples were stored at 0"c in the Department of Food science Technology, Science Kaduna Polytechnic Nigeria. They were divided in to two separate portions, first portion was air dried for a period of 4-weeks while the other fresh portion was analyzed for their thiamin and ascorbic acid contents.

All the reagents and standard used in this work were of analytical grade. The methods used in this work for the various determinations of the samples are the standard methods.

Estimation of ascorbic acid:

Sample analysis: Two grammas of the sample (fresh and dried *Hibiscus sabdarriffa* and *lactuca sativa)* was extracted in 4% oxalic acid and make up to know volume ($100cm^3$) and centrifuged and Ascorbic acid contents were estimated by method described by Ibitoye (2005). Briefly $5cm^3$ of the working standard solution was pipetted out into $100cm^3$ conical flask and l0ml of 4% oxalic acid was added and titrated against the dye solution .The end point is the appearance of pink colour, which persists for a few minutes. The amount of dye consumed is equivalent to the amount of ascorbic acid present in the test sample

Thiamin estimation (flourimetr1c analysts): Two grammas (2g) of the sample (fresh and dried *Hibiscus sahdarriffa* and *lactuca sativa* was grinded in a mortar and 30ml of hydrochloric acid was added by portions. The content was thoroughly mixed and filtered using filter paper.

This analysis comprises of three (control, test sample and standard), for each sample both fresh and dried. To the first (control), 5ml of hydrochloric acid solution was transferred, the second (sample). To 1ml of the extract of the sample and 4ml of hydrochloric acid was transferred. To the third (standard) 5ml of thiamin solution was transferred.1.5ml of oxidizing mixture was poured into each phial and mixed, with gentle shaking to homogeneity. Then 5ml of butanol was added to each phial and stopper-using flask shaker and shaken vigorously for 5 minutes. The phials were then allowed to stand until the contents were separated into two layers. Then 0.5 ml of ethanol was added cautiously to further clarify the butanolic phase (Abdullateef, 2000). The cleared butanolic layer was cautiously decanted into a flourimeter cell and successive measurement of the fluorescence intensity for the three (test sample, control and standard) solutions of both fresh and dried leaves of *Hibiscus sabdarriffa* and *Lactuca sativa* were recorded.

RESULTS AND DISCUSSION

The amount of two important vitamins Ascorbic acid and thiamine were estimated in the leaves of *Hibiscus sabdariffa* and *Lactuca sativa*. The results reveal that both plant leaves contain appreciable quantity of both vitamins. Ascorbic acid content in both dried and fresh leaves of *Hibiscus sabdariffa* were found to be 0.0736mg/g and 0.1802mg/g respectively, suggesting that drying has negative effect on the conc. of Ascorbic acid. In fact there is significant lose of Ascorbic acid by 59.2% due to drying, revealing that drying has effects on vitamin C. The results for determination of Ascorbic acid in the leaves of dried and fresh *Lactuca sativa* were 0.0319mg/g and 0.1109mg/g respectively, indicating that drying has reduced the nutritional value of Ascorbic acid, up to 71.2% of the vitamin content has been lost due to drying (Table 1). These were found in degree of variation of these constituents from one sample to another and from one determination to another the recommended dietary in take or allowance of thiamin for male is 1.4mg/ day and female 1.0 mg/day and although 50mg is usually used in supplementation (Sallamander, 1998 while the recommended dietary intake or allowance of ascorbic acid is 60mg but most health care professional recognized that this tiny amount is barely enough to prevent the on set of ascorbic acid deficiency (scurvy) base on countless medical studies the therapeutic intake of vitamin c can be said to safety range from 500 - 4000mg / day (Smart and Crawford, 1991). Since this water-soluble vitamin cannot be stored in the body, they are being excreted in urine. The results for estimation of thiamine as shown in Table 2 reveals that *Hibiscus sabdariffa* have 0.00194ug/g

Table 1: Results for % of thiamin and ascorbic acid contents lost due to drying.

Sample	% of ascorbic acid contents lost	% of thiamin contents lost
Hibiscus sabdariffa	59.2	71.2
lactuca sativa	99.7	99.9

Table 2: Results for the estimation of ascorbic acid and thiamin contents

Sample {5determinations}	Ascorbic acid	Thiamin
Dried *Hibiscus sabdarnffa*	0.0736mg/g ±0.21	0.00194mg/g ±0.22
Fresh *Hibiscus sabdariffa*	0.1802mg/g ±0.11	0.75mg/g ±0.21
Dried *Lactuca sativa*	0.0319mg/g ±0.04	0.00139mg/g ±0.06
Fresh *Lactuca sativa*	0.1109mg/g ±0.31	15.00mg/g ±0.23

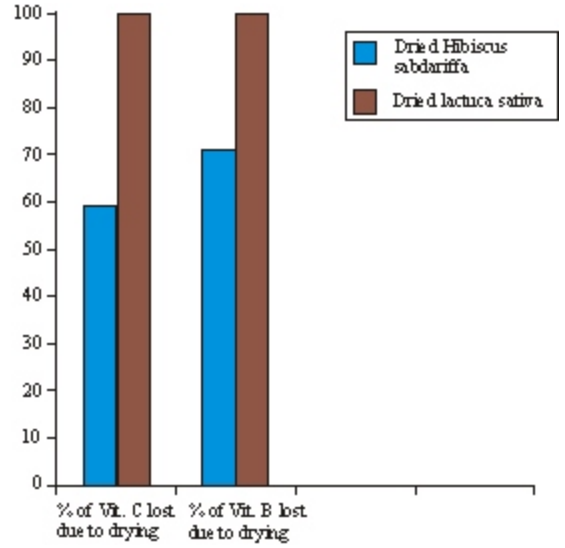

Fig. 1: Results for percentage of vitamins C and B_1 lost due to drying,

and 0.75µg/g for both dried and fresh leaves respectively, while the leaves of *Lactuca sativa* has 0.00139µg/g and 15.08µg/g for both dried and fresh leaves respectively. These shows that *Hibiscus sabdariffa* less contents of thiamine where as *Lactuca sativa* has high content of thiamine. The results further reveal that drying has significant negative effects on both leaves. As in Fig. 1, the thiamine nutritional content in *Hibiscus sabdariffa* had decreased by 98.7% while that of *lactuca sativa* thiamine content has its nutritional value lost by 99.9%, suggesting that drying has a serious negative effects on the thiamine nutritional contents of the two leaves.

CONCLUSION

Based on findings of this study, it could be concluded that drying significantly reduces the thiamine and ascorbic acid content of *Hibiscus sabdariffa* and *Lactuca sativa,* samples. Thus lowering their nutritive values. The result shows that the widely edible vegetables, *Lactuca sativa* was found to contain less thiamin and ascorbic acid contents than the *Hibiscus sabdariffa* which is not popularly known.

RECOMMENDATION

It is suggested that further research work should be carried on this particular plants to find more about their medicinal applications and since drying has great negative effect on the nutritive value of these leaves, it is therefore suggested that these vegetables should be freshly used. It is also suggested that these vegetables should be adequately included in our daily diet.

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