

Antioxidant Contents (Vitamin C) of Raw and Blanched Different Fresh Vegetable Samples

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ABSTRACT

The study was aimed to determine the antioxidant contents and the effect of different blanching times (5 min, 10 min, 15 min and 20 min) on antioxidant contents of three different selected fresh vegetables. Three different types of vegetable were used namely *Amaranthus* specie locally known as spinach, namely "tete", (*Celosia argentea*), soko, (*Solanum nodiflorum*) and odu, (*Telfeira occidentalis*) were analyzed for their antioxidant contents. The analysis revealed that raw vegetables have the highest amount of antioxidant contents. *Telferia occidentalis* had the highest antioxidant content followed by *Solanum nodiflorum*. It was observed that blanching time had an adverse effect on the antioxidant contents of the blanched vegetables. The antioxidant contents of tete, soko and odu were significantly decreased ($p < 0.05$) after blanching.

Keywords: Spinach; Blanching and Antioxidant Contents

1. Introduction

Antioxidants are chemical substances that donate an electron to the free radical and convert it to a harmless molecule. Antioxidants intercept free radical and protect cells from the oxidative damage that leads to aging and disease. Antioxidants prevent injury to blood vessel membranes, helping to optimize blood flow to the heart and brain, defend against cancer-causing DNA damage, and help lower the risk of cardiovascular disease. Other essential antioxidants such as vitamin C, E and selenium must be obtained from our diet. Fruits, vegetables and grains are rich sources of antioxidant vitamins.

Epidemiological studies revealed that diets rich in fruits, vegetables and grains are associated with a lower risk of several degenerative disease, such as cancers [1] and cardiovascular diseases [2,3] reported that increased consumption of fruits and vegetables containing high levels of phytochemicals has been recommended to prevent chronic diseases. This association is often attributed to different antioxidant components such as vitamin C, E, carotenoids, lycopenes and other phytochemicals.

Many food composition data bases never take into consideration the fact that concentrations of nutrients and their activity may change through cooking practices such

as blanching. This is of great importance's considering that only a small amount of vegetables is consumed in the raw state, whilst most need to be processed for safety and quality. *Amaranthus* specie locally known as 'tete' is one of the most popular leafy vegetable and abundantly available in the market, and commonly consumed by urban and rural Nigerians. [4] and [5] reported high concentration of antioxidant components for *amaranthus* specie. This leafy vegetable is generally cooked before being consumed. Losses of antioxidant components from vegetables during cooking have been reported by [3,6,7]. However, no research has been carried out to investigate the antioxidant properties of these three different types of vegetables in Nigeria.

This study was to determine the amount of antioxidant present and the effect of blanching time on antioxidant components of these three different selected vegetables.

2. Materials and Methods

2.1. Materials

Three different types of fresh vegetables: spinach, (*Amaranthus* specie), soko, (*Celosia argentea*) and Odu, (*Solanum nodiflorum*) were purchased from Iree market in Osun State and randomly selected.

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2.2. Sample Preparation

Three different vegetables were cleansed under running tap water and excessive water was drained off. Tete (*Amaranthus* spp), soko (*Celosia argentea*) and odu (*Solomon nodiflorum*) of 1 kg each was chopped into small pieces and divided into four portions for blanching at (5 min, 10 min, 15 min and 20 min). Blanching was done by simmering the vegetables in boiling water in the ratio of 1 to 5 draining the sample and leaving it to cool at room temperature. They were also analyzed raw. All the raw and blanched samples were lyophilized and homogenized using a blender before being transferred into an air-tight container, and kept in the refrigerator prior analysis.

2.3. Extract Preparation

The ground samples were extracted with distilled water in the ratio of 1 to 10. The mixtures were placed in a different conical flask and agitated at 100 rpm with the aid of an orbital shaker. Then each mixture was filtered through a Whatman No. 4 filter paper to obtain a clear extract. Each extract was used for the analysis.

2.4. Determination of Antioxidant Content

Antioxidant content of the each sample was determined by the method of [8] using dye 2,6-dichloro phenol-indophenol(DCPIP). The blue dye was titrated against each extract solution until a faint pink coloured persisted for 15 seconds. This indicated the end points of the titration.

2.5. Statistical Analysis

All determinations were triplicate and mean values and standard deviations were reported. Analysis of variance (ANOVA) was performed and the mean separation was done by Duncan multiple range test ($p < 0.05$) (XPSS Version 14).

3. Results and Discussion

3.1. Effect of Blanching Time on Antioxidant Contents

Table 1 showed the mean values of blanched vegetables (Tete, Soko, Odu) for 5 min as 56.7 ± 4.0 , 67.7 ± 5.6 and 72.0 ± 6.7 respectively. Significant differences ($p < 0.05$) were observed within the values obtained for blanched vegetables with time. Besides temperature, time is one of the critical factors affecting the loss of antioxidant components during blanching. [9,10] reported that blanching for less than 1min would retain the high antioxidant activity in green leaves of sweet potatoes. [11] reported a decrease in total antioxidant components when vegetables juices were cooked at 102°C for 10 min.

3.2. Antioxidant Contents of the Raw Vegetables

From **Table 2** Odu had the highest antioxidant content followed by Soko and the least was found in Tete. It implied that raw vegetables were better than that of the blanched counterparts because they have higher antioxidant contents. Cooking practices, such as blanching, may greatly influence the loss of antioxidant components in leafy vegetables [6,12]. Spinach has been reported as one of the many vegetables rich in antioxidant components [13-15].

3.3. Effect of Blanching Time on Three Different Types of Vegetables

Figure 1 showed that odu had the highest antioxidant contents through out the blanching times. As the blanching time increased the antioxidant contents reduced. This observation agreed with the [4,5,7] reported that the antioxidant components reduced after blanching due to blanching time and temperature. In this study, spinach at 10 min leached out 49% - 51% of its antioxidant contents into boiling water. In addition, [14] reported that boiling of fresh-cut spinach for 10 min released 50% - 60% of its antioxidant components into the cooking water. Factors such as maturity and variety can also influence the anti-oxidant capacity of vegetables [16,17]. [4] have indicated that boiling processes at above 95°C would decompose the antioxidant components of vegetables. Blanching up to 20 min affected the antioxidant components.

4. Conclusion

From the above investigation it can be concluded that higher blanching time and higher temperature affected

Table 1. Effect of blanching time on antioxidant contents of three vegetables.

Time (Mins)	Tete	Soko	Odu
5	56.7 ± 4.0^d	67.7 ± 5.6^c	72.0 ± 6.7^c
10	50.0 ± 2.3^c	63.3 ± 4.4^c	67.3 ± 3.6^c
15	45.0 ± 1.9^b	52.7 ± 6.2^b	57.0 ± 4.2^b
20	35.7 ± 2.0^a	43.7 ± 2.2^a	43.0 ± 1.8^a

All values are means of triplicate determinations \pm S.D. Means within columns with different superscripts are significantly different ($p < 0.05$).

Table 2. Antioxidant contents of the raw vegetables.

Tete	75.3 ± 6.7^a
Soko	84.9 ± 2.4^b
Odu	90.0 ± 8.3^c

All values are means of triplicate determinations \pm S.D. Means within columns with different superscripts are significantly different ($p < 0.05$).

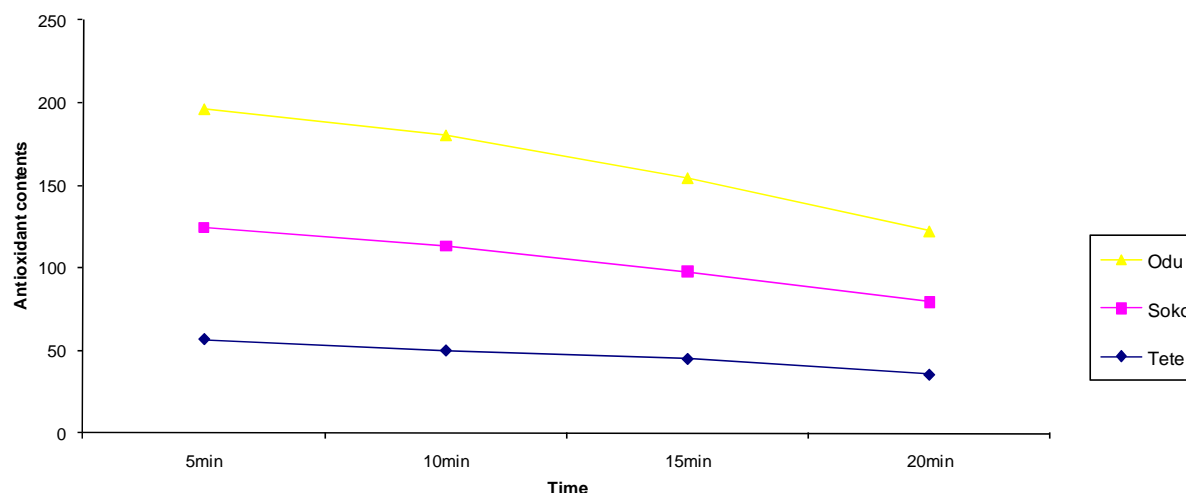


Figure 1. Effect of blanching on three different types of vegetables.

the antioxidant contents (Vitamin C) which was supposed to be derived from the vegetables as vitamin C supplement. Therefore 1 min of blanching time is recommended for blanching of vegetables.

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