Impact of Pickling on Carbohydrate, Protein and Tannin Content of Five Selected Fruits

*Saranya R[1], Rajani V[2]

[1]PG student, Dept. of Environmental Sciences, All Saints' College, Thiruvananthapuram, Kerala, India
[2]Assistant Professor, Dept. of Environmental Sciences, All Saints' College, Thiruvananthapuram, Kerala, India

ABSTRACT
Fruits are nature's precious gift to the humankind and animals; indeed, they are an absolute feast to our sight, not just because of their flavour and colour but of their unique nutrient profile that helps the human body to remain fit, rejuvenate, and free of diseases. They are life-enhancing medicines fully packed with, minerals, antioxidants, vitamins, fibers and many phytonutrients. A healthy intake of fruits helps to protect against major illnesses, such as heart disease and cancer. In this study, an attempt was made to estimate the impact of pickling on Carbohydrate, Protein, and Tannin content of five selected fruits (both fresh and pickled) – Averrhoa bilimbi, Phyllanthus emblica, Citrus limon, Carica papaya and Mangifera indica. Among the five selected fruits, the highest amount of carbohydrate was found in fresh Phyllanthus emblica (13g/100g) and lowest amount of carbohydrate was found in pickled Citrus limon (0.4g/100g). Among the selected five fruits, it was found that fresh Carica papaya had the highest value (0.9g/100g) for protein and pickled Averrhoa bilimbi and Phyllanthus emblica showed the least value (0.1g/100g). It was determined that fresh Mangifera indica had the highest amount of tannin (328.97g/100g) and pickled Citrus limon (228.63g/100g) had the least amount. From this priliminary study, it was clear that all other selected factors showed higher values in fresh samples. So it is always suggested to eat raw, fresh and ripe fruits.

Keywords: *Carbohydrate, Protein, Tannin, Fresh fruits, Pickled fruits.*

INTRODUCTION

Fruit and vegetables are power-packed foods.Their overall benefits are manifold. Fruit nutrition benefits are enormous.Fruit's health benefiting properties are because of their richness in vitamins, minerals, micro-nutrients, pigment anti-oxidants. Altogether, these compounds help the body to prevent or at least prolong the natural changes of aging by protecting from damage and rejuvenating tissues, and organs. Since the fruits are having a very short shelf life and their health benefiting properties decline with time it is better to consume it while they are fresh. For storing, place them in zipping pouches or paper wrappings and keep in the refrigerator for short periods. But, in order to use these fruits and vegetables throughout the year, some processing methods can be adopted. This helps to stabilize and transport fruits and vegetables of remote regions of the world, to distant locations for consumption. Several methods of preservation like canning, freezing, dehydration, pickling, are carried out to get safe products. They are having desirable quality attributes similar to those of fresh products. However, all these processing methods will have the capacity to produce undesirable changes in the color, texture, flavor and nutritional quality of many fresh fruits and vegetables. In this study, an attempt was made to estimate the carbohydrate, protein and tannin content in five selected fruits- Averrhoabilimbi, Citrus limon, Carica papaya, Phyllanthusemblicaand Mangifera indica.

RELATED WORKS

An investigation was made on the chemical composition of some lesser known wild fruits and vegetables consumed in Ayamelum local government area of Anambra state by Onuekwe monica Ekwutosi (2012) [11]. He observed that raw Guava had proximate composition of protein as 0.82g, carbohydrate- 11.8g, in the case of mango the amount of protein was 0.51g carbohydrate-17.00g. Fruits and vegetables are immensely valued for their nutritional content and their potential health functionality against various degenerative diseases such as cancer, cardiovascular, cataract, diabetes and neurodegenerative diseases like Alzheimer's and Parkinson's (Kaur and Kapoor, 2001)[8]. Loganayaki N and Manian S., 2010 [9] describing them as functional foods, nutriceuticals and nutraceuticals . These anti-nutritional factors are known to interfere with metabolic processes such that growth and bioavailability of nutrients are negatively influenced (Abara 2003) [1]. Carotenoids, flavonoids, cinnamic acids, benzoic acids, folic acid, ascorbic acid, tocopherols, tocotrienols are some of the antioxidants produced by the plant for their sustenance (Bajpai *et al.*, 2005)[3].Peris.C *et al.*, (2013)[12] had determined the total carbohydrates in fresh bililmbi fruit and fruit concentrate.

MATERIALS AND METHODS

The following fruits were selected for the study- *Averrhoa bilimbi, Citrus limon, Carica papaya, Phyllanthus emblica* and *Mangifera indica*. Both

fresh and pickled samples were used for the estimation of Carbohydrate, Protein and Tannin.

Estimation of Total Carbohydrate

The Total Carbohydrate was estimated by the method of Hedge, J E and Hofreiter, B T., 1962[6]

Estimation of Protein

The protein content was estimated by Lowry's method (Lowry *et al*., 1951) [4]

Estimation of Tannin

Estimation of Tannin was done according to the method by Robert E B (1971) [5]

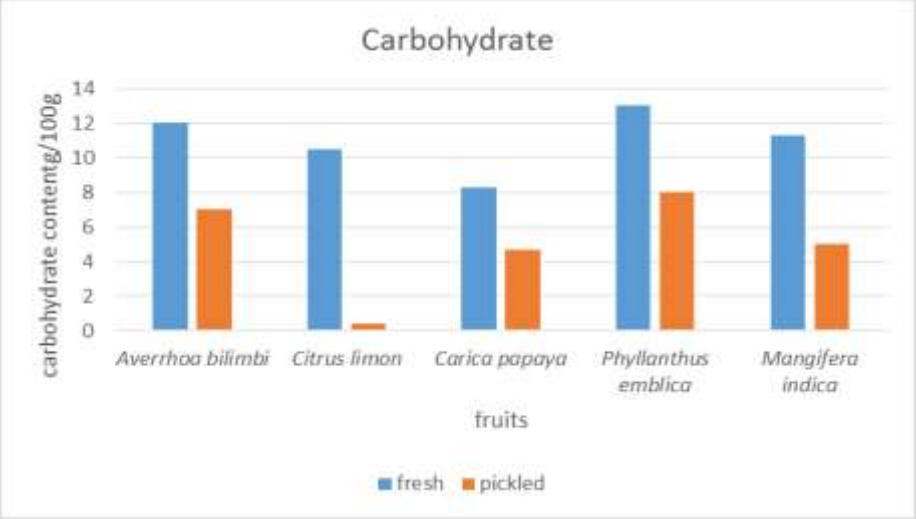
RESULTS AND DISCUSSION

Fruits and vegetables deteriorate within a few days after harvest. They are consumable in their fresh state .The traditional way of sun/shade drying is the most feasible method usually used to preserve these plant products. In recent years, preserved food has gained lot of popularity. But its benefit towards human health is still unknown.

ESTIMATION OF TOTAL CARBOHYDRATE

Results of the present study are as follows (Figure 1). The carbohydrate content of the fresh and pickled fruits was given in the table1. Among the five selected fruits, the highest amount of carbohydrate was found to be in fresh *Phyllanthus emblica* (13g/100g) and lowest amount of carbohydrate was found to be in pickled *Citrus limon* (0.4g/100g) .Followed by *Phyllanthus emblica*, the following are *Averrhoa bilimbi, Mangifera indica, Citrus limon* and finally *Carica papaya* in case of fresh fruits. Among the pickled fruits, *Phyllanthus emblica* showed highest value and *Citrus limon*, the lowest. The carbohydrate content of fresh *A. bilimbi* was 12g/100g and that of pickled was 7g/100g. Loganayaki N and Manian S.,2010 [9]had determined the total carbohydrates in fresh bililmbi fruit and fruit concentrate. The carbohydrate content in the fresh *Citrus limon* was found to be 10.5g/100g and that of pickled was 0.4g/100g and this pickled fruit showed the least carbohydrate value among all the selected samples. 8.3g/100g of carbohydrate was observed in fresh *Carica papaya* and 4.7g was found in pickled. In fresh *Phyllanthus emblica* it was determined that the amount of carbohydrate was 13g/100gwhich recorded the highest amount among the selected fruits and in pickled, it was 8g/100g. Carbohydrate content in *Mangifera indica* was determined as 11.3g/100g and 5g/100g in fresh and pickled respectively. The results indicate that the process of pickling lowers the carbohydrate contents in the selected fruits.

Figure 1- Estimation of carbohydrate (g/100g)

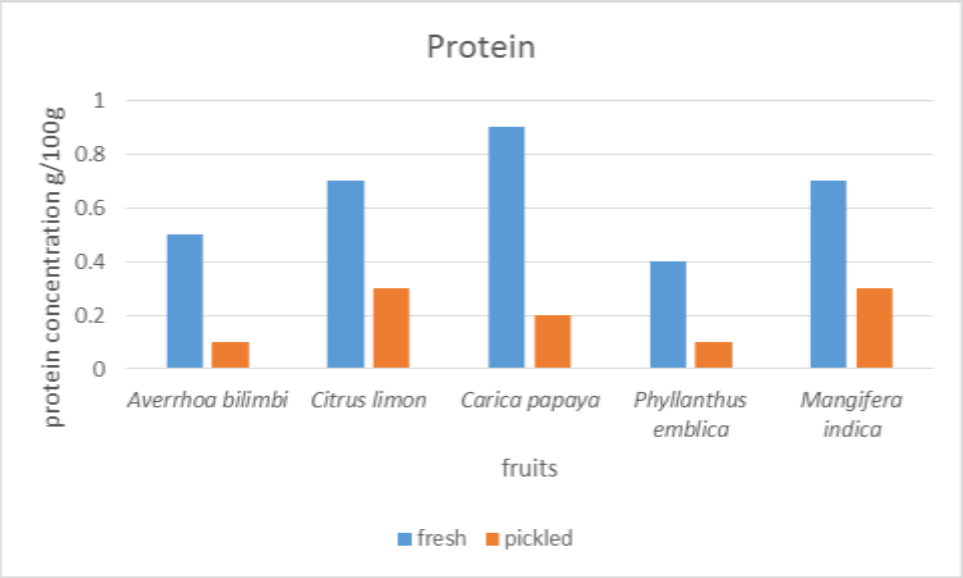


ESTIMATION OF PROTEIN

The protein content of the fresh and pickled fruits was given in the figure 2. Among the selected five fruits, it was found that fresh *Carica papaya* had the highest value (0.9g/100g) for the protein and pickled *Averrhoa bilimbi* and *Phyllanthus emblica* showed the least value (0.1g/100g). Among the fresh fruits followed by *Carica papaya*, there were *Mangifera indica*, *A. Bilimbi*, *Citrus limon* and then the *Phyllanthus emblica*. The protein content of fresh *A. bilimbi* was 0.5g/100g and that of pickled was 0.1g/100g.In the fresh *Citrus limon* the protein content was estimated as 0.7g/100g and that of pickled was 0.3g/100g. 0.9g/100g of carbohydrate was observed in fresh *Carica papaya* which was the fruit with highest protein content and 0.2g/100g was found in pickled. In fresh *Phyllanthus emblica* it was determined that the amount of protein was 0.4g/100g and in pickled, it was 0.1g/100g (least value). In *Mangifera indica* it was determined as

0.7 g/100g and 0.3g/100g in fresh and pickled respectively, which was same as that of *Citrus limon*. Protein content in fresh fruit and fruit concentrate of *A.bilimbi* was also determined by Loganayaki N and Manian S.,2010 [9]. The results also indicate that the process of pickling lowers the protein contents in the selected fruits.

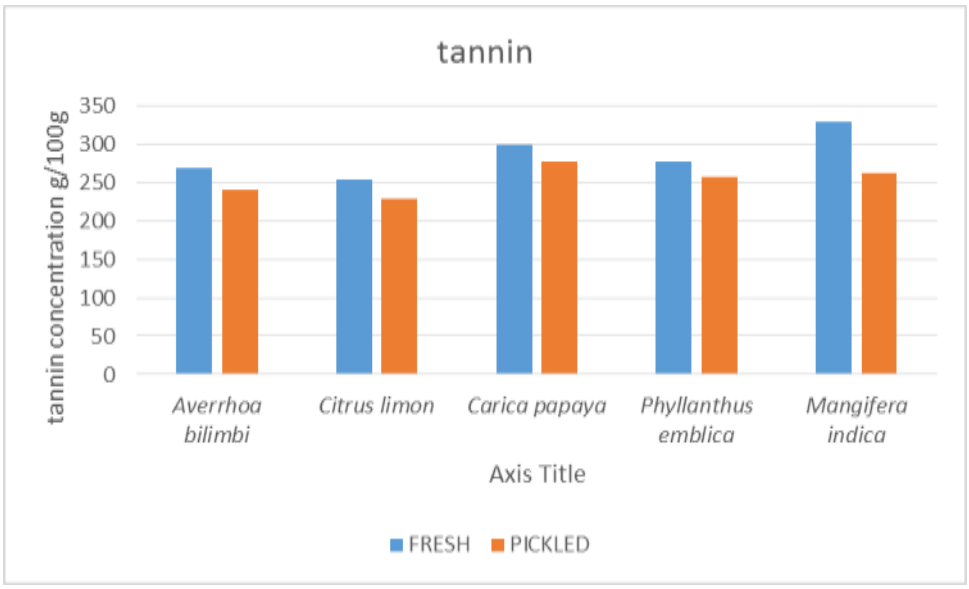
Figure 2- Protein content in fresh and pickled fruits (g/100g)



ESTIMATION OF TANNIN

Anti-nutritional factors are those substances found in fruits and food substances in general are poisonous to humans or in some ways limit the nutrient availability to the body. Anti-nutritional factors are present in different food substances. They are in varying amounts depending on the kind of food, chemicals used in growing the crop, mode of its propagation, as well as those chemicals which used in storage and preservation of the food items. These anti-nutritional factors are known to interfere with metabolic processes such that growth and bioavailability of nutrients are negatively influenced [1]. The result of the analysis is given in the figure 3.

Figure 3- Estimation of Tannin in fresh and pickled fruits (g/100g)



Among the five selected fruits, it was determined that fresh *Mangifera indica* had the highest amount of tannin (328.97g/100g) and pickled *Citrus limon* (228.63g/100g) had the lowest amount. It was observed that the amount of tannin in fresh *Averrhoa bilimbi* was estimated as 269.15/100g where as pickled gave the value as 240.15g/100g which was the least value noted in this study. Peris

C et al.,2013[12] and Loganayaki N and Manian S.,2010 [9] had determined the tannin in fresh bilimbi fruit and fruit concentrate. Archana S R and Rajani V., 2014 [2] had estimated the tannin content in fresh and pickled bilimbi and observed the same pattern of result. In case of *Citrus limon* the values were noted as 254.20g/100g and 228.63g/100g (the lease amount) for fresh and pickled respectively. *Carica papaya* gave the amount as 298.04g/100g and 276.63g/100g, *Phyllanthus emblica:* 276.63g/100g and 256.63g/100g and Mangifera indica: 328.97g/100g(the highest value) and 261.68g/100g. So incase of fresh samples, the highest value was given by*Mangifera indica*, followed by *Carica papaya, Phyllanthus emblica, Averrhoa bilimbi* and finally *Citrus limon*. In case of pickled samples, the highest amount was given by *Carica papaya* followed by *Mangifera indica, Phyllanthus emblica, Averrhoa bilimbi and Citrus limon.* This preliminary study indicates that, in case of tannin also the pickling can lower the tannin content in all the selected fruits.

Tannins have traditionally been considered as antinutritional but it is now known for its beneficial or antinutritional properties depend upon their chemical structure or dosage. Tannins are aromatic compounds containing phenolic groups. They interact with salivary proteins and glycoproteins in the mouth and render the tissues astringent to taste [7].Astringency gives tannin the medicinal value in preventing diarrhea and dysentery and for controlling hemorrhage [10].This is because tannins are metal ion chelators, and tannins chelated metal ions, they are not bioavailable. Tannins do not affect absorption of either trace minerals such as zinc, copper, and manganese in rats [2] .Umeobika et al.; 2015[13] quantitatively evaluated the antinutritional factors in mango fruit,the result showed mango fruit contained 1.75% tannin. Large quantity of tannins may cause kidney irritation, irritation of the stomach, liver damage, bowel irritation and gastrointestinal pain.

CONCLUSION

The health benefits of fruits and vegitable guarantee you, optimum health and a well-being of body in the long run. Fruits benefit your body immensely than any other food. These natural sources of vitamins and minerals are essential for the functioning of the body. In this study, an attempt was made to estimate the Carbohydrate, protein and tannin content in five selected fruits (both fresh and pickled) - *Averrhoa bilimbi, Citrus limon, Carica papaya, Phyllanthus emblica* and *Mangifera indica.* Among the five selected fruits, the highest amount of carbohydrate was found to be in fresh *Phyllanthus emblica*(13g/100g) and lowest amount of carbohydrate was found to be in pickled *Citrus limon* (0.4g/100g). Followed by *Phyllanthus emblica, Averrhoa bilimbi, Mangifera indica, Citrus limon* and finally *Carica papaya* in case of fresh fruits. Among the selected five fruits, it was found that fresh *Carica papaya* had the highest value (0.9g/100g) for the protein and pickled *Averrhoa bilimbi* and *Phyllanthus emblica* showed the least value (0.1g/100g). It was determined that fresh *Mangifera indica* had the highest amount of tannin (328.97g/100g) and pickled *Citrus limon* (228.63g/100g) had the lowest amount. From this priliminary study, it was clear that except beta carotene, all other selected factors showed higher values in fresh samples and beta carotene content was found to be high in pickled samples. So it is always suggested to eat raw, fresh and ripe fruits because then you experience the real health benefits, rather than consuming them after processing or cooking.

REFERENCES

[1] Abara 2003"Tannin content of Dioscoreabulbufera." J. Chem. Soc. Niger 28:, pp. 55-56

[2] Archana S R and Rajani V. 2014, ''Evaluation of nutrient and antioxidant properties of fresh and pickled *Averrhoa bilimbi* 'Journal of Eco toxicology and Environmental monitoring, 24(3) pp-85-94,

[3] Bajpai, M., A. Pande, S.K. Tewari and Prakash, D. 2005. Phenolic contents and anti nutritional content of some food and medicinal plants. International journal of food science and nutrition, 56(4):287-291

[4] O.H. Lowry, N.J. Rosebrough, A.L. Tarr, R.J. Randall. 1951.'' Protein measurement with the folin-Phenol reagent'' in the Journal of biological chemistry 193:265-276

[5] E.B. Robert (1971). Method for estimation of tannin in grain sorghum. Agronomy Journal. 63: 511-512

[6] Hedge E and Hofreiter, B T.1962 In: Carbohydrate Chemistry 17(EdsWhisteler R L and Be Miller , JN) Academic Press Newyork

[7] Howes, 1953, Vegitable tanning materials ,butter worth scientific publication, London

[8] Kaur C. and Kapoor H. C 2002. Antioxidant activity and total phenoloic content of some asian vegetables. *Int. J. Food Science Technol.*, 37, 153-161.

[9] Loganayaki N and Manian S .2010 In vitro antioxidant properties of indegenious underutilized fruits food Sci. Biotechnol. 19:725-734

[10] Nurul S R, and Asmah R. 2012 Evaluation of antioxidant properties in fresh and pickled papaya, International Food Research Journal. 19(3):1117-1124.

[11] Onuekwe monica ekwutosi 2012 'Chemical composition of some lesser-known wild fruits and vegetables consumed in ayamelum local government area of anambra state' PG thesis-Department of Home Science, Nutrition and Dietetics Faculty of Agriculture

[12] Peris C and, Sing k D'souza 2013 M Archives of pharmacy and biological sciences nutritional and bio chemical evaluation of Averrhoa bilimbi L 58-63

[13] Umeobika,U C ; Nwali,D.C and Ekwueme, I. J. 2015 Quantitative Evaluation of Anti-nutritional Factors in Mango *(Magniferaindica)* Fruit in International journal of applied science and mathematics; 2(5) 142-145