ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 6, Issue 3, pp: (660-664), Month: July - September 2018, Available at: www.researchpublish.com

FATTY ACID PROFILE OF FREEZE – DRIED AVOCADO POWDER

Jobil.J.Arackal[1], Dr.S.Parameshwari[2]

1. Research Scholar, Department of Clinical Nutrition and Dietetics, Periyar University, Salem.

2. Associate professor, Department of Clinical Nutrition and Dietetics, Periyar University, Salem.

Abstract: **Avocado, a tropical fruit has gained nutritional prominence in recent times due to its high lipid content. The aim of this work is to evaluate the fatty acid profile and nutritional values of Non-Lime treated avocado pulp and lime treated avocado pulp by freeze drying. Lime treatment helps to prevent the browning reaction of the pulp and also helps to improve the texture, colour and flavour of the powder. Drying applied in food preparation helps to extend the shelf life of the available seasonal fruit and avoid transportation problem of fruit. Freeze-dried avocado had high water absorption capacity and rate. Freeze-dried and rehydrated samples were harder and softer respectively than fresh avocado. The result indicates that the fatty acid profile and nutrient values are slightly variable in the two types of avocado powder (Non-Lime and lime treated) and also browning is prevented to a larger extent.**

Keywords: **Avocado, Freeze dried, Lime treatment, Fatty acid profile.**

1. INTRODUCTION

The avocado tree (Persea americana Mill.) belongs to the family of the Lauraceae, is native to the Western Hemisphere from Mexico south to the Andean regions, now widely cultivated in tropical America. There are three general cultivators namely the Mexican, Guatemalan and West Indian, each of which comprises a group of varieties. Apart from these, there are many important hybrids. The well-known variety 'Fuerte' is a Guatemalan-Mexican hybrid, while 'Hass' is of Guatemalan origin. There is a great variability in fruit traits not only between races but between cultivators within a race. One of the most distinct differences between cultivars is the peel colour when ripened. The peel of some cultivars changes from green to black or purple with increasing maturity or ripening. The names of the cultivars reflect the area of origin of the avocado, and fruit properties such as ripening, quality and abscission are related to the climates of the respective areas. In recent years, significant public interest has been generated by the researchers on the effects of the consumption of different kinds of fats and their relationship to obesity, cardiovascular disease and certain types of breast and colon cancer [1, 2, 3, 4, 5].

The lipophilic fraction of avocado is rich in unsaturated fatty acids with antioxidant properties. The studies have demonstrated the high anti carcinogenic potential of the carotenoids present in avocados.[6] The naturally occurring, fat-soluble antioxidants protect the lipid fraction against oxidation by blocking the action of free radicals, converting them into stable products by donating hydrogen or electrons, and contributing to the overall antioxidant activity of food.[7] For food preservation, one of the industrial processes which has proven to be efficient is drying, which besides being practical, also favours the product quality.[8,9] However, not all drying methods favour the processing of avocado pulp due to a variety of enzymatic and oxidative reactions occurring in the fruit. Thus, lyophilization may be a suitable alternative for the processing of avocados, since it offers high-quality products. The impact of Lyophilization on avocado has been investigated meagrely. [10, 11]

OBJECTVES OF THE STUDY:

- To select quality Avocado fruit and remove pulp.
- To develop selected Non-Lime treated and Lime treated avocado powder by freeze drying method.

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 6, Issue 3, pp: (660-664), Month: July - September 2018, Available at: www.researchpublish.com

- To analyze the fatty acid profile of the selected avocado powders.
- To analyze the nutrients of Non-Lime treated and Lime treated avocado powder.

2. MATERIALS AND METHODS

2.1) Procurement of raw materials

The raw materials like Avocado and lime were procured from the local market in the city of Yercaud, Salem, Tamil Nadu.

2.2) Location of the study

This study was carried out in the Department of Clinical nutrition and dietetics, Periyar University, Salem, Tamil Nadu. The fatty acids profile and Nutrients analysis were done by the IIFPT (Indian Institute of Food Processing and Technology) Tanjore, Tamil Nadu.

2.3) Sample Preparation

The collected fruits were stored at room temperature for three days to complete the ripening process. The ripened fruits were washed in running water and sanitized with 200ppm of chlorine, washed again in running water to remove the chlorine, and then peeled and cut into cubes (size 1*1*1cm) after which the mashed avocado pulp was poured into two round bottom flask. A set of sample from one of the round bottom flask was lime treated and second sample from another round bottom flask was not treated with lime.

2.4) The Conversion of Fruit Pulp to Powder

The avocado pulps prepared by employing two different techniques (Lime treatment and Non- lime treatment) were frozen in conventional freezer at -26^{0}C. After freezing, approximately 25g samples were dried in a freeze dryer in each samples. Vacuum pressures of 0.12, 0.37, and 1.07 mbar were studied. Sublimation temperature in the chamber was automatically changed to-40^{0}C, -30^{0}C, and -20^{0}C, respectively. Once the pulp was freeze-dried, it was placed in glass bottles. Nutrient analysis and fatty acid profile for the freeze dried powders were carried out in Indian Institute of Food Processing and Technology (NABL Accredited Lab), Tanjore, Tamil Nadu.

2.5) Nutrient Analysis of Freeze-Dried Avocado Pulp Powder

The optimum samples were prepared and stored in glass bottles and kept under refrigeration conditions (5-7^{o}C) for the proximate and fatty acid analysis. Protein, carbohydrate, and crude fibre were determined using standard methods (AOAC, 1990). The fatty acid compounds identified by AOCS, 2000 (Official method of analysis of American Oil Chemists Society), Method number Ce 266. Preparation of methyl esters of fatty acids. USA. All analysis were carried out in triplicates

3. RESULTS AND DISCUSSION

The results were expressed as mean ± standard deviation (S.D). The experimental data were analysed using analysis of variance (ANOVA) (Microsoft Excel 2010). The mean values were considered at the 99% confidence level (p = 0.05). Correlation between the phenolic contents and the antioxidant activity was determined using IBM SPSS Statistics.

3.1) FATTY ACID PROFILE OF FREEZE DRIED AVOCADO POWDERS

S.no	Name of the molecular	Sample I (Non -lime treated)		Sample II (Lime treated)		P-VALUE
		Retention time	Peak area %	Retention time	Peak area %	
1	7-Hexadecenoic acid, methyl ester	14.45	4.60	14.48	5.97	0.65(NS)
2	Hexadecanoic acid	14.72	24.06	-	-	
3	9,12-Octadecadienoic acid (Z,Z)-, Methyl ester	16.96	17.17	16.97	5.47	
4	9- Octadecenoic acid(Z)-Methyl ester	17.08	51.50	17.05	53.97	

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 6, Issue 3, pp: (660-664), Month: July - September 2018, Available at: www.researchpublish.com

5	Pentadecanoic acid,	17.41	1.12	17.45	0.01	
6	Methyl(Z)-5,11,14,17-eicosatetraenoate	18.14	0.97	-	-	
7	13,16-Octadecasiynoic acid ,methyl ester	19.91	0.10	-	-	
8	Hexadecanoic acid,15-methyl-,methyl ester	20.29	0.18	-	-	
9	17-Octadecynoic acid	20.78	0.20	-	-	
10	8,11,14-Eicosatrienoic acid (Z,Z,Z)-	21.47	0.08	-	-	
11	Dadecanoic acid,10 – methyl-,methyl ester	23.21	0.04	-	-	
12	Decanoic acid, methyl ester	-	-	14.74	24.17	
13	Octadecanoic acid , 2-propenyl ester	-	-	25.19	4.92	
14	i-propyl 9-tetradecenoate	-	-	30.98	5.50	

The maximum peak area (53.97) represented in the lime treated avocado powder was 9-octadecenoic acid (Z)-, (C19H36O2) with the retention time of 17.05.The same compound present in the non-lime treated avocado powder peak point was 51.50 with retention time of 17.08 and the common name of the 9-octadecenoic acid (Z) was oleic acid methyl esters .

The moderate peak area(5.47) represented in the lime treated avocado powder was 9, 12-Octadecadienoic acid (Z,Z)-, Methyl ester (C19H34O2) with retention time of 16.97.The same compound present in the non-lime treated avocado powder peak point was 17.17 with the retention time of 16.96 and the compound is called as oleic acid methyl esters .

Linoleic acid which is one of the most important polyunsaturated fatty acids in human food because of its prevention of distinct heart vascular diseases (Boelhouwer) is found in avocado. It is rich in oleic acid. It contains high oxidative stability and it can prevent skin irritation caused by oxidation of the oil when used as body cream.

3.2) STATISTICAL ANALYSIS OF FATTY ACID PROFILE

Group Statistics

	Parameter	N	Mean	Std. Deviation	Std. Error Mean
samples	sample1	11	18.5836	2.78775	.84054
	sample2	7	19.5514	6.17268	2.33305

Independent Samples Test

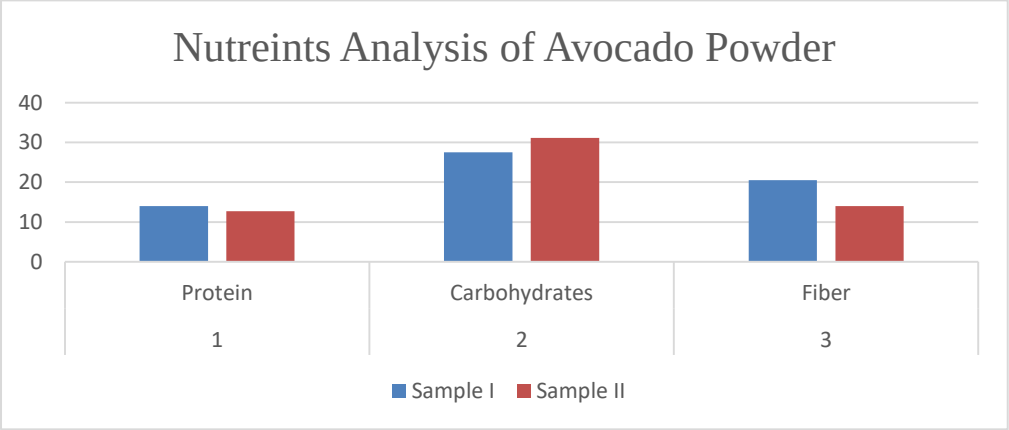
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									99% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Samples	Equal variances assumed	5.547	.032	-.457	16	.653	-.96779	2.11555	-7.14686	5.21127

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 6, Issue 3, pp: (660-664), Month: July - September 2018, Available at: www.researchpublish.com

3.3) NUTRIENT ANALYSIS OF FREEZE DRIED AVOCADO POWDERS

S. No.	Parameter	*Result (g/100g)*		p-value
		Sample I (Non -lime treated)	**Sample II (lime treated)**	
1	Protein	14.01	12.69	0.85(NS)
2	Carbohydrate	27.51	31.13	
3	Fiber	20.5	14.0	

Based on the joint statistical analysis of the two factors evaluated, no significant differences were detected for the variables sample I and sample II. In contrast, for the nutrient analysis there is a no significant differences were detected with p<0.85(table 3.3). The non-lime treated avocado powder contains the greatest amount of protein 14.01 g/100 g, whereas the lime treated avocado powder contains 12.69 g/100 g. On comparing, the carbohydrate content, more carbohydrate is present in the lime treated avocado powder i.e. 31.13 g/100 g, and the non - lime treated avocado powder contains only 20.5g/100 g of carbohydrates. The result also indicated 20.5 g/100 g of fiber is present in the non-lime treated powder.



Sample I-Non lime treated, Sample II-Lime treated

3.4) STATISTICAL ANALYSIS OF NUTRIENTS

	Parameter	N	Mean	Std. Deviation	Std. Error Mean
samples	sample1	3	20.6733	6.75167	3.89808
	sample2	3	19.2733	10.28904	5.94038

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									99% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Samples	Equal variances assumed	1.265	.324	.197	4	.853	1.40000	7.10515	-31.31278	34.11278

4. CONCLUSION

It can be concluded that the lime treated and freeze dried avocado powder which was considered to be the salient procedure for prevention of browning and preserve the colour and appeal of the product, led to significant loss of nutrients viz. Protein, Fibre and certain Fatty acids (Oleic and Linolenic acid). Even though there was a deviance of colour in the non-lime treated freeze dried avocado powder, the major nutrients were held intact and hence this non-lime treated freeze dried avocado powder can be recommended for further development of avocado based food products.

REFERENCES

[1] Association of Official Analytical Chemists. Official methods of analysis of the AOAC (1995). Crude protein: chapter4, p.5-7, moisture: chapter 4, p. 2 and ashes: chapter 4 p. 4.

[2] Ayrosa, A.M.I.B.; Pitombo, R.N.M. Influence of plate temperature and mode of rehydration on textural parameters of precooked freeze-dried beef. Journal of Food Processing and Preservation 2003, 27, 173–180.

[3] Barrett, A.H.; Porter, W.L.; Marando, G.; Chinachoti, P. Effect of various antioxidants, antioxidant levels, and encapsulation on the stability of fish and flaxseed oils: Assessment by fluorometric analysis. Journal of Food Processing and Preservation 2011, 35(3), 349–358.

[4] Claussen, C.; Ustad, T.S.; Strommen, I.; Walde, P.M. Atmospheric freeze drying: A review. Drying Technology 2007, 25(6), 957–967.

[5] Ding, H.; Chin, Y.W.; Kinghorn, A.D.; D'ambrosio, S.M. Chemopreventive characteristics of avocado fruit. Semin Cancer Biology 2007, 17(5), 386–394.

[6] Dorantes-Alvarez, L., Parada-Dorantes, L., Ortiz-Moreno, A., Santiago-Pineda, T., ChiraltBoix, A., and Barbosa-Cánovas, G. (1998). Effect of anti-browning compounds on the quality of minimally processed avocados. Food Science and Technology International 4: 107-113.

[7] Esteller, M.S.; Pitombo, R.N.M.; Lannes, S.C.S. Effect of freeze-dried gluten addition on texture of hamburger buns. Journal of Cereal Science 2005, 41(1), 19–21.

[8] Hayakawa, K., Linko, Y.Y. and Linko, P. (2000). The role of trans fatty acids in human nutrition. Journal of Lipid Science and Technology 102: 419-425.

[9] Marques, L.G.; Silveira, A.M.; Freire, J.T. Freeze-drying characteristics of tropical fruits. Drying Technology 2006, 24(4), 457–463.

[10] Taah, K.J., Alderson, P.G. and Power, J.B. (2003). Molecular approaches for the characterisation of Ghanaian avocado pear (Persea americana Mill.) germplasm.

[11] Proceedings V World Avocado Congress (Actas V Congreso Mundial del Aguacate) Malaga, Spain, pp 69-72.

[12] Zheng-Wei, C.; Chun-Yang, L.; Chun-Fang, S.; Yun, S.; Combined microwave-vacuum and freeze drying of carrot and apple chips. Drying Technology 2008, 26(12), 1517–1523.