Physicochemical and Pharmacological Prospective of Homemade Virgin Coconut Oil

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Abstract

Coconut is one of the most important types of plant under the palm family Arecaceae. Coconut is called "Kalpaviriksha" and it is a valuable gift to human being. A study was undertaken to estimate the nutritional value, phytochemical and physicochemical properties and microbial counts of Virgin Coconut Oil (VCO). The result showed that the oil obtained by boiling method was more than which obtained through fermentation method. The physicochemical parameters showed that the oil obtained by boiling method was best for consumption. In fatty acid composition, not much difference was noted between the virgin coconut oils. The chemical constituents present in the methanol and aqueous extracts of virgin coconut oil (Sample –A & B) were phytosterols and polyphenols and the constituents absent were steroids and flavonoids. The nutrient analysis in virgin coconut oil showed that there was not much difference between the oils. The total microbial count of virgin coconut oil obtained through boiling method was found to be safe than the oil obtained through the fermentation method.

1. Introduction

Cocos nucifera is called as "Tree of life" and it is commonly known as coconut, coco, coco – da – bahia (coconut – of – the – beach). It is produced in large amounts and exported to other countries by India, Indonesia, Sri Lanka and Malaysia.

Virgin coconut oil is considered to be a unique and high value product derived from fresh coconut and this is the only oil found with multi – functional uses. VCO can be used as a food supplement or as functional food or neutraceutical.

An attempt was made to study the physico chemical, functional properties, fatty acid composition and nutrient content for homemade Virgin Coconut Oil (VCO).

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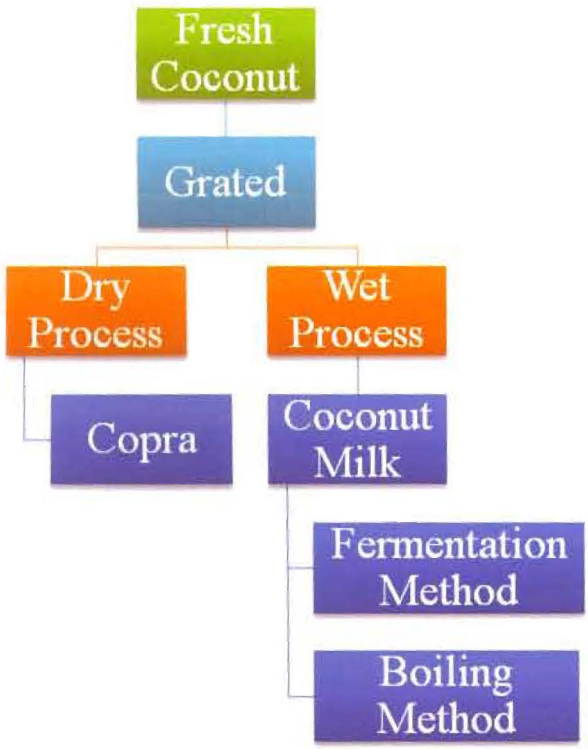


Figure 1: Processing of Virgin Coconut Oil

2. Materials and Methods

The Cocos nucifera is a drupe and it grows around 30 m in tropical and subtropical regions. It yields around 75 fruits in a year under proper growing conditions.The plant consists of exocarp and endocarp which covers the hardened endocarp containing a kernel inside. Mesocarp and endocarp are brown in colour, fibrous in nature and found to be thick of about 3 – 5 mm and the kernel is separated from the shell by the thin brown layer called testa. For the present study, healthy fresh brown coloured coconuts were collected, dehusked and analyzed. Ten to eleven month matured fresh brown coconuts were collected from the farmers, and they were selected carefully without any damage.

▶ 2.1 ANALYSIS OF PHYSICOCHEMICAL PARAMETERS

The quantitative analysis of the physicochemical parameters such as melting point, solidification point,iodine value, saponification value, acid value, viscosity, peroxide value,moisture content,refractive index, relative density and specific gravity were determined in the VCO samples using standard procedures.

VCO by Boiling method VCO by Fermentation method

Figure 2: Virgin Coconut Oil

▶ 2.2 Analysis of Phytochemicals

The qualtitative analysis of the phytochemicals such as flavonoids, saponins, alkaloids, steroids, terpenoids, glycosides, phytosterols, tannins, and polyphenols were determined in the Virgin Coconut Oil obtained by both boiling and fermentation methods.

▶ 2.3 Analysis of Nutrient Contents

The nutrient content such as calories (energy), carbohydrates, proteins, fat and fibre of the virgin coconut oil produced by two different methods were analysed quantitatively.

▶ 2.4 Analysis of Fatty Acid Composition

The fatty acid composition of the derived virgin coconut oil were analysed using standard procedures qualitatively which includes saturated fats such as caproic acid, caprylic acid, capric acid, lauric acid, myristic acid, palmitic acid and stearic acid and unsaturated fats such as oleic acid and linoleic acid.

▶ 2.5 Assessment of Storage Stability

The total microbial counts in the virgin coconut oil obtained by boiling and fermentation methods stored in the glass containers were evaluated initially on the 15th and 30th days of storage.

3. Results and Discussion

▶ 3.1 Physicochemical Analysis of Virgin Coconut Oil

The physicochemical characteristics of the product help to identify the changes that occur during the storage period. The physico chemical parameters of Virgin Coconut Oil is presented in table I

Table I: Physicochemical Parameters of Virgin Coconut Oil

S.no.	Parameters	Values		APCC * Standard
		Sample A	Sample B	
1	Specific gravity (g/cc)	1.017	0.916	0.915 – 0.920
2	Relative density	0.924	0.919	0.915 – 0.920
3	Viscosity	0.04	0.03	NA
4	Refractive index	1.449	1.448	1.4480 – 1.4492
5	Moisture content (%)	0.52	0.13	0.1 – 0.5
6	Solidification point (0C)	262	258	248 – 265
7	Melting point (0C)	40	38	NA
8	Iodine value	7.5	8.6	4.1 – 11.0
9	Saponification value	252	258	250 – 260 minimum
10	Acid value	1.59	1.96	< 6.0
11	Peroxide value 1st Day	1.2	1.8	≤ 3
	30th Day	2.0	2.6	
12	Free radical scavenging activity (DPPH)	34.41 ± 0.23	39.84 ± 0.37	BHT 40.39 ±0.34
13	Ferrous ion chelating activity	36.71 ±0.48	38.43 ±0.33	EDTA 42.28 ± 0.16

Sample A = Fermentation method, Sample B = Boiling method

*APCC - Asian and Pacific Coconut Community (2007)

Table II: - Qualitative Analysis of Phytochemical in VCO

S.no.	Phytochemicals	Methanol Extract		Aqueous Extract	
		Sample A	Sample B	Sample A	Sample B
1	Alkaloids	-	-	+	+
2	Glycosides	-	-	+	+
3	Phytosterols	+	+	-	-
4	Steroids	-	-	-	-
5	Flavonoids	-	-	-	-
6	Saponins	-	-	+	+
7	Polyphenols	+	+	-	-
8	Tannins	-	-	+	+
9	Terpenoids	+	+	+	+

Sample A = Fermentation method, Sample B = Boiling method

All the physicochemical parameters, peroxide value and also the potential antioxidant activity were observed to be high in virgin coconut oil obtained by the boiling method than the oil obtained by the fermentation method. Hence, it is proved that oil obtained by boiling method was best for consumption than oil obtained by fermentation method.

▶ 3.2 Phytochemicals in Virgin Coconut Oil

Chemical tests were carried out to analyse the presence or absence of the phytochemicals in the methanolic extract and also aqueous extract of the samples using standard methods. The results of the quantitative analysis of Phytochemicals in Virgin Coconut Oil is given in table II.

The methanol extract of virgin coconut oil (sample A and B) contained varied type of phytochemical compounds which include, phytosterols, polyphenols, and terpenoids. The aqueous extract of virgin coconut oil contains phytochemical compounds such as alkaloids, glycosides, saponins, tannins and terpenoids. Terpenoids were present in both the methanol and aqueous extract of virgin coconut oil (sample A and B). Steroids and flavonoids were absent in both the methanol and aqueous extracts.

▶ 3.3 Nutrient Contents in Virgin Coconut Oil

The nutrient contents are observed quantitatively in the produced Virgin Coconut Oil and it is given in table III.

Table III - Nutrient Content of Virgin Coconut Oil (100 gm)

S.no.	Nutrients	Virgin Coconut Oil	
		Sample A	Sample B
1	Energy (K.Cal)	849.64	848.93
2	Carbohydrates (gm)	0.03	0
4	Fat (gm)	99.88	98.47

Sample A = Fermentation method, Sample B = Boiling method

The nutrient content of both the samples (VCO – A and B) were found to be more or less similar and

Table IV - Fatty Acid Composition of VCO

S No.	Fatty Acids	CARBON NUMBER	Sample A (%)	Sample B (%)	APCC* STANDARDS (%)
1	Caproic acid	C6 : 0	0.09	0.41	0.40 – 0.60
2	Caprylic acid	C8 : 0	7.27	7.46	5.00 – 10.00
3	Capric acid	C10 : 0	5.95	7.25	4.50 – 8.00
4	Lauric acid	C12 : 0	53.08	49.72	43.00 – 56.00
5	Myristic acid	C14 : 0	18.35	19.43	16..00 – 21.00
6	Palmitic acid	C16 : 0	8.47	8.59	7.50 – 10.00
7	Stearic acid	C18 : 0	3.36	2.91	2.00 – 4.00
8	Oleic acid	C18 : 1	8.79	7.84	5.00 – 10.00
9	Linoleic acid	C18 : 2	1.74	1.36	1.00 – 2.50

Sample A = Fermentation method, Sample B = Boiling method

*APCC - Asian and Pacific Coconut Community (2007)

not much differences were observed.based on the nutritive value especially energy and fat contents. VCO – B was found to be more useful and better for the health because of its lower fat and calorie contents.

▶ 3.4. Fatty Acid Composition in Virgin Coconut Oil

The fatty acid composition of VCO developed by both boiling and fermentation methods were analyzed and the values were compared with the APCC Standards. There was difference in the values between the samples and there was not much deviations in the fatty acid compositions.

▶ 3.5. Storage Satbility of VCO and Coconut Flour/Meal

The storage stability of the virgin coconut oils subjected to storage in the glass container and the coconut flour / meal was stored in the glass container and ziplock polypack and it was analysed during the initial day, 15th day and 30th day and it is represented in table V.

There was slight increase in the bacterial count in sample A which may be due to the increased moisture content in virgin coconut oil obtained by fermentation method than the oil obtained by the boiling method because it was separated from the water and creamy layers. Though the values increased, it is safe and consumable.

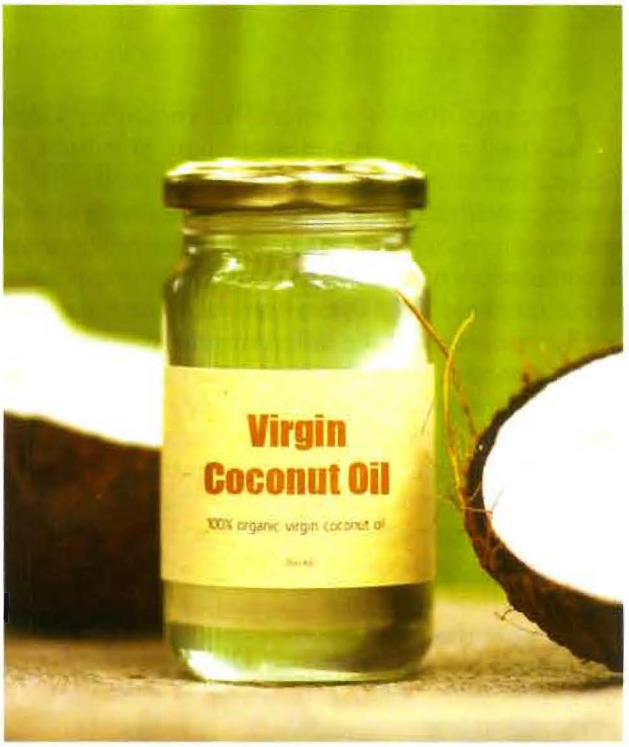
4. CONCLUSION

It can be concluded that Virgin Coconut Oil was rich in phytochemicals and it can be used to treat various disease conditions. The vigin coconut oil obtained by boiling method was found to be rich in all the nutritional parameters than the fermentation

Table V- Total Microbial Count of Virgin Coconut Oil

S.no.	Virgin Coconut Oil	Total Microbial Count (Cfu / Gm)		
		1st DAY	15th DAY	30th DAY
1	Sample A	1.3×103	2.9×103	3.8×103
2	Sample B	0.9×103	2.1×103	3.2×103

Sample A = Fermentation method, Sample B = Boiling method



method. Virgin Coconut oil obtained through boiling method. was much more beneficial in both in maintaining good health and also economically low in budget. The virgin coconut oil obtained by the fermentation method and boiling method were microbiologically safe.

REFERENCES

1. Bawalan, D.D., (2011), "Processing Manual for Virgin Coconut Oil, its products and By-products for Pacific Island, Countries and Territories", Secretariat of the Pacific Community, Noumea, New Caledonia, Pp:88.

2. Pradeepkumar, T., Sumajyothibhaskar, B and Satheesan, K.N., (2008),"Management of Horticultural Crops", Horticulture Science Series : New India Publishing, 11(2);Pp:539–587.

3. Ramaswamy, L., (2014), "Coconut flour a low carbohydrates gluten free flour", International journal of Ayurvedic and herbal medicine, 4(1); Pp:1426-1436.

4. Varghese, S.K., Samachari., Radhakrishna, K and Bawa, A.S., (2013), "Defence food research laboratory", Indian food industry magazine, 32(1); Pp:42.