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## Proximate, Microbial and Organoleptic Characteristics of Juice Blend From Carrot and Coconut Spiced with Ginger and Turmeric (Curcuma longa)

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**ABSTRACT:** The proximate composition, microbial quality and the level of consumer acceptability of coconut and carrot juice blend when spiced with ginger and turmeric were investigated. The juice was produced in various proportions and coded as follows: AOA 50:50:0:0 of coconut and carrot, no ginger and turmeric, BOB 60:30:5:5; coconut, carrot, ginger and turmeric, COC 50:30:10:10; coconut, carrot, ginger and turmeric DOD 50:30:5:5, coconut, carrot, ginger and turmeric and on addition of 5% sugar, they were pasteurized at 65 – 75°C for 15mins. The proximate, microbial and organoleptic properties and the result of the proximate analysis revealed a moisture range of 84.60 – 88.20 with BOB having the highest (88.20%) moisture and AOA (84.60%) the least moisture. The ash level was highest in DOD (320%) ash and least in AOA (1.40). The crude fibre was highest in sample COC (0.60%) and least (0.40%) in AOA. The fat contents was highest (7.80) in COC and least (4.80) in BOB, protein was highest (2.16%) in AOA and least (1.67%) in DOD there were no significant differences ( $P < 0.05$ ) in the carbohydrate content of all the samples. The result of the microbiological analysis showed that sample AOA had the highest. Total plate content of ( $1.2 \times 10^5$ /ml) while COC had the least  $3.1 \times 10^4$ /ml. The result of the organoleptic analysis showed that sample AOA (8.1) was the overall best in appearance followed by DOD (7.1). The flavor of sample AOA was the best followed by DOD (6.9) for taste, consistency and general acceptability, there are slight differences between samples at ( $P < 0.05$ ). This study recommends that the blended juice should be served in meals to aid digestion, serve as food supplement and source of energy. The low microbial count indicates antimicrobial properties from ginger and turmeric for a more stable predict and diversify its utilization by value-creation to yield a desired blend.

**Key words:** Proximate, carrot, coconut, ginger, sensory juice.

## INTRODUCTION

Juices are liquid, non-alcoholic product with a degree clarity and viscosity produced by pressing or squeezing of fruits/vegetables with sugar and carbondioxide addition. Juices are mainly consumed for their health benefits (Okaka, 2009). The invention of pasteurization process has become possible to preserve food without fermentation and the new juices

have emerged as a popular beverage choice with many juice blends entering the market (Gat, 2019).

Coconut (*Cocos nucifera*), is the most extensively grown and used nut in the world. It plays a significant role in the diet of people, worldwide. It is known as the wonder food, and is recommended as a perfect diet because it has all essential nutrients required by the body (Nasrin, 2002). It is highly nourishing, energizing and fattening food (Asibe, 2018). Carrot (*Daucus carota*) is a desired vegetable grown worldwide. Carrots are high in protein, carbohydrates, mineral and crude fibre contents. Carrots also contain good quantities of vitamins, minerals and  $\beta$ -carotene contents, (Desbony, 2008). Consumers like carrot juice because it is rich in  $\beta$ -carotene content, colour, aromatic compounds and nourishing characteristics (Okezie, et al, 2007).

Ginger (*Zingiber* of finale of the family *Zingiberaceae*, has been widely used as spice and flavouring agents in foods and beverages (Okezie et al., 2007) Ginger may help to joint pains from arthritis and it also has the ability to reduce weight and cholesterol effect which is beneficial for heart patients (Fahlberg, 2006). The aroma of ginger is pleasant and greatly spiced which enables food technologists create ginger drinks (Pruthin et al., 2004). Turmeric (*curcuma longa*) is a rhizome and permanent plant of the ginger family, *zingiberaceae* (Fahlberg, 2006). The functional properties and therapeutic uses of turmeric are known due to its active antioxidant, anti-inflammatory, antiviral and antifungal effects and studies have shown that curcumin is not toxic to human system (Akram et al., 2010)/ All these fruits and vegetables are treasured esteemed fort their refreshing juice with nutritional or medical properties. Therefore, blending them for the production of various drinks is reasonable and also, serve as a preferred means of utilizing these fruits. The objective of this work is to use juice made from coconut and carrot blend spiced with ginger and turmeric to create an enhanced aroma, taste and more health nutritional value.



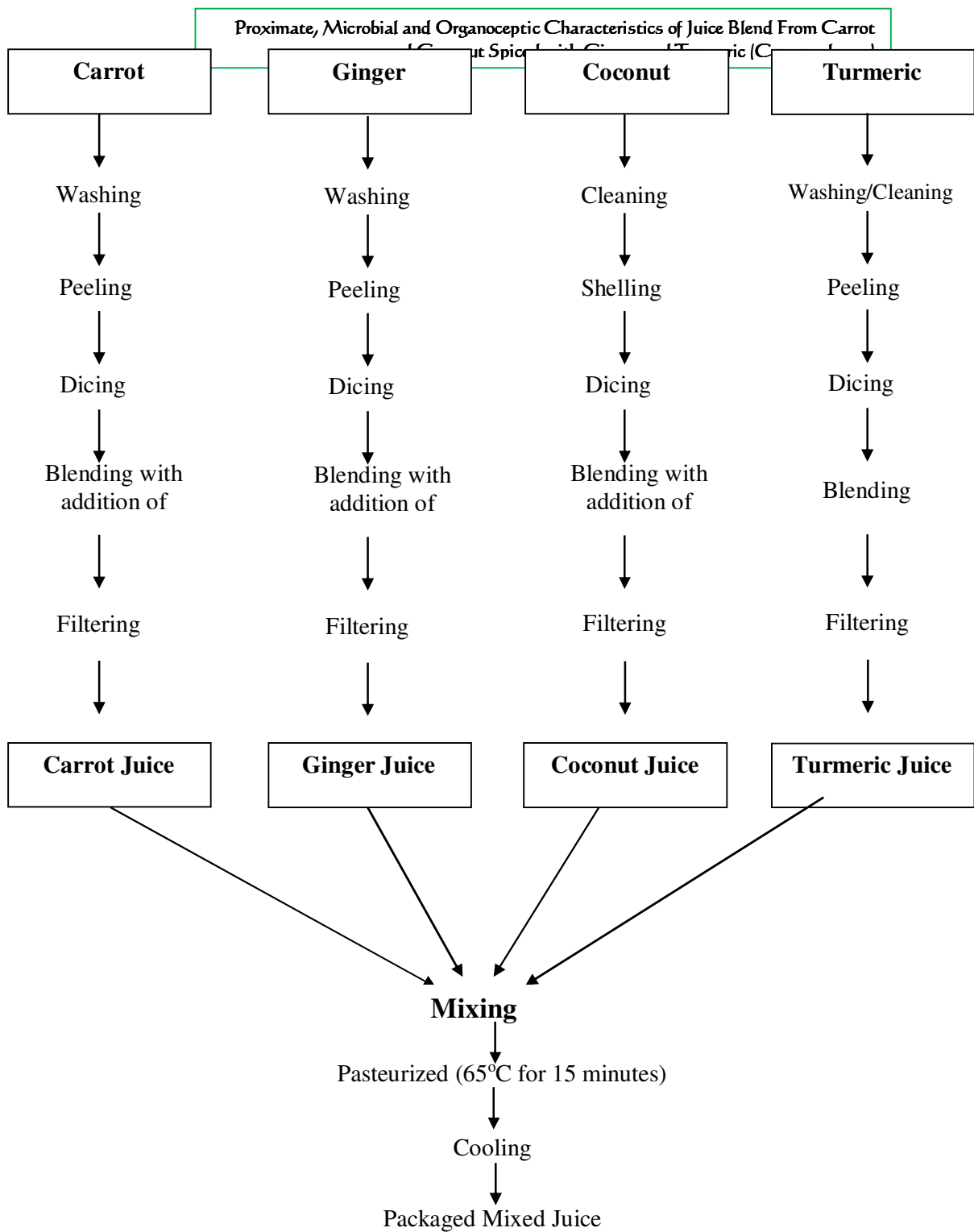
## MATERIALS AND METHODS

### Raw Materials Procurement

All the materials for this work, coconut, carrot, ginger, turmeric and sugar were purchased at Relief market, Owerri, Imo State, Nigeria. The preparation of the materials was done in Food Technology Laboratory, Federal Polytechnic Nekede, Owerri where the work was carried out. The reagents used were of analytical grade.

### Production of Juice

Four coconuts were split and were shelled, manually using knives. The milk or juice was extracted by blending the shelled coconut with small quantity of water to get the required consistency. It was then filtered with muslin cloth to obtain the milk or juice. Carrot was peeled and then cut into small pieces and after which it was blended with the electric blender. Small quantity of water was added during the blending for easy extraction. It was sieved with muslin cloth and the consistency of the juice obtained was the same as cow milk. The fresh turmeric was washed and cleaned by removing all the dirt and impurities. The rhizome was peeled and then blended with electric blender on addition of small quantity of water for easy extraction. The liquid was sieved with muslin cloth and the juice obtained had same consistency with cow milk. The fresh ginger rhizomes were also washed and cleaned, then peeled and blended with the electric blender. Water was added for easy extraction and the juice acquired after sieving with muslin cloth had the same consistency as cow milk. After the preparation stages, the unpasteurized coconut milk, carrot juice, ginger and turmeric juice were mixed together using varying proportions and labeled as follows; AOA (50: 50: 0:0), BOB (50: 30: 5:5), COC (50: 30: 10:10), and DOD (50: 40: 5:5). All the samples were sweetened with 5% sugar and pasteurized at 65 – 75°C for 15 minutes in hot water bath, after which it was cooled. On cooling, the samples were dispensed into clean packaging bottles and corked. It was refrigerated at 8°C.



Flow chart for the production of Coconut and Carrot Juiced Spiced with Ginger and Turmeric.



### **Proximate Analysis of the Juice Blend**

The proximate analysis of the juice blend were determined using the standard methods of the Association of Official Analytical Chemist (AOAC, 2010). The juice blends were subjected to analysis. The moisture content, ash, crude fibre, fat, crude protein and carbohydrates were calculated by differences and others determined according to the methods of AOAC (2010). Analysis were carried out in triplicates

### **Microbiological Analysis**

The microbiological analysis was carried out according to AOAC (2005). Plate count agar was used for enumeration of bacteria. A well homogenized sample was serially diluted with 0.1% peptone water up to  $10^{-6}$ . One ml aliquote from a suitable dilution was transferred aseptically into sterile petri dishes. To each plate about 15ml of melted sterilized and cooled PDAC (potato dextrose Agar) was added. The inocula was evenly mixed with media by rotating the plates and allowed to solidify. The inverted plate was incubated for 35 to 37°C for 48 hours. The TVC (cfu/ml) was determined with a colony counter.

### **Sensory Evaluation**

The sensory evaluation was done using a twenty-member panel of judges drawn from the polytechnic community. The procedure was explained to them before commencement. The quality attributes assessed were appearance (colour), flavor (aroma and taste), texture and overall acceptability. The point hedonic scale described by Ihekoronye and Ngoday (1985) was used. The rating scale was 1 – Dislike extremely, 2 – Dislike very much, 3 – Dislike moderately, 4 – Dislike slightly, 5 – Neither like nor dislike, 6 – Like slightly, 7 – Like moderately, 8 Like very much 9 – Like extremely.

### **Statistical Analysis**

All the results obtained were subjected to statistical analysis using analysis of variance to determine significant difference among juice blends. Least significant difference was calculated to ascertain which samples were significantly different.

## RESULT AND DISCUSSION

**Table 1: Result of the proximate composition of juice blends produced from coconut and carrot and spiced with ginger and turmeric.**

Sample code	Parameters					
	Moisture %	Ash %	Crude fibre %	Crude protein %	Crude protein	CHO
AOA	84.60 <sup>a</sup> ±1.41	1.40 <sup>c</sup> ± 0.02	0.48 ± 0.005	6.80 <sup>a</sup> ± 0.06	2.90 <sup>a</sup> ± 0.81	4.64 <sup>a</sup> ± 0.02
BOB	88.20 <sup>a</sup> ± 0.65	1.60 <sup>c</sup> ± 0.15	0.50 <sup>a</sup> ± 0.0025	4.8 <sup>b</sup> ± 0.9	1.97 <sup>a</sup> ± 0.51	2.93 <sup>a</sup> 0.25
COC	85.60 <sup>a</sup> ± 0.68	2.60 <sup>a</sup> ± 0.03	0.60 <sup>a</sup> ± 0.006	7.80 <sup>a</sup> ± 1.5 <sup>a</sup>	1.89 <sup>a</sup> ± 0.31	1.51 <sup>a</sup> ± 0.08
BOD	85.00 <sup>a</sup> ± 0.55	3.20 <sup>a</sup> ± 0.33	0.45 <sup>b</sup> ± 0.03	6.20 <sup>a</sup> ± 1.2	± 1.67 <sup>a</sup> ± 0.09	3.49 <sup>a</sup> ± 0.95
LSD	7.97	0.96	0.12	1.64	0.76	3.64

Mean values with the same superscript on the same column are not significantly different ( $P < 0.05$ ).

**Table 2: Result of microbiological quality of coconut and carrot juice blended with ginger and turmeric**

Samples	Parameters
AOA	1.2X10 <sup>5</sup>
BOB	4.9X10 <sup>4</sup>
COC	3.1X10 <sup>4</sup>
DO	6.2X10 <sup>4</sup>

**Table 3: Result of sensory evaluation of juice blend from coconut and carrot blended with ginger and turmeric**

Sample code	Appearance	Flavor	Taste	Texture	Acceptability
AOA	8.1 <sup>a</sup>	7.6 <sup>a</sup>	7.6 <sup>a</sup>	7.3 <sup>a</sup>	8.29 <sup>a</sup>
BOB	6.7 <sup>b</sup>	6.8 <sup>a</sup>	7.0 <sup>a</sup>	6.5 <sup>a</sup>	7.2 <sup>a</sup>
COC	6.7 <sup>b</sup>	6.3 <sup>b</sup>	5.6 <sup>c</sup>	6.5 <sup>a</sup>	6.2 <sup>a</sup>
DOD	7.1 <sup>a</sup>	6.9 <sup>a</sup>	6.5 <sup>b</sup>	6.4 <sup>a</sup>	7.5 <sup>a</sup>
LSD	0.89	1.26	0.73	1.61	1.05

Mean values having the same superscript on the same column are significantly different ( $P < 0.05$ )

## DISCUSSION

### Proximate composition

The proximate composition of coconut and carrot blend spiced with ginger and turmeric is presented in Table 1. The moisture content of juice blend ranged from 88.20 to 84.60%. High moisture content makes juice



suitable as a refreshing and quench-thirsting product which is characteristic of good beverage although this can be an indication of short shelf life due to its high moisture content (Scott, 1980). The ash content of the juice ranged from (1.40 – 3.20%). Ash content is an indication of mineral contents in food which is needed for bone development, teeth formation and body function (Trachro and Misty, 1998). This indicates that sample D.O.D which has the highest ash is a better source of mineral among other samples. The high varying mineral value is attributed to the addition of ginger and turmeric in varying proportion which contributed to high minerals.

The crude fibre content of the juice ranged from (0.40 to 0.60%) sample COC had the highest value for fibre. Fibre is reported to help in lowering the serum cholesterol, control blood sugar and assist in maintaining bowel health and prevents colorectal cancer (The Mayo clinic webpage, 2015). The protein content of the juice blends ranged from (1.67 to 2.16%) which is high compared to what is expected of juices. The high protein content is attributed to coconut and carrots which are good protein sources. Proteins are important in food for growth and tissues repair. The crude fat ranged from (7.80 to 4.80) which is high fat is an effective method of delivering fat soluble vitamins A, D, E and K.

The high fat is because of incorporation of coconut which is a strong indicator of predisposition to rancidification (Eke, 2007). The carbohydrate content ranged from (1.51 to 464) it is therefore a good source of energy and useful for food formulation. Table 2 showed the results of microbial evaluation of the samples. Sample AOA showed higher value of total plate count ( $1.2 \times 10^5/\text{ml}$ ) of maximum bacteria load according to Gulf standing sample COC had the least count of  $3.1 \times 10^4/\text{ml}$ . The highest microbial count indicates high susceptibility to spoilage under favourable condition. The low microbial count of COC can be attributed to the high content of ginger and turmeric which have antimicrobial properties.

### **Organoleptic Assessment**

Table 2 showed the results of the organoleptic assessment. The results revealed that juices that samples like colour, flavor and taste except in

texture and overall acceptability. The panelists preferred samples AOA, BOB and DOD to COC in all parameters evaluated.

## CONCLUSION

The results obtained indicated that juice made from coconut and carrot and spiced with ginger and turmeric has good nutritional profile with fat, mineral, crude fibre, protein and other nutrients comparable with that of other juice blends which is rich for people who care malnourished to enrich their diets.

## RECOMMENDATION

Considering the nutritive and health benefits of coconut, carrot, ginger and garlic, there is need for its increased utilization and awareness of its benefits. It is therefore; recommended that coconut and carrot juice blends be used in juice industries to create awareness, increase the availability of cheap healthy products.

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