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Value Addition in Beverages with Papaya Leaves Extract (*Carica Papaya*)

Sharma Megha[1], Gupta Alka[2]

[1]Research Scholar, Foods and Nutrition, Ethelind School of Home Science, , SHIATS Allahabad – 211007

[2]Assistant Professor, Foods and Nutrition, Ethelind School of Home Science, SHIATS Allahabad – 211007

Abstract: ***Various parts of papaya leaves extract have been traditionally used as ethno medicine for a number of disorders, including different diseases. The present study was carried out "Value addition in beverages with papaya leaves extract (Carica papaya)" with the objectives to determine the nutritive value of different beverages by the incorporation of papaya leaves extract at different levels and to assess the Organoleptic evaluation of the prepared beverages, banana shake ,mosambi juice pineapple juice and pomegranate juice. Nutritional composition of prepared beverages were analyzed by AOAC.(2007)The nutrient dense products can be helpful from therapeutic point of view for those people suffering from dengue, liver problems, stomach problems, and stone formation and other iron deficiencies diseases. Carica papaya leaves extract mainly effects on dengue fever. Dengue fever is one of the life threatening disease caused by dengue virus(flavivirus).so far there is no effective medicine and vaccine approved for dengue fever. The effect of papaya leaf juice improved the health of patient by increasing the number of platelets. The result also indicated that the leaf and pulp extract increases the formation of the thrombocytes, especially at 300mg kg^{-1} out of the three extract ,the pulp extract boosted the thrombocytes number more in order, pulp extract>leaf extract>seed extract.***

Keywords: Papaya Leaves, Nutritional Composition, Sensory Evaluation

1. Introduction

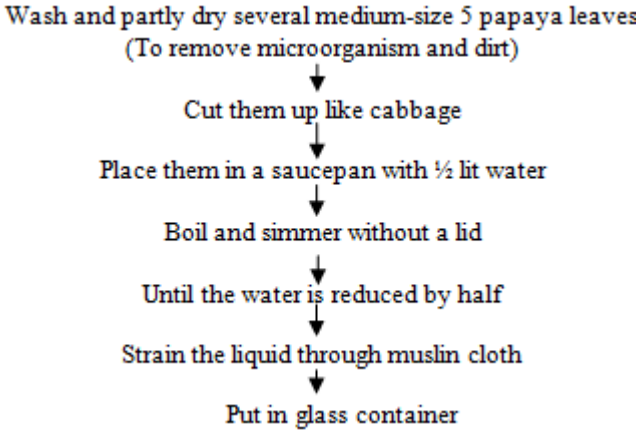
Numerous studies have demonstrated that beverages containing different micronutrients **(Wolf 2008)[16]**. Historically, fruit juice was recommended by pediatricians as a source of vitamin C and an extra source of water for healthy infants and young children as their diets expanded to include solid foods with higher renal solute. The pattern of fruit juice consumption has changed over time. While fruit juice is a healthy, low-fat, nutritious beverage.**(Coll 1996)[3].**World over, at least 35,000 plant species are used for medicinal purpose **(Ikpeme 2011)[5].***Carica papaya*, believed to be originated in Central America, is a plant that belongs to the family caricaceaes **(Zakaria et.al 2006)[17].**

The leaves of papaya have been shown to contain many active components that can increase the total antioxidant powder in blood and reduce lipid per oxidation level, such as papain, chymopapain cystatin, α tocopherol, ascorbic acid, flavonoids, gynogenic glycosides and glucosinotes.*Carica papaya* leaves juice is consumed for its purported anti-cancer activity by people living on the gold coast of Australia .*Carica papaya* leaf juice have also been used for a long time as an aboriginal remedy for various disorders, including cancer and infectious disease **(Otsuki 2009)[10]**.The dengue fever is one of the threatening disease caused by dengue virus (*Flavirus*) that is borne and transmitted by mosquitoes living in tropical and subtropical climates worldwide, mostly in urban and semi urban areas. As per the estimation of World Health Organization, every year, 50 million peoples access the world are infected by dengue and about 2/5 of the world population (2.5 billion peoples) are at risk from this dreadful disease, which spread over about 100 countries. Dengue is also known as break-bone fever as it causes extreme body pain, especially in the joints of bones. There have no effective medicine and vaccine approved for the dengue virus and developing a safe and effective antiviral drug is difficult, because viruses use the host's cells to replicate. This makes it difficult to eradicate the virus without harming the host organism's cells**. (Kala 2012)[7].**

2. Materials and Method

The present investigation was carried out in the Research Laboratory of Foods and Nutrition,Ethelind School of Home Science, (SHIATS), Allahabad. Healthy green leaves of Papaya (C*arica papaya*) required for the experiments were collected from the farm of SHIATS, Allahabad .Only the fresh leaves were collected. These leaves were washed with the help of clean water so as to remove the dirt and other disease causing organism

3. Preparation of Papaya Leaves Extract:



Flow diagram for extract of papaya leaves

Formulation and preparation of beverages

Value added beverages utilizing papaya leaves were prepared keeping in mind the food habits in the niche area as well as border areas adjoining the production catchment. In

order to select the ratios of ingredients, several beverages namely Banana shake, *Mosambi* juice, Pineapple juice and Pomegranate juice, were prepared with the incorporation of fresh papaya leaves extract. Three different treatments coded as T_0 (control without papaya leaves extract), T_1 (5% of papaya leaves extract), T_2 (10% of papaya leaves extract) and T_3 (15% of papaya leaves extract) were selected for the study. To perform sensory evaluation judge were drown from the group of faculty and PhD scholars of Ethelind school of Home Science, SHIATS.The judge were trained and given pre-prepared tips for each of the beverages and subjective measurements feelings. Sensory attributes i.e. color and appearance, consistency, tastes and flavors and all acceptability of the prepared products by using nine points Hedonic scale (9-like extremely and 1-dislike extremely)in order to determine the nutritional characteristics of these, standard methods described below as follows-:

Proximate Composition

The moisture, crude protein and ash content were determined by standard procedures of AOAC (2007).Carbohydrate content was calculated by difference and energy content by multiplying protein, fat and carbohydrate by factors 4,9 and 4 respectively.

Minerals and Vitamin Analysis

For iron and calcium content, ash solution were prepared after dry ashing of the samples using standard methods **(AOAC, 2007)[1].**The vitamin C was determined using, **AOAC (2007)[1].** Method and total carotene content was determined using methods of **Rangana, (2001)[12].** All determinations were done in triplicate.

Statistical analysis

The data obtained from sensory evaluation were statistically analyzed by using analysis of variance technique (one way classification). Significant difference between the treatments was determined by using CD (critical difference) test.

4. Results and Discussion

The products were standardized and were subjected to Organoleptic evaluation within one hour of preparation which was considered as zero days. The result of the evaluation carried out revealed that one hundred percent of the persons their willingness to prepare the products at home. Papaya leaves is nutritionally superior compared to other leaves.

Banana Shake

As evident from table 1, banana shake prepared from papaya leaves extract were given high scores ranging from (7.45 to 8.24), All experimental recepies were accepted in terms of appearance, colour, texture and overall acceptability. Present result of stastical analysis of patability evaluation scoring using ANOVA. Irrespective of the type of papaya leaves extract, accepted for the appearance and colour, significant difference were noted in texture, taste and flavor of papaya leaves extract beverages compared to the control. Result of overall acceptability of beverages indicates was highly comparable to the control as also evident from the insignificant difference between the scores T_1 was found the best product to analysis with the incorporation of 5% of papaya leaves extract. One can improve the taste profile of banana shake by using extract of papaya leave.

Table 1: The average sensory scores of different parameters in control and treated sample of 'Banana shake'.

Sensory Characteristic /Treatments	*Scores on 9 point hedonic scale*			
	Colour and appearance	*Texture*	*Taste and flavour*	*Overall acceptability*
T_0(Control)	8.66±0.23	8±0.16	8.8±0.08	8.4±0.13
T_1	8.73±0.15	7.8±0.12	8.66±1.0	8.24±0.05
T_2	8.4±0.24	7.6±0.58	8.13±0.15	8.08±0.12
T_3	7.46±0.23	7.2±0.16	7.4±0.28	7.45±0.19
F%	11.59 (S)	4 (NS)	26.41 (S)	40 (S)
C.D	0.13	-	0.25	1.17

Mosambi Juice

Table.2 shows that result the sensory evaluation of mosambi juice prepared from papaya leave extract shows that in contrast to banana shake, Mosambi juice were highly acceptable and very close to all sensory characteristics followed by mosambi juice from papaya leave extract. Scores ranging from 7.70 to 8.08.Results of ANOVA reflected that irrespective of the type of papaya leave extract, mosambi juice shows significant difference when compared with control for appearance, colour, texture and overall acceptability.

Table 2: The average sensory scores of different parameters in control and treated sample of *'Mosambi* juice'.

Sensory Characteristic/ Treatments	Scores on 9 point hedonic scale			
	Colour and appearance	Consistency	Taste and flavour	Overall acceptability
T_0(Control)	8.33±0.25	8±0.16	8.33±0.15	8.10±0.25
T_1	8.13±0.07	7.13±0.03	8.53±0.40	8.08±0.21
T_2	7.93±0.25	7.66±0.19	7.93±0.25	7.81±0.24
T_3	7.53±0.16	7.2±0.16	7.13±0.03	7.70±0.17
F%	21.87 (S)	4 (NS)	10.45(S)	2.39(NS)
C.D	0.13	-	0.36	

Pineapple Juice

Table.3 shows that mean score for sensory evaluation of control and experimental pineapple juice showed no obvious differences between pineapple juice prepared by incorporating papaya leave extract for appearance of colour and texture. Pineapple juice high ranging from 7.55 to 8.48.

Table 3: The average sensory scores of different parameters in control and treated sample of *'*Pineapple juice'.

Sensory Characteristic/ Treatments	Scores on 9 point hedonic scale			
	Colour and appearance	Texture	Taste and flavour	Overall acceptability
T_0(Control)	8.66±0.21	7.93±0.13	8.8±0.08	8.45±0.19
T_1	8.73±0.26	8.2±0.24	8.86±0.20	8.48±0.61
T_2	8.4±0.24	7.46±0.25	8.13±0.15	7.97±0.08
T_3	7.46±0.23	7.8±0.08	7.4±0.16	7.55±0.49
F%	11.59 (S)	3.55(NS)	26.41(S)	1.02(N)
C.D	0.31	-	0.24	-

Pomegranate Juice

Table.4 shows that pomegranate juice prepared from papaya leave extract were closely acceptable when compared with control for all sensory characteristics. Statistical interpretation for acceptability of experimental beverages

revealed that papaya leave extract can be successfully incorporated in pomegranate juice high score ranging from 7.45 to 8.24.

Table 4: The average sensory scores of different parameters in control and treated sample of 'Pomegranate juice'

Sensory Characteristic/ Treatments	Scores on 9 point hedonic scale			
	Colour and appearance	Texture	Taste and flavour	Overall acceptability
T_0(Control)	8.33±0.25	7.8±0.16	8.86±0.23	8.41±0.15
T_1	8.13±0.19	7.53±0.19	8.66±0.20	8.24±0.05
T_2	7.93±0.25	7.93±0.19	7.93±0.17	8.03±0.53
T_3	7.53±0.11	7.46±0.23	7.4±0.16	7.45±0.19
F%	9.72(S)	1.86(NS)	21.87(S)	40(S)
C.D	0.12	-	0.13	0.12

Nutritional Composition of Prepared Beverages

Table.5 shows that the wide ranges of variation were observed in the nutrient content of the beverages blending of papaya leaves extract with juices to enhance the composition of beverages. Present information regarding the mean nutrient composition of papaya leaves extract incorporated beverages (per 100 gm). Differences were observed between control and experimental beverages for their moisture, ash, energy, carbohydrate, protein, calcium, vitamin C, iron, and total carotene of all four beverages prepared from papaya leave extract were found to be very good. Results showed that the moisture content was highest in pomegranate juice (8.38±0.29g/100g).Ash content of *Mosambi* juice was observed to be maximum (0.70±0.19g/100g) not only due to the basic ingredients but also due to incorporation of papaya leaves extract. Protein content of the sample was highest in banana shake (3.38±0.28g/100g) followed by pomegranate juice (2.70±0.21g/100g).Calcium content of the sample was found highest in banana shake (147.33±0.83mg/100g) and least by (45.02±0.35mg/100g). Iron content of the sample was observed highest in pomegranate juice (4.49±0.51mg/100g). Vitamin C content of the sample was highest in *Mosambi* juice (62.27±0.32 mg/100g) and least by banana shake (18.17±0.29mg/100g). Carbohydrate content of the sample was highest in pineapple juice (99.10± 1.11g/100g). Energy content of the sample was highest in pomegranat*e* juice (7.81±0.29kcal/100g) and least by pineapple juice (4.09±0.27kcal/100g).Total Carotene was found highest in pineapple juice (644.50±3.21mg/100g) followed by mosambi juice (640.91±3.21mg/100g).Besides papaya leave has many medicinal values, nutrient density can be increased by increasing the proportion of papaya leave extract in beverages.

Table 5: Mean nutrient composition of value added products developed by incorporating papaya leaves extract (per 100 ml)

Names	Treatments	*Moisture (%)*	*Ash (g)*	*Protein (g)*	*Carbohydrate (g)*	*Energy (Kcal)*	*Calcium (mg)*	*Iron (mg)*	*Vitamin C (mg)*	*Total carotene (mg)*
Banana shake	T_0	7.51±0.36	0.19±0.14	2.93±0.17	88.36±0.11	3.67±0.39	113.±0.20	0.28±0.10	4.15±0.41	62.6±2.66
	T_1	7.52±0.20	0.20±0.14	3.33±0.24	88.65±0.12	3.68±0.23	139.93±0.60	0.30±0.11	17.14±0.18	608.6±3.09
	T_2	7.54±0.23	0.40±0.22	3.35±0.26	92.66±10.17	7.67±0.24	145.33±0.81	0.40±0.11	18.13±0.19	611.7±3.11
	T_3	7.56±0.24	0.60±0.18	3.38±0.28	92.68± 0.19	7.69±0.27	147.33±0.83	0.70±0.13	18.17±0.29	614.01±3.12
Mosambi juice	T_0	7.38±0.20	0.47±0.14	1.39±0.21	56.23±00.20	3.90±0.10	66.01.±0.21	1.47±0.27	57.2±0.22	88.40±0.23
	T_1	7.40±0.22	0.48±0.16	1.42±0.24	56.25±0.22	3.92±0.12	70.02±0.23	1.33±0.24	58.2±0.23	634.90±3.15
	T_2	7.60±0.24	0.50±0.18	1.45±0.25	61.22±0.25	4.01±0.24	78.02±0.25	1.43±0.25	59.25±0.29	637.9±3.19
	T_3	7.90±0.26	0.70±0.19	1.47±0.26	61.24± 0.27	4.09±0.27	85.01±0.56	1.47±0.27	62.27±0.32	640.91±3.21
Pineapple juice	T_0	8.29±0.22	0.32±0.11	1.51±0.11	89.72±1.01	3.65±0.21	45.20.±0.19	0.96± 0.23	45.60±1.20	88.40± 0.90
	T_1	8.30± 0.23	0.35±0.14	1.53± 0.12	92.02± 1.05	3.92±0.12	50.2±0.23	0.98±0.24	48.60±1.70	637.30±3.12
	T_2	8.50± 0.27	0.39±0.16	1.56±0.14	97.74±1.09	4.01±0.24	56.21±0.25	0.99±0.25	49.7±1.80	640.40±3.19
	T_3	8.70±0.29	0.42±0.19	1.58±0.17	99.10± 1.11	4.09±0.27	59.08±0.31	1.01±0.27	53.70±1.90	644.50±3.21
Pomegranate juice	T_0	8.30±0.20	0.30±0.15	2.60±0.13	88.72±1.01	3.79±0.23	38.±0.29	4.26± 0.39	27.41±0.67	77.50± 0.30
	T_1	8.33± 0.23	0.33±0.16	2.66± 0.14	92.02± 1.05	3.92±0.12	40.01±0.30	4.38±0.43	27.45±0.69	627.50±3.13
	T_2	8.35± 0.26	0.35±0.17	2.68±0.16	92.54±0.26	7.78±0.26	42.09±0.31	4.43±0.47	28.41±0.69	629.5± 3.17
	T_3	8.38±0.29	0.37±0.19	2.70±0.21	99.10± 1.11	7.81±0.29	45.02±0.35	4.49±0.51	31.86±0.50	631.50±3.21

5. Conclusion

From the result it is being concluded that the papaya leaves extract incorporated in *Banana shake, Mosambi juice, Pineapple juice, Pomegranate juice* of the products were well acceptable on the basis of sensory evaluation. In banana shake Treatment T_1 (60:45:5) was best as compared to other treatments, Treatment T_1 (95:5) was best in *Mosambi* juice followed by T_2 and T_3.In pineapple juice T_1 (95:5) was found to be the best treatments, followed by T_1 and T_3. In pomegranate juice T_1 (95:5) found to be the best treatment followed by T_2 and T_3.Banana shake was rich in calcium and protein content .Vitamin C content was observed high in *mosambi* juice .Iron content was also rich in pomegranate juice. Total Carotene content was rich in pineapple juice. From the result it can be shows that the addition of papaya leaves extract increased nutrient density of all prepared beverages.

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