

Acceptability and nutrient composition of drumstick leaves powder chutney

ASHWINI BIDWE AND TASNEEM NAHEED KHAN

Four variations of drumstick leaves powder chutney were developed by utilizing drumstick leaves powder (*Moringa oleifera*), Bengal gram powder (*Cicer arietinum*), black gram powder (*Vigna mungo*), niger seed powder (*Guizotia abyssinica*), Jaggery, tamarind (*Tamarindus indica*) and chilli (*Capsicum annum*) powder were added in same amount in all the developed variations. The acceptability of four variations of developed drumstick leaves powder were studied by evaluating different organoleptic characteristics by selected panel member. Drumstick leaves powder chutney variation III secured highest acceptability scores. Further variation III was subjected for nutrient analysis. The results of nutrient analysis indicated that the developed chutney is rich in protein, fibre, calcium and iron.

Key Words : Development of drumstick leaves powder chutney, Organoleptic evaluation, Nutrient analysis

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INTRODUCTION

Moringa oleifera belongs to the monogeneric family *Moringaceae* and it is one of the best known, most widely distributed and naturalized species. It is a fast-growing tree and is grown throughout the tropics for human food, livestock forage, medicine, dye, and water purification. Moringa is grown traditionally as backyard trees or hedges. The increased awareness of the multiple uses of moringa leaves for both domestic and industrial purposes is leading to an increased demand for it.

Drumstick leaves have the enormous medicinal potential and curative properties. The leaves have been reported to be a rich source of β -carotene, protein, vitamin

C, calcium and potassium and act as a good source of natural antioxidant due to the presence of ascorbic acid, flavonoids, phenolics and carotenoids. Moringa contains nitrile mustard oil glycosides and thiocarbamate glycosides which are anti hypertensive (Faizi *et al.*, 1994) and are very rare in nature (Faizi *et al.*, 1995). The leaves exhibit strong antioxidant property expressed in terms of free radical scavenging activity (Pari *et al.*, 2007). The high concentrations of ascorbic acid, oestrogenic substances and β -sitosterol, iron, calcium, phosphorus, copper, vitamins A, B and C, α -tocopherol, riboflavin, nicotinic acid, folic acid, pyridoxine, β -carotene, protein, and in particular essential amino acids such as methionine, cystine, tryptophan and lysine present in *Moringa* leaves and pods make it a virtually ideal dietary supplement (Makkar and Becker, 1996). Carbohydrates, fats and phosphorus content are low making this one of the finest plant foods.

Nutritionists are now trying to encourage cultivation and incorporation of GLVs in various recipes with minimum effort and little cost, yielding a great benefit.

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Devising several simple and acceptable micronutrient rich recipes containing GLVs would not only bring variety to the diet but also help in combating micronutrient deficiencies. In developing countries where most of the people are engulfed in poverty and cannot afford the expensive food products and suffer from various deficiency diseases, a need to identify cheap and easily available source rich in micronutrients is essential. Less utilized leaves of *M. oleifera*, which are rich in micronutrients but are mostly discarded or go waste were used in traditional Indian recipes and evaluated for their acceptability among children. However, the threshold for acceptability may vary since drumstick leaves have a slightly bitter taste to many people. Thus, organoleptically acceptable recipes with drumstick leaves would be a most suitable protocol for dietary diversification or improvement, as these leaves are storehouses of both the classic nutrients (carbohydrate, protein, oil, vitamins and minerals) as well as beneficial non-nutrients (typically referred to as phytochemicals or phytonutrients). Therefore, the present study was planned to develop drumstick leaves powder chutney as it may be useful for inducing beneficial changes in blood pressure and lipid profile of the people.

METHODOLOGY

Four variations of drumstick leaves powder chutney were developed by using drumstick leaves powder (*Moringa oleifera*), Bengal gram powder (*Cicer arietinum*), black gram powder (*Vigna mungo*), niger seed powder (*Guizotia abyssinica*). Jaggery, tamarind (*Tamarindus indica*) and chilli (*Capsicum annum*) powder. Developed variations of drumstick leaves powder chutney were evaluated for organoleptic characteristics. Further highly accepted drumstick leaves powder chutney was analyzed for nutrient content.

Preparation of drumstick leaves powder :

Drumstick leaves were collected from campus. Clean and dried in mechanical dryer at 57°C. Fine powder was prepared in electrical mixture.

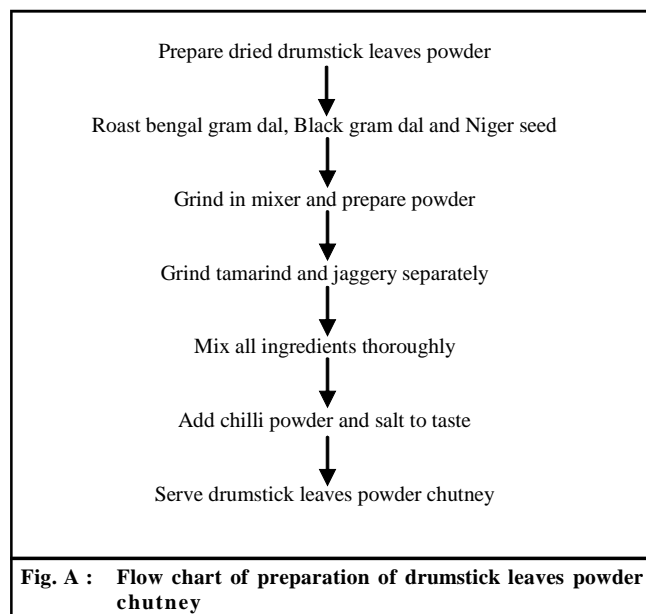
Development of drumstick leaves powder chutney:

Four variation of drumstick leaves powder chutney were developed by utilizing selected ingredients with varying amount of Drumstick leaves powder, Bengal gram dal powder, Black gram dal powder, Niger seed

powder whereas Jaggery, Tamarind and Chilli powder were constant. The detailed description of developed four variation is given in Table 1.

Preparation of drumstick leaves powder chutney :

Preparation of drumstick leaves powder chutney is given in following flow chart



Sensory evaluation :

Evaluation of drumstick leaves powder chutney for acceptability was carried out following ranking method (Ranganna, 1979). The variations of drumstick leaves powder chutney were served to ten trained judges to score for different sensory characters namely colour, texture, taste, flavour and overall acceptability at room temperature with the help of score card. Among the variations, the highly accepted drumstick leaves powder chutney was selected for nutrient analysis.

Nutrient analysis :

The nutrient content of highly accepted variation of drumstick leaves powder chutney was analyzed. Moisture free sample was used for analysis. The proximate composition (moisture, total protein, fat, fibre and total minerals) was carried out as per procedures prescribed by A.O.A.C. (1975). Carbohydrate content was calculated by difference method. Calcium was estimated by EDTA method. Trace elements (iron, copper, zinc and magnesium) were estimated by Atomic Absorption

Spectrophotometer (Perkin R Elmer Model - 3110). The values for all nutrients were averages of triplicate value on dry weight basis. Moisture was expressed on fresh weight basis.

The data of acceptability of four developed variations of drumstick leaves powder chutney were statistically analysed by one way analysis of variance and 'F' values were calculated to find out the difference among the developed variations of herbal composite (Panse and Sukhatme, 1985)

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Organoleptic characteristics of drumstick leaves powder chutney :

Information regarding the general description of development of drumstick leaves powder chutney is given in Table 1. Four variations of drumstick leaves powder chutney were prepared with varying of drumstick leaves powder, Bengal gram dal powder, Black gram dal powder, Niger seed powder and constant amount of Jaggery, Tamarind and Chilli powder.

The mean values of organoleptic scores for the acceptability of drumstick leaves powder chutney prepared by utilizing selected foods with varying amount

of drumstick leaves powder, bengal gram dal powder, black gram dal powder and niger seed powder are given in Table 2.

The mean scores for colour of I, II, III and IV variations of drumstick leaves powder chutney were found to be 3.1, 3.6, 4.4 and 4.4, respectively. The maximum score of 4.4 was obtained for colour of variation III and IV whereas minimum score of 3.1 was recorded for colour of variation I. The scores obtained for the colour of variations III and IV were same (4.4).

Statistical analysis revealed that the scores obtained for the colour of drumstick leaves powder chutney of variation III was differed significantly with variation I. On the whole, among the prepared variations of drumstick leaves powder chutney variation III and IV were found to be most accepted with regard to colour.

The scores recorded for the texture of drumstick leaves powder chutney prepared by utilizing selected foods were between 3.3 to 4.5. The maximum score was recorded by variation III and the minimum score was recorded by variation I.

Statistical analysis showed that the scores obtained for texture of variation III was differed significantly with variation I and II. From the findings it can be inferred that variation III was found to be the most acceptable in the context of texture.

The mean scores secured for flavour of drumstick leaves powder chutney was ranging from 3.2 to 4.3. The

Table 1 : General description of development of drumstick leaves powder chutney

Sr. No.	Drumstick leaves powder chutney Variations	Description of ingredients						
		Drumstick leaves powder	Bengal gram powder	Black gram powder	Niger seed powder	Jaggery	Tamarind	Chilli powder
1.	Variation I	3.0	4.5	4.5	1.5	3.5	2.5	0.5
2.	Variation II	3.5	4.0	4.0	2.0	3.5	2.5	0.5
3.	Variation III	4.0	3.5	3.5	2.5	3.5	2.5	0.5
4.	Variation IV	4.5	3.0	3.0	3.0	3.5	2.5	0.5

Table 2: Mean acceptability scores of organoleptic characteristics of developed drumstick leaves powder chutney

Drumstick leaves powder chutney variations						(n=4)
	Colour	Texture	Flavour	Taste	Overall acceptability	
I	3.1	3.3	3.2	3.1	3.2	
II	3.6	3.5	3.3	3.1	3.6	
III	4.4	4.5	4.3	4.7	4.6	
IV	4.4	3.7	3.9	3.6	3.8	
Mean	3.87	3.75	3.62	3.67	3.8	
'F' Value	10.04**	7.54**	11.19**	5.80**	8.91**	
S.E. ±	0.19	0.19	0.22	0.21	0.19	
C.D. (P=0.05)	0.54	0.52	0.62	0.59	0.54	

** indicates significance of value at P=0.01

highest score of 4.3 for the flavour was secured by variation III while the minimum score of 3.2 was secured by variation I.

The scores recorded by variation III was significantly higher than those of variation I, II and IV. Whereas statistically significant difference were recorded by variation III with variation I and II.

On the whole, it can be concluded that the variation III was considered as most accepted in terms of flavour.

The scores registered for the taste were 3.1, 3.1, 4.7 and 3.6 for variation I, II, III and IV, respectively. The highest score of 4.7 for the taste was recorded by the variation III where as lowest score of 3.1 was secured by the variation I and II.

Statistical results showed that the taste of drumstick leaves powder chutney of variation III was differed significantly with variation I, II and IV.

In conclusion it can be said that the variation III was found to be highly acceptable and recorded 4.7 score in terms of taste.

The mean scores for overall acceptability of drumstick leaves powder chutney variations I to IV were ranging from 3.2 to 4.6. The maximum score (4.6) was obtained by the variation III, followed by variation IV and II, while the minimum score (3.2) was obtained by variation I.

From results it can be said that the highest score for overall acceptability was recorded by variation III which was found to be significant statistically.

In the light of above result it can be concluded that variation III was found to be most acceptable in terms of all organoleptic characteristics.

Similarly the results are in good agreement with the studies conducted by Nambiar *et al.* (2005); Nambiar (2006); Nambiar and Parnami (2008) and Mukunzi *et al.* (2011)

Nutritional composition of drumstick leaves powder chutney :

Among the four developed drumstick leaves powder chutneys the variation III was highly accepted in terms of organoleptic characteristics. The nutrient content was analyzed for variation III (prepared by utilizing selected foods with bengal gram dal, black gram dal, niger seed and drumstick leaves. Proximate compositions of drumstick leaves powder chutney are presented in Table 3.

Table 3 : Proximate composition of drumstick leaves powder chutney

Constituent	Composition (g %)
Moisture	3.5
Protein	29.62
Fat	9.18
Total mineral	6.3
Crud fibre	11
Carbohydrates	40.37

The contents of moisture (g%), protein (g%), fat (g%), total mineral (g%), crude fibre (g%) and CHO (g%) in drumstick leaves powder chutney were 3.5, 29.62, 9.18, 6.3, 11.0 and 40.37 per cent, respectively. The results of the study revealed that the drumstick leaves powder chutney contained more amount of protein 29.62g/100g, and fibre 11.0 g/100g which is a good attribute for therapeutic purpose.

The fat content of chutney was 9.18 but it could not be considered as a rich source of fat, which is in agreement with the fact that green leafy vegetables are 'Heart friendly food'.

The results are in agreement with Lakshmi and Vimla (2000); Kowsalya and Vidhya (2004); Jemima *et al.* (2004) and Fuglie (2001).

The contents of calcium (mg/100g), magnesium (mg/100 g), iron (mg/100 g), copper (mg/100 g) and Zinc (mg/100 g) of the drumstick leaves powder chutney are presented in Table 4.

Table 4 : Mineral composition of drumstick leaves powder chutney

Element	mg/100g
Calcium	497.5
Magnesium	1.1
Iron	10.2
Copper	5.1
Zinc	7.05

The estimated value for calcium, magnesium, iron, copper and zinc were 497.5, 1.1, 10.2, 5.1 and 7.05 mg/100g, respectively. The results of analysis showed that drumstick leaves powder chutney contained high calcium and iron.

The results of present study are in agreement with the study conducted by Dillard and German (2000) and Siddhuraju and Becker (2003).

The results of the biochemical analysis showed that the leaf samples after dehydration became a concentrated

source of all the nutrients. On the whole, it was inferred from the results that development of drumstick leaves powder chutney by utilizing selected foods provides more amount of nutrients like protein, crude fibre, calcium and iron. Supply of trace elements in the diet is of great current interest to the nutrition of the community because of increasing evidence of their marginal or inadequate intake among different segments of the population.

Conclusion :

The result of organoleptic characteristics of drumstick leaves powder chutney revealed that variation III registered significantly higher scores for colour (4.4), texture (4.5), flavour (4.3), taste (4.7) and overall acceptability (4.6) which was followed by variation IV. From the result it was inferred that the variation III was found to be most acceptable in terms of all organoleptic characteristics.

The highly accepted drumstick leaves powder chutney (variation III) was analyzed for nutrient content. The contents of moisture (g%), protein (g%), fat (g%), total mineral (g%), crude fibre (g%) and CHO (g%) in drumstick leaves powder chutney were 3.5, 29.62, 9.18, 6.3, 11.0 and 40.37 per cent, respectively. Besides the values for calcium, magnesium, iron, copper and zinc were 497.5, 1.1, 10.2, 5.1 and 7.05 mg/100g, respectively.

It is evident from the results that the developed drumstick leaves powder chutney contained more amounts of protein, fibre, calcium and iron.

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