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Research Article

EFFECT OF SELECT PRE- PROCESSING AND PRESERVATION TECHNIQUES INCLUDING THERMAL PROCESSING ON VITAMIN-C CONTENT OF AMLA POWDERS

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ABSTRACT
Amla is one of the cheapest fruit with several nutritional, medicinal and pharmalogical properties. However the fruit is available seasonally only for a short period keeping this fact in view, an attempt has been made in the present study to develop powders of amla fruit subjected to different pre processing methods and comparing these with untreated Figures of amla powders .the objective behind this processing is to make the nutrient rich amla fruit products available throughout the year. This can increase the interest and consumption among different age groups and can also popularize acceptable food product development and preparations by incorporating or blending the powders in different forms of foods.The Figures of powders in different pre processing and thermal processing techniques were subjected to sensory evaluation and analyzed for vitamin c composition the different pre treatments are blanching of the segments with potassium meta bi sulphate and /or osmotic dehydration of amla segments in a) brine solution b) sugar syrup and honey. Pretreated amla fruit segments subjected to blanching repeated soaking and drying were made into powder through oven drying. The dried Figures were collected on 1st, 7th, and 14thdays. The Figures were subjected to sensory evaluation and the results revealed that 1st day Figures scored high and the level of acceptability were good for all the quality attributes. Analysis of vitamin c revealed that 1st day Figures retained maximum nutrient than the other Figures collected on 7th and 14th day. However even with the 30%loss of vitamin c the powder serves as a good source of the vitamin .Raw amla and blanched amla powders can be made into acceptable forms by incorporating in different food products such as jams jellies etc. Amla powder pretreated with salt can be consumed orally and it has been observed that this Figure was rated as excellent by panel members. Amla powder pretreated with sugar and honey also was highly acceptable to consumers when blended with ground nuts grated coconut and jiggery. This mix is nutritious and can be used to prevent anemia and enhance immunity and wound healing.

Key Words: *Amla, Dried Figures, Amla Powder, Vitamin C*

INTRODUCTION
The amla fruit, (*Emblica officinalis*) small and innocuous looking, is worthy of consideration by the serious herbalist. Amla has long been recognized as a starl wart member of the family Euphorbiaceae with literally hundreds of uses. The amla shrub grows into a small (or) middle sized deciduous tree with feathery leaves 10-13mm long and 2-3mm broad. Male and female pale green flowers appear on the same tree and thie juicy, green, fleshly fruit grows to over 2cm with six softly defined ridges and six seeds (Jain, 1968).
The English name of amla –Indian Gooseberry denotes that it is indigenous to India and is one of the most often used herbs in ayurveda. It has a reputation as a highest content of vitamin-C than any other naturally occurring substance in nature. Traditionally, amla has been called the best of the powerful and ayurvedic rejuvenating herbs, because it is tridoshagna, that is, through its natural balance of tastes (sweet, sour, pungent, bitter and astringent) all in one fruit, it stimulates the brain to rebalance the three main components of all physiological functions, the water, fire and air elements within the body (Bajracharya, 1979).

Due to this, in the present study, drying technology was applied to preserve fruits. If the shelf life of the amla fruits has prolonged, white specks will be developed on the fruits. To control these white specks, an attempt has done by premi *et al.,* and reported that a solution containing 10% Nacl and 0.04% potassium Meta bisulphate was most effective in controlling the development of white spots during storage with maximum retention of fruits. The availability of the amla fruits is also a limited period i.e., October to January. By applying several techniques at the time of processing (which can be doing during peak production of amla fruits) can make available throughout the year in different forms and this can enhance the interest among consumers. The developed different forms of amla fruits again can make into acceptable products through incorporating in different preparations such as jams, jellies, candies. It is easily spoiled by several factors, unavailability throughout the year and its excellent form of powders through pre processing the amla fruits without and with pretreatments i.e., blanching with preservative, brine solution, sugar syrup and honey and then subjecting to drying.In the present study, after developing powders, subjected to sensory evaluation to test the acceptability among consumers and also to study the changes in ascorbic acid and acidity at first day, seventh day and fourteenth day. The study is to estimate how extent pre treatments will serve as a barrier to the retention of vitamin-C, which oxidizes easily and available only in little amounts and also to know the acceptability of the amla powders after giving pretreatments.

MATERIALS AND METHODS

The present study focuses on 'to develop amla powders without and with pre treatments, which increases not only the shelf life of food and also increases acceptability of foods, to test the acceptability of amla powders by subjecting to sensory evaluation and to estimate the extent of retention of vitamin-C and acidity after powdering the amla Figures at 1st day, 7th day and 14th day.

1.1. Selection and Procurement of Raw Materials

Sound light green color wild amla fruits are selected for the present study and procured from the local fruit market at Tirupati. The other ingredients such as honey (dark colored) are procured from nearby village at Tirupati, sugar and salt are procured from the local super market at Tirupati.

1.2. Preparation and Processing of Amla Powders

The processing of amla powders was discussed under the following steps.

1.2.1. Washing

After proper selection and weighing, the surface dirt of fruits was removed by washing under cold running water. Washing is the preliminary step for any processing of foods and it is essential to remove any surface adhering dust particles (or) impurities and divided into portions, then allowing them to further processing.

1.2.2. Slicing/Deseeding

The washed fruits are subjected to slicing (or) deseeding along length wise marked of amla fruits by using sharp stainless steel.

1.2.3. Pre Processing of Amla

Out of five portions, one portion was untreated with pretreatment and the other remaining four portions are subjected to pre treatments. First portion of amla slices are blanched with 0.5% potassium meta bisulphate for five minutes, then subjected to hot air oven drying, then the remaining three portions are subjected to pricking, which helps to penetrate the pretreatments inside of the slices and then subjected to pretreatments i.e., soaked in 20% Nacl, sugar syrup and honey overnight.

1.2.4. Drying

Fifth untreated portion and blanched amla slices are subjected to hot air oven drying at 70°C for 4hrs, to remove total moisture content from amla slices which accelerates spoilage and reduces shelf life of fruits..Pre treated three portions of amla slices are divided into two potions, one portion was completely hot air oven dried at 70°C for 4hrs and collected for 1st day nutrient estimation. The other portion was partially dried at 70°C for 1hr, then soaked overnight and then partially dried. In this way repeated

soaking and drying has done until 7 days, then again divided into two potions. One portion was completely dried at 70°C for 4hrs and collected for 7thday nutrient estimation. The other portion was again subjected to repeated soaking and drying until 14th day and collected to estimate the nutrient changes in pre treated amla Figures.

1.2.5. Blending

Then, the dried untreated, blanched amla Figures and collected pre treated Figures are subjected to blending by passing through an electric mixer, fine powder was obtained.

1.3. Sensory Evaluation of Amla Powders

Sensory evaluation can be defined as the quality assessment of a product which is assessment of a product which is assessed by means of human sensory organs. Sensory evaluation was done by panel members and they judgment was given by evaluating the product. Senses play an important role in evaluating the product. E.g.: Appearance, which can be judged by the eye. E.g.: color, size, shape, uniformity is of first importance in food selection. In addition, to color, odor, taste and mouth feel certain psychological factors contribute to acceptability of foods. The quality parameters such as appearance, color, taste, flavor and overall acceptability were judged by panel members.

Nutrient analysis has been done in food chemistry laboratory, Department of Home science, S.V. University. The extent of retention and losses of vitamin-C and acidity in amla powders was estimated.

1.4. Statistical Analysis of Amla Powders

All the data is recorded and tabulated and subjected to appropriate statistical analysis, the difference between the acceptability of amla powders were studied.

RESULTS AND DISCUSSION

Sensory Analysis of the Amla Powders

Sensory evaluation was done by three age groups i.e., among children, PG students and House wives to test the acceptability of Amla powders by 5- point Hedonic rating scale.

Hedonic scale test was used by the Quarter Master Food and Container Institute3 of the U.S.Armed Forces for ascertaining the likes (or) dislikes for various dishes by the soldiers (peryam and pilgrim, 1957). The test can be used to ascertain the acceptability of various dishes in army mess, student hostels, etc. so that food wastage can be avoided and psychological satisfaction of the persons involved can be achieved. It can also be used in research laboratories to ascertain the acceptability (or) other wise of new products. (Food science and Experimental foods)

The mean scores calculated through the scores of sensory evaluated amla Figures from all age groups are presented in table 2, 3 and 4.

Table 1: Shows the mean scores of sensory evaluated amla powders from all age groups at 1st day

S.No.	Quality attributes	Figure-I	Figure-II	Figure-III	Figure-IV	Figure-V
1	Appearance	2.26	2.46	3.46	2.73	2.86
2	Color	3.06	2.46	3.26	2.66	2.46
3	Taste	2.8	2.73	3.73	2.53	2.06
4	Uniformity	2.6	2.73	3.33	2.13	1.93
5	Flavor	2.26	2.46	3.06	2.06	1.8
6	Overall acceptability	3.06	3.2	3.46	2.73	2.4

Table 2: Shows the mean scores of sensory evaluated amla powders from all age groups at 7th day

S.No.	Quality attributes	Figure-I	Figure-II	Figure-III	Figure-IV	Figure-V
1	Appearance	2.26	2.46	2.4	2.0	1.8
2	Color	3.06	2.46	2.13	2.06	1.8
3	Taste	2.8	2.73	2.86	2.06	1.8
4	Uniformity	2.6	2.73	2.06	1.93	1.8
5	Flavor	2.26	2.46	1.93	1.66	1.66
6	Overall acceptability	3.06	3.2	2.6	2.06	1.8

Table 3: Shows the mean scores of sensory evaluated amla powders from all age groups at 14th day

S.No.	Quality attributes	Figure-I	Figure-II	Figure-III	Figure-IV	Figure-V
1	Appearance	2.26	2.46	2.4	1.93	1.06
2	Color	3.0	2.46	2.26	1.93	1.0
3	Taste	2.8	2.73	2.86	2.0	1.0
4	Uniformity	2.6	2.73	1.93	1.93	1.0
5	Flavor	2.6	2.46	1.86	1.66	1.06
6	Overall acceptability	3.0	3.2	2.66	2.0	1.06

**Note: Figure-I- Raw amla powder, Figure-II-Blanched amla powder, Figure-III-Amla powder Pre treated with salt, Figure-IV- Amla powder Pre treated with sugar syrup, Figure-V- Amla powder Pre treated with honey*

From the above scores, it was concluded that 1st day Figures scores high and good in all quality attributes when comparing with 7th and 14th day Figures. Among five Figures, Amla powder Pre treated with salt scored high when comparing with other Figures.

Acceptability of Amla Powders

After doing sensory evaluation, the mean scores have calculate among three age groups i.e., Children, PG students and House wives. With the help of these mean scores, graphs are depicted to know the extent of acceptability among three age groups, which has done in three different time intervals.

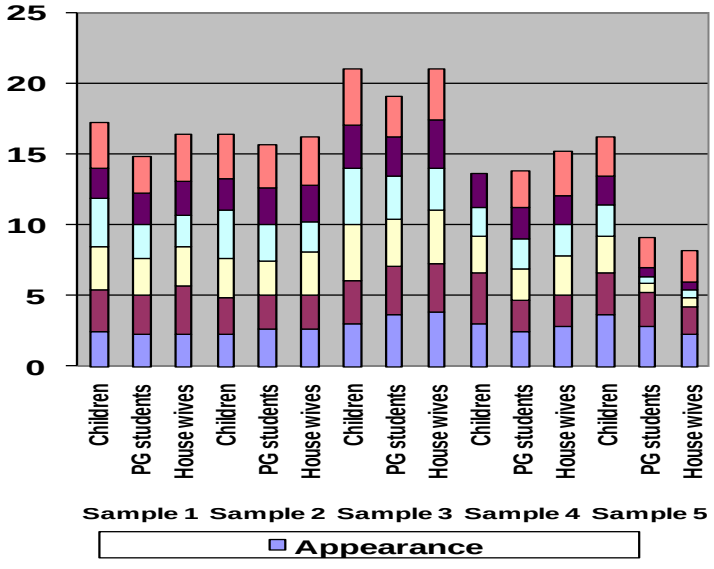

Table 4: Shows the mean scores of sensory evaluated amla Figures among three age groups at first day

S.No.	Figures	Age groups	Appearance	color	Taste	Uniformity	flavor	Overall acceptability
1	1	Children	2.4	3	3	3.4	2.2	3.2
		PG students	2.2	2.8	2.6	2.4	2.2	2.6
		House wives	2.2	3.4	2.8	2.2	2.4	3.4
2	2	Children	2.2	2.6	2.8	3.4	2.2	3.2
		PG students	2.6	2.4	2.4	2.6	2.6	3.0
		House wives	2.6	2.4	3.0	2.2	2.6	3.4
3	3	Children	3	3	4.0	4.0	3.0	4.0
		PG students	3.6	3.4	3.4	3.0	2.8	2.8
		House wives	3.8	3.4	3.8	3.0	3.4	3.6
4	4	Children	3.0	3.6	2.6	2.0	2.4	
		PG students	2.4	2.2	2.2	2.2	2.2	2.6
		House wives	2.8	2.2	2.8	2.2	2.0	3.2
5	5	Children	3.6	3.0	2.6	2.2	2.0	2.8
		PG students	2.8	2.4	0.6	0.5	0.6	2.2
		House wives	2.2	2.0	0.6	0.6	0.5	2.2

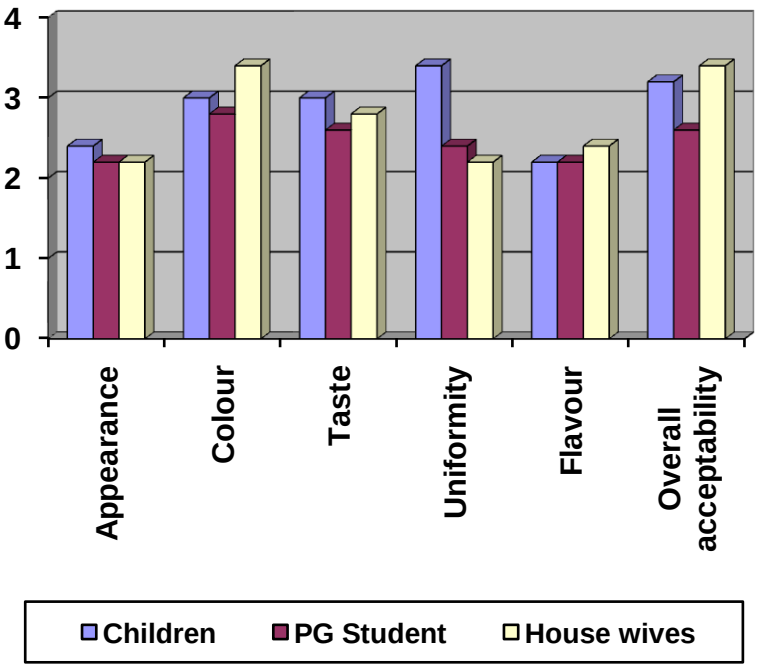

Figure 1

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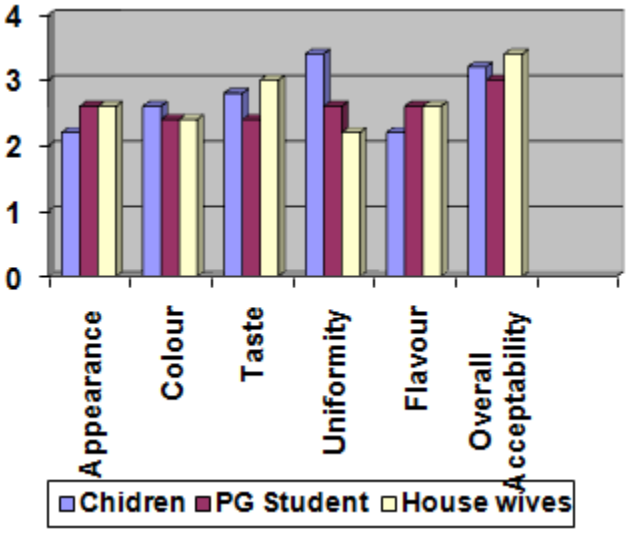

Figure 2

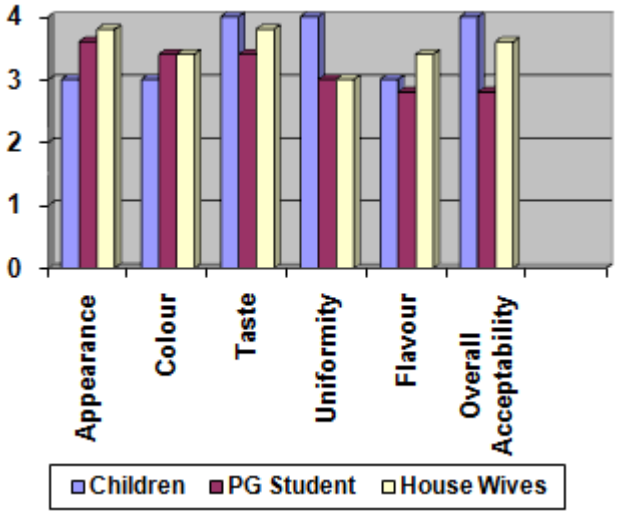

Figure 3

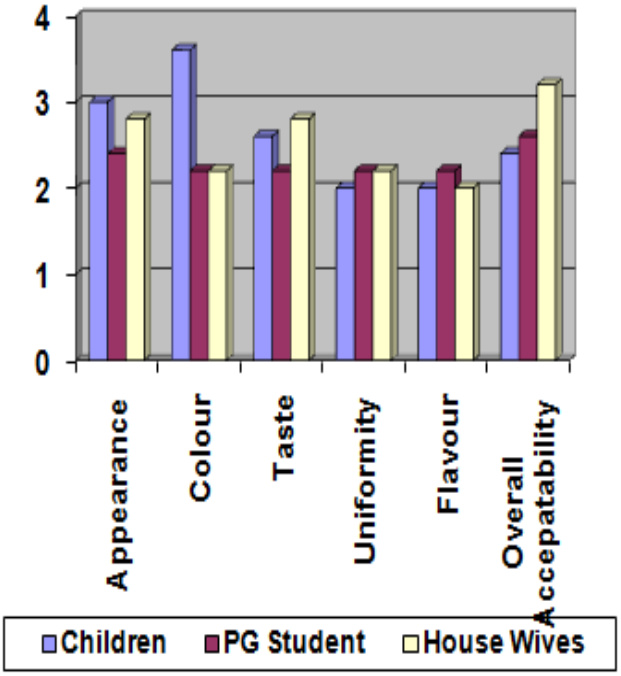

Figure 4

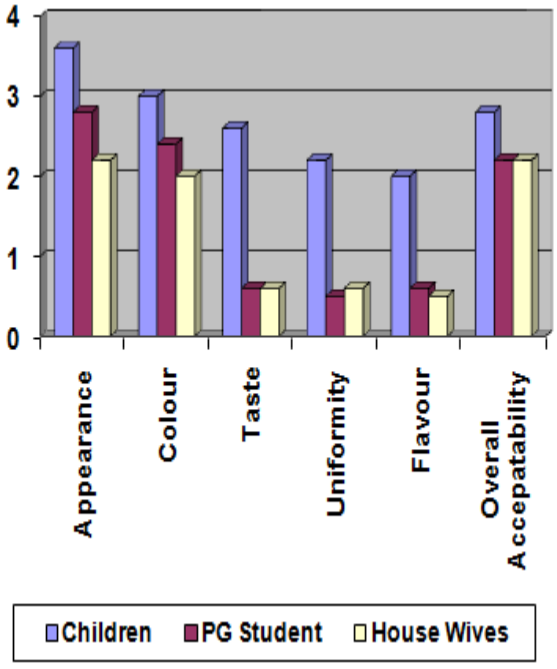

Figure 5

The extent of acceptability among three age groups in all quality attributes at 1st day is described below:

Appearance

In the first Figure, out of five Figures, the mean scores of appearance reveals children scored high than the two age groups i.e., PG students and House wives who shows interest somewhat less than children.

In the second Figure, PG students and House wives scores are high than children. In the third Figure, the scores are constantly increased among three age groups and this Figure likes all age groups and its appearance also good when compared with other all Figures.

In the fourth Figure, children scored high than House wives and least scored PG students. In the fifth Figure also children scored high than PG students and least scored house wives and these two Figures are not liked much and preferred third Figure.

Color

Due to hot air oven drying, the first two Figures turn slightly brown in color. In the first Figure, mean scores of color also reveals House wives scored good and high than the other age groups and shows interest to taste the Figures.

In the second Figure, children scores are high than PG students and House wives who scored equally. In the third Figure, PG students and House wives scores are high than children and the color of this Figure is creamy white in color, it may be due to the steeping of raw amla segments in brine solution and dried after soaking 1st day.

In the fourth and fifth Figures children scores are high than PG students and house wives and this color are very much liked by children when comparing with first two Figures which is slightly brown in color.

Taste

First Figure is astringent in taste and this taste liked much by children whose scores are high and then hose wives, less scored by PG students than other age groups, second Figure also astringent in taste. This Figure scores are high in house wives then children and somewhat less scored by PG students than the other age groups. This Figure is somewhat less in astringency when comparing with the first Figure; it is due to blanching of amla fruits.

Third Figure is a little bit salty in taste and this Figure is very much liked by all age groups. This Figure also scored high among children and then house wives and a little difference in scores of PG students due to a little bit salty.

Fourth Figure is sweet in taste when consume, then immediately astringency mouth feel was observed and reported by panel members. This sweetness is due to steeping of raw amla segments in sugar syrup. This Figure scores high in house wives then children and a little difference scored by PG students.

Both sweet and a little astringency mouth feel was reported by panel members in fifth Figure and it can be consume only in little amount but it can't consume in large amounts. This taste is due to steeping of raw amla segment in honey. This Figure scores are high among children when comparing with other age groups. Large differences scores are observed in the other age groups are observed.

Uniformity /Texture

The first two Figures are powdered finely, the texture is rough in first Figure and a little smooth was observed in second Figure, it is due to blanching of amla fruits. And the scores of two Figures are high among children, then PG students and with a little difference scored by house wives.

In the third Figure all the powdered granules are even in structure and has high flow characteristics was observed with the all other Figures. This Figure scores are high among children and equally scored by PG students and house wives.

In the fourth and fifth Figures all the powdered granules even in structure, big granules are formed by combining powdered granules of the Figures and it is due to steeping of raw amla segments in sugar syrup and honey. The powder of these Figures is slightly sticky and this stickiness is the reason for the formation of big granules and uneven structure of powdered granules. The scores of fourth Figure was high and equally scored among PG students and house wives, a little difference scores scored buy the PG students and house wives. This large difference is due to the unevenness in powdered granules and can consume only in little amounts.

Flavor

The first two Figures are acidic in flavor. In the first Figure high scores are scored by house wives and equally scored children and PG students. In the second Figure PG students and house wives are scored equally, a little difference scored by children. The third Figure is moderately acidic in flavor and the scores are high among house wives and then children, a little difference scored by PG students. The fourth Figure possesses both sweet and astringency flavor and the scores are equally scored by children

and hose wives, and with a little difference scored by PG students. Fifth Figure possess both sweet and light astringency flavor and the scores are high in children and a large difference are scored by PG students and House wives.

Over All Acceptability

Overall acceptability for the first and second Figures is high in house wives then children and a little difference scores scored by PG students. For third Figure, overall acceptability was high in children, then house wives and a little difference scores scored by PG students and this alterations is due to a little bit salty of the Figure. Overall acceptability for fourth Figure was high in house wives, and a little differences scored by the other age groups i.e., PG students and house wives. The above difference among three age groups in all quality attributes is due to the psychological factors, likes and dislikes personal preferences etc.

Table 5: Shows the mean scores of sensory evaluated amla Figures among three age groups at seventh day

S.No.	Figures	Age groups	Appearance	color	Taste	Uniformity	flavor	Overall acceptability
1	1	Children	2.2	3	2.8	2.4	2.4	3.2
		PG students	2.4	3.4	2.6	2.2.	2.2	2.6
		House wives	2.2	2.8	3.0	3.4	2.2	3.4
2	2	Children	2.2	2.4	2.8	2.6	2.2	3.2
		PG students	2.6	2.6	3.0	3.4	2.6	3.0
		House wives	2.6	2.4	2.4	2.2	2.6	3.4
3	3	Children	2.8	2.6	3.8	2.6	2.2	2.0
		PG students	2.2	2.0	2.4	1.6	1.6	2.4
		House wives	2.2	1.8	2.4	2.0	1.8	2.4
4	4	Children	2.2	2.2	2.2	2.2	1.6	2.2
		PG students	1.6	2.0	2.0	1.8	1.6	1.8
		House wives	2.2	2.0	2.0	1.8	.8	2.2
5	5	Children	2.0	2.0	2.0	2.0	2.0	2.0
		PG students	1.8	1.6	1.8	1.8	1.6	1.8
		House wives	1.6	1.8	1.8	1.6	1.4	1.8

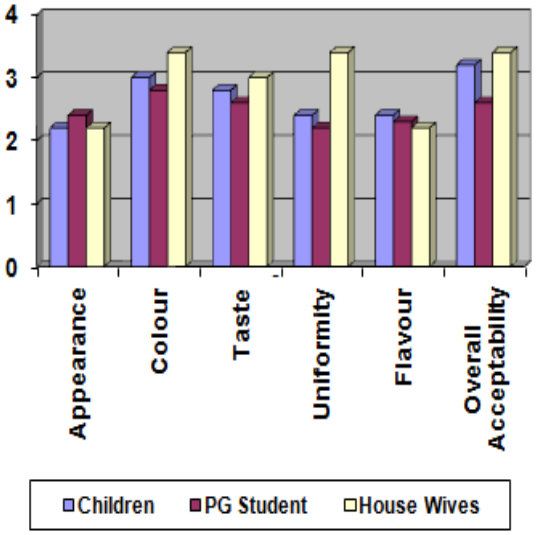

Figure 1

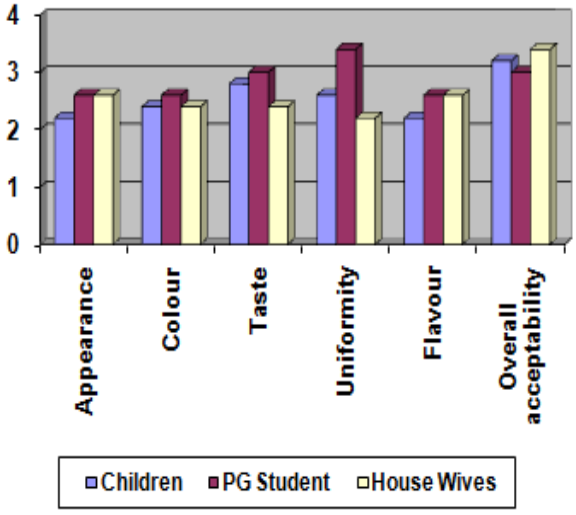

Figure 2

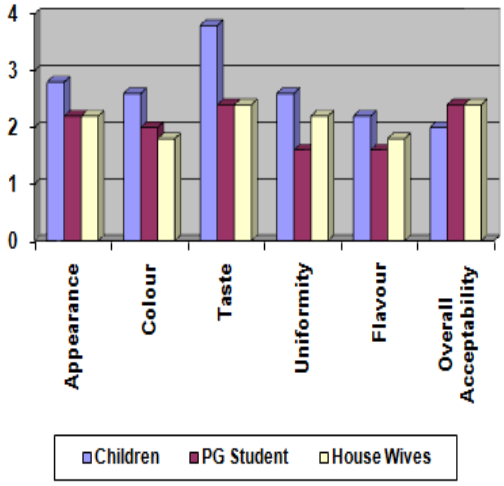

Figure 3

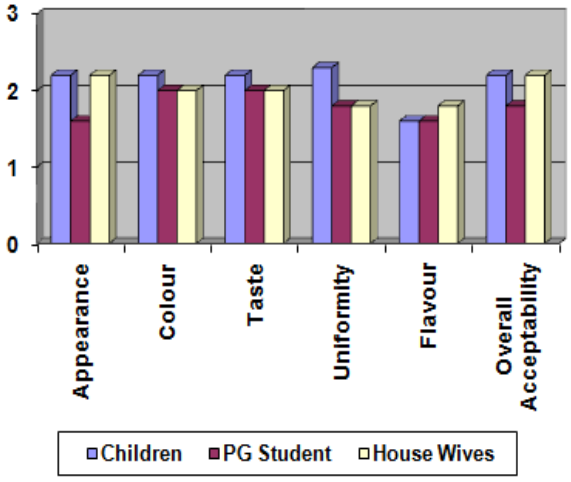

Figure 4

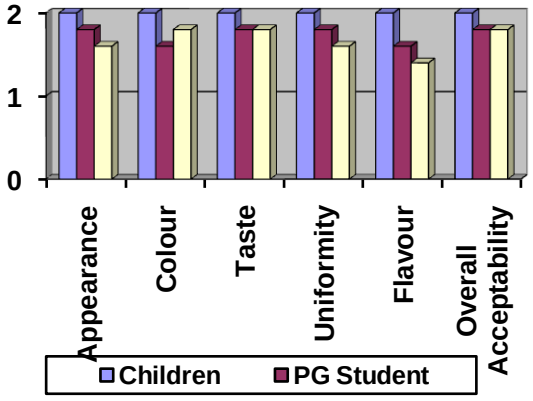

Figure 5

The extent of acceptability among three age groups in all quality attributes at 7th day is described below:

Appearance

The first Figure scores are high among PG students and with a little difference, equally scored by children and house wives and in second Figure scores are high and equally scored by PG students and house wives and with a little difference scored by children. In third Figure scores are high among PG students and house wives. In fourth Figure, scores are high and equally scored by children and house wives and a little difference scored by PG students. In fifth Figure, scores are constantly decreasing and high among children, and with a little differences scored by PG students and house wives.

Color

The color changes from 1stday to 7th day were not occurred and it is same as 1st day appears but the scores scored among three age groups are different. For first Figure, the scores are high in house wives, and a little difference scored by children and a large difference scored by PG students. In second Figure; the score are high in PG students, a little difference and equally scored by children and house wives.

In third Figure, the scores are high in children, little difference scored by PG students and house wives.

In fourth Figure also, scores are high in children, a little difference and equally scored by PG students and house wives. In fifth Figure also, scores are high in children, decreasing scores with a little difference by house wives and PG students.

Taste

At 7th day, in first Figure, the scores of taste were high in housewives, decreasing with a little difference scored by children and PG students.

In a second Figure, the scores are high in PG students with a little difference scored by children and some greater difference scored by house wives.

In third Figure, the scores are high in children, a little difference and equally scored by PG students and house wives. In a fourth Figure and fifth Figure also, the scores are high in children, a little difference, equally scored by PG students and house wives. At 7th day also, the first three Figures are taste like the taste developed at 1st day. In fourth Figure no astringency, a light sweet was obtained but in the fifth Figure bitterness was developed.

Uniformity/Texture

The first three Figures are even in all powdered granules and scores high and good than the fourth and fifth Figures. Fourth and fifth Figures are not even in the granules.

Big granules are formed at the time of blending into powder and it is due to stickiness developed by repeated soaking and drying in sugar syrup and honey. This is the major reason for the decreasing scores of fourth and fifth Figures in all quality attributes.

In first Figure, scores of uniformity are higher in house wives, then some greater difference scored by PG students. In second Figure, the scores are high in PG students followed by children and house wives. In third Figure the scores are high in children and then observed in house wives followed by PG students. In fourth Figure, the scores are high in children, with a little difference and equally scored by PG students and house wives in fifth Figure, the scores are high in children followed by PG students and house wives.

Flavor

The first two Figures are acidic in flavor and the third Figure possess slightly acidic, fourth Figure sweet flavor and in fifth Figure honey flavor was dominated. The scores of flavor in first Figure were high in children, with a little difference, equally scored by PG students and house wives, with a little difference scored by children. In third Figure, the scores are high in children followed by house wives and PG students. In fourth Figure, fewer score equally scored by children and PG students, and with a little greater difference scored by house wives.

Overall Acceptability

The first three Figures scored high and good in all quality attributes than fourth and fifth Figures. Due to physical characteristics and bitterness fourth and fifth Figures scoreless when comparing with the first

three Figures. The scores of overall acceptability for the first Figure were high in house wives, and with a little difference scored by children and with a slightly greater difference scored by PG students.
In second Figure, the scores were high in house wives and with a little difference scored by children and PG students. In third Figure, the scores equally scored by PG students and house wives and with a little difference scored by children. In fourth Figure, the scores equally scored by children and house wives and with a little difference scored by PG students. In fifth Figure, the scores are equally scored by PG students and house wives and with a little difference scored by children.

Table 6: Shows the mean scores of sensory evaluated amla Figures among three age groups at fourteenth day

S.No.	Figures	Age groups	Appearance	Color	Taste	Uniformity	flavor	Overall acceptability
		Children	2.2	3	2.8	2.4	2.4	3.2
1	1	PG students	2.4	2.8	2.6	2.2.	2.2	2.6
		House wives	2.2	3.4	3.0	3.4	2.2	3.4
		Children	2.2	2.4	2.8	2.6	2.2	3.2
2	2	PG students	2.6	2.6	3.0	3.4	2.6	3.0
		House wives	2.6	2.4	2.4	2.2	2.6	3.4
		Children	2.6	2.8	3.8	2.2	2.0	3.4
3	3	PG students	2.2	2.0	2.4	1.8	1.8	2.4
		House wives	2.4	2.0	2.4	1.8	1.8	2.2
		Children	2.0	2.0	1.6	1.6	1.6	1.8
4	4	PG students	2.0	1.8	2.2	2.0	1.6	2.0
		House wives	1.8	2.0	2.2	2.2	1.8	2.2
		Children	1.0	1.0	1.0	1.0	1.0	1.0
5	5	PG students	1.0	1.0	1.0	1.0	1.0	1.0
		House wives	1..2	1.0	1.0	1.2	1.2	1.2

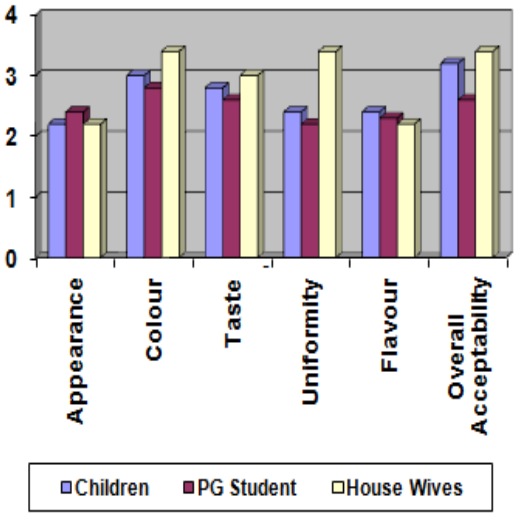

Figure 1

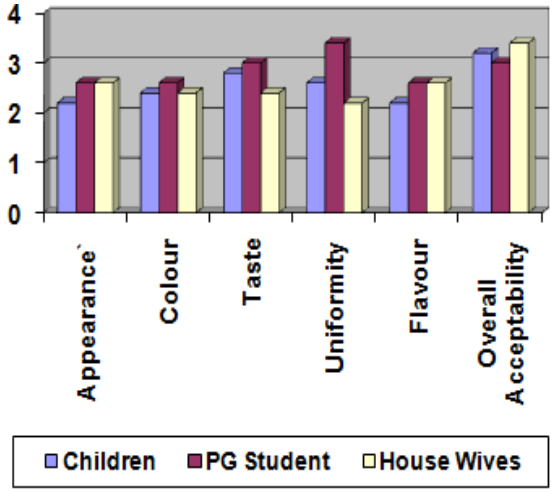

Figure 2

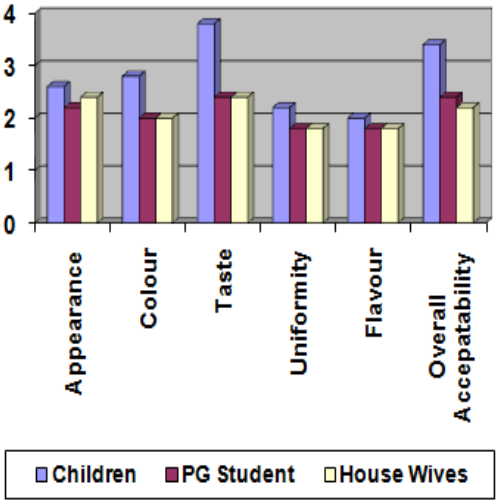

Figure 3

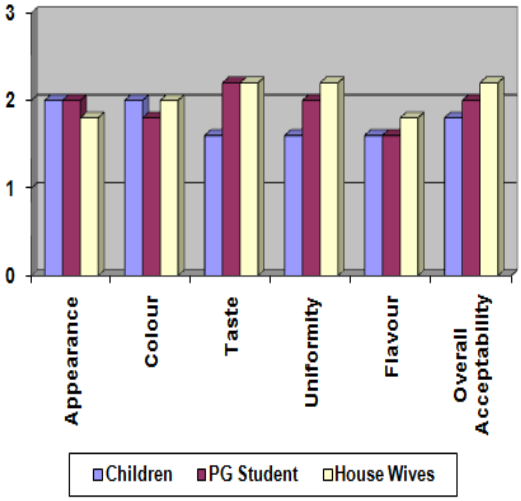

Figure 4

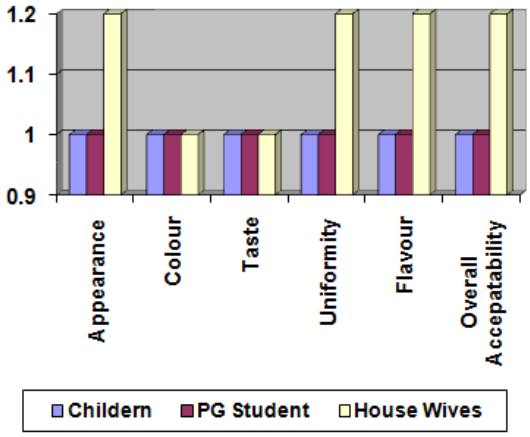

Figure 5

The extent of acceptability among three age groups in all quality attributes at 7th day is described below:

Appearance

In first Figure, score are high in PG students when comparing with the other age groups and they equally scored, a little difference was observed in children and house wives. In second Figure, the scores are equal in PG students and house wives, with a little difference was observed in children. In third Figure, the sores are high in children followed by house wives and PG students. In fourth Figure and fifth Figure, the scores in terms of appearance are equally scored by children and PG students, with a little difference scores was observed in house wives. From the above, it was noted that least scores was observed in fifth Figure and then in fourth Figure

Color

At 14th day, color changes in first two Figures were not occurred and in third Figure slightly brown color was developed. In fourth and fifth Figures, brown and black color develops due to repeated soaking and drying of raw amla segments in sugar syrup and honey for14 days.

In first Figure, the scores are high in house wives and with a little differences, scores are scored by the other age groups i.e., children and PG students. In second Figure, the scores are high in PG students and with a little difference, equal scores scored by children and house wives.

In third Figure also, the scores are high in children and with a little difference, equal scores scored by PG students and housewives in fourth Figure, the scores are equal and high in children and house wives, and with a little difference scored by PG students. In fifth Figure, all age groups scored equally and poor when comparing with all other age groups.

Taste

At 14th day, the first three Figures scores high and good in all quality attributes when comparing with fourth and fifth Figures. In fourth Figure also slightly bitterness developed and in fifth Figure bitter taste developed and these two Figures got poor in quality attributes.

In first Figure, the scores are higher in house wives, and then followed by children and PG students. In second Figure, the scores are higher in PG students and with a little difference scored by housewives. In third Figure, the scores are higher in children, with a little difference equally scored by PG students and house wives. In fourth Figure, scores are higher in house wives then with a little difference followed by PG students and children.

In fifth Figure, the sores are higher in house wives, with a little difference equally scored by PG students and children and from the fourth and fifth Figure scores, it was concluded that these Figures got poor in all quality attributes.

Uniformity/Texture

The first three Figures are even in all powdered granules and it was not formed any big granules, it is observed only in fourth and fifth Figures due to stickiness, which develops due to steeping of raw amla segments in sugar syrup and honey for 14th days.

In the first Figure, the scores of uniformity are high scored by house wives, and then with a little scored by children and PG students. In second Figure, the scores are high in PG students and with a little difference scored by children and house wives. In third Figure, the scores are high in children, with a little difference and equally scored by PG students and House wives.

In fourth Figure, the scores are high in house wives, with a little difference scored by PG students and children. In fifth Figure, the scores are high in house wives, with a little difference and equally scored by children and PG students.

Flavor

The three Figures are acidic in flavor and fourth and fifth Figures possess both sweet and light bitterness flavor. In first Figure, the scores are high in children and with a little difference, equally scored by PG students and house wives. In second Figure, the scores are high and equally scored by PG students and house wives then with a little difference scored by children.

In third Figure also, the scores are high and equally scored by PG students and hose wives, with a little difference scored by children. In fourth and fifth Figures, the scores are high and equally scored by house wives.

Overall Acceptability

Over all acceptability was high and good in first three Figures and poor in fourth and fifth Figures due to large granules and bitter taste. In first Figure, the scores are high in house wives, and with a little difference, scored by children, with a slightly greater difference scored by PG students. In second Figure, the scores are high in house wives, with a little difference scored by children and PG students.

In third Figure, the scores are high in children, with a slightly greater difference was scored by PG students and house wives. In fourth Figure, the scores are high in house wives, with a little difference differences was scored by PG students and children.

In fifth Figure, the scores are high in house wives, with a little difference was scored by children and PG students and this Figure got poor in all quality attributes.

From the above scores of all amla Figures at 1st day, 7th day, 14th day, it was concluded that 1st day Figures was scored high and good in all quality attributes.

Table 7: Shows the nutrients in amla Figures which processed at 1st, 7th, 14th days

S.No.	Figures	Ascorbic acid mg/100g			Titrable acidity (%)		
1	Amla pulp		310			0.384	
	Amla powders	1st	7th	14th	1st	7th	14th
2	1	620	600	590	1.09	1.06	1.03
3	2	430	420	410	0.54	0.50	0.48
4	3	480	170	160	1.0	0.19	0.14
5	4	440	50	40	0.92	0.48	0.24
6	5	530	80	60	0.48	0.25	0.32

**Note: Figure-I- Raw amla powder, Figure-II-Blanched amla powder, Figure-III-Amla powder Pre treated with salt, Figure-IV- Amla powder Pre treated with sugar syrup, Figure-V- Amla powder Pre treated with honey*

The ascorbic acid content in fresh amla fruit (pulp) (310mg/100g) is increased to 620mg/100g in raw amla powder and to 430mg/100g in blanched amla powder. The same Figures at 7th and 14th day shows a little difference in ascorbic acid i.e.,600mg/100g and 590mg/100g in raw amla powder and 420mg/100g and 410mg/100g in blanched amla powder respectively. Vijayanand *et al.*, investigated composition of gooseberry fruits and gooseberry powder from different cultivars and reported 'chakaiya' variety recorded the highest ascorbic acid content (357mg/100g) followed by Krishna (298mg/100g) and NA-7 (272mg/100g) and the gooseberry powder prepared from chakaiya had higher ascorbic acid content (982mg/100g) followed by Krishna (461mg/100g). In their study also, reported ascorbic acid content is increased in gooseberry powder when comparing with fresh amla fruits. Scartezzini stated the emblica fruit contains ascorbic acid (0.40%, w/w) and that the ayurvedic method of processing increases the healthy characteristics of the fruit to a higher content of ascorbic acid is (1.28% w/w). It has also been found that vitamin-C accounts for approximately 45-70% of the anti oxidant activity. Suresh kumar *et al.*, stated the emblica officinaliis free phenolics (EOFP) and bound phenolics (EOBP) anti oxidant activity as evaluated by both free radical scavenging and reducing power assays compared to that of curcuma longa free and bound phenolics.

The extent of extraction of free and bound phenolics i.e., L- ascorbic acid and D- ascorbic acid is the reason for the lower and higher values of amla fruits and in powders.

The nutrient values of pretreated amla powders at 7th day and 14th day showed greater losses when comparing with 1st day pretreated amla powders.

In 1st day Figures of amla poders, Figure-V i.e. Amla pretreated with honey recorded the highest ascorbic acid (530mg/100g) followed by Figure-III (Amla pre treated with salt-480mg/100g) and Figure-IV (Amla pretreated with honey 440mg/100g).

In 7th and 14th day, Figure-III recorded the highest ascorbic acid i.e., 170mg/100g and160mg/100g followed by Figure-V is 80mg/100g and60mg/100g then Figure-IV is 50mg/100g and 40mg/100g. The Figures IV and V at 7th and 14th day forms coarse material after blending in electric mixer. Improper releasing of free and bound phenolics from coarse material leads to lesser values of ascorbic acid and acidity. The acidity in fresh amla pulp is 0.384% and it is increased to 1.09% in raw amla powder and 0.54% in blanched amla powder. At 7th and 14th day the acidity also shows a little or negligible losses has observed i.e., 1.06 and 1.03% in raw amla powder and 0.50% and 0.48% in blanched amla powder. Vijayanand *et al.,* studied the acidity in chakaiya fruit is 2.7 and it is increased to 10.5 in chakaiya amla powder. The acidity in Figure-III and IV retains maximum acidity at1st day and in Figure-V, it showed a greater difference i.e., 0.48 when comparing with raw amla powder (1.09%). The acidity in Figures-III, IV and V has showed a greater loss when comparing with 1st day amla Figures and it may be due to repeated steeping and drying of amla segments in selected treatments and also due to the large granules instead of fine powder.

Premi *et al.,* stated a solution containing 10% Nacl and 0.04% KMS was most effective in controlling the development of whitte spots during storage with most retention of nutrients. In the present study, 20% brine solution was used as a pre treatment for amla fruits. From the above, it concludes that amla pretreated with salt was safe for consumption.

Neelima garg *et al.,* stated yeast growth was observed at all acidity levels where as growth of Eurotium repens, Saccharomyces bacilli occurred at 0.5% acidity but not at greater than (or) equal to 70° brix and 0.75% acidity. From this Amla powder pretreated with sugar syrup possesses 0.92%, for that it is also safe for consumption in terms of microbial analysis. Gordon (1990) reported that the anti oxidant action of reductones is based on the breaking of the free radical chain by donating a hydrogen atom. Phenolics present in honey (Gheldof *et al.,* 2002) may act in a similar fashion as reductones by donating the electrons and reacting with free radicals to convert them to more stable product and to terminate free radical chain reaction. In amla powder pretreated with honey, honey acts as a preservative and protective agent and this Figure also can be safe for consumption. From the above all, it concludes that 1st day amla powder Figures was scored high and good in quality attributes and retains maximum nutrients when comparing with 7th day and 14th day Figures.

Conclusion

Amla, proudly known as Indian Gooseberry have literally hundreds of uses and has been the key constituent of many Ayurvedic formulations. And now-a- days, it has been accepted by almost all medical branches as a result of extensive research carried out at Germany, England, India and various other counties. The fruit has both medicinal and pharmacological values. It has acrid, cooling, diuretic and laxative properties. Dried fruits are also useful in hemorrhage, diarrhea, dysentery, anemia, jaundice and cough. Amla is not only wonderful anti oxidant, but it has proven anti fungal, anti- bacterial, anti-viral, anti-mutagenic, yeast inhibiting, nematicidal, anabolic, anti-hepatoxic, anti-hyperhidrosis, anti-inflammatory, anti-histaminic, anti-spasmodic, hypolipidemic and hypotensive relieving properties. It also acts as an antacid and anti-tumorganic agent. In addition, it increases protein synthesis and thus useful in cases of hypoglycemia. Keeping the above points in view, an attempt has done to develop amla powders without and with pretreatments and assessed the acceptability of the powders by subjecting to sensory evaluation, further, the changes in vitamin-C and acidity of the amla powders was tested in three different time periods.

Raw amla power was made by subjecting amla segments to hot air oven drying at 70°C and blanched amla powder was prepared by boiling with acid for 5 min. and then subjected to drying. Pretreated amla

powders was prepared by steeping the three divisions of amla fruits in 20% brine solution, sugar syrup and honey over night and then subjected to drying. A small Figure from this, was subjected to complete drying, remaining amla segments subjected to partial drying and then steeped again in respective pretreatment solutions. Repeated soaking and drying was done for 14th days and small Figures were collected at 1st, 7th, and 14th day and dried. These Figures are subjected to sensory evaluation to test the acceptability of the powders. Vitamin-C and acidity changes are estimated in amla Figures which processed at three different time periods. Sensory analysis revealed that 1st day Figures was preferred mostly by panel members and scored high and good in all quality attributes. Nutrient analysis also revealed that 1st day Figures retains maximum nutrients than the other Figures processed at 7th day and 14th day. During a period of 14th day processing reveals, the nutrients in amla Figures decreases significantly. At 14th day vitamin-C in gooseberry powders decreases from 620 to 590mg/100g in raw amla powder and 430mg/100g to 410mg/100g in blanched amla powder;480mg/100g to 160mg/100g in amla pretreated with brine solution; 440to 40 mg/100g in amla pretreated with sugarsyrup;530 to 60mg/100gin amla pretreated with honey. At 14th day acidity also decreases from 1.09 to 1.03% in raw amla powder, 0.54 to 0.48% in blanched amla powder, 1.0 to 0.14% in pretreated amla powder with brine solution, 0.92 to 0.24% in pretreated amla Figure with sugar syrup, 0.48 to 0.32% in pretreated amla powder with honey. It was concluded that 1st day amla Figures are good in all quality attributes in the aspects of sensory and nutrient analysis. The developed amla powders can make into acceptable form by processing into different ways. The first two Figures i.e, raw amla powder and blanched amla powder can make into acceptable form by incorporating into different types of foods. E.g. Jams Jellies, Fruit bars etc.
Third Figure (Amla powder pretreated with brine solution scored high among five Figures and reported excellent by all panel members, but it is a bit salty, it can be decreased by steeping raw amla segments in 10% or 15% brine solution and this Figure can be consumed a little amounts daily can enhance the positive healthy benefits to the body. Fourth and Fifth Figures i.e., amla pretreated with sugar syrup and honey can also make into acceptable form by blending the Figures with correct amounts of ground nuts, grated coconut and jaggery then make into small balls, this Figure also accepted by all age groups. It can also make at house hold level. In this way processing of the amla fruits in several forms by following preservation techniques can enhance the shelf life of amla fruits, makes the availability of amla throughout the year, may increases interest and consumption among all age groups and can make into accepted products by incorporating in different products.

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