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## Effect of different treatments on sensory characteristics of groundnut milk

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### Abstract

Looking into the high cost and availability of milk protein for low income group of the population, research efforts are made to prepare low cost vegetable milk substitutes from groundnut. For regions where soybean is not cultivated but groundnut is widely grown and where the beany flavour of soybean is not liked by the population but the nutty flavor of groundnut is quite accepted, groundnut milk can be promoted. Groundnut has nutty flavour and prepared groundnut milk also had nutty flavour. To decrease nutty flavor in groundnut milk, four treatments i.e. soaking in 1% NaHCO<sub>3</sub>, roasting (at 120°C for 5 min), blanching (at 100°C for 2 min) and roasting + blanching were given to the groundnut kernels. Sensory evaluation was done using nine point hedonic scale. In the initial trial, highest score for sensory characteristics was recorded for blanching treatment and the lowest score for sodium bicarbonate treatment. In the second trial, blanching treatment amongst all the treatments, secured highest score for different sensory characteristics like taste, smell, mouthfeel and overall acceptability. Blanching treatment was found most suitable for preparation of groundnut milk.

**Keywords:** Groundnut milk, treatments, sensory characteristics

### Introduction

Looking into the high cost and availability of milk protein for low income group of the population, low cost vegetable milk substitutes were developed especially from soybean. Like soybean, groundnut can be processed into groundnut milk. It has been well known that groundnut milk and groundnut milk products have nutritional benefits because of their extreme richness in protein, minerals and essential fatty acids such as linoleic and oleic acids, which are considered to be highly valuable in human nutrition. It is utilized in developing countries by vegetarians and more recently by children allergic to cow milk (Kouane *et al.*, 2005) [1].

Various reasons for putting research efforts for developing groundnut milk based products include health and dietary concerns, scarcity of dairy milk and cost efficiency compared to dairy milk (Nimsate *et al.*, 2010) [2]. For regions where soybean is not cultivated but groundnut is widely grown and where the beany flavour of soybean is not liked by the population but the nutty flavor of groundnut is quite accepted, groundnut milk can be promoted.

Groundnut has been reported to contain bioactive phytochemicals, particularly isoflavones (genistein, daidzein, and biochanin A) and trans-resveratrol. The availability of genistein and trans-resveratrol has been reported as significantly higher in the processed groundnut, hence, groundnut milk and milk products are healthful as that of soybean milk. The added advantages of groundnut milk and milk products are of not having strong beany flavour and indigestible oligosaccharides as that of soybean milk. (Asibuo *et al.*, 2008, Atasiye *et al.*, 2009, Jennette 2003, Jambunathan, 1991) [3-6].

Acetaldehydes, acetone and n-hexanal are the major carbonyl compounds found in soybean. N-hexanal has a low flavor threshold and is believed to contribute to the beany flavour. It is believed to be a product of oxidation of polyunsaturated fatty acids by oxygenase (Wolf and Cowan, 1971) [7]. Many of the flavours found in soybean products, particularly soymilk may be generated enzymatically by lipoxygenase, resulting during the initial grinding step (Welkins *et al.* 1967) [8]. Similarly, hexanal is one of the compounds responsible for unwanted nutty flavour in groundnut milk (Hao and Brackett, 1988; Lee and Beuchat, 1991) [9, 10]. To check the effect of different treatments on sensory characteristics of groundnut milk and to make the groundnut milk more acceptable, the present study was carried out.

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## Materials and Methods

The groundnut kernels were procured from the Agricultural Research Station, Talod of Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. GG2 variety was used for the experiment. To decrease nutty flavor in groundnut milk, four treatments i.e. soaking in 1% NaHCO<sub>3</sub>, roasting (at 120 °C for 5 min), blanching (at 100 °C for 2 min) and roasting + blanching were given to the groundnut kernels. For preparation of groundnut milk the groundnut kernels were cleaned manually, washed and soaked in water in kernel (g): water (ml) ratio of 1:3 at room temperature for 13 hours and 1:6 ratio was used for preparation of groundnut milk. The milk so obtained were analyzed for sensory evaluation using nine point hedonic scale by semi trained panel of judges.

## Results and Discussion

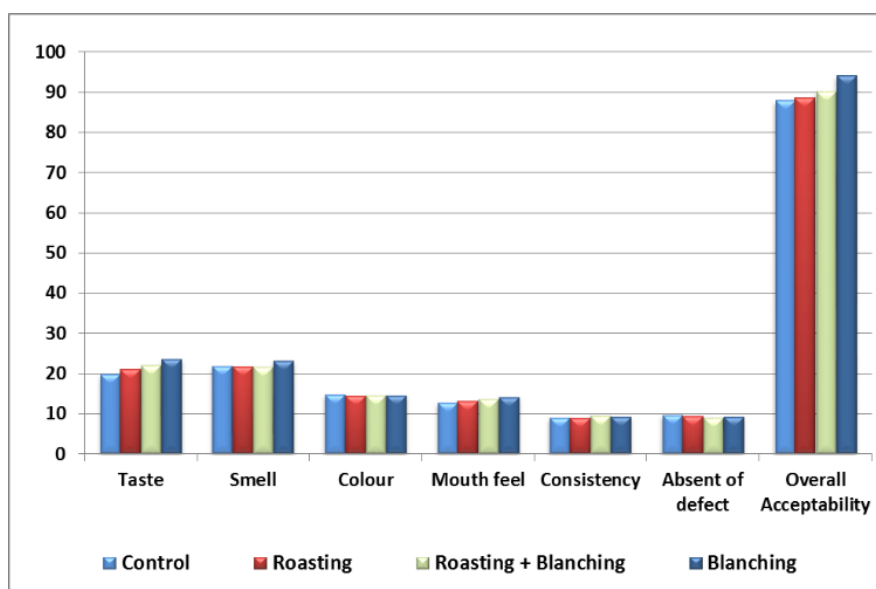
During the process of development and standardization of groundnut milk consisted of different trials by applying different treatments to groundnut kernels and milk to prepare affordable and acceptable groundnut milk. The purpose of applying different treatments to groundnut milk was to minimize the nutty flavour of groundnut from the groundnut milk. Groundnut has a very typical flavor profile. Groundnut is valued for such flavor for those who are used to take it regularly. The efforts were made to reduce / remove the nutty flavor of the prepared milk.

Various researchers have experimented for standardization of groundnut milk by applying different methods. In the present study, groundnut milk was processed using four methods i.e. (i) roasting, (ii) soaking in sodium bicarbonate, (iii) roasting + blanching and (iv) blanching. The sensory evaluation of prepared milk was carried out by composite scoring test and is depicted in table 1.

In the initial trial, the panelists were asked to evaluate the samples on the basis of their preference and setting aside the nutty flavor of the samples. No significant variation in different sensory characteristics among different treatments was observed. The highest score for taste was recorded 20.25 for blanching, followed by the control and roasting. Similarly, the highest score for smell, colour, mouth feel, consistency and absence of defect was recorded for blanching treatment followed by control. The lowest score for all the sensory characteristics, specially, taste, smell and consistency was recorded for the milk treated with sodium bicarbonate. It is interesting to note that that the panelists found control groundnut milk acceptable, though the nutty flavor in the sample was higher than the rest. The reason may be due to the fact that the consumers are familiar to the taste and the flavor of the groundnut in Gujarat and even the nutty flavor are also found to be acceptable. Rubico *et al.*, (1987)<sup>[11]</sup> and Lee and Beuchat, (1992)<sup>[12]</sup> have also mentioned similar trend in the preferences of the consumers of the developing countries.

**Table 1:** Sensory scores of groundnut milk prepared with different treatments (trial-1)

| Sr. No | Treatments              | Taste      | Smell      | Colour     | Mouth feel | Consistency | Absent of defect | Overall Acceptability |
|--------|-------------------------|------------|------------|------------|------------|-------------|------------------|-----------------------|
| 1      | Control                 | 19.50±2.17 | 19.55±3.13 | 13.75±8.86 | 7.75±1.62  | 12.60±2.71  | 8.60±1.07        | 81.85±9.20            |
| 2      | Roasting (4 min)        | 18.30±3.31 | 17.35±3.68 | 13.55±1.50 | 7.50±1.84  | 12.50±2.19  | 8.75±0.71        | 78.95±8.85            |
| 3      | NaHCO <sub>3</sub> (1%) | 17.45±4.05 | 17.05±5.08 | 13.45±1.11 | 7.10±2.28  | 11.85±2.51  | 8.50±0.85        | 75.4±13.59            |
| 4      | Blanching (2 min)       | 20.25±2.79 | 20.45±2.40 | 13.60±1.17 | 7.70±2.05  | 12.40±2.55  | 8.75±0.71        | 83.15 ±8.81           |



**Fig 1:** Sensory scores of groundnut milk prepared with different treatments (trial-1)

Traditionally, many researcher prepared soymilk with sodium bicarbonate treatment to reduce beany flavor of soybean. Traditionally, oriental consumers have used mild alkali such as sodium bicarbonate (NaHCO<sub>3</sub>) to improve the flavour and mouth feel of common dry beans and same can be sued for preparation of groundnut milk (Bourne *et al.*, 1976)<sup>[13]</sup>. Hinds *et al.* (1997)<sup>[14]</sup> noted that the need for improved sensory attributes (*viz.* flavour and mouthfeel) of oilseed beverages

led them to formulate a beverage using finely ground, partially defatted roasted groundnuts (proteins may have been denatured during roasting) as the main ingredient.

Sunny-Roberts (2004)<sup>[15]</sup>, Isanga and Zhang (2009)<sup>[16]</sup> and Bensmira and Jiang (2011)<sup>[17]</sup> also prepared groundnut milk with sodium bicarbonate treatment to reduce the nutty flavor. In the present study bicarbonate treatment, as was adopted by the Sunny-Roberts (2004)<sup>[15]</sup>, was experimented, but the

panelists, during sensory evaluation found the milk a bit thinner in consistency. This finding is in agreement with Akintunde and Souley (2009) [18], who recorded significantly lower score for texture and appearance in bicarbonate treatment as compared to soaking + blanching treatment in soymilk.

Soaking + blanching and sodium bicarbonate treatments while preparing soymilk was experimented by Akintunde and Souley (2009) [18]. They, in their experiment, observed significant reduction in fat and carbohydrate contents and slight reduction in ash and protein content of milk treated with sodium bicarbonate as compared to soaking + blanching technique. In bicarbonate treatment, slight but non-significant decrease in mouth feel score was noticed on the bases of these findings, they recommended that the different methods of

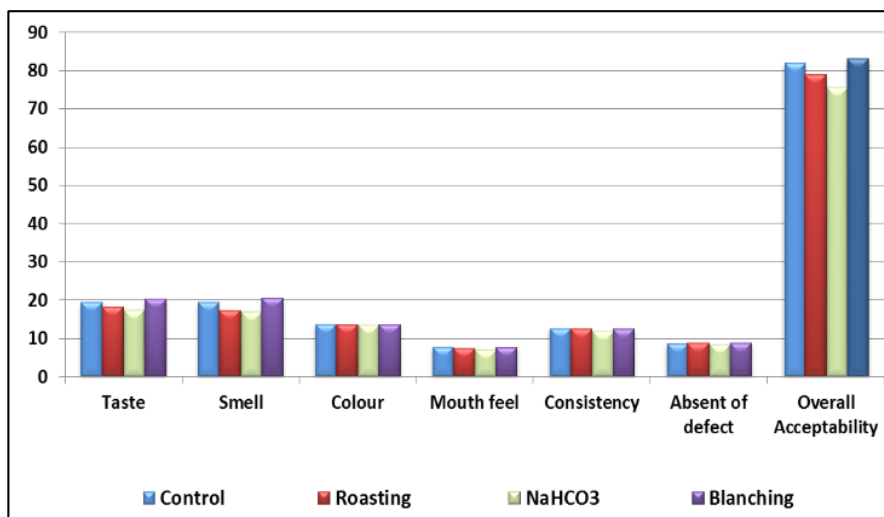
production have different nutritional compositions and therefore the methods chosen should be determined by the important nutritional component that is needed. Further they mentioned that sodium bicarbonate reacts with protein and forms a complex, which reduces the protein availability and thus decreases the protein content of produced soymilk. Same mechanism may also occur in groundnut milk, if treated with sodium bicarbonate.

From the above discussion, it is found that bicarbonate treatment showed inferior scoring as compared to roasting and blanching treatments in sensory score and it is likely to affect nutritional characteristics and hence, for further standardization process in the present study, sodium bicarbonate treatment was not repeated.

**Table 2:** Sensory score of groundnut milk prepared with different treatments (trial-2)

| Sr. No | Treatments           | Taste                    | Smell      | Colour     | Mouth feel | Consistency | Absent of defect | Overall Acceptability |
|--------|----------------------|--------------------------|------------|------------|------------|-------------|------------------|-----------------------|
| 1      | Control              | 19.80±2.82 <sup>b</sup>  | 21.85±1.81 | 14.75±0.43 | 12.80±1.81 | 9.10±0.74   | 9.60±0.84        | 87.9±4.33             |
| 2      | Roasting (2 min)     | 21.10±3.50 <sup>b</sup>  | 21.70±3.03 | 14.50±0.98 | 13.05±2.06 | 9.00±1.05   | 9.30±1.49        | 88.65±8.06            |
| 3      | Roasting + Blanching | 22.00±1.75 <sup>ab</sup> | 21.55±1.71 | 14.55±0.96 | 13.55±1.21 | 9.50±0.76   | 8.90±1.29        | 90.05±4.53            |
| 4      | Blanching (2 min)    | 23.60±1.41 <sup>a</sup>  | 23.20±1.34 | 14.60±0.81 | 14.10±1.02 | 9.30±0.79   | 9.30±1.06        | 94.1±3.37             |

\*Mean ± S.D having different superscript letter in columns differ significantly using Duncan's New Multiple Range Test



**Fig 2:** Sensory score of groundnut milk prepared with different treatments (trial-2)

In a second experimental trial roasting, roasting + blanching and blanching treatments were compared. Significant variation ( $p < 0.05$ ) was observed for the taste of different treatments. The highest score was observed in blanching (23.60) followed by roasting + blanching (22.0). The remaining characteristics have no significant differences recorded, yet the blanching scored the highest ranking amongst all the characteristics (Table 2).

Jain *et al.*, (2011) [19], who employed three treatments i.e. traditional, 1% NaHCO<sub>3</sub> soaking and pressure blanching (at 121 °C, 15 psi for 2, 3 and 5 min) for the preparation of groundnut milk. She concluded that pressure blanching (at 121 °C for 3 min) was found most acceptable method for the preparation of groundnut milk beverage although it had the negative effect on the protein and total solid extraction. Results of the present study are in agreement of these findings.

According to Hinds *et al.*, (1997) [14], the previous studies in which a beverage was prepared from roasted defatted groundnuts indicated that the proteins may have been denatured during roasting. These changes could affect

suspension stability, viscosity and colour of the beverage, which may in turn affect mouthfeel and appearance.

Due to blanching treatment, higher value for fat, protein and other nutrients was observed in the milk (Akintunde and Souley, 2009) [18]. The higher protein content was probably due to the fact that blanching increase the breakdown of the secondary bonds holding down the molecules of the amino acid thus making the protein more soluble in the filtrate and hence increasing availability of the amino acids in the groundnut milk.

The blanching treatment, thus weighs so far as increasing the protein content as well as availability of the protein in the milk produced. Looking to this Blanching treatment was found most suitable for preparation of groundnut milk.

## Conclusion

Groundnut milk can be prepared from groundnut by soaking and grinding kernels into kernel: water ratio 1:6. For regions where soybean is not cultivated but groundnut is widely grown and where the beany flavour of soybean is not liked by the population but the nutty flavor of groundnut is quite

accepted, groundnut milk can be promoted. To decrease nutty flavor in groundnut milk, treatments i.e. soaking in  $\text{NaHCO}_3$ , roasting, blanching and roasting + blanching can be given to the groundnut kernels. In the initial trial, highest score for sensory characteristics was recorded for blanching treatment and the lowest score for sodium bicarbonate treatment. In the second trial, blanching treatment amongst all the treatments, secured highest score for different sensory characteristics like taste, smell, mouthfeel and overall acceptability. Blanching treatment was found most suitable for preparation of groundnut milk.

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