

## STUDIES ON CHEMICAL CHANGES IN *BURFI* ENRICHED WITH DIFFERENT HERBS

Comment [B1]: If important is used instead of different

### ABSTRACT

The investigation was carried out to study the chemical changes taking place in burfi by the addition of several herbs and their comparison with the control product. Different herbs, viz., *Withaniasomnifera* (*Ashwgandha*), *Asparagus racemosus* (*Shatavari*), and *Ocimum sanctum* (*Tulsi*), were incorporated into the blend in the ratio of 5:4:1, respectively, to develop herbal burfi. The combination of herbs was added at levels of 1.00, 1.25, 1.50, and 2.00% by weight of *khoa* to obtain products designated T1, T2, T3, and T4, respectively. The control product (TC) was prepared in a similar manner but was devoid of herbs. Proximate analysis, including moisture, total solids, fat, lactose, protein, and ash, was conducted. The results show that moisture content decreased significantly ( $P \leq 0.05$ ) with increasing herb addition, while total solids increased. Protein content increased with higher herb percentages, likely due to the protein content of the added herbs. Fat and lactose content remained unchanged with herb addition, as herbs do not contribute significantly to these components. Ash content increased with higher herb addition rates, though not significantly ( $P \geq 0.05$ ). Overall, the addition of herbs influenced the chemical composition of burfi, impacting moisture, total solids, protein, and ash content with varying degrees of significance.

Comment [B2]: Use proper spacing

**Key Words:** *Burfi*, Chemical changes, Herbs, *Tulsi*, *Ashwgandha*, *Shatavari*

### INTRODUCTION

*Burfi* has been favored as one of the most popular *khoa*-based sweets all over India. The unique adaptability of *khoa* in terms of its flavor, body, and texture to blend with a wide range of foods permitted the development of an impressive array of *Burfi* varieties (Hoshinget *al.*, 2023). The *khoaburfi* prepared with fruits, nuts, chocolate, coconut, saffron, rawa, and santra-added burfi is popular. These food adjustments make products artfully used singly or in innovative combinations to delight a gourmet (Rahateet *al.*, 2021). Variation in ingredients, their proportion, and processing conditions affect the quality of burfi, and a lack

of knowledge in these aspects is a serious limitation for process standardization and quality control of *burfi* (Chetana *et al.*, 2010).

The term “herb” is referred to as a subset of spice or leafy spice that belongs to plant sources with aromatic leaves valued for medicinal and aromatic characteristics (Darriet, 2007). Herbs are recognized as a rich source of powerful antioxidants along with high bioactivity (Embuscado, 2015). Nowadays, many people are suffering from various diseases. As a result, herbal products in the form of food are gaining popularity in the world market. Epidemiological data as well as in vitro studies strongly suggest that foods containing phytochemicals with anti-oxidation potential have strong protective effects against certain major disease risks, including cancer and cardiovascular diseases (Sofowora *et al.*, 2013).

Comment [B3]: Not italics. Use one format

Historically, *Ashwagandha* plant has been used as an aphrodisiac, sedative, liver tonic, diuretic, hypocholesterolemic, anxiolytic, antidepressive, and anti-inflammatory agent. *Ashwagandha* is chemically rich with its varied content of active compounds, such as steroidal lactones (withanolides), siterosides, and many useful steroidal alkaloids, and has been used for centuries to treat a wide range of diseases. (Singh *et al.*, 2011). Shatavari (*Asparagus racemosus*) is a well-known ayurvedic drug. The root of Shatavari is also used in the treatment of nervous disorders, dyspepsia, diarrhea, dysentery, tumors, hyperpiesia (hyperplasia), neuropathy, and hepatopathy. This plant is reported to have immunostimulant, antihepatotoxic, and antioxytotic activities (Goyal *et al.*, 2003). Tulsi (*Ocimum sanctum*), a small herb seen throughout India, has been recommended for the treatment of bronchitis and bronchial asthma. Eugenol is the active constituent present in tulsi leaves (Cohen, 2014).

Milk sweets are an integral part of the Indian subcontinent's socio-cultural life. These are consumed on special religious occasions, social events, and at the end of our daily meals. Among various dairy products, *burfi* is the most popular *khoa* based sweet all over India. *Khoa* is responsible for the desired texture of *burfi* (Kumar *et al.*, 2016). There are many varieties of *burfi*, depending on the ingredients mixed with it, viz., *besanburfi* (made with gram flour), *kaju barfi* (made with cashew nuts), *pistaburfi* (made with pistachio), etc., and fruits or spices added to it, viz., mango *burfi*, coconut *burfi*, and cardamom *burfi*, etc. (Pal *et al.*, 2018).

Comment [B4]: Use tab

Comment [B5]: improve

Traditional milk sweets have a distinct advantage in that they are value added products and have great mass demand. Keeping in view the changed scenario of the Indian dairy industry in respect of increased availability of milk, globalization, the entry of the private sector into the trade, and more demand for value added products, the heat-desiccated traditional milk sweets have great scope for export to overseas markets with a large Indian

diaspora. Keeping in view the importance of traditional dairy products and the health benefits of herbs, the present study was aimed at studying the chemical changes in *burfi* incorporated with different herbs, viz., *Ashwagandha*, *Shatavari*, and *Tulsi*.

## MATERIAL AND METHODS

The present investigation was carried out at College of Dairy Technology, Warud (Pusad). Buffalo milk was procured from the Government Chilling Center, MIDC, Pusad. *Ashwagandha* and *Shatavari* root powders were obtained from Narayana Ayurvedic Pharmacy, Ahemdabad, India, while *Tulsi* powder was prepared from *Tulsi* leaf as per method suggested by Satyanarayan and Sen (2009).

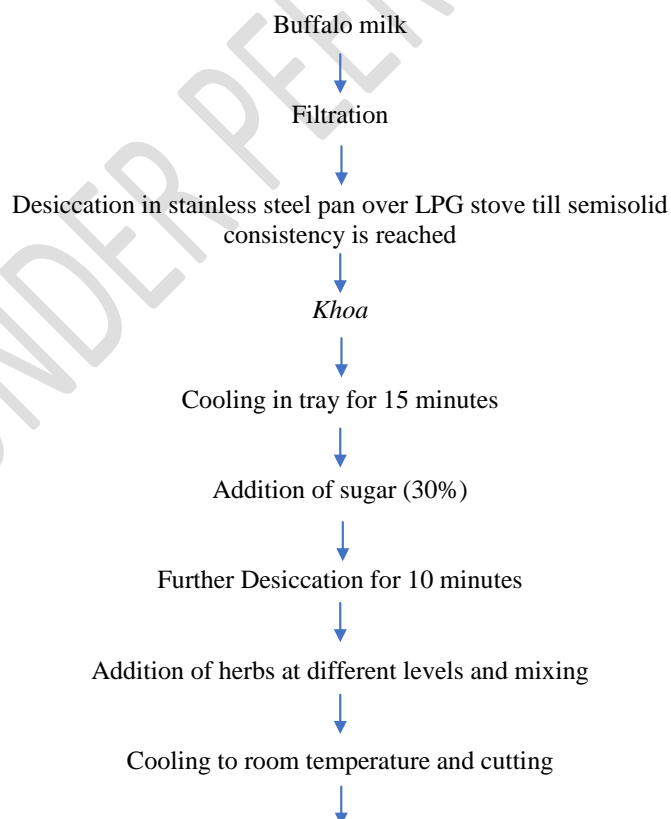
Sugar and laminated paper board boxes for commercial burfi packaging were procured from the local market.

Comment [B6]: tab

### Preparation of *Burfi*

The *burfi* with herb was prepared according to method of Prasad *et al.* (2017) with slight modification which is shown in Figure 1. Control *burfi*.e.TC was also prepared using sugar procured from local market.

Comment [B7]: abbreviation



Packaging in laminated paperboard packaging

↓  
Storage (6 – 7°C)

Figure 1. Flow cart for preparation of Burfi

### Optimizing the level of *Herb* addition in *Burfi*

Herbs were added in a blend of Ashwagandha, Shatavari, and Tulsi in a ratio of 5:4:1. Herb levels (as a percentage of *khoa*) designated as Tc (Control, T1, T2, T3, and T4) were optimized based on sensory evaluation by a panel of 8 judges using a 9-point hedonic scale. Sensory attributes evaluated: color, appearance, body and texture, flavor, overall acceptability.

### Statistical Analysis

In all experiments, a one-way analysis of variance (ANOVA) with a subsequent least significant difference (LSD) test was applied for multiple sample comparison. This was done to test for any significant differences ( $P < 0.05$ ) in the mean values of all the groups, as described by Snedecor and Cochran (1989). Three replications of each experiment were analyzed for statistical analysis.

Comment [B8]: fresh reference

## RESULTS AND DISCUSSION

### Chemical changes in *burfi* with herb addition

In this section, changes in major constituents of *burfi* due to the addition of herbs were studied in comparison with the control. The effect of herb addition on proximate analysis, viz., moisture, total solids, fat, lactose, protein, and ash, is reported in Table 1. Herbs such as the root powder of *Withaniasomnifera* and *Asparagus racemosus* and the leaf powder of *Ocimum sanctum* were used for addition in *burfi*. Herbs were added to *burfi* at rates of 1, 1.25, 1.5, and 2 percent on a *khoa* basis.

### Protein

It was observed that the protein content (Table 1) in *burfi* changes significantly with the addition of herbs. The protein content was high in sample T<sub>4</sub> (12.53) and low in sample T<sub>1</sub> (12.23), whereas in control it was 12.00%. In *burfi*, protein content increased with an increase in herb percentage. *Withaniasomnifera* root powder content was 5.8 percent protein, and *Osmium sanctum* leaf content was 21.78 percent protein, which might have contributed

Treatment	Moisture	Total solids	Protein	Fat	lactose	Ash
-----------	----------	--------------	---------	-----	---------	-----

to the increased protein content of herbal *burfi*. The present results agreed with Goyal and Shamsher (2015).

### Fat

It was observed that, from Table 1, the fat content in herbal *burfi* did not change significantly with the addition of herbs. The fat content was high in sample T<sub>4</sub> (22.45) and low in sample T<sub>3</sub> (21.68), while in control it was 22.32 percent. Fat content remains unaltered due to no contribution of herbs toward fat content. The results are similar to those of Prasad *et al.* (2017).

Comment [B9]: space?

### Lactose

It was observed that, from Table 1, the lactose content in herbal *burfi* did not change significantly with the addition of herbs. The lactose content was found to be high in sample T<sub>4</sub> (16.87) and low in sample T<sub>2</sub> (16.58), while in control it was found to be 16.59 percent. This finding was in accordance with Rasaneet *al.* (2012), who reported 15.10 percent lactose in *burfi*. Lactose is a milk sugar not found in herbs; hence, no difference was observed in lactose content with the addition of herbs. The BIS specification for lactose content in *burfi* is a minimum of 15 percent.

Comment [B10]: Space issue.

### Ash

Table 1 indicates that the ash content was high in sample T<sub>4</sub> (2.83) and low in sample T<sub>1</sub> (2.65), while in control it was found at 2.62 percent. Ash content in *burfi* increased as the rate of herb addition increased. However, this difference was statistically non-significant.

### Total solids

It was observed that total solids in *burfi* increased significantly (level of significance 0.05) as the rate of herb addition increased from Table 1. Low total solids were found in T<sub>1</sub> (88.17) and high in T<sub>4</sub> (89.00), while in control it was 87.70 percent. Total solids content increased with an increased herb percentage in *burfi*. The addition of herbs in powder form might have contributed to higher total solids in *burfi* composition. The similar results agreed with Goyal and Shamsher (2015).

**Table 1** Chemical changes in *burfi* with herb addition

<b>Control</b>	12.29±0.16 <sup>a</sup>	87.70±0.16 <sup>c</sup>	12.00±0.03 <sup>c</sup>	22.32±0.18 <sup>a</sup>	16.59±0.20 <sup>a</sup>	2.62±0.09 <sup>a</sup>
<b>T<sub>1</sub></b>	11.82±0.14 <sup>ab</sup>	88.17±0.14 <sup>bc</sup>	12.23±0.11 <sup>bc</sup>	21.85±0.21 <sup>a</sup>	16.81±0.19 <sup>a</sup>	2.65±0.02 <sup>a</sup>
<b>T<sub>2</sub></b>	11.48±0.30 <sup>bc</sup>	88.52±0.30 <sup>ab</sup>	12.32±0.15 <sup>a<sup>b</sup></sup>	22.23±0.89 <sup>a</sup>	16.58±0.29 <sup>a</sup>	2.74±0.05 <sup>a</sup>
<b>T<sub>3</sub></b>	11.62±0.21 <sup>bc</sup>	88.37±0.21 <sup>b</sup>	12.27±0.24 <sup>a<sup>b</sup></sup>	21.68±0.37 <sup>a</sup>	16.58±0.11 <sup>a</sup>	2.80±0.02 <sup>a</sup>
<b>T<sub>4</sub></b>	10.99±0.56 <sup>c</sup>	89.00±0.56 <sup>a</sup>	12.53±0.99 <sup>a</sup>	22.45±0.38 <sup>a</sup>	16.87±0.03 <sup>a</sup>	2.83±0.01 <sup>a</sup>
<b>Level of significance</b>	*	**	*	NS	NS	NS

Data are represented as mean ± standard deviation means with different superscripts in a column differ in significantly at 5%\*; n=3

Comment [B11]: what is indicates?

Comment [B12]: NS is what?

### Conclusion

**Herbal** and its extracts in all their forms represent the greatest potential for food formulators in today's quest for ever more innovative, functional food products. There are many companies already capitalizing on the growing consumer acceptance of foods and beverages containing herbal extracts, although the use of these extracts in milk and milk products is scarce. Therefore, the present investigation has been carried out to study the suitability of herbs in burfi. The effects of the addition of herbs on chemical changes in the proximate composition of *burfi* have been studied.

Comment [B13]: tab

**Protein** content in herbal burfi changed significantly ( $P > 5\%$ ) with the addition of the herb in the burfi. The highest protein content was 12.53 percent and the lowest was 12.23 percent, while in the control sample it was 12.00 percent. Herbs were added in powder form, which caused an increase in total solid content and reduced moisture content in herbal burfi. Herbs like *Withaniasomnifera*, *Ocimumsanctum* contain a high amount of protein, which might have resulted in increased protein content. The addition of herbs to burfi could not affect the acidity of herbal burfi significantly. Total solids in herbal burfi increased significantly ( $P \leq 5\%$ ) as the rate of herb addition increased.

Comment [B14]: tab

### References

- Hoshing, S. P., Shegokar, S. R., Shelke, R. R., Kahandal, S. S., Chavan, S. D., & Kahate, P. A. (2023). Studies on sensory qualities of Burfi prepared from cow milk *Khoa* and beetroot (*Beta vulgaris*) pulp.
- Rahate, S. M., Patil, B. D., Jaybhay, V. B., & Chaugule, C. C. (2021). Sensory quality of *khoa* Burfi blended with guava (*Psidiumguajava* L.) pulp.

Comment [B15]: italics

- Chetana, R., R. Ravi and S. Yella Reddy (2010) Effect of processing variable on quality of milk burfi prepared with without sugar. *Journal of Food Science and Technology*. 47(1): 114-118.
- Darriet, A. (2007). Herbs, spices, and essential oils. *Handbook of Food Products Manufacturing*; Hui, YH, Ed.; John Wiley & Sons: Hoboken, NJ, USA, 205-220.
- Embuscado, M. E. (2015). Herbs and spices as antioxidants for food preservation. In *Handbook of antioxidants for food preservation* (pp. 251-283). Woodhead Publishing.
- Sofowora, A., Ogunbodede, E., & Onayade, A. (2013). The role and place of medicinal plants in the strategies for disease prevention. *African journal of traditional, complementary and alternative medicines*, 10(5), 210-229.
- Goyal, R. K., J. Singh and Lal, H. (2003) *Asparagus racemosus* an update. *Indian Journal of Medical Research*: 57, 408-14.
- Singh, N., Bhalla, M., de Jager, P., & Gilca, M. (2011). An overview on ashwagandha: a Rasayana (rejuvenator) of Ayurveda. *African journal of traditional, complementary and alternative medicines*, 8(5S).
- Cohen, M. M. (2014). Tulsi-Ocimum sanctum: A herb for all reasons. *Journal of Ayurveda and integrative medicine*, 5(4), 251.
- Kumar, A., Verma, P., Kishor, K., Tiwari, S., Morya, S., Srivastava, N., & ROUT, S. (2016). Studies on Quality Parameters of Burfi Prepared by Blending Pineapple Pulp.
- Pal, M. K., Jacob, T., Pal, V., & Wasnik, P. (2018). Development and quality evaluation of burfi prepared by using bottle gourd (*Lagenariasicereria*) and carrot (*Daucuscarota* L sub sp. Sativus).
- Satyanarayana, C. V. and D.C. Sen (2009) Potential application of holy Basil (Tulsi) in dairy products. *Indian Dairyman*. 61(1): 49-52.
- Snedecor, G.W. and Cochran, W.G. (1989) *Statistical Methods*. 8th Edition, Iowa State University Press, Ames.
- Prasad Rasane, P. R., Arvind, A., & Alok Jha, A. J. (2012). Sensory and texture profile analysis of burfi samples manufactured in Varanasi.
- Goyal, S.K. and Samsher (2015). Studies on quality attributes of herbal burfi. *South Asian Journal of Food Technology Environment*, 1(1): 46-51 (2015).
- Prasad, W., Khamrui, K., Mandal, S., & Badola, R. (2017). Anti-oxidative, physico-chemical and sensory attributes of burfi affected by incorporation of different herbs and its comparison with synthetic anti-oxidant (BHA). *Journal of food science and technology*, 54, 3802-3809.