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Exploring the impact of herb varieties on the sensory profile of *Burfi*

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Abstract
In this research study, we aimed to incorporate different herbs, namely *Withania somnifera* (Ashwagandha), *Asparagus racemosus* (Shatavari), and *Ocimum sanctum* (Tulsi), into a blend for the development of herb *burfi*. The herbs were combined in a ratio of 5:4:1, respectively, and added at varying levels (1.00%, 1.25%, 1.50%, and 2.00% by weight of *khoa*) to create four different product formulations designated as T1, T2, T3, and T4. Additionally, a control product (TC) was prepared following a similar procedure, but without the inclusion of any herbs. The objective was to create a value-added *burfi* enriched with natural antioxidants and functional properties. The sensory evaluation results indicated that the *burfi* formulation containing herbs at a level of 1.25% exhibited superior acceptability in terms of sensory attributes. This formulation showcased enhanced sensory characteristics attributed to the inclusion of herbs. However, it is noteworthy that the color and appearance, as well as the overall acceptability of the herb-infused *burfi*, were lower (p<0.05) compared to the corresponding control sample. These differences in sensory scores might be attributed to the presence of herbs, which could have imparted distinct flavors, colors, or textures to the *burfi*. Based on the findings, it is recommended to prepare value-added *burfi* by incorporating herbs at a level of 1.25%. This formulation demonstrated the best sensory acceptability and was enriched with natural antioxidants and functional compounds derived from the herbs. Although there was a slight compromise in terms of color, appearance, and overall acceptability compared to the control sample, the potential health benefits associated with the inclusion of herbs make it a desirable choice.

Keywords: Burfi, sensory characteristics, herbs, Tulsi, Ashwgandha, Shatavari

Introduction
Milk sweets hold a significant place in the socio-cultural fabric of the Indian sub-continent. These delectable treats are cherished during special religious festivities, social gatherings, and as a delightful conclusion to our daily meals. Among the various dairy products, *Burfi* stands out as the most popular *khoa*-based sweet across India. The texture of *Burfi* is largely attributed to the presence of *khoa*, a concentrated milk product (Dharmadhikari, 2002) [2]. *Burfi* comes in a multitude of varieties, distinguished by the ingredients blended into it. For instance, besan *burfi* is crafted using gram flour, while kaju *burfi* boasts the richness of cashew nuts. Other variations incorporate flavoursome elements such as pistachios (pista *burfi*), fruits like mango (mango *burfi*), coconut (coconut *burfi*), or aromatic spices like cardamom (cardamom *burfi*) (Navale *et al*., 2014) [8].

These diverse versions of *Burfi* showcase the versatility and creativity of Indian sweets, offering a wide range of Flavors and textures to cater to different palates. The combination of traditional ingredients and innovative additions adds to the allure of *Burfi*, making it an irresistible treat enjoyed by people of all ages. The popularity and rich heritage of milk sweets, particularly *Burfi*, continue to thrive in the Indian sub-continent, serving as a symbol of celebration and culinary tradition. The ever-expanding array of *Burfi* varieties reflects the culinary ingenuity and cultural vibrancy of the region, ensuring that these delightful sweets remain an integral part of our lives for generations to come.

The term “herb” is referred to as a subset of spice or leafy spice which belongs to plant sources with aromatic leaves valued for medicinal and aromatic characteristics (Zheng and Wang, 2001) [12]. Herbs are recognised as rich source of powerful antioxidants along with high bioactivity (Sackewitz 1956) [13]. Nowadays, many peoples are now suffering from various diseases. So, herbal products in the form of foods 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 effect have strong protective effects against certain major disease risks including cancer and cardiovascular diseases (Kaur and Kapoor, 2002) [5].

Historically, *Ashwagandha* plant has been used as an aphrodisiac, sedative, liver tonic, diuretic, hypocholesterolemic, anxiolytic, antidepressant, and anti-inflammatory agent *Ashwagandha* is chemically rich with its varied content of active compounds, such as steroidal lactones (withanolides), sitoindosides and many useful steroidal alkaloids, and used for centuries to treat a wide range of diseases. (Mishra *et al*., 2000) [14]. Shatavari (*Asparagus racemosus*) it well known ayurvedic drug. The root of Shatavari is also used in the treatment of nervous disorders, dyspepsia, diarrhoea, dysentery, tumours, hyperpiesia (hyperplasia), neuropathy and hepatopathy. This plant is reported to have immunostimulant, antihepatotoxic and antioxytocic activities (Goyal *et al*., 2003) [3]. Tulsi (*Ocimum sanctum*) a small herb seen throughout India, have been recommended for the treatment of bronchitis, bronchial asthma. Eugenol is the active constituent present in tulsi leaves (Sachdeva and Rajorhia, 1982) [9].

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 Indian dairy industry in respect of increased availability of milk, globalization and entry of private sector in the trade and more demand for value added products, the heat desiccated traditional milk sweets have great scope for export to overseas markets with lots of Indian Diaspora. Keeping in view of the importance of traditional dairy products and health benefits of herbs; the present study was aimed to evaluate the quality parameters of *burfi* prepared by blending with different herbs *viz*., *Ashwagandha*, *Shatavari* and *Tulsi*. Further research and development efforts could focus on optimizing the formulation and processing conditions to improve the color and appearance of the herb-infused *burfi* without compromising its sensory attributes. Additionally, exploring the potential of other herbs or herb combinations could provide alternative options for the development of functional and flavorful *burfi* products.

Material and Methods

The present investigation was carried out at College of Dairy Technology, Warud (Pusad). Buffalo milk was procured from Government Chilling Center, MIDC, Pusad. Ashwgandha and *Shatavari* root powders were obtained from Narayana Ayurvedic Pharmacy, Ahemdabad, India while *Tulsi* powder prepared from Tulsi leaf as per method suggested by Satynarayan and Sen (2009) [10]. Sugar and laminated paper board boxes for commercial *burfi* packaging were procured from local market.

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

Herbs were added in the form of blend, in ratio of 5:4:1 of *Withania somnifera* (*Ashwgandha), Asparagus racemosus (Shatavari)* and *Ocimum sanctum (Tulsi)* respectively. Herb levels were optimized by sensory analysis evaluation of *burfi* on the basis of its acceptance by a panel of 08 judges using 9-point hedonic scale score card. The samples were judged for sensory attributes like color, appearance, body and texture, flavor and overall acceptability. The scores ascertained for each factor and expressed numerically on a scale of 1-9. The levels of herbs tried for *burfi* were in the range 1– 2% on the basis of *khoa*. Treatment and levels decided were as follows;

TC (Control) = milk *burfi* without herb
T1 = milk *burfi* +1 per cent herb on basis of *khoa*
T2 = milk *burfi* +1.25 per cent herb on basis of *khoa*
T3 = milk *burfi* +1.5 per cent herb on basis of *khoa*
T4 = milk *burfi* + 2 per cent herb on basis of *khoa*

Preparation of *Burfi*

The *burfi* with herb was prepared according to method of Bhatele (1983) [1] with slight modification which is shown in Figure 1. Control *burfi* i.e. TC was also prepared using sugar procured from local market.

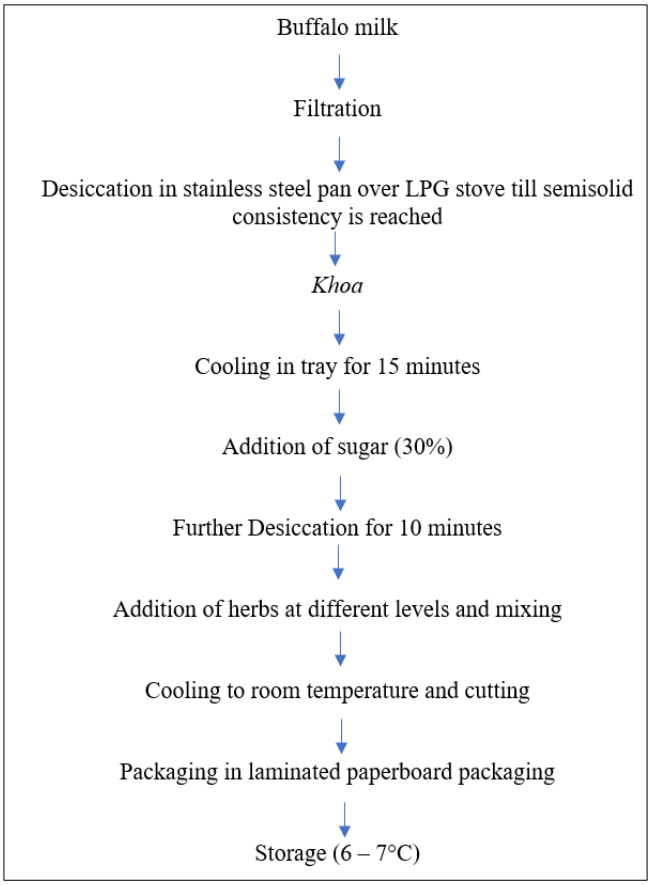

Fig 1: Control *burfi* i.e. TC was also prepared using sugar procured from local market.

Statistical Analysis

In all experiments, 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) [11]. Three replications of each experiment were analysed for statistical analysis.

Results and Discussion

Sensory evaluation revealed that herbs in blend when used at the levels of 1.00, 1.25, 1.50 and 2.00% in *burfi* (Table 1) resulted in lower sensory scores than control. Amongst all the herb *burfi* samples, level of 1.25% in *burfi* scored highest in terms of overall acceptability next to control. *Burfi* with herbs samples resembled the control in body and texture and flavor scores. However, colour and appearance and overall acceptability of *burfi* with herbs was lower (p<0.05) than the corresponding controls. This is because Tulsi leaves powder

imparting its green colour to the product and it increases with rate of addition resulting in lower colour and appearance scores. Hence, on the basis of sensory evaluation, out of the above four levels, the level of 1.25% of herbs in *burfi* was finally selected for the manufacture.

Color

Sensory score obtained as indicated in Table 1 for color of *Burfi* added with different level of herb T1, T2, T3 and T4 were 6.93±0.88, 6.93±0.79, 5.86±1.30 and 5.81±1.46 respectively. Sensory scores for color decreased in the order of T4 <T3< T2 =T1 with increased per cent of herb addition. Sample T4 herbal *Burfi* had lowest score because of dark color of herb. Similar results also reported by Londhe *et al*. (2012) [6] who reported decrease in colour score during storage study of brown Peda at 30 ºC using different packaging materials.

Appearance

Sensory score obtained as indicated in Table 1 for appearance of *Burfi* added with different level of herb T1, T2, T3 and T4 were 6.80±0.86, 7.20±0.67, 5.93±1.38 and 6.00±1.13 respectively. Sensory scores for appearance decreased in the order of T2>T1> T4 >T3 percent of herb addition. *Burfi* sample T2 herbs showed maximum acceptance for appearance. Statistical analysis showed that there were significant differences (p>5%) among the *Burfi* containing different levels of herbs and their corresponding control sample. Londhe *et al*. (2012) [6] who reported decrease in appearance score during storage study of brown Peda at 30 ºC using different packaging materials.

Table 1: Effect of various levels herbs on sensory score of *burfi*

Treatment	Colour	Appearance	Body & Texture	Flavour	Overall Acceptability
Control	8.13±0.74^{a}	8.13±0.63^{a}	7.53±0.99	7.60±0.98	7.67±0.81^{a}
T1	6.93±0.88^{b}	6.80±0.86^{b}	6.80±1.20	7.27±0.78	6.93±0.96^{ab}
T2	6.93±0.79^{b}	7.20±0.67^{b}	7.07±1.22	7.27±0.90	7.07±1.22^{ab}
T3	5.86±1.30^{c}	5.93±1.38^{c}	6.47±1.06	6.87±0.91	6.40±1.29^{b}
T4	5.81±1.46^{c}	6.00±1.13^{c}	6.73±1.22	6.73±1.16	6.33±1.23^{b}
Level of significance	*	*	NS	NS	*

Body and Texture

Sensory score for body and texture (Table 1) of *Burfi* added with different level of herb T1, T2, T3 and T4 were 6.80± 1.2, 7.07±1.22, 6.47±1.06 and 6.73±01.22 respectively. Sensory scores for body and texture decreased in the order of T2>T1> T4 >T3 percent of herb addition. *Burfi* sample T2 showed maximum acceptance for body and texture. Statistical analysis by ANOVA showed that there were non-significant differences (p>5%) among the *Burfi* containing different levels of herbs and their corresponding control sample. Londhe *et al*. (2012) [6] who reported decrease in body and texture score during storage study of brown Peda at 30 ºC using different packaging materials.

Flavor

Sensory scores for flavor of *Burfi* (Table 1) added with different level of herb T1, T2, T3 and T4 were 7.27±0.78, 7.27±0.90, 6.87±0.91 and 6.73±1.16 respectively. Flavor acceptance of *Burfi* samples decreased in the order T2=T1> T3 > T4 percent herb addition. *Burfi* sample T2 sample T2 showed maximum acceptance for flavor. T4 shows lower sensory score due to high after taste. Statistical analysis by ANOVA showed that there were nonsignificant differences (p>5%) among the *Burfi* containing different levels of herbs and their corresponding control sample. Sharma and Kulkarni16 also reported the decrease in mean flavour and body and texture scores of the control and MAP packaged Malai Peda samples in flexible packaging material at room temperature.

Overall acceptability

Sensory scores obtained as indicated in Table 1 for Overall acceptability of *Burfi* added with different level of herb T1, T2, T3 and T4 were 6.93±0.96, 7.07±1.22, 6.40±1.29 and 6.33±1.23 respectively. Overall acceptability of *Burfi* samples decreased in the order T2>T1> T3 > T4 percent herb addition. *Burfi* sample T2 showed maximum acceptance for overall acceptance. Statistical analysis showed that there were significant differences (p>5%) among the *burfi* containing different levels of herbs and their corresponding control sample. Hence, on the basis of these preliminary studies 1.25% herb added *Burfi* was selected for storage study and for determination of cost of production. Londhe *et al*. (2012) [6], also reported decrease in overall acceptability score during storage study of brown Peda at 30 ºC using different packaging materials.

Conclusion

In conclusion, the incorporation of Ashwagandha, Shatavari, and Tulsi in the formulation of herbal *Burfi* resulted in a product that exhibited comparable quality to its control counterpart. The development of this product was based on traditional therapeutic knowledge, utilizing a standardized process for its creation. This innovative approach introduced the concept of standardized processing while harnessing the functional characteristics of herbal ingredients. The addition of herbs at a concentration of 1.25% successfully enhanced the *Burfi* without causing any significant changes in its sensory attributes when compared to the control *Burfi*. This inclusion of herbs not only provided functional benefits but also contributed to the product's overall shelf life without compromising its inherent properties. By successfully integrating herbs into the *Burfi* formulation, this study demonstrates the potential for creating value-added products that combine traditional wisdom with modern processing techniques. The optimized concentration of herbs ensures a harmonious balance between sensory acceptability and the desired functional attributes, offering consumers an enriched and healthier treat.

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