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

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 [U1]: Control usually presented as T0

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 (Hoshing*et 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 (Rahate*et 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).

Historically, *Ashwagandha* plant has been used as an aphrodisiac, sedative, liver tonic, diuretic, hypocholesterolmic, anxiolytic, antidepressive, 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 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 antioxytocic 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 swe*et al*l 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., besan*burfi* (made with gram flour), kajubarfi (made with cashew nuts), pista*burfi* (made with pistachio), etc., and fruits or spices added to it, viz., mango *burfi*, coconut *burfi*, and cardamom *burfi*, etc. (Pal *et al*., 2018).

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*.

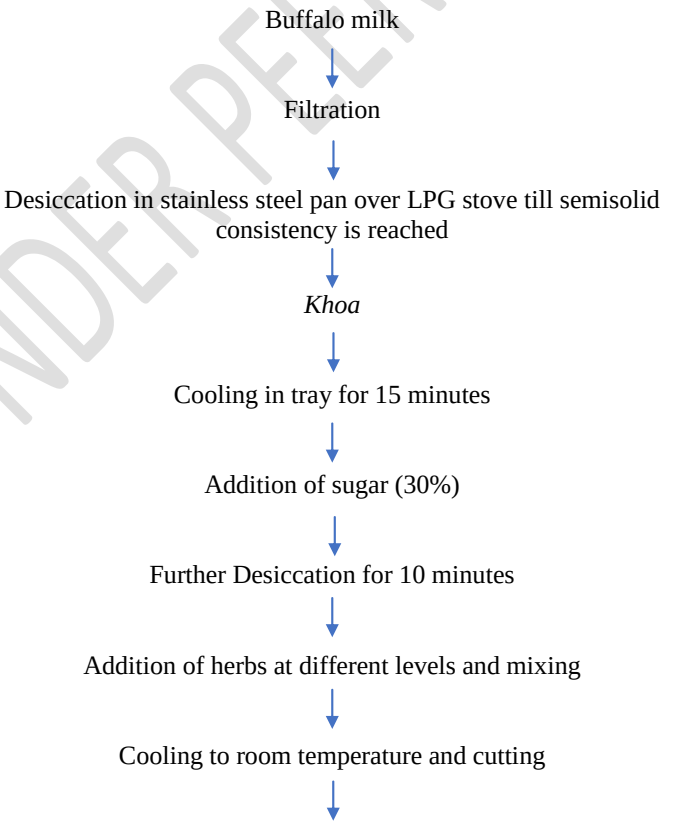
MATERIAL AND METHODS

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 NarayanaAyurvedic 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.

Preparation of *Burfi*

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



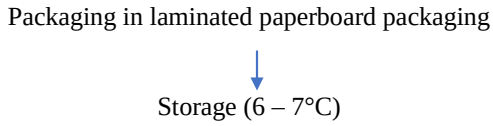


Figure 1. Flow cart for preparation of Burfi

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.

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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_4 (12.53) and low in sample T_1 (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_4 (22.45) and low in sample T_3 (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).

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_4 (16.87) and low in sample T_2 (16.58), while in control it was found to be 16.59 percent. This finding was in accordance with Rasane*et 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.

Ash

Table 1 indicates that the ash content was high in sample T_4 (2.83) and low in sample T_1 (2.65), while in control it was found at 2.62 percent. Ash content in *burf*i 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 T1 (88.17) and high in T4 (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

Control	12.29±0.16 ^{a}	87.70±0.16 ^{c}	12.00±0.03^{c}	22.32±0.18^{a}	16.59±0.20^{a}	2.62±0.09^{a}
T_1	11.82±0.14^{ab}	88.17±0.14^{bc}	12.23±0.11^{bc}	21.85±0.21^{a}	16.81±0.19^{a}	2.65±0.02^{a}
T_2	11.48±0.30^{bc}	88.52±0.30^{ab}	12.32±0.15a^{b}	22.23±0.89^{a}	16.58±0.29^{a}	2.74±0.05^{a}
T_3	11.62±0.21^{bc}	88.37±0.21^{b}	12.27±0.24a^{b}	21.68±0.37^{a}	16.58±0.11^{a}	2.80±0.02^{a}
T_4	10.99±0.56 ^{c}	89.00±0.56^{a}	12.53±0.99^{a}	22.45±0.38^{a}	16.87±0.03^{a}	2.83±0.01^{a}
Level of significance	*	*	*	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 [U3]: Table Heading is absent. Unit of data (gm/ml/%/any this else) is absent. Foot note for the table is absent, i.e is it the mean value? How may replications were used, different letter a, b, c representing what? And What NS denoted for.

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.

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≤5%) as the rate of herb addition increased.

Comment [U4]: It is better to present p value as 0.05 than 5%. And be sure that is it >5% or ≥5%?

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