



Herbs: A Way to Enhance Functionality of Traditional Dairy Products



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Submission: May 21, 2018; **Published:** July 02, 2018

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Keywords: Dairy Products; Natural health; *Ghee*; Herbs; Cheese; *Ayurveda*; Butter oil; Nutrition; Dahi; Milk; Literature; Antioxidants; Ferulic acid; Tea catechins; Oleuropein; Ellagic acid; Phenolic compounds

Introduction

The functional foods promote health beyond supplying basic nutrition. As a result, the functional foods are gaining popularity throughout the world. The growing consumer demand along with industry interest states that there is a great scope for functional foods in India. A huge amount of milk produced in India is utilized for manufacturing of traditional dairy products [1]. Indian traditional dairy products have a significant demand and their domestic markets are well established. However, to compete and to sustain with the ever-increasing functional food market, Indian dairy industry should find ways to induce or to improve the functionality in traditional dairy products. Herbs and their extracts have a long history of usage as natural remedies for curing many health-related complications. Herbs have also found their usage in culinary purposes and some of them have been reported for their use in cheese, yoghurt and other food products. Since 1960, there has been an increased interest in "natural health" and it has propelled the consumption of natural remedies i.e. herbs and their preparations. A considerable portion of today's functional food market consists of herbal supplemented functional foods [2].

Ayurveda, Indian traditional medicinal literature, has prescribed several ways in which the medicinal benefits of herbs could be conveyed via certain foods as carriers. More than 50 medicated *ghee* formulations made with incorporating different herbal preparations were reported in *Ayurveda*. However, there is a very little or no literature reported regarding supplementation of herbs into other Indian dairy products to improve their functionality. In the recent past, traditional dairy products have received special attention from the R&D institutions. Research has been carried out to induce and/or

to improve the functionality of many Indian dairy products. Developments in the manufacture Indian dairy products with improved functionality, especially herbal supplemented Indian dairy products are depicted here.

Application of Herbs and Herbal Nutraceuticals in Milk and Milk Products

Fat Rich Dairy Products

Herbs contain high amounts of phenolic compounds which possess antioxidant properties. The natural antioxidant properties of herbs have made their use in the formulation of functional foods specifically targeted for the people suffering from cardio vascular diseases [3]. The antioxidant properties of herbs also led their use into fat rich dairy products for retarding auto-oxidation there by prolonging the shelf-life. Moreover, it was found that the artificial antioxidants, like BHT (butylated hydroxytoluene) or BHA (butylated hydroxyanisole) are not safe for human consumption (suspected to have carcinogenic activity). On the other hand, increasing sensitivity of consumers to synthetic ingredients as well as their increasing awareness about the effect of diet on their health contributed to the increasing trend to use natural additives like herbal extracts for the stabilization of fat rich dairy foods like *ghee*, butter oil, butter etc. Sage (*Salvia officinalis*) and Rosemary (*Rosmarinus officinalis*) extracts are the most widely used for this purpose [4]. These extracts have antioxidant activity many times stronger than synthetic antioxidants like BHA or BHT [5].

Milk fat, particularly *ghee* has the characteristics to absorb all the medicinal properties of the herbs with which it is fortified, without losing its own attributes. About 60 medicated *ghee*

preparations used for the treatment of various diseases were reported in Ayurvedic literature [6]. Recently, *Arjuna ghee* was developed at NDRI, Karnal by incorporating functional attributes of *Terminalia arjuna* for providing beneficial effects against cardiovascular diseases and the product was more stable to oxidative deterioration as compared to control *ghee* [7]. Unlike in case of medicated *ghee* preparations, *Arjunaghee* can be replaced with normal *ghee* in the daily diet. Pawar et al. [8] has successfully increased the oxidative stability of *ghee* by incorporating the alcoholic and aqueous extracts of *Satavari* herb.

Research evidence supporting the health benefits of herbal *ghee* preparations is scanty. In a clinical study on antiasthmatic effects of *vasaghee* (*ghrit*), Prasher [9] reported that oral ingestion of *vasa ghee* was beneficial in reducing the risk of asthma. There was marked improvement in 92.59% cases within 21 days of study period. HPTLC studies have shown that vasicinone, an antiasthmatic agent present in *Adhatodavasica* was responsible for antiasthmatic effects of *vasa ghee*. The authors have also reported that *vasa ghee* consumption also had an additional benefit in reducing serum cholesterol level by 30.16%. Pharmacological studies showed that *Panchtikta ghee* (*ghrit*) prepared with different methods was beneficial in reducing the cardiovascular diseases [6]. A thorough study on the bioactive components of herbs and effect of different processing conditions on them during *ghee* preparation could lead us to diversify the usage of *ghee* in a well-organized commercial way.

Dahi and Lassi

Aloe vera, an herb of the Liliaceae family has a long and illustrious history dating from biblical times and given a high ranking as an all-purpose herbal plant. Scientific investigations on *Aloe vera* have gained more attention over the last several decades due to its reputable medicinal properties [10]. *Lassi*, a ready-to-serve traditional fermented milk beverage has got wide popularity in India as well as in overseas markets. Sweet *lassi* with its characteristic sweet and slightly sour taste can be used as a food carrier for herbal bioactives like *Aloe vera* juice. Hussain et al. [2] has developed functional *lassi* using the herb *Aloe vera* (*Aloe barbadensis* Miller). A culture combination containing NCDC 60 and *Lactobacillus paracasei* L at an inoculum rate of 1 percent was used for functional *lassi* preparation. Animal study of functional *lassi* revealed that it has better immune protective effects compared to control *lassi*. Recently, Pal et al. [11] also supplemented *Aloe vera* juice into *lassi* to enhance its health benefits. The authors have reported that supplementation of *Aloe vera* juice at 15% level into *lassi* has obtained optimum sensory scores.

Herbal supplemented probiotic *dahi* using the herb *Aloe barbadensis* Miller was also prepared by Hussain et al. [12]. The authors have reported that *Aloe vera* supplementation has supported the growth of probiotic strain *Lactobacillus*

paracasei L in *dahi*. The probiotic viability was more than 7 log cfu/ml during 12 days storage period.

Sandesh

Sandesh is a very popular heat-desiccated product of coagulated milk protein mass called *chhana*. About 80% of *chhana* produced in Kolkata (West Bengal, India) is converted into *sandesh* [13]. Incorporation of herbs into these kinds of highly demanded dairy products will improve the health status of the consumers. Bandyopadhyay et al. [14] incorporated herbs such as turmeric (*Curcuma longa* L.), coriander (*Coriandrum sativum* L.), curry leaf (*Murraya koenigii* L.), spinach (*Spinacia oleracea*) and aonla (*Embllica officinalis*), separately as a paste, at the 10% level into *Sandesh* to induce the antioxidant properties into the product. The antioxidative levels of these herbs were compared with the synthetic antioxidants TBHQ and BHA: BHT (1:1) at 100 and 200 mg/kg levels. The authors have reported that the total antioxidative status of herbal *sandesh* was lower than samples with TBHQ but like those with 200 mg/kg BHA: BHT (1:1). The authors have also reported that the use of coriander herb with its antimicrobial and antioxidant properties increased the shelf-life of herbal *sandesh* up to 8 days at (30±1°C) and 30 days at (7±1°C) when compared with the remaining samples.

Shrikhand

Shrikhand is a semi-soft, sweetish-sour, whole milk product prepared from lactic fermented curd [15]. *Shrikhandis* prepared by admixing of sugar in required quantities with strained *dahi* or concentrated *dahi*. Being a sweetish-sour and semi soft product it can easily harbour herbs/herbal extracts without undergoing significant quality changes. Landge et al. [16] successfully prepared *shrikhand* using *Ashwagandha* herb powder as an additive. The authors have found that addition of 0.5% *Ashwagandha* powder to *shrikhand* has improved the organoleptic quality and the product was remained acceptable up to 52 days at refrigerated temperatures.

Other Possible Uses of Herbs to Improve the Functionality of Indian Dairy Products

Most of the Indian traditional dairy products contain high amount moisture content besides harbouring valuable nutrients. The high moisture content of these dairy products will favour the growth of microorganisms leading to their spoilage. Phenolic compounds of herbs are a good alternative for the synthetic antimicrobial agents used in food industry. Phenolic compounds namely, ferulic acid, tea catechins, oleuropein, ellagic acid and p-coumaric acid have been reported to inhibit the growth of pathogenic bacteria (*Salmonella enteritidis*, *Staphylococcus aureus*, *Listeria monocytogenes*) and fungi [17]. These antimicrobial properties herbs can be effectively utilized to control the growth of unwanted/spoilage and pathogenic microbes in Indian dairy products. Oleuropein derived from

Olive tree has been reported to markedly inhibit the production of aflatoxins [18]. This property of oleuropein could be advantageous in products like *chhana* and *paneer* where the growth of moulds leading to mycotoxins production may present health risk [19,20].

Conclusion

Herbs are considered as nature's gift to human beings as they can prevent and cure many illnesses. Herbs harbor a wide variety of functional components which can perform wide range of biological functionalities. In recent past, research regarding functionality of herbal components, toxicology and their use in food products has been the matter of interest. However, depending upon the concentration and type, the incorporation of herbs into food products may have certain undesirable effects on their sensory, physico-chemical and textural properties which in turn could affect their overall acceptability. Presently, the herbal *ghee* being marketed in the global market is mostly sold as medicine (medicinal *ghee*), which is associated with typical flavour, bitter or pungent taste and a dark colour. Such therapeutic preparations are therefore not acceptable for routine use. Incorporation of these nutraceuticals into food systems may therefore call for technological modifications/alterations so that the sensory quality of the final product remains unaltered. Furthermore, very limited information is available for ascertaining the residual levels of these functional components in herbal food preparations. Interactions of herbal and food constituents on human health must be studied thoroughly. More research should be directed towards the effect of processing conditions on the bioavailability of functional components in the herbs so that the processes will be designed in such a way that little or no damage will occur to the functional components during their incorporation into food matrix.

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DOI: [10.19080/JDVS.2018.06.555689](https://doi.org/10.19080/JDVS.2018.06.555689)

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