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Studies on sensory attributes of Herbal Sandesh by incorporation of ashwagandha (*Withania somnifera*) and Tulsi (*Ocimum sanctum*) at room temperature

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Abstract

The present study was undertaken to prepare the sandesh dessert by using standard buffalo milk, sugar, Ashwagandha and Tulsi. There was one control and 15 treatments and each was replicated five times. The control (A₀B₀) was prepared from standardized buffalo milk, (fat, 4.5% and SNF, 8.5%), chhana, sugar ((30.0% of total wt.). Experimental Herbal Sandesh dessert A₀B₁, A₀B₂, A₀B₃, A₁B₀, A₁B₁, A₁B₂, A₁B₃, A₂B₀, A₂B₁, A₂B₂, A₂B₃, A₃B₀, A₃B₁, A₃B₂ and A₃B₃ was prepared from standard buffalo milk (fat, 4.5% and SNF, 8.5%), chhana, sugar ((30.0% of total wt.) and different ratio of Herbs such as 1, 2, 3, 4, 5 and 6%. The control and the experimental product were tested for organoleptic properties by using 9 point hedonic scale. Effect of different level and herbs ratio and sensory scores for all attributes were highly acceptable for Sandesh A₂B₂ made with 96 % Chhana, 2.0% Ashwagandha and 2.0% Tulsi extract at 0, 5, 10 and 15 days. Increased levels of herbs in Herbal Sandesh A₃B₃ made with 94% Chhana, 3% Ashwagandha and 3% Tulsi-3% herbs Sandesh, resulted in decrease in Flavour, Texture and overall acceptability.

Keywords: chhana, ashwagandha, tulsi, sandesh, hedonic scale

Introduction

Sandesh is a popular Chhana based sweet. Sandesh (meaning message) is perhaps the oldest sweetmeat of Bengal where there is a traditional custom to send some Sandesh along with a good message to relatives and friends. The sweet is known for its palatability and aroma. It is a good source of milk protein and fat. Sandesh is preferably prepared from Chhana obtain from cow milk because it yields soft body and texture with fine and uniform grains. Buffalo milk Chhana on the other hand leads to hard body and coarse textured sweet which is not desirable. Several varieties of Sandesh are sold in the market and each varieties of Sandesh are sold in the market and each varieties differs in appearance, flavor, body and texture and composition. It is very vital to health because of its fairly high protein and fat content, minerals, specially calcium and phosphorus and also fat soluble vitamins particularly vitamin A and D content. Protein efficiency ratio, biological value and digestibility coefficients of Sandesh are higher than skim milk (Rajani and Sharda, 1983) [20]. Buffalo milk Chhana on the other hand leads to hard body and coarse textured sweet which is not desirable. Several varieties of Sandesh are sold in the market and each varieties of Sandesh differs in appearance, flavor, body and texture and composition (Aneja *et al.* 2002) [1].

This product is considered a delicacy and commands a much higher price. This is normal quality sandesh and has a longer shelf-life than the second type which is softer and is more expensive. It is made from fresh chhana. Chemical composition of Sandesh from buffalo milk, Moisture-27.14%, Fat-18.42%, Protein-18.71%, Sugar-33.83%, Ash-1.90%. This is normal quality sandesh and has a longer shelf-life than the second type which is softer and is more expensive (Parekh, 1994) [15].

Attributes of Sandesh: Colour-creamy white, flavor-sweet, nutty flavor, body and texture-soft body with fine and uniform grains, appearance-dry and smooth, taste-sweet.

Modern medicine or allopathy is very costly and poor people cannot afford it. Now-a-days Ayurveda has become popular not only in India but also in many developing and developed countries due to the fact that there is no side effect (Panneerselvan *et al.*, 2003) [14]. The advantages of certain ayurvedic herbs are well documented in literature. Low cost nutritive biscuits made of ayurvedic components Shatavari, Ashawagandha and Yastimadhu powder was developed (Mehta, 2013) [12]. The plant contains tropane alkaloids such as tropine, hygrine,

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anferine and a number of steroidal lactones known as Withanolides. Recently *W. somnifera* L. was also used to inhibit the development of tolerance and dependence on chronic use of various phytotropic drugs (Gupta and Rana, 2007) [6]. However, the last few years have seen a major increase in their use in the developed world. Several screening studies have been carried out in different parts of the world. There are several reports on the antimicrobial activity of different herbal extracts in different regions of the world (Singh and Paney 1998; Kuttan, 1996) [23, 11].

The plant's of Ashwagandha long, brown, tuberous roots are used for medicinal purposes. The Ashwagandha berries can be used as a substitute for rennet, to coagulate milk in cheese-making (Mirjalili, *et.al.*, 2009) [13]. The main active constituents are alkaloids and steroidal lactones. These include tropine and cuscohygrine. The leaves contain the steroidal lactones, withanolides, notably withaferin A, which was the first withanolide to be isolated from *W. somnifera*. Ashwagandha contains flavonoids and many active ingredients of the withanolide class. Numerous studies over the past two decades indicate that it has anti-inflammatory, anti-tumor, anti-stress, antioxidant, mind-boosting, and rejuvenating properties. *Ocimum sanctum*, known as Tulsi in Hindi and holy basil in English, is an erect softy hairy aromatic herb or undershurb found throughout India. Tulsi is commonly cultivated in gardens. Two type of *Ocimum sanctum* are met within cultivation i.e. tulsi plant with green leaves known as Sri Tulsi & Tulsi plant with purple leaves known as Krishna Tulsi. *Ocimum sanctum* is held sacred by Hindus and is used as medicinal plants in day to day practice in Indian homes for various ailments. It shows a number of medicinal activities. it used in anticancer, antifertility, antidiabetic and various other disease (Prakash *et al.*, 2005) [17]. *Tulsi* has been used for thousands of years in Ayurveda for its diverse healing properties. It is mentioned in the Charaka Samhita. An ancient Ayurvedic text. *Tulsi* is considered to be an adaptogen, balancing different processes in the body, and helpful for adapting to stress. Marked by its strong aroma and astringent taste, it is regarded in Ayurveda as a kind of "elixir of life" and believed to promote longevity (Puri *et al.*, 2002) [19]. The addition of tulsi paste at 0.2 per cent, 0.3 per cent and 0.4 per cent level improved the taste and flavour, colour and appearance, body and texture and also overall acceptability of herbal yoghurt. There was less number of yeast and mould and no number of coliform counts because of proper maintenance of sanitary condition. It is also due to the anti microbial and anti bacterial properties of herbal paste (tulsi) added in low fat herbal yoghurt (Kumari *et al.*, 2011) [10]. The herbal products are gradually gaining popularity in the world market due to presence of natural antioxidants and functioning active ingredients. They used *tulsi* for the preparation of various traditional herbal sweets like sandesh chamcham, etc. (Bandopadhyay., 2006) [2]. Aqueous extract of leaves of *Ocimum kilimandscharicum* Aqueous extract of leaves of *Ocimum kilimandscharicum* contains camphor, 1, 8-cineole, limonene, trans caryophyllene, camphene, 4-terpeneol, myrtenol, α -terpineol, endo-borneol, linalool (Eliningaya *et al.*, 2009) [5]. Leaves also contain flavonoids, tannins, saponins, sterols, carbohydrates, proteins and triterpenoids (Paschapur *et al.*, 2009) [16]. *Ocimum kilimandscharicum* is active against *aspergillus*

fumigates, *aspergillus niger*, *candida albicans*, *Cryptococcus neoformans*, *Microsporium cassis*, *sporotrichum schenckii* (Prasad *et al.*, 1986) [18]. The aqueous extracts were found more active than methanolic extracts (Williamson, 2002; Sharma, 2010; Joshi *et al.*, 2011) [24, 8]. The aqueous extract of *O. sanctum* leaves revealed alkaloids, flavonoids, tannins and carbohydrates (Gupta *et al.*, 2002) [7]. The leaf volatile oil contains eugenol (1-hydroxy-2-methoxy-4-allylbenzene), euginal (also called eugenic acid), urosolic acid, carvacrol (5-isopropyl-2-methylphenol), linalool (3, 7-dimethylocta-1, 6-dien-3-ol), limatrol, caryophyllene, methyl carvicol (also called Estragol: 1-allyl-4-methoxybenzene) while the seed volatile oil have fatty acids and sitosterol. Other than these the seed mucilage of Tulsi contains some levels of sugars and green leaves are the source of anthocyanins. Two major sugars of the plants are xylose and polysaccharides (Kelm *et al.*, 2000; Shishodia *et al.*, 2003) [9, 2].

Materials and Methods

The present study has been carried out in the research Lab, Warner School of Food and Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P. (India). All the raw materials were collected from the local market of Allahabad. Potable water was used for preparing the product. It was ensured that the materials used were free from any kind of infection.

Herbs: Ashwagandha root powder and Tulsi leaves dried form were purchased from Allahabad city.

Preparation of herbal water extract: Herbal water extract was prepared by soaking each herb in distilled water (1:10) overnight followed by centrifugation (2000 rpm; 15 min at 40 °C). The supernatant was harvested and refrigerated and used in the preparation of Herbal Sandesh.

Preparation of chhana: The method adopted to prepare chhana in this study was according to the method given by Bhattacharya *et al.*, (1971) [3] with slight modification. The standardized buffalo milk was heated up to 75 °C. The freshly prepared coagulant solution was heated to 75 °C and then added slowly in a thin continuous stream with continuous gentle agitation till a clear whey separated out. Stirring was then stopped and the curd was allowed to remain in whey for about 5 minutes. It was then drained through a hang with muslin cloth (10 min) and stored for future use.

Preparation of herbal Sandesh: Fresh chhana and herbs (table 1) was kneaded thoroughly to make a uniform dough. Fine powdered cane sugar (300 g) was added to the dough' and was kneaded again. The dough was then heated (75 °C) in an iron pan with continuous stirring. Heating was continued until the mixture acquired desired consistency with slightly cooked flavoure. During the final stages of heating, the mixture developed slight cooked flavour and the sticking tendency to the pan disappeared. The cooking was completed in 15-20 min. The products were then transferred to a shallow pan, cooled and sliced into desired shapes. Thus, final product obtained and packed in plastic box for storage at room temperature (25± 5 °C).

Table 1: Ingredients Used in the Preparation of Herbal Sandesh for 1 Kg.

S.No.	Treatment	Chhana		Ashwagandha Root Extract		Tulsi Leave Extract		Total (gm)
		%	(gm)	%	(gm)	%	(gm)	
1	A ₀ B ₀	100	1000	0	0	0	0	1000
2	A ₀ B ₁	99	990	0	0	1	10	1000
3	A ₀ B ₂	98	980	0	0	2	20	1000
4	A ₀ B ₃	97	970	0	0	3	30	1000
5	A ₁ B ₀	99	990	1	10	0	0	1000
6	A ₁ B ₁	98	980	1	10	1	10	1000
7	A ₁ B ₂	97	970	1	10	2	20	1000
8	A ₁ B ₃	96	960	1	10	3	30	1000
9	A ₂ B ₀	98	980	2	20	0	0	1000
10	A ₂ B ₁	97	970	2	20	1	10	1000
11	A ₂ B ₂	96	960	2	20	2	20	1000
12	A ₂ B ₃	95	950	2	20	3	30	1000
13	A ₃ B ₀	97	970	3	30	0	0	1000
14	A ₃ B ₁	96	960	3	30	1	10	1000
15	A ₃ B ₂	95	950	3	30	2	20	1000
16	A ₃ B ₃	94	940	3	30	3	30	1000

Note: Sugar use For all Treatment: 300 gm (30.0% of total wt.)

Sensory evaluation of Herbal Sandesh: The samples of Herbal Sandesh were evaluated for colour and Appearance, Flavour and Taste, Body and texture, and Overall Acceptability and Total Score of Herbal Sandesh samples on a 9-point Hedonic scale by a sensory panel consisting of 5 judges for 5 replication (BIS,1981) [4].

Results and Discussion

The studies were conducted on the assessment of sensory quality of the Herbal Sandesh. The findings are tabulated in Table-2.

Table 2: Sensory evaluation Attributes of herbal sandesh (Mean Value)

Treatments	Colour and appearance score				Body and texture score				Flavour and Taste score				Overall acceptability			
	0 day	5 days	10 days	15 days	0 day	5 days	10 days	15 days	0 day	5 days	10 days	15 days	0 day	5 days	10 days	15 days
A ₀ B ₀	7.28	6.88	5.96	4.16	7.40	7.12	6.04	4.36	7.22	6.93	5.72	2.14	7.30	6.98	5.91	3.54
A ₀ B ₁	7.40	7.08	6.72	6.00	7.68	7.56	7.28	6.72	8.24	7.88	7.56	6.08	7.77	7.51	7.19	6.27
A ₀ B ₂	7.44	7.18	6.76	5.96	7.88	7.68	7.44	7.20	8.52	8.12	7.80	6.64	7.93	7.66	7.33	6.60
A ₀ B ₃	7.34	7.04	6.80	6.08	7.90	7.72	7.72	7.32	8.56	8.16	7.92	7.16	7.93	7.64	7.48	6.85
A ₁ B ₀	7.52	7.36	6.52	6.08	7.88	7.44	7.16	6.80	7.66	7.16	6.72	5.88	7.63	7.32	6.80	6.25
A ₁ B ₁	7.72	7.40	7.04	6.16	7.76	7.52	7.24	7.08	8.16	7.88	7.24	6.88	7.88	7.60	7.17	6.71
A ₁ B ₂	7.54	7.36	7.00	6.28	7.92	7.72	7.44	7.16	8.62	8.16	7.68	7.12	8.03	7.75	7.37	6.85
A ₁ B ₃	7.72	7.48	7.08	6.24	7.92	7.76	7.48	7.24	8.28	7.88	7.28	6.80	7.97	7.71	7.28	6.76
A ₂ B ₀	7.68	7.42	6.92	6.40	7.90	7.84	7.60	7.28	7.66	7.44	7.08	6.52	7.75	7.57	7.20	6.74
A ₂ B ₁	8.48	7.96	7.32	6.08	8.00	7.80	7.48	7.20	8.10	7.72	7.16	6.76	8.20	7.83	7.32	6.68
A ₂ B ₂	8.36	8.04	7.64	6.32	8.24	8.04	7.72	7.40	8.64	8.24	7.72	7.20	8.42	8.11	7.69	6.97
A ₂ B ₃	8.18	7.84	7.48	6.48	7.25	7.20	7.04	6.68	8.44	8.08	7.40	7.00	7.96	7.71	7.31	6.72
A ₃ B ₀	8.44	7.82	7.28	6.64	8.04	8.16	7.48	7.36	7.70	7.36	7.12	6.68	8.06	7.78	7.29	6.89
A ₃ B ₁	8.40	8.08	7.44	6.36	8.26	8.08	7.76	7.40	7.44	7.12	6.84	6.56	8.03	7.76	7.35	6.77
A ₃ B ₂	8.40	7.96	7.56	6.52	7.48	7.36	7.08	6.72	8.00	7.76	7.24	6.92	7.96	7.69	7.30	6.72
A ₃ B ₃	7.36	7.32	7.08	6.60	7.32	7.04	7.00	6.76	8.02	7.80	7.28	6.96	7.57	7.39	7.12	6.77

Note: Average score evaluated by five judges.

3. Sensory evaluation of Herbal Sandesh

3.1 Colour and appearance score of Herbal Sandesh at zero day

The highest mean in colour and appearance score at zero day of Herbal Sandesh was obtained in treatment A₂ B₁ (8.48) while A₂B₁ recorded the minimum (7.28).

3.2 Colour and appearance score of Herbal Sandesh at five days

The highest mean in colour and appearance score at five days of Herbal Sandesh was obtained in treatment A₃ B₁ (8.08) while A₀B₀ recorded the minimum (6.88).

3.3 Colour and appearance score of Herbal Sandesh at ten days

The highest mean in colour and appearance score at ten days of Herbal Sandesh was obtained in treatment A₂ B₂ (7.64) while A₀B₀ recorded the minimum (5.96).

3.4 Colour and appearance score of Herbal Sandesh at fifteen days

The highest mean in colour and appearance score at fifteen days of Herbal Sandesh was obtained in treatment A₀ B₂ (5.96) while A₀B₀ recorded the minimum (4.16).

3.5 Body and texture score of Herbal Sandesh at zero day

The highest mean in body and texture score at zero day of Herbal Sandesh was obtained in treatment A₃ B₁ (8.26) while A₃B₃ recorded the minimum (7.32).

3.6 Body and texture score of Herbal Sandesh at five days

The highest mean in body and texture score at 5th days of Herbal Sandesh was obtained in treatment A₃ B₀ (8.16) while A₃B₃ recorded the minimum (7.06).

3.7 Body and texture score of Herbal Sandesh at ten days

The highest mean in body and texture score at 10th days of

Herbal Sandesh was obtained in treatment A₃B₂ (7.76) while A₀B₀ recorded the minimum (6.04).

3.8 Body and texture score of Herbal Sandesh at fifteen days

The highest mean in body and texture score at 15th days of Herbal Sandesh was obtained in treatment A₃B₁ (7.4) while A₀B₀ recorded the minimum (4.36).

3.9 Flavour and taste score of Herbal Sandesh at zero days

The highest mean in flavour and taste score at zero day of Herbal Sandesh was obtained in treatment A₂B₂ (8.64) while A₀B₀ recorded the minimum (7.22).

3.10 Flavour and taste score of Herbal Sandesh at five days

The highest mean in flavour and taste score at 5 days of Herbal Sandesh was obtained in treatment A₂B₂ (8.24) while A₀B₀ recorded the minimum (6.93).

3.11 Flavour and taste score of Herbal Sandesh at ten days

The highest mean in flavour and taste score at 10th days of Herbal Sandesh was obtained in treatment A₂B₂ (7.72) while A₀B₀ recorded the minimum (5.72).

3.12 Flavour and taste score of Herbal Sandesh at fifteen days.

The highest mean in flavour and taste score at 15th days of Herbal Sandesh was obtained in treatment A₂B₂ (7.2) while A₀B₀ recorded the minimum (2.14).

3.13 Overall acceptability score of Herbal Sandesh at zero day

The highest mean in overall acceptability score at zero day of Herbal Sandesh was obtained in treatment A₂B₂ (8.41) while A₀B₀ recorded the minimum (7.3).

3.14 Overall acceptability score of Herbal Sandesh at five days

The highest mean in overall acceptability score at five days of Herbal Sandesh was obtained in treatment A₂B₂ (8.11) while A₀B₀ recorded the minimum (6.98).

3.15 Overall acceptability score of Herbal Sandesh at ten days

The highest mean in overall acceptability score at ten days of Herbal Sandesh was obtained in treatment A₂B₂ (7.69) while A₀B₀ recorded the minimum (5.91).

3.16 Overall acceptability score of Herbal Sandesh at fifteen days

The highest mean in overall acceptability score at fifteen days of Herbal Sandesh was obtained in treatment A₂B₂ (6.97) while A₀B₀ recorded the minimum (3.54).

Conclusion

The above research work provided a better understanding of desired Sensory evaluation imparted by the herbs on Herbal Sandesh. The Herbal Sandesh prepared by standard procedure incorporated with Ashwagandha and Tulsi extract. From the findings of this study undertaken, it is concluded that the Herbal Sandesh containing 4% Ashwagandha and Tulsi (A₂B₂), 3% Ashwagandha (A₃B₀) and 3% Tulsi (B₃A₀) was better as compare to with other treatments in organoleptic characteristics. A₂B₂, A₃B₀ and B₃A₀ showed significant

differences in organoleptic characteristics (Colour & Appearance, Body & Texture, Flavour & Taste and Overall Acceptability) at regular interval 0,5,10 and 15 days.

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