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Cost analysis of herbal Sandesh prepared with Ashwagandha (*Withania somnifera*) and Tulsi (*Ocimum sanctum*)

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Abstract

The present study was carried out in SHIATS, Allahabad with the objective to calculate the cost of production of Herbal Sandesh. Sandesh is an indigenous milk product used as sweet dairy desserts, prepared by acid and heat coagulation of milk. Ashwagandha traditionally been used for calming the mind, relieving weakness, nervous exhaustion and arthritis, and for building sexual energy. It is beneficial to people who do physical labor or exercise a lot to help the body adapt to physical stress. Tulsi is rich in antioxidants and is suggested to guard against free radicals. It prevents from damaging excess oxidation. Antioxidants slow down the process of excess oxidation and protect cells from the damage caused by free radicals. Herbal Sandesh prepared by incorporating medicinal herbs showed average of cost. Ashwagandha (*Withania somnifera*) and Tulsi (*Ocimum sanctum*) are popular medicinal plant and containing antioxidant, antibacterial, antiviral, adaptogenic, and immune-enhancing properties. The present study was carried out to find the cost of herbal extract inclusion in the Sandesh. Sandesh was prepared by this method was subjected to sensory properties of herbal Sandesh. The result found that A₂B₂ combination of herbs (2 % Ashwagandha and 2 % Tulsi) was best and received high score in sensory evaluation and cost analysis was followed by A₀B₀, A₀B₁, A₀B₂, A₀B₃, A₁B₀, A₁B₁, A₁B₂, A₁B₃, A₂B₀, A₂B₁, A₂B₃, A₃B₀, A₃B₁, A₃B₂ and A₃B₃ herbs which were used respectively in selected Herbal Sandesh.

Keywords: Herbal Sandesh, cost analysis, medicinal herbs, ashwagandha, tulsi, sensory properties

1. Introduction

Sandesh is a sweet product mostly produced in unorganized small-scale sectors wherein variations in quality between batches, days of production and shops are noticed (Yadav *et al.*, 1989) [1]. Sandesh is an indigenous milk product used as sweet dairy desserts, prepared by acid and heat coagulation of milk. It is a well known sweet in the eastern part of India particularly in West Bengal. It is an enriched with high quality animal protein, fat, minerals and vitamins. It is appreciated by people belonging to every social groups. Due to different types of milk and variation in milk composition, various techniques have been developed for manufacturing of sandesh as per the requirements of the consumers with attendant improvement in the yield and other quality characteristics. The cost of raw materials for sandesh preparation is about 40% of sale price, which makes it a profitable product (Parekh, 1994) [8].

Buffalo milk Chhana leads to hard body and coarse textured sweet which is not desirable. Several varieties of Sandesh are available 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. There are two types of sandesh available. One a drier variety made from old chhana. This product is considered a delicacy and commands a much higher price. This is normal quality sandesh and has higher keeping quality than the second type which is softer and is more expensive. It is made from fresh chhana. Attributes of Sandesh are colour-creamy white, flavor-sweet, nutty flavor, body and texture-soft body with fine and uniform grains, appearance-dry and smooth, taste-sweet. Chemical composition of Sandesh from buffalo milk, Moisture-27.14%, Fat-18.42%, Protein-18.71%, Sugar-33.83%, Ash-1.90%.

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) [7]. A World Health Organization survey indicated that about 70-80% of the world's population rely on non-conventional medicines, mainly derived from herbal sources, for holistic healthcare.

This is specially the case in developing countries where the cost of treatment is beyond the means of most people (Mukinda and Syce, 2007) [6]. The advantages of certain ayurvedic herbs are well documented in literature. Low cost nutritive biscuits made of ayurvedic components shatavari, Ashwagandha and Yastimadhu powder was developed (Mehta, 2013) [5]. The medicinal properties of ashwagandha have been studied well and reviewed in detail (Gupta and Rana, 2007) [3]. Most of the active principles of ayurvedic and unani medicines are found in *W. somnifera* and around hundred different preparations are already commercially available (Tripathi *et al.*, 1996) [10].

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) [4]. 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) [1]. The lowest cost was spent towards license fee and taxes. In variable cost, milk contributes major amount of cost as compared to other costs. In the manufacturing process, the only non-milk product added was the sugar. All the manufacturers used wood as a fuel for preparation of the product, which costed Rs.9.10/kg of product. The total cost of production was about Rs. 79.08 per kg and market sale price was Rs. 100 per kg (Gaikwad *et al.*, 2009) [9].

2. Material and Methods

The present study has been carried out in the research Lab, Warner School of Food and Dairy Technology, Sam Higginbottom Institute 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.

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

2.2 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.

2.3 Preparation of chhana: The method adopted to prepare chhana in this study was according to the method given by Bhattacharya *et al.*, (1971) [2] 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.

2.4 Preparation of herbal Sandesh: Fresh chhana and herbs (table 1) was kneaded thoroughly to make an 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 flavour. 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.	Treat ment	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.)

3. Results and Discussions

The costs of the ingredients are very important factor besides other factors in determining the cost of production. It is considered as a basis for price fixation and determining the profit. The price of a product is dependent on the cost of production. The cost of Herbal Sandesh was calculated, which is shown in the table. The cost analysis data along with formulations is shown in Table.1 and Table.2.

3.1 Requirement for 1 Kg chhana production

- Standardize buffalo Milk(4 % FAT,8.5 % SNF) for 1 kg chhana preparation = 5 litre
- Citric acid 2% for 1 kg chhana preparation =10 gm

Cost of 1 kg chhana	Herbs and Sugar cost
1. Milk cost Rs.40/lit	1 Ashwagandha root powder =500/kg
2. Citric acid cost Rs.530/kg	2. Tulsi dried leave =350/kg
Chhana cost Rs.-210.60/kg	3. Sugar = 40/kg

Table 2: Cost (Rs/Kg) of Materials Used In the Preparation of Herbal Sandesh

S. No.	Treatments	Chhana			Ashwagandha Root Extract			Tulsi Leave Extract			Sugar 300 gm	Processing cost @10%	Total cost (Rs./Kg)
		%	(gm)	Rs.	%	(gm)	Rs.	%	(gm)	Rs.	Rs.		
1	A ₀ B ₀	100	1000	210.6	-	-	-	-	-	-	12.0	22.26	244.86
2	A ₀ B ₁	99	990	208.49	-	-	-	1	10	3.5	12.0	22.399	246.39
3	A ₀ B ₂	98	980	206.39	-	-	-	2	20	7.0	12.0	22.539	247.93
4	A ₀ B ₃	97	970	202.24	-	-	-	3	30	10.5	12.0	22.474	247.93
5	A ₁ B ₀	99	990	208.49	1	10	5.0	-	-	-	12.0	22.549	248.04
6	A ₁ B ₁	98	980	206.39	1	10	5.0	1	10	3.5	12.0	22.689	249.58
7	A ₁ B ₂	97	970	204.28	1	10	5.0	2	20	7.0	12.0	22.828	251.11
8	A ₁ B ₃	96	960	202.18	1	10	5.0	3	30	10.5	12.0	22.968	252.64
9	A ₂ B ₀	98	980	206.39	2	20	10.0	-	-	-	12.0	22.839	251.23
10	A ₂ B ₁	97	970	204.28	2	20	10.0	1	10	3.5	12.0	22.978	252.76
11	A ₂ B ₂	96	960	202.18	2	20	10.0	2	20	7.0	12.0	23.118	254.29
12	A ₂ B ₃	95	950	200.07	2	20	10.0	3	30	10.5	12.0	23.257	255.83
13	A ₃ B ₀	97	970	204.28	3	30	15.0	-	-	-	12.0	23.128	254.41
14	A ₃ B ₁	96	960	202.18	3	30	15.0	1	10	3.5	12.0	23.268	255.94
15	A ₃ B ₂	95	950	200.07	3	30	15.0	2	20	7.0	12.0	23.407	257.48
16	A ₃ B ₃	94	940	197.96	3	30	15.0	3	30	10.5	12.0	23.546	259.01

The cost of prepared Herbal Sandesh. The average cost of 1 Kg Herbal Sandesh samples A₀B₀, A₀B₁, A₀B₂, A₀B₃, A₁B₀, A₁B₁, A₁B₂, A₁B₃, A₂B₀, A₂B₁, A₂B₂, A₂B₃, A₃B₀, A₃B₁, A₃B₂ and A₃B₃ were Rs. 244.86, 246.39, 247.93, 247.93, 248.04, 249.58, 251.11, 252.64, 251.23, 252.76, 254.29, 255.83, 254.41, 255.94, 257.48 and 259.01 respectively.

It can be observed that the cost of production of Herbal Sandesh sample A₃B₃ (259.01) is higher than other samples. The variations in the cost were due to the difference in the percentage of herbs used for the preparation of Herbal Sandesh.

4. 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. The cost of Herbal Sandesh prepared from 4 % fat and 8.5% SNF standardized buffalo milk and herbs was estimated to be (A₀B₀) Rs. 244.86 and (A₃B₃) Rs. 259.01per kg respectively. From the findings of this study undertaken, it is concluded that the Herbal Sandesh containing 4% Ashwagandha and Tulsi (A₂B₂) was better as compare with other treatments in organoleptic characteristics. The cost of Herbal Sandesh (A₂B₂) was estimated to be Rs.254.29/kg.

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