The Pharma Innovation Journal 2022; 11(8): 950-954

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(8): 950-954

www.thepharmajournal.com
Received: 10-05-2022
Accepted: 14-06-2022

RR Dhole
PG Student, Department of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur, Maharashtra, India

DT Undratwad
Assistant Professor, College of Agriculture Gadchiroli, Maharashtra, India

PN Khadse
Ph.D., Student, Animal Husbandry and Dairy Science Section, DR. PDKV, Akola, Maharashtra, India

TA Meshram
PG Student, Department of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur, Maharashtra, India

Corresponding Author:
RR Dhole
PG Student, Department of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur, Maharashtra, India

Studies on sensory evaluation and cost structure of low fat flavoured milk incorporated with ashwagandha (*Withania somnifera)* root powder

RR Dhole, DT Undratwad, PN Khadse and TA Meshram

Abstract
The present investigation entitled "Utilization of ashwagandha (*Withania somnifera*) root powder for preparation of low fat flavoured milk" was undertaken during the year 2019-2020. Milk was cream separated to 0.5 per cent fat and the flavoured milk was prepared with different combinations of milk and ashwagandha root powder in proportion of 100:0 (T_1), 99.8:0.2 (T_2), 99.6:0.4 (T_3), 99.4:0.6 (T_4) and 99.2:0.2 (T_5) with five treatments and four replications in completely randomized design (CRD). Sensory evaluation carried out by the five judges, showed the different levels of ashwagandha root powder had a significant effect on sensory attributes such as flavour and taste, consistency, mouth feel, colour and appearance and overall acceptability of ashwagandha root powder flavoured milk. Flavoured milk prepared by blending with 0.4 parts of ashwagandha root powder (T_3) had secured the highest score (41.24).The cost of production of flavoured milk was increased with increasing level of ashwagandha root powder. The cost of production was lowest for treatment T_1 with 0 parts of ashwagandha root powder (Rs. 51.18 per lit) while, the cost of production was highest for treatment T_5 with 0.8 parts of ashwagandha root powder level (Rs. 60.15 per lit). The flavoured milk prepared by blending with 0.4 parts ashwagandha root powder level i.e. (T_3) costing Rs 55.66 per lit which was superiorly accepted by the panel of judges.

Keywords: Milk, aswagandha root powder, sensory attributes, cost structure, flavoured milk

Introduction
Milk and milk products provide essential nutrients for both adults and children. However, overall milk consumption of both adults and children does not meet the recommendations from dietary guidelines. Flavored milk can increase milk consumption for children and adolescents. flavored milk can help food developers and manufacturers to address attractive attributes while reducing the sugar content to meet the needs of a healthy diet. Flavored milk plays a significant role in increasing milk consumption to ensure children's essential nutrients intake as well as providing nutrition for adults (Xiaomeng and Mary Anne Drake, 2015) [1].

Beverages based on fruits and milk products are currently receiving considerable attention as their market potential is growing. Soft drink industry had made significant progress during recent years in terms of production, but there is only a limited range of flavours available in India. Many types of syrups, sherbets and soft drinks containing artificial fruit flavours are well known throughout the world. The basic consideration is the caloric and therapeutic values, which make them popular and acceptable. At present fruit beverages are generally synthetic flavoured, bottled and sold in the market. If this could be substituted with milk/whey, it will be more beneficial to consumers, dairy industries and beverage manufacturers. Beverages based on whey/milk have high nutritional quality and increased caloric value. These could be particularly useful in places where, there is improper food and nutrition leading to the deficiencies of some nutrients. Most of the people do not relish milk and milk products as such, so various flavoured milks have been made by using variety off flavours like chocolate flavoured and fruit flavoured milk drinks (Hassan *et al*., 2015) [2]. The roots of *Withania somnifera* (WS) are used extensively in ayurveda, the classical Indian system of medicine, and WS is categorized as Ramayana, which are used to promote physical and mental health, to provide defense against disease and adverse environmental factors and to arrest the aging process. WS has been used to stabilize mood in patients with behavioral disturbances (Bhattacharya *et al*., 2000) [3].

Studies indicate ashwagandha possesses anti-inflammatory, antitumor, antistress, antioxidant, Immunomodulatory, hematopoietic, and rejuvenating properties.

It also appears to extra positive influence on the endocrine, cardiopulmonary, and central nervous systems. The mechanisms of action for these properties are not fully understood. Toxicity studies reveal that ashwagandha appears to be a safe compound (Mishra *et al*., 2000) [4].

Ashwagandha possesses many qualities, including anti-inflammatory, anti-tumor, and immunomodulatory properties, as well as exerting an influence on the endocrine, nervous, and cardiopulmonary systems. On the basis of analysis, it was concluded that supplementation of ashwagandha with milk is more effective in treatment of hypertension whereas it does not have any effect on body mass index and weight. Thus, *Withania somnifera* offers a natural alternative or as an adjunct with conventional agents with lesser side- effects. However, for concrete evidence and its application as a drug in as per the stricter norms of drug development, more studies are warranted in clinical settings (Shalini Kushwaha *et al*., 2012) [5]. There is great potential of traditional Indian dairy products for innovation and value addition. Education on value addition must be made more relevant to the future needs.

The present study will be effective for future research in order to maximize the use of medicinal plant. Now a day's value and demand of ayurvedic products is increasing. The addition of ashwagandha improves flavour, acceptability and nutritional quality of product. Hence present research work has been undertaken.

Material and Methods

The present research work entitled "Utilization of ashwagandha (*Withania somnifera*) root powder for preparation of low fat flavoured milk" was undertaken in the section of Animal Husbandry and Dairy science, College Of Agriculture Nagpur, during 2019-20.

Materials

In this investigation cow milk was used for conducting the experimental trials. The fresh, clean cow milk was obtained from section of Dairy Science and Animal Husbandry, College of Agriculture Nagpur. Obtained milk was filtered through the muslin cloth to avoid dirt and extraneous matter. The milk sample was analyzed for different milk constituent's *viz*. fat, total solids, protein, ash and acidity.

Cow milk was used for conducting the trial throughout the experiment the milk was cream separated at 0.5 per cent fat skim milk by using cream separation by gravimetric method for each trial for preparation of flavoured milk.

Different equipments *viz*., Muslin cloth, Conical flask., Weighing balance, Test tube, Thermometer, Grinder/Juicer, Gas burner, Ladle, Pipette, Burette, Stainless steel container with diameter of 30cm and depth 20cm, etc. were available in the department. Analytical reagent grade chemicals were used for the chemical analysis.

Methods

This experiment was done with five treatments and four replications for preparation of flavoured milk. The levels of ashwagandha root powder in flavoured milk were given below.

Treatments	Milk (parts)	Ashwagandha root powder (parts)
T1	100	00
T2	99.8	0.2
T3	99.6	0.4
T4	99.4	0.6
T5	99.2	0.8

5 per cent sugar and 0.15 percent cardamom powder was added for all treatments.

Procedure for preparation of ashwagandha flavored milk

Method of preparation of flavoured milk suggested by De (2003) was used. Sugar was weighed as per proportion. At the same time milk was cream separated to 0.5 per cent fat by using cream separator. The milk was filtered and heating to 63 ºC for 30 minutes. After cream separation, boiling of milk was carried out. The sugar and ashwagandha root powder were properly in desired amount added in milk. The mixture was then kept for cooling to room temperature and after cooling the mix was put in the sterilized bottle and kept under refrigeration storage at (5 ºC) until use.

Fig 1: Sensory evaluation of ashwagandha flavored milk

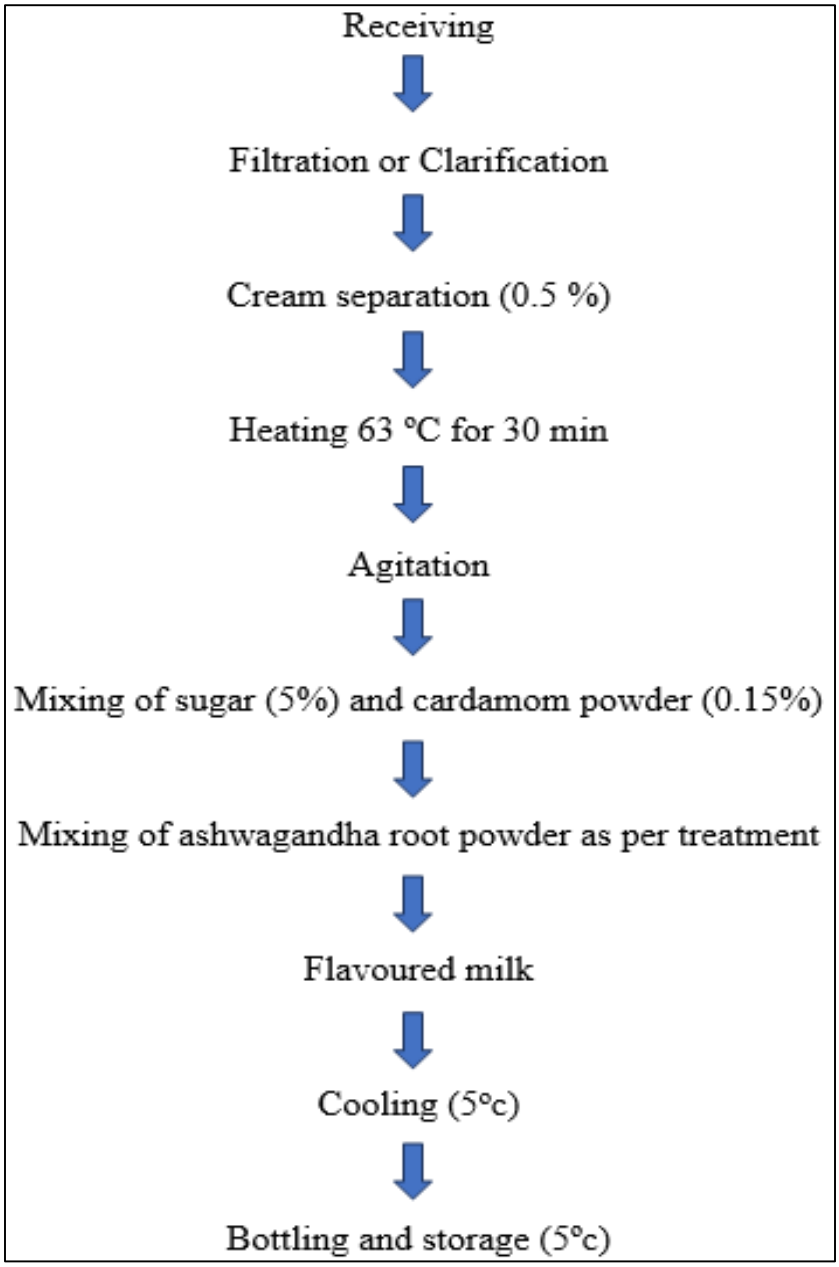

Fig 2: Flow chart for preparation of ashwagandha root powder based flavoured milk

Bottling immediately after cooling, flavoured milk was filled into 200 ml clean bottles followed by sterilization. For each treatment, five bottles were sealed and sterilized and labeled properly for identification and kept in a refrigerator.

Result and Discussion

Sensory evaluation of ashwagandha flavoured milk

The sample of ashwagandha flavoured milk prepared under five treatments and four replications was evaluated by panel of five judges for sensory evaluation. A 9 point hedonic scale prescribed by Nelson and Trout (1964) [6] were used for judging different quality attributes of ashwagandha flavoured milk.

Sensory evaluation of ashwagandha flavoured milk

The sample of ashwagandha flavoured milk prepared under five treatments and four replications was evaluated by panel of five judges for sensory evaluation. A 9 point hedonic scale prescribed by Nelson and Trout (1964) [6] were used for judging different quality attributes of ashwagandha flavoured milk.

Flavour and taste score

The score for flavour and taste was increased up to T_3 i.e. 0.4 per cent addition of ashwagandha root powder, thereafter score was declined simultaneously. The highest score (8.31) was obtained by the treatment T_3 i.e. at 0.4 per cent level of ashwagandha root powder and the lowest score (7.15) was obtained by treatment (T1) i.e. flavoured milk with 0 per cent addition of ashwagandha root powder.

Consistency score

The highest score (8.56) was obtained by the treatment T_5 i.e. at 0.8 per cent level of ashwagandha root powder and the lowest score (7.06) was secured by in treatment (T_1) i.e. flavoured milk with 0 per cent addition of ashwagandha root powder. The significant score was (8.17) received by flavoured milk prepared with 0.4 parts of ashwagandha root powder i.e. T_3 treatment which was superior treatment in respect of consistency of flavoured milk.

Colour and appearance score

The highest score (8.09) was obtained by the treatment T_3 i.e. at 0.4 per cent level of ashwagandha root powder and the lowest score (7.04) was secured by in treatment (T_1) i.e. flavoured milk with 0 per cent addition of ashwagandha root powder.

Mouth feel score

The highest score (8.29) was obtained by the treatment T_3 i.e. at 0.4 per cent level of ashwagandha root powder and the lowest score (7.43) was secured by in treatment (T_1) i.e. flavoured milk with 0 per cent addition of ashwagandha root powder.

Overall acceptability

The highest score (8.38) was obtained by the treatment T_3 i.e. at 0.4 per cent level of ashwagandha root powder and the lowest score (7.42) obtained for treatment (T_1) i.e. flavoured milk with 0 per cent addition of ashwagandha root powder. On the basis of results obtained it was observed that amongst different levels of ashwgandha root powder T_3 treatment (0.4 per cent ashwagandha root powder) was found more acceptable by the judges.

Overall acceptability

The data regarding the organoleptic evaluation for overall acceptability of flavoured milk are presented in Table 1.

Table 1: Overall acceptability score of flavoured milk prepared with different levels of ashwagandha flavoured milk on the basis of 9 point Hedonic scale

Sr. No.	Treatments	Replications				Mean
		R-I	R-II	R-III	R-IV	
1	T_1	7.30	7.43	7.45	7.48	7.42^e
2	T_2	7.89	7.98	8.02	7.92	7.95^b
3	T_3	8.45	8.33	8.40	8.35	8.38^a
4	T_4	7.65	7.70	7.77	7.80	7.73^c
5	T_5	7.42	7.55	7.58	7.61	7.59^d
S.E.(m)±		0.045				
C.D. at 5%		0.138				
Result		Sig.				

Values with different superscripts differ significantly ($p < 0.05$)

It is revealed from Table 1 that the overall acceptability of flavoured milk was significantly affected due to addition of ashwagandha root powder at different levels. The average score for overall acceptability attributes of flavoured milk prepared under each treatment as 7.42, 7.95, 8.38, 7.73 and 7.59. The significantly highest score 8.38 was received by flavoured milk prepared with addition of 0.4 per cent of ashwagandha root powder i.e. T3 treatment which was superior to remaining treatment.

Table 2: Cost structure of ashwagandha flavoured milk

Items	Treatments									
	T_1		T_2		T_3		T_4		T_5	
	QTY	Value (Rs)	QTY	Value (Rs)	QTY	Value (Rs)	QTY	Value (Rs)	QTY	Value (Rs)
Skim milk (ml) @ Rs 28/lit.	1000	28	998	27.94	996	27.88	994	27.83	992	27.77
Ashwagandha root powder (gm) @ Rs 115/100gm	-	-	2	2.3	4	4.6	6	6.9	8	9.2
Sugar (gm) @ Rs 40/Kg	50	2	50	2	50	2	50	2	50	2
Fuel Charges LPG (gm) Rs 758.50/14.2kg	52.50	2.80	52.50	2.80	52.50	2.80	52.50	2.80	52.50	2.80
Electricity Charges@ Rs. 5/Unit	0.40	1.20	0.40	1.20	0.40	1.20	0.40	1.20	0.40	1.20
Labour time (hrs) @ Rs 275/8hr	½	17.18	½	17.18	½	17.18	½	17.18	½	17.18
Total		51.18		53.42		55.66		57.91		60.15

The cost of production of 1 litre ashwagandha flavoured milk under various treatments was calculated by taking into consideration the prevailing retail market prices for the various items i.e. cow milk, skim milk, sugar and ashwagandha root powder, while the other charges such as labour, fuel, electricity charges etc. are work out on the basis of actual hours of work performed for the preparation of 1 lit ashwagandha root powder flavoured milk.

The data presented in table indicated that cost of production of 1 lit ashwagandha root powder flavoured milk prepared with milk and ashwagandha root powder in proportion of 100:0(T1), 99.8:0.2(T2), 99.6:0.4(T3), 99.4:0.6(T5) and 99.2:0.8(T5) treatments were Rs 51.18, Rs 53.42, Rs 55.66, Rs 57.91 and 60.15, respectively. The increased in the level of added ashwagandha root powder showed the slightly increased in cost of production. These differences were mainly because of cost of ashwagandha root powder.

Conclusion

It may be concluded from the present study that, Flavoured milk prepared with addition of 99.6 parts of milk and 0.4 parts of ashwagandha root powder (T_3) scored highest marks for all sensory attributes, *viz*. flavour and taste, consistency, mouth feel and colour and appearance as compared to flavoured milk with addition of milk and ashwagandha root powder in proportion of 100:0(T_1), 99.8:0.2(T_2), 99.4:0.6(T_4) and 99.2:0.8(T_5) parts. The cost of flavoured milk slightly increased with the increased in the levels of ashwagandha root powder. The cost of most acceptable treatment prepared with addition of 0.4 parts of ashwagandha root powder (T_3) was Rs.55.66 per lit.

References

1. Xiaomeng, Li E, MaryAnne Drake. Sensory perception, nutritional role, and challenges of flavored milk for children and adults. J of Food Sci. 2015;80(4):65-70.

2. Hassan M, Dar BN, Rather SA, Rehana Akhter, Aamina Huda B. Physico-chemical, sensory and microbial characteristics of fruit flavoured milk based beverages during refrigerated storage. Adv. Biomed. Pharma. 2015;2(1):32-39.
3. Bhattacharya SK, Bhattacharya A, Sairam K, Ghosal S. Anxiolytic-antidepressant activity of *Withania somnifera* glycol with annelids: An experimental study. Phytomed. 2000;7(6):463-469.
4. Mishra S, David J, Hussain SKA, Kumar P, Upadhyay S. Studies on sensory and microbial quality of herbal based flavoured beverage by using wheat grass powder and honey. J Pharmacognosy and Phytochemistry. 2018;7(3):1217-1219.
5. Shalini Kushwaha, Betsy A, Chawla P. Effect of Ashwagandha (*Withania somnifera*) root powder supplementation in treatment of hypertension. Ethno Med. 2012;6(2):111-115.
6. Nelson JA, Trout JM, Judging of dairy product, 4th edition Olson Publ. Co. Milwaukee, 1964, 302-306.