Biological Forum – An International Journal **14(4): 146-149(2022)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Development of Goat Milk Shrikhand Fortified with *Mimosa pudica* Powder

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(Received 06 August 2022, Accepted 22 September, 2022)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Goat milk is used to replace cow milk for those suffering from allergy. It has a high nutritional content. It is a rich source of calcium, phosphorous, chlorine, and vitamins. It is highly digestible and has a mild laxative effect. It is a good source of vitamin B1. Shrikhand is a semi solid, sweetish-sour, whole milk product, prepared from lactic fermented curd. Goat milk has a high nutritional content. *Mimosa pudica* is a creeping leguminous herb, primarily used for its medicinal benefits. Therefore, for fortification of goat milk shrikhand with *Mimosa pudica* powder was studied so as to provide functional shrikhand with nutritional and medicinal values. In present study the suitability of *Mimosa pudica* powder in goat milk shrikhand studied based on sensory and chemical qualities. Sensory score observed in different treatment combination shows higher score (8.06) for addition of *Mimosa pudica* powder @ 1% indicating overall acceptability of the product (T_3).

Keywords: Shrikhand, Goat milk, *Mimosa pudica*, Fortification of milk products.

INTRODUCTION

Goat milk has a high nutritional content. It is a rich source of calcium, phosphorous, chlorine, and vitamins. It is highly digestible and has a mild laxative effect. It is a good source of vitamin B1, which is useful in relieving symptoms of stress (neurotic indigestion, constipation, and insomnia). It may be used to replace cow milk for those suffering from allergy. It has a higher fat content than cow milk and low cholesterol levels than cow milk, hence suitable for people with high blood pressure. It is low in sugar than cow milk, hence good for those suffering from diabetes. Goat milk is closer to human milk and is therefore easily accepted especially by those young or frail. It has an alkaline reaction like mother's milk. It does not form mucous (phlegm) and is therefore better tolerated by asthmatics and those with allergies (Kalyankar, 2016). The role of fermented milks (FM) in human nutrition is well documented (Khedkar *et al*., 2003). Shrikhand, a fermented and coagulated milk product, prepared from Dahl obtained from whole milk of Cow, Buffalo, Goat or mixed milk. Shrikhand is a semi solid, sweetish-sour, whole milk product, prepared from lactic fermented curd. The curd (dahi) is partially strained through a muslin cloth to remove the whey to yield Chakka. Sugar, flavour, colour and dry fruits/condiments are mixed into Chakka to form a soft homogenous mass known as Shrikhand (Jadhav *et al*., 2019).

Several herbs have been in use for centuries both for culinary and medicinal purposes, similarly they therapeutic properties such as antioxidative, anti-inflammatory, antidiabetic, antihypertensive and antimicrobial activities (El-Sayed and Youssef, 2019). The bioactive compounds from spices and herbs have the potential to decrease or inhibit the risk of degenerative diseases such as diabetes, obesity, cancer and cardiovascular diseases (Anderson *et al*., 1999). Few herbs can help in extending the shelf life of dairy products (especially fermented dairy products) especially through their suppressing effect on fungi and bacteria (Oraon *et al*., 2017). Therefore, fortification of dairy products with herbs could help to provide functional dairy foods with nutritional and medicinal values. *Mimosa pudica* is a creeping leguminous herb, commonly known as touch-me-not plant. It is primarily used for its medicinal benefits. Phytochemical studies on *M. pudica* have revealed the presence of alkaloids, non-protein, amino acids, flavonoids e-glycosided, sterols, terpenoids, tannis and fatty acids. It also possesses antibacterial, antifertility, antivenin, antidepressant, Anticonvulsant properties etc (Ahmad

et al., 2012). Therefore, to study the suitability of addition of *M. pudica* powder in goat milk shrikhand have been planned.

MATERIALS AND METHOD

Materials: This study was conducted in Department of Dairy Science, Shivaji Mahavidyalaya, Udgir. For the preparation of goat milk shrikhand, good quality goat milk of Osmanabadi breed was procured from the adjoining villages of Udgir. Milk was processed and starter cultures are used for the preparation of curd. Quality cane sugar was purchased from the local market. Good quality of *Mimosa pudica* powder was also procured from authorized sources.

Manufacturing process of goat milk shikhand: Fresh goat milk with 4% Fat & 8.5% SNF was procured, pasteurized and cooled at room temperature. Thereafter it was inoculated with starter culture @ 1.5 % of milk it, after complete inoculation milk was stirred thoroughly and was incubated at room temperature for 12 hrs without disturbing until it attains the acidity of 0.60 to 0.70% LA. By using muslin cloth curd was strained for complete removal of whey while draining the product it is kept in refrigeration at below 5°C to avoid increase in acidity. When semi solid mass is obtained, *i.e*. chakka, the good quality sugar (preferably ground sugar) is added @ 45% of weight of *Chakka* and kneaded uniformly. The *Shrikhand* was prepared by adding different levels of *Mimosa pudica* powder. One control and three treatments like T_1(3gm), T_2(2gm) and T_3 (1gm) were studied for its sensory and physico-chemical parameters. Sensory evaluation of fresh samples was done by a panel of six semi trained members, based on a 9-point hedonic scale. The different attributes namely colour and appearance, taste, flavour. Body and texture & overall acceptability was evaluated. The preparation of goat milk shrikhand fortified with *Mimosa pudica* powder is summarized in Fig. 1.

Statistical Analysis: Sensory evaluation was performed to standardize and determine the acceptability of the Goat milk shrikhand blended with *M. pudica* powder. The study panelists were instructed to evaluate the sample and their opinions were recorded for colour & appearance, body & texture, flavour and overall acceptability on nine-point hedonic scale. After providing information of sample the panelist received treatment samples coded as T_0, T_1, T_2 and T_3 in series with a spoon and glass of water to cleanse the palate between evaluations. The data obtained from the research have been suitably organized and analyzed by taking into an account the study objectives, hypothesis and the theoretical orientation. This product is also analysed for its physico-chemical parameters.

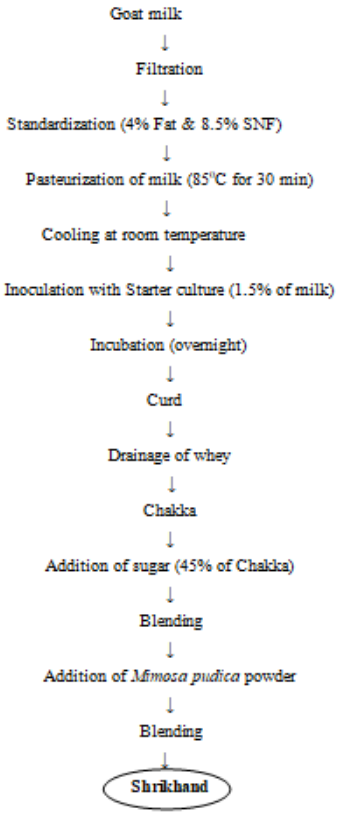

Fig. 1. Flow chart for preparation of goat milk shrikhand fortified with *Mimosa pudica* powder.

RESULT AND DISCUSSION

Shrikhand is the most popular fermented and coagulated milk product of India. Goat milk Shrikhand fortified with *Mimosa pudica* powder improves the nutritional value of the product. The sensory scores revealed that addition of *Mimosa pudica* powder @ 1% gave good sensory perception. The results are summarized in Table 1.

Table 1: Effect of addition of *M. pudica* on sensory properties of Goat Milk Shrikhand.

Variables/ Attributes	Colour & Appearance	Body & Texture	Flavour	Overall acceptability
T_0	8.01±0.17	8.20±0.78	8.29±0.11	8.06±0.00
T_1	6.22±0.06	6.40±0.11	6.42±0.00	6.56±0.00
T_2	7.18±0.57	7.21±0.00	7.25±0.33	7.19±0.37
T_3	7.94±0.88	8.14±0.86	8.13±0.18	8.06±0.28

T_0-No addition of *M. pudica* powder, T_1-(3%); T_2-(2%); T_3-(1%)

The Table 1 shows that the maximum mean sensory score towards overall acceptability of the shrikhand was obtained in T_3 (8.06). Colour and appearance of the product in T_3 shows pleasing colour as compared to T_1 and T_2, which will not affect the flavour (8.13) of the product. The mean sensory score for body and texture is obtained the sample T_3 is highest as compared to other samples i.e T_1 & T_2 shows lowest score which means increase of *Mimosa pudica* powder decreases the body and texture quality. The higher rate of addition in T_1 and T_2 affects the sensory score in terms of body & texture and flavour of the product, resulting the product with slightly coarse texture and product leaves aftertaste. In summary goat milk shrikhand enriched with *M. pudica* powder @1% showed the good score on hedonic scale in terms of colour & Appearance (7.94), body & texture (8.14), flavour (8.13) and overall acceptability was also good (8.06). These results are in conformity with Pathrikar *et al*. (2021); Waghmare *et al.* (2019); Landge *et al*. (2011); Sahu *et al.* (2021).

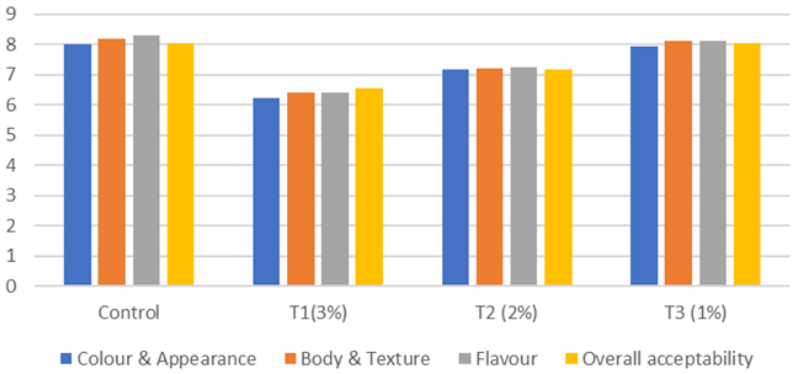

Fig. 2. Effect of addition of *Mimosa pudica* powder on sensory quality of goat milk shrikhand.

Analysis of Goat milk shrikhand enriched with *M. pudica* powder: The shrikhand samples were analyzed for the proximate properties like moisture, ash, protein, fat and carbohydrate. Table 2 shows the comparative analysis of the control and shrikhand enriched with M. pudica powder (1%). The moisture content of control shrikhand and *M. pudica* enriched shrikhand was 50.44% and 47.11%, respectively. The enriched shrikhand showed lower percentage of moisture content in comparison with control sample as the total solid content is more in enriched shrikhand. The ash content was 0.61% and 0.99% for the control and final product, respectively. This variation is due to the addition *M. pudica* @ 1%. The fat content was 6.24% and 6.30% in control and *M. pudica* enriched shrikhand, respectively. The protein content was 9.51% and 9.36% for the control and enriched product, respectively. The carbohydrate content was 46.35% for control and 45.10% for enriched shrikhand.

Table 2: Comparative analysis of the control and shrikhand enriched with *M. pudica* powder.

Sr. No.	Parameters	Unit	T_0	T_3	Reference Method
1.	Moisture	%`	50.44	47.11	Gravimetric Method by Hot Air Oven
2.	Ash	%	0.61	00.99	Gravimetric Method by Muffle Furnace
3.	Protein	%	09.51	09.36	Kjeldahl Method
4.	Fat	%	06.24	06.30	Soxhlet Extraction Method
5.	Carbohydrate	%	46.35	45.10	Titrimetric Method With Fehling Reagent.

CONCLUSION AND FUTURE SCOPE

In preparation process of *Mimosa pudica* powder blended with goat milk shrikhand for the purpose to increasing the nutritional value of the product. In present investigation the suitability of *Mimosa pudica* powder in goat milk shrikhand studied based on sensory and chemical qualities. There was a significant difference in overall acceptability. Score observed in different treatment combination shows higher overall acceptability score (8.06) indicating superior acceptability among experimental samples. The mean liking sequence was in following the trend T_0, T_3, T_2, T_1, the present work showed that goat milk shrikhand prepared with 1gm *Mimosa pudica* powder in 99gm of shrikhand had more acceptable quality characteristics among all the experimental samples. It is acceptable that the *Mimosa pudica* can be effectively used for the production of goat milk *Shrikhand*. In future suitability of this herb in various traditional dairy products can be studied. Such types of dairy products will be considered as therapeutic food for health conscious peoples.

Acknowledgement. I would like to thank co-authors for their ideas, valuable suggestions and contribution during this work. I would also like to thank our Institute for providing support during this study.

Conflict of Interest. None.

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How to cite this article: R.B. Yedatkar, S.D. Kalyankar, B.D. Landge, Jyoti S Gaikwad and S. N. Landge (2022). Development of Goat Milk Shrikhand Fortified with *Mimosa pudica* Powder. *Biological Forum – An International Journal*, *14*(4): 146-149.