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Effect of Singada (*Trapa natans* L.) flour on Sensory quality of Gulabjamun

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Abstract
The present investigation conducted with the objective of value addition in milk and milk products. In this regard the gulabjamun was prepared with utilization of different levels of Singada flour as T_1 (control), T_2 (10%), T_3 (15%), T_4 (20%) and T_5 (25%) with the main objective to evaluate the sensory quality of gulabjamun. Sensory evaluation of control gulabjamun and gulabjamun blended with different levels Singada flour was judge by semi trained panel of judges (9-point Hedonic scale). It was observed on the basis of sensory evaluation of gulabjamun blended with different levels of Singada flour in respect of flavour, colour, appearance, body and texture, and overall acceptability indicate that the utilization of level of 15% Singada flour for preparation of gulabjamun showed positive trend and consumer acceptance for commercial production. It is concluded that the Singada could be better source for value addition and the final product can be used for religious purpose.

Keywords: Gulabjamun, Singada flour, sensory evaluation**,** overall acceptability

1. Introduction
India ranks first among the world's milk-producing countries, contributing approximately 24.76% to the total global milk production. Over the past decade, milk production in India has grown at a Compound Annual Growth Rate (CAGR) of 5.62%, increasing from 146.31 Million Tonnes in 2014–15 to 239.30 Million Tonnes in 2023–24. (Press Information Bureau 2024). Milk and milk-based products which are used for preparation of traditional Indian foods, which continue to be widely consumed due to their enduring social, economic, religious, medicinal, and cultural importance (Murtaza *et al*. 2017) [5].

Value addition in milk and milk products is a critical aspect of the dairy industry, aimed at improving the economic returns to producers while offering consumers enhanced nutrition, convenience, and variety. One of the primary methods of value addition is processing raw milk into traditional and novel dairy products such as khoa, paneer, yogurt, cheese, ghee, and flavored milk. These not only extend shelf life but also cater to evolving consumer preferences (Aneja *et al*. 2002) [1]. Fortification of milk with essential micronutrients like vitamins A, D, B12, and minerals such as iron and zinc enhances the nutritional profile of milk, addressing malnutrition and micronutrient deficiencies among different population groups (Singh and Sharma, 2017) [14]. Functional dairy products that incorporate bioactive compounds, such as omega-3 fatty acids, antioxidants, or herbal extracts, offer health benefits beyond basic nutrition, including improved heart health and immune function (Patel and Park, 2015) [9]. Fermented dairy products like yogurt, lassi, and probiotic dahi are gaining popularity due to their digestive and gut health benefits, driven by the presence of beneficial bacteria (Tamime and Robinson, 2007) [15]. The growing demand for organic milk, A2 milk, and indigenous dairy products like shrikhand and kulfi provides new opportunities for niche marketing and premium pricing (Kumar *et al*. 2011) [3].

Khoa is a traditional dairy product obtained by concentrating milk and used in India and neighboring countries as a fundamental ingredient in the preparation of a variety of sweets such as peda, burfi, gulabjamun, and kalakand. (Patel and Bhadania, 2015) [10]. The quality of khoa significantly affects the texture, flavor, and moisture content of gulabjamun (Aneja *et al*. 2002) [].

Gulabjamun is a traditional Indian sweet primarily prepared from khoa and is especially popular in the Northern, Western, and Central regions of the country. The preparation of

gulabjamun typically involves kneading wheat flour (Maida) and baking powder with khoa derived from cow or buffalo milk to form a smooth dough. The dough is then divided into equal portions, shaped into round balls, deep-fried until golden brown, and subsequently soaked in sugar syrup overnight to enhance sweetness and texture (Nalawade *et al.* 2015) [7].

Singada offers several advantages compared to other food sources, including its high nutrient density and low caloric content. Singada is an excellent source of dietary fiber and may contribute to improved digestive health by promoting regular bowel movements. Additionally, it has potential benefits such as lowering blood cholesterol levels, regulating blood glucose, offering neuroprotective effects, and supporting overall gut health. In addition, Carbohydrates constitute the primary source of calories in Singada. Although they are rich in fiber, potassium, manganese, copper, vitamin B6, and riboflavin, uncooked Singada consists of approximately 74% water, which contributes to its relatively low caloric value. (Rajput and Singh, 2023) [13].

2. Materials and Methods

The present study conducted on Effect of Singada (*Trapa natans* L.) flour on sensory quality of Gulabjamun in the Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra during the year 2024-25. The Singada flour was used for preparation of gulabjamun with different percent i.e. T_1 (control), T_2 (10%), T_3 (15%), T_4 (20%) and T_5 (25%). A sensory evaluation was conducted to assess both the control gulabjamun and the gulabjamun prepared with different levels of Singada flour. A semi-trained panel of judges evaluated the products based on key sensory attributes, including flavour, colour and appearance, body and texture, and overall acceptability. The assessment was carried out using the 9-point Hedonic scale as described by Nelson and Trout (1964) [8].

2.1 Procedure for preparation of Gulabjamun

Receiving of Cow milk
↓
Preheating (35 to 40^0 C)
↓
Filtration
↓
Heating and boiling continuously
↓
Stirring and scrapping
↓
Thicken mass show and reaches a pasty consistency and leave the side of pan
↓
At this stage reduce the temperature
↓
Khoa
↓
Mixed and kneading with roasted Singada flour
↓
Preparation of Balls
↓
Frying in vegetable oil
↓
Soaking in sugar syrup
↓
Gulabjamun (ready to serve)

3. Results and Discussion

Sensory evaluation

The data pertaining to sensory evaluation were statistically analyzed, organized, and presented in Table 1.

Table 1: Sensory evaluation of gulabjamun blended with different levels of Singada (*Trapa natans* L.) flour

Treatments	Mean values of score obtained for five treatments and four replications (out of 9)			
	Flavour	Colour and appearance	Body and texture	Overall acceptability
T_1	8.15	8.20	8.10	8.17
T_2	7.90	7.93	7.95	7.92
T_3	8.23	8.27	8.20	8.25
T_4	7.72	7.73	7.66	7.75
T_5	7.30	7.35	7.25	7.32
'F' test	Sig.	Sig.	Sig.	Sig.
SE (m)±	0.0084	0.0083	0.0076	0.0079
CD at 5%	0.0254	0.0250	0.0230	0.0238

3.1 Flavour

The flavour of gulabjamun was significantly influenced by the incorporation of different levels of Singada flour. The treatment with 15% Singada flour (T_3) achieved the highest flavour score of 8.23, indicating that this level provided an optimal balance between the traditional sweetness of gulabjamun and the unique flavour of Singada. However, as the level of Singada flour increased beyond 15%, the flavour acceptability declined. The results obtained for developed gulabjamun were in agreement with the observations reported by Londhe (1995) [4].

3.2 Colour and appearance

The colour and appearance of gulabjamun were markedly influenced by the different level of Singada flour incorporated in the formulation. An increase in the levels of Singada flour led to a gradual decline in both colour intensity and visual appeal. The treatment containing 15% Singada flour received the highest mean score of 8.27 for colour and appearance, indicating superior sensory quality, whereas the one with 25% achieved the lowest score of 7.35. The results obtained for the prepared gulabjamun were in accordance with the findings reported by Patil (2002) [11].

3.3 Body and texture

The incorporation of Singada flour had a significant influence on the body and texture of gulabjamun. The study revealed that as the level of Singada flour increased, there was a gradual change in the texture of the product. The treatment with 15% Singada flour (T_3) achieved the highest

score 8.20 for body and texture, indicating a soft, spongy, and well-integrated structure that closely resembled the desirable characteristics of traditional gulabjamun. At this level, the product maintained a uniform internal structure with good moisture retention and an appealing bite. However, with further increases in Singada flour levels beyond 15%, the texture became increasingly firm and slightly coarse. This hardening effect may be attributed to the higher starch and fiber content in Singada flour, which could reduce water absorption and interfere with the development of a soft, cohesive structure. The results obtained for the developed gulabjamun were in agreement with the findings reported by Nalawade (2014) [6] and Thaware (2011) [16].

3.4 Overall acceptability

The sensory evaluation results clearly indicated that among the different levels of Singada flour incorporated into gulabjamun, the T_3 treatment, containing 15% Singada flour, was the most acceptable by the panel of judges. This treatment received the highest overall sensory scores, suggesting that a 15% incorporation level provides an optimal balance of flavour, texture, and appearance without adversely affecting the traditional qualities of the product. Whereas, higher levels of Singada flour were associated with a decline in sensory attributes, likely due to undesirable changes in colour, texture, and taste. These findings are in alignment with the observations made by Dewani and Jayaprakasha (2002) [2].

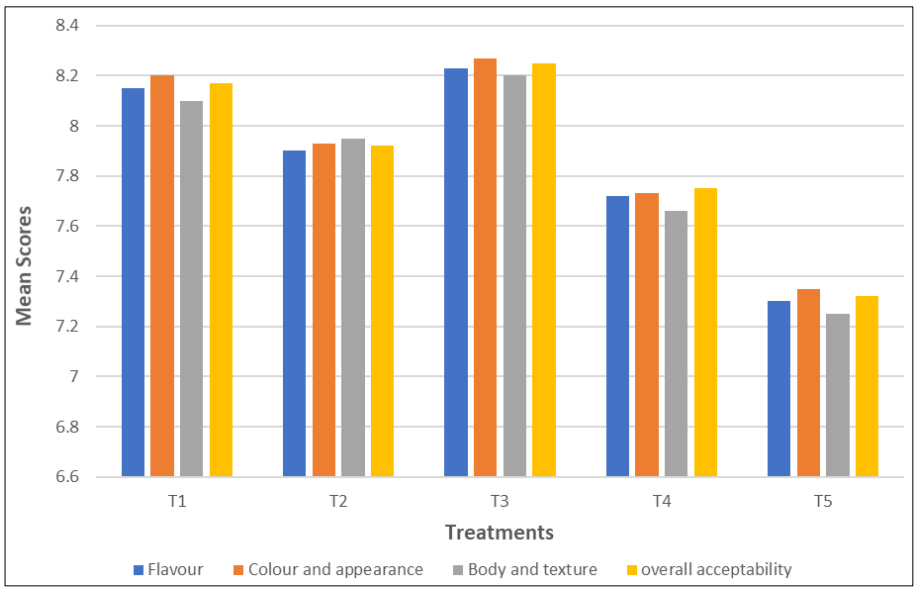

Fig 1: Sensory evaluation of gulabjamun blended with different levels of Singada (*Trapa natans* L.) flour

4. Conclusion

Thus, it is concluded that on the basis of sensory evaluation of gulabjamun blended with different levels of Singada flour for the parameters flavour, colour and appearance, body and texture, and overall acceptability that the level of 15% Singada flour used for preparation of gulabjamun showed positive trend and consumer acceptance for commercial production.

5. References

1. Aneja RP, Mathur BN, Chandan RC, Banerjee AK. Technology of Indian Milk Products. Delhi: Dairy India Yearbook; 2002.
2. Dewani PP, Jayaprakasha HM. Effect of addition of whey protein concentrate on physico-chemical and sensory characteristics of Khoa and Khoa based sweets. J Food Sci Technol Mysore. 2002;39:502–506.
3. Kumar A, Staal S, Singh DK, Jain D. Market participation by smallholders' dairy producers: Evidence from the National Dairy Development Board (NDDB) in India. IFPRI Discussion Paper. 2011;01120:1–32.
4. Londhe S. Comparative studies on the use of different binders flours on the quality of Gulabjamun [MSc (Agri.) thesis]. Parbhani (India): MAU; 1995. p. 1–85.
5. Murtaza MA, Pandya AJ, Haenlein GF, Khan MMH. Traditional Indian dairy products. In: Park YW, Haenlein GFW, Wendorff WL, editors. Handbook of Milk of Non-Bovine Mammals. 2nd ed. Oxford: Wiley-Blackwell; 2017. p. 343–367.
6. Nalawade MR. Studies on preparation of Gulabjamun blended with wheat bran [MSc (Agri.) thesis]. Parbhani (India): MAU; 2014. p. 1–76.
7. Nalawade MR, Shinde AT, Korake RL, Ligayat NT. Studies on preparation of Gulabjamun blended with wheat bran. Res J Anim Husb Dairy Sci. 2015;6(2):139–144.
8. Nelson JA, Trout GM. Judging Dairy Products. 4th ed. Westport (CT): AVI Publishing Co.; 1964. p. 1–368.
9. Patel S, Bhadania AG. Mechanized production of traditional Indian dairy products: Present status, opportunities and challenges. In: Compendium of National Seminar on "Indian Dairy Industry – Opportunities and Challenges". Anand: SMC College of Dairy Science; 2015. p. 214–222.
10. Patel S, Park S. Functional and therapeutic roles of whey protein: A review. Food Sci Hum Wellness. 2015;4(2):56–68.
11. Patil HS. Studies on formulation of Gulabjamun from goat milk [PhD dissertation]. Parbhani (India): Vasantrao Naik Krishi Vidyapeeth; 2002. p. 1–120.
12. Press Information Bureau. India achieves record milk production of 230.58 million tonnes in 2022-23 [Internet]. 2024 [cited 2025 Aug 1]. Available from: https://pib.gov.in/PressReleasePage.aspx?PRID=2086052

13. Rajput JD, Singh SP. Water chestnut (Trapa natans L.): Functional characteristics, nutritional properties and applications in food industry: A review. J Phytopharmacol. 2023;12(2):119–126.
14. Singh AK, Sharma N. Fortification of milk and milk products: Recent trends. Indian Dairyman. 2017;69(5):48–52.
15. Tamime AY, Robinson RK. Tamime and Robinson's Yoghurt: Science and Technology. 3rd ed. Cambridge: Woodhead Publishing; 2007. p. 1–619.
16. Thaware SS. Utilization of potato (Solanum tuberosum) powder as substitute of maida in manufacture of Gulabjamun [MSc (Agri.) thesis]. Dapoli (India): Dr. BSKKV; 2011. p. 1–88.