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Studies on sensory characteristics of danedar during storage

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Abstract

Sensory evaluation of *danedar* plays an important role in product development and determining the shelf life of a product. In present investigating, *danedar* sample were analyzed on sensory basis on ambient and refrigerated temperature. The initial color and appearance score of *danedar* samples were observed 8.27 ± 0.13 at ambient and refrigerated temperature, this initial value was decreased 8.27 ± 0.13 to 5.53 ± 0.03 and 4.62 ± 0.04 in 15th days of storage and 35th days of storage, respectively. Cow milk *danedar* showed a rapid increase in browning index at storage condition at ambient temp. (30°C) and refrigerated temp. (7°C). The color and appearance score for cow milk *danedar* decreased significantly ($p < 0.05$) throughout the storage period. The initial flavour score of *danedar* was observed 8.47 ± 0.03 at ambient and refrigerated temperature and it is decreased to value of 5.40 ± 0.00 and 4.80 ± 0.03 in 15th and 35th days of storage temperature respectively. The initial score of body and texture of *danedar* was 8.93 ± 0.03 at ambient and refrigerated temperatures, which score was decreased to 5.23 ± 0.12 and 4.83 ± 0.04 on 15th and 35th days of storage condition respectively. The body and texture scores of *danedar* samples decreased with the development of storage period. The decrease in the body and texture score was more in the sample stored at ambient temp. (30°C) than stored at refrigerated temp. (7°C). The body and texture of *danedar* spoiled as sandy, hard, gritty, coarse and dry surface towards the end of storage. The initial overall acceptability score of *danedar* was 8.47 ± 0.03 at ambient and refrigerated temperatures decreased to the score of 5.10 ± 0.10 and 4.38 ± 0.06 on 15th and 35th days of storage, respectively.

Keywords: Danedar, sensory, flavour, colour and appearance, overall acceptability

Introduction

India is the largest milk producing country in the world. Milk production in the country is estimated as 230.58 million tonnes during the year 2022-23 and a growth of 22.81% over the past 5 years (Ministry of Fisheries, Animal Husbandry & Dairying, 2023) [6]. The global contribution of milk production is about 23% and India is the largest milk production in the world. The cost of milk production in the India is going up due to many factors like feed cost, which holds a significant portion of expenses of dairy farmers. The per capita availability of milk in India in 2021-22 was 444 grams per day over the world milk consumption average of 394 grams. In India, about 20-22 per cent of milk production contributes to organized dairy sector (Khanna, 2016) [5]. Many traditional dairy products such as gulabjamun, rasogolla, peda, burfi, danadar, dahi, misti dahi etc. are made in India since ancient times. These dairy products are known as their economic, social, religious, medicinal, and other activities. Sweetmeats are typical traditional dairy products in Bangla cuisine. Sweetmeats are available in the Indian markets, it is mostly chhana-based milk products and palatable. Among these traditional dairy products, danadar plays a unique place in local market of West Bengal. Indigenous dairy products occupy potential role in the emerging dairy and food industry in the organized dairy sector. It is generally sold in spherical form. Danedar has golden and white color. It has a semi hard to firm body with granular texture. Danedar is boiled in sugar syrup till developed the golden color and sugar soaked danadar is rolled on sugar granules. The preparation of chhana using calcium lactate as a coagulant in West Bengal. Calcium lactate chhana has a dazzling white color, soft body, smooth texture and pleasant sweet taste (Sen and De, 1984) [7]. Sen and Rajorhia (1994) [8] observed that use of saffron @ 0.015 percent by weight of Chhana improved the flavour of Sandesh.

Materials and Methods

Sample collection

Source of raw Materials: The following materials were used in this investigation.

Dairy Ingredients

Cow milk: It was procured from the local University Dairy Farm, Mohanpur, India

Other Ingredients

Suji: This was procured from local market Mohanpur, Nadia, (W.B.), India

Sugar: It was obtained from local market of Mohanpur, Nadia, (W.B.), India

All glassware's were used and made of Borosil, India

Sensory evaluation of *Danedar*

Danedar samples were prepared for sensory evaluation by a panel of five judges using by a 9 point Hedonic scale (Amerine *et al.*, 1965)^[1]. The panel of Judges were evaluated the *danedar* samples with respect to color, flavor, body and texture and overall acceptability. The sensory scores awarded by the panelist as per 9 point Hedonic Scale were compiled for statistical analysis. All the replicates were carried out minimum of 3 times to evaluate the mean and standard values. Representative sample of *danedar* was tested for

sensory parameters like flavour, color and appearance, body & texture and overall acceptability. 50 g of *danedar* was finely ground and kept in capped plastic sample cups at storage of ambient temperature and refrigeration temperature ($7\pm 1^\circ\text{C}$) till analysis was completed. A product having better shelf life indicates good marketability over longer period. Generally, foods are susceptible to quality of product losses due to physico-chemical and microbial instability and depending upon the chemical composition, different processing techniques and environmental conditions to which the product is exposed.

Results and Discussion

Sensory evaluation plays an important role in product development and determining the shelf life of a product. Sensory score is depending on the many deteriorative changes during the processing and storage such as browning reaction, oxidative rancidity, lipolytic, proteolysis, and acidity development, microbial and textural changes. From the consumers point of view, it is one of the best characteristics on the quality of product is decided by sensory. *Danedar* were analyzed to sensory quality studies at 5 days regular interval from 1st day of storage period, to assess the shelf life of the finished product under ambient and refrigerated temperature of storage. A panel of judges were evaluated sensory quality of *danedar* by 9 point Hedonic Scale. The sensory scores of *danedar* at ambient and refrigerated temperatures were obtained from the result are presented in Table-1.

Table 1: Sensory parameters of *danedar* at ambient and refrigerated temperatures

Storage Day	Color & appearance		Flavour		Body & texture		Overall acceptability	
	Ambient Temperature	Refrigerated Temperature	Ambient Temperature	Refrigerated Temperature	Ambient Temperature	Refrigerated Temperature	Ambient Temperature	Refrigerated Temperature
0	8.27±0.13	8.27±0.13	8.47±0.03	8.47±0.03	8.93±0.03	8.93±0.03	8.47±0.03	8.47±0.03
5	7.43±0.03	8.33±0.03	7.67±0.12	8.10±0.06	7.30±0.06	8.33±0.03	7.43±0.03	8.35±0.03
10	6.60±0.21	7.65±0.03	6.10±0.06	7.80±0.06	6.17±0.09	7.87±0.09	6.33±0.0	7.73±0.06
15	5.53±0.03	7.45±0.03	5.40±0.06	7.45±0.03	5.23±0.12	7.52±0.04	5.10±0.10	7.42±0.04
20	-	6.67±0.09	-	6.95±0.03	-	6.73±0.06	-	6.45±0.03
25	-	5.65±0.03	-	6.10±0.06	-	5.82±0.04	-	6.20±0.12
30	-	5.10±0.06	-	5.27±0.12	-	5.35±0.03	-	5.30±0.12
35	-	4.62±0.04	-	4.80±0.03	-	4.83±0.04	-	4.38±0.06

Color and appearance

Color and appearance scores of *danedar* stored at ambient temperature and refrigerated temperatures indicates in Table 1. The initial value of color and appearance score was higher than the longer storage at ambient temperature as well as refrigerated temperature. As the storage period increased, cow milk *danedar* samples showed a rapid increase in browning index during stored at 30°C , it indicates in lower score. As a result, the denatured whey protein increased the size of casein micelles by interacting with the product (Burton, 1994)^[3]. The initial score of *danedar* was 8.27 ± 0.13 at both ambient and refrigerated temperature, which was decreased to 5.53 ± 0.03 and 4.62 ± 0.04 in 15th and 35th storage days respectively. The color change to dull and yellow formation and mold growth on the surface of samples (Fox and McSweeney, 1998)^[4]. The final scores at ambient and refrigerated conditions was declined after 15th and 35th days respectively and this value were unacceptable by the judges. The color and appearance score of cow milk *danedar* samples were decreased significantly ($p < 0.05$) during the storage period.

Flavor

Flavor score of *danedar* stored at refrigerated temperature shown a better flavor score as compared with ambient temperature. The flavor score of *danedar* samples prepared from cow milk indicates the decreases with increase the storage periods. The quality deterioration was faster at ambient temperature (30°C) than refrigerated temperature (7°C), its shown a significantly increase in the free fatty acids (FFA) and resulting concomitant increase in peroxide value during storage. At ambient temperature, the pleasant flavor of *danedar* turned acidic and foul flavor at the end of 15th days and at refrigerated temperature, it indicates same flavor at the end of 35th days. This study revealed that the decline in flavor score due to the rancid flavor development and bitter taste reached to an extreme level in 35th days of storage after that the refrigerated *danedar* were indicates unacceptable by the judges. The sensory score, chemical as well as microbial changes were observed to affect the taste and smell of the product during storage condition. The initial flavor score of *danedar* was 8.47 ± 0.03 at both ambient as well as refrigerated temperature and it was decreased to the level of 5.40 ± 0.06 and 4.80 ± 0.03 in 15th and 35th days of storage, respectively.

The study indicates that the flavor score of *danedar* decreased significantly ($p < 0.05$) during the storage period.

Body and Texture

The body and texture score of *danedar* samples decreases with increase the storage period, it is due to evaporation of moisture during the storage period. The decrease score of body and texture was more at ambient temperature as compared with stored at 7°C. The initial score of *danedar* was 8.93 ± 0.03 at both ambient and refrigerated temperatures, which was decreased on 15th and 35th days of storage to the level of 5.23 ± 0.12 and 4.83 ± 0.04 respectively. The scores of *danedar* decrease with the storage period at ambient and refrigeration temperature. The body and texture scores were also decreased significantly ($p < 0.05$) during storage. The increase in body and texture score of *danedar* with increase fat content due to smoothness of milk fat and it gives softness to the product (Bansal, 2015)^[2].

Overall acceptability

The overall acceptability score of *danedar* decreases gradually with the increase in longer storage period due to developed acidity, expulsion of moisture during storage, oxidation of fat and growth of microorganism. A higher reduction score was observed in *danedar* at 30°C, whereas a lower reduction score was observed at refrigerated temperature. The initial overall acceptability score of *danedar* was observed 8.47 ± 0.03 at ambient and refrigerated temperatures and decreased the score to 5.10 ± 0.10 and 4.38 ± 0.06 on 15th and 35th days of storage, respectively. From the table 1, the overall acceptability scores were decreased with increase in storage period.

Conclusion

Indigenous milk products have a big potential of the emerging dairy industry in the organized dairy sector. *Danedar* sample were analyzed on sensory basis on ambient and refrigerated temperature. It was concluded that the color and appearance score of *danedar* was initially higher. As the storage period increased, cow milk *danedar* stored at 30°C showed a rapid increase in browning index, resulting in lower final score. The flavor score of the *danedar* prepared from cow milk decreases with increase in storage periods. The deterioration was faster at 30°C than at 7°C, indicating a significant increase in the free fatty acids resulting concomitant increase in peroxide value so as flavor score during storage. The body and texture scores of *danedar* declined with the advancement of storage period regardless whether it was stored at ambient or refrigeration temperature. The overall acceptability scores decreased with the increase in storage, regardless of temperature.

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