Study on sensory evaluation and chemical changes occurred in Mahua (*Madhuca longifolia*) flower burfi during the storage

ABSTRACT

In the present study, the cow milk was standardized to 4% fat.The Burfi was prepared by addition of crushed dried Mahua flowers in the proportion of 100:0 (T_1), 90:10 (T_2), 85:15 (T_3), 80:20 (T_4) and 75:25 (T_5) with 30 per cent sugar was added. The objectives of the present investigations were to study the chemical and sensory changes during storage of the selected treatment i.e. T_4 (80% khoa : 20% crushed dried Mahua flower) at room temperature and refrigerated temperature at the interval of 0, 5, 10, 15, 20, 25 days. The study aimed to investigate the quality of the burfi during storage. The data obtained was statistically analyzed by FRBD. Sensory evaluation studies were conducted by a panel of judges and it was found that the burfi prepared by using 20 parts of crushed dried Mahua flowers and 80 parts of khoa was having the highest overall acceptability scores. The overall acceptability scores of selected treatment were decreased from 5^{th} days onwards. But burfi was acceptable up to 15 days and 25 days onwards at room temperature and refrigerated temperature, respectively. The results regarding the chemical analysis revealed that the fat, protein, lactose, ash, titratable acidity and total solids content of burfi was increased after 0^{th} day to 25^{th} day in both room and refrigerated condition. While, moisture and solids not fat content reported decrease in trend in both room and refrigerated temperature. The rate of changes was found more in room temperature conditions.

Keywords : Milk,Khoa, burfi, Mahua flower, chemical properties, fat, protein, total solids, acidity, ash

Introduction:

Milk is known as nature's most complete food and dairy products are considered the most nutritious foods. On the other hand, the traditional view of the role of milk has been greatly expanded in recent years. Milk contains biologically active compounds besides its major proteins, casein and whey proteins, that have important physiological and biochemical functions with significant impact on human metabolism, nutrition and health (Park and

Haenlein, 2013).

Burfi is one of the most popular khoa based sweet in India. Once confined to household production, burfi is gaining an international market in recent years owing to its delicious taste, flavour and texture. The Mahua tree is considered as medicinal tree and very useful for curing diseases like piles, skin diseases, headache, ulcer, constipation and many more.Mahua flowers are high in Vitamin C, which is responsible for their antioxidant properties. Carotene, a precursor to Vitamin A, is found in Mahua flowers. Flowers are also high in minerals such as calcium and phosphorus. Mahua flowers also contain a little number of proteins and lipids (Dwivedi *et al.,* 2022).

Material and methods :

Experimental trials were conducted using fresh, clean cow milk obtained from the Dairy Farm at College of Agriculture Nagpur. GoodqualityofdriedMahuaflowersobtainedfrom nearbylocal market andclean and crystalline sugar were used for the preparation of Mahua burfi.

Treatment Details :

T_1 - 100% khoa burfi

T_2 - 90% khoa + 10% crushed dried Mahua flowers

T_3 - 85% khoa + 15% crushed dried Mahua flowers

T_4 - 80% khoa + 20% crushed dried Mahua flowers

T_5- 75% khoa + 25% crushed dried Mahua flowers

In all treatments sugar was added at the rate 30% by wt. of khoa.

Treatments for keeping quality studies

Conditions

Factor A : Temperature (a) Room temperature

(b) Refrigeration temperature

Factor B : Time in days (0, 5, 10, 15, 20, 25 days)

Number of Treatments : 12 (As stated above in combination with factor A & B)

Number of Replication : 5

Design of experiment : Factorial Randomized Block Design (FRBD)

Preparation of Burfi

Receivingoffreshcowmilk

↓

Standardization(4%fat)

↓

Filtration

↓

Continuousheatingandstirring (80°C)

↓

Viscousproductwithpastyconsistency

↓

Gentle heating till pat formation

↓

Khoa

↓

Additionofsugar30%

↓

Additionofcrusheddriedmahuaflowers(asper treatment)

↓

Gentleheatingtodesired consistency

↓

Pourandspreadingthemixtureinlayeringreasytray

↓

Allowtosetand cooling

↓

Cuttinginrequireshapeand size

↓

Packingin parchment paper

↓

Mahuaburfi

Result and Discussion

Table 1 : Changes in sensory evaluation of selected treatment of burfi (T_4) preparedwith crushed dried Mahua flower during storage.

Parameters	Sensory Score	
Treatment / Period (Days)	A1	A2
0	8.3	8.3
5	7.5	7.9
10	6.8	7.3
15	6.4	7.00
20	Nil	6.5
25	Nil	5.5
Result	sig	sig

Where, A1: Room Temperature; A2: Refrigerated Temperature

The mean score of overall acceptability of zero day storage of Mahua burfi was same i.e. 8.3 at room temperature and refrigerated temperature. Score of overall acceptability was decreased after 0^{th} day to 25^{th} day of storage in both room temperature as well as refrigerated temperature. On 25^{th} day of storage mean overall acceptability score of burfi were decreased from 8.3 to 0 and 8.3 to 5.5 at room temperature and refrigerated temperature, respectively. Further it was revealed from Table that, overall acceptability score value was decreased significantly due to effect of temperature, storage interval and their interaction. Overall

acceptability score was decreased very fast for the burfi stored at room temperature as compare to burfi stored at refrigerated temperature.

The present results were found that, the overall acceptability of burfi stored at room temperature were acceptable only 15 days, while at refrigerated temperature was acceptable up to 25 days.

This trend of result was in agreement with the trend of result noted by Shrivas *et al.* (2018) who observed that the overall acceptability of rava burfi decreased at faster rate during storage period at room temperature as compared to refrigerated temperature. The overall acceptability score on 0 day storage at room temperature and refrigerated temperature were seen as 8.48. And the score on 9th day storage at room temperature and 35th day storage at refrigerated temperature were significantly decreased as 6.20 and 7.02 respectively.

Table 2. Chemical changes in selected treatment of burfi (T_4) prepared with crushed dried Mahua flowers during storage

Parameters	Moisture		Fat		Protein		Ash		Total Solid		SNF		Titratable Acidity	
Treatment / Period (Days)	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2
0	15.63	15.63	12.96	12.96	14.15	14.15	2.58	2.58	84.37	84.37	71.01	71.01	0.33	0.33
5	15.46	15.60	13.75	13.42	14.52	14.42	2.90	2.81	84.69	84.34	70.90	70.94	0.35	0.34
10	14.87	15.56	14.52	13.63	14.75	14.63	3.21	2.95	85.13	84.46	70.60	70.80	0.40	0.38
15	14.67	15.46	14.92	13.78	14.92	14.77	3.41	3.28	85.32	84.53	70.42	70.75	0.43	0.41
20	14.51	15.35	15.70	14.20	15.68	15.39	3.50	3.39	85.48	84.65	69.61	69.78	0.52	0.44
25	13.72	14.62	15.75	14.57	15.75	15.80	3.75	3.55	86.27	85.37	69.25	69.45	0.57	0.45
Result	sig	sig	sig	sig	sig	sig	sig	sig	sig	sig	sig	sig	sig	sig

Where, A1: Room Temperature; A2: Refrigerated Temperature

Moisture

From the table 2, it revealed that, The moisture percentage has been decreased after 0^{th} day to 25^{th} day of storage at both room temperature as well as refrigerated temperature. On 25^{th} day of storage mean moisture percentage of burfi was decreased from 15.63 to 13.72 and 15.63 to 14.62 at both room temperature and refrigerated temperature, respectively. According to the BIS (IS: 5550), the moisture content of burfi should not exceed 15%. Based on the table, the burfi stored at room temperature on the 10^{th}, 15^{th}, 20^{th} and 25^{th} day and 25^{th} day at refrigerated temperature all meet this standard. This results are in agreement with the results noted by Ingle (2010) who analyzed the moisture percent of burfi prepared with different pulps and revealed that the total moisture content reduced by 5.68 per cent on refrigerated temperature and 7.39 per cent on ambient temperature. Shrivas *et al.* (2018) observed the moisture content of rava burfi decreased rapidly at room temperature as compared to refrigerated temperature.

Fat

The fat percentage has been increased after 0^{th} day to 25^{th} day of storage at both room temperature as well as refrigerated temperature. On 25^{th} day of storage mean fat percentage of burfi increased from 12.96 to 15.75 and 12.96 to 14.57 at room temperature and refrigerated temperature, respectively. This might be due to the losses in moisture content of burfi during storage. The Bureau of Indian Standards (IS: 5550) has set a limit of atleast 10 per cent for the fat content of burfi. Based on the table, the burfi stored at room temperature and refrigerated temperature both meet this standards. Present results are in agreement with the results reported by Ingle (2010) who observed that the fat per cent was significantly increased from 18.06 to 19.66 in T_1, while 20.14 in T_2 treatment during 13 days of storage period which is slightly more by 2.08 per cent on ambient temperature. Shrivas *et al.* (2018), observed that as the storage period progresses, the sample showed an increase in the fat content of rava burfi for both the storage temperatures studied.

Protein

The protein per cent was increased after 0^{th} day to 25^{th} day of storage at room temperature as well as refrigerated temperature. On 25^{th} day of storage mean protein percentage of burfi increased from 14.15 to 15.75 and 14.15 to 15.80 at room temperature and refrigerated temperature, respectively. under room temperature rate of protein content increased in burfi was higher as compare to storage under refrigerated condition, this might be due to fast evaporation of moisture from burfi and increasing trend in total solids. The present results are supported by the results noted by Patil *et al.* (2015) which determine the chemical composition of burfi during interval of storage and observed that protein content was increased from 14.90 to 16.30 percent in market burfi. Shrivas *et al.* (2018) observed that there was a progressive increase in protein content of rava burfi with increase in storage period at 30 ± 2°C and 7 ± 2°C which was found to be significant.

Ash

The ash percentage has been increased after 0^{th} day to 25^{th} day of storage at both room temperature as well as refrigerated temperature. On 25^{th} day of storage mean protein percentage of burfi were increased from 2.58 to 3.75 and 2.58 to 3.55 per cent at room temperature and refrigerated temperature, respectively. Ash content was increased highly at room temperature as compared to refrigerated temperature. The values of ash content in present investigation are similar with other researchers like Prasad *et al.* (2017) reported that the ash content was increasing from 2.95 to 3.09 per cent in burfi during storage. Shrivas *et al.* (2018) observed that there was increase in ash content of rava burfi with increase in storage period at 30 ± 2°C and 7 ± 2°C which was found to be significant.

Total Solids

The total solids percentage has been increased after 0^{th} day to 25^{th} day of storage at room temperature as well as refrigerated temperature. On 25^{th} day of storage mean total solid percentage of burfi increased from 84.37 to 86.27 and 84.37 to 85.37 at room temperature and refrigerated temperature, respectively. Ingle (2010) reported that initial percentage of total solids in burfi was 80.14, which increased during storage subsequently and significantly to 85.82 per cent i.e. by 5.68 per cent in T_1 and up to 87.53 per cent i.e. by 7.39 per cent in T_2 treatment i.e. on refrigerated and ambient temperature. The total solids increased in both the treatments may be due to the proportionate reduction in moisture at different storage temperature levels. Shete *et al.* (2012) reported that total solids content in burfi was increased

from 74.13 to 82.90%, Chavhan (2013) and Satav *et al.* (2014) also found same treatment results. These results are in agreement with present results found in experimental trial.

Solids Not Fat

The solid not fat percentage has been slightly decreased after 0^{th} day to 25^{th} day of storage at room temperature as well as refrigerated temperature. On 25^{th} day of storage mean solids not fat percentage of burfi decreased from 71.01 to 69.25 and 71.01 to 69.45 at room temperature and refrigerated temperature, respectively. The decrease in solids not fat content of burfi storage of room temperature was found more under room temperature as compare to refrigerated temperature. This might be due to high rate of evaporation of moisture from burfi under room temperature. Shrivas*et al.* (2018) reported that the solids not fat content was decreased in burfi prepared from cow milk khoa by using rava.The snf per cent on 0 day storage at room temperature and refrigerated temperature were same. And the snf per cent on 9th day storage at room temperature and 35^{th} day storage at refrigerated temperature were seen decreasing.

Titratable acidity

The titratable acidity percentage has been increased after 0^{th} day to 25^{th} day of storage at room temperature as well as refrigerated temperature. On 25^{th} day of storage mean titratable acidity percentage of burfi were increased from 0.33 to 0.57 and 0.33 to 0.45 at room temperature and refrigerated temperature, respectively. According to the BIS (IS: 5550), the acidity content of burfi should not exceed 0.45 per cent. The burfi stored at room temperature and refrigerated temperature both meet these standards till 15 and 25 days respectively. The values of titratable acidity and trend of present investigation are agreed with the findings of Ingle (2010) who reported that there was increase of acidity from 0.52 to 0.72 and 0.52 to 0.80 per cent in T_1 and T_2 treatment, respectively. Shrivas (2018) that the titratable acidity of rava burfi increased at faster rate during storage period at room temperature as compared to refrigerated temperature. The titratable acidity per cent on 0 day storage at room temperature and refrigerated temperature were seen as 0.264 per cent. And the titratable acidity per cent on 9th day storage at room temperature and 35^{th} day storage at refrigerated temperature were significantly seen as 0.294 and 0.293 per cent respectively.

Conclusion

Overall acceptability scores were decreased from 5th days onwards. But burfi was acceptable upto 15 days and 25 days at room temperature and refrigerated temperature, respectively. Fat, protein, total sugar, ash, total solids, titratable acidity content of burfi prepared with 80% cow milk khoa and 20% crushed dried Mahua flower was increased from 5th day to 25th day in both room and refrigerated temperature. While, moisture and SNF was decreased in both room temperature and refrigerated temperature. The rate of changes was found more in room temperature storage.

Thus, from present investigation, it was concluded that burfi can be stored and utilized upto15 days at room temperature and upto 25 days and onwards under refrigerated temperature.

References

Dwivedi, A., Priyadarshini A. and Induar S. 2022. Mahua (*Madhuca longifolia*) flower application in food industry: A review. *International J. of chemical studies;* 10(1): 80-84.

IS:5550, 1970. Indian Standard specification for Burfi. Indian Standard Institute, Manak Bhava, New Delhi.

Chavhan, D. 2013. Studies on keeping quality of burfi prepared from buffalo milk blended with dried dates. M.Sc. Thesis (*Unpub*.), Dr. PDKV, Akola.

Ingle, Y. M. 2010. Preparation of burfi from goat milk blended with different fruit pulps. M.Sc. (Agri.) Thesis (*Unpub*.), College of Agriculture, Nagpur.

Park and Haenlein, 2013. Milk and dairy products in human nutrition: Production, Compostion and Health.

Patil, R. J. and P. R. Todkar, 2015. Physicochemical analysis and sensory evaluation of burfi enriched with dried date, *Journal of Animal Research,* 5(1): 131-134.

Prasad, W., K. Khamrui and S. Sandhya, 2017. Effect of packaging materials and essential oils on the storage stability of burfi, A Dairy dessert. Journal of Packaging Technology and Research, 1: 181-192.

Satav, Y. L., S. G. Narwade, R. P. Kadam and H. S. Imran, 2014. Effect of walnut powder incorporation on sensorial, nutritional and textural quality profile of burfi. *Asian J. Animal Sci.,* 9(2): 129-133.

Shete, S. M., B. K. Pawar, D. M. Choudhari and D. K. Kamble, 2012. Quality of different types of Burfi sold in Ahmednagar market. *J. Dairying Foods and H.S.* 31(1): 5-6.

Shrivas, A. A., Pinto S. V., Patel S. M. and Balakrishnan S. 2018. Effect of storage on composition, physico-chemical, rheology, sensory and microbiological quality of Indian cookie Rava Burfi. *J. of applied and natural Sci.* 10(1): 88-97.