

Physico-Chemical and microbial quality of Dharur Pedha sold in Beed dist of Maharashtra state

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Abstract

The given study examines the physico-chemical and microbial quality of Dharur Pedha sold in Beed district by ten representative samples. The main nutritional parameters such as fat, protein, lactose, and sucrose, moisture, ash, acidity as well as total solids were examined together with the microbial indicators such as SPC, coliforms and yeast and mould counts. Outcomes indicated that there was reasonable deviation in nutrient content consideration of traditional manner of preparation, whereas microbial analyses revealed high standards of hygiene, low bacterial count, and no coliforms. In the study, it is concluded that Dharur Pedha is safe to be consumed and has the traditional quality standards.

Keywords: Dharur Pedha, physico-chemical analysis, microbial quality, milk sweets, SPC, coliforms, Beed district

Introduction

Dharur Pedha is a sweet delicacy of Indian origin, the origin of which is the town of Dharur in Beed district of Maharashtra where it has a strong cultural connection and is much valued as a representation of local identity. It is made in a very specific way, has a rich taste and a soft texture which is usually had on festivals, celebrations, and religious occasions. This sweet is mainly prepared using khoa, which is a concentrated milk paste that is formed by slow heat and sugar and the specific flavouring agents like cardamom or saffron. Everyone, every house, every local confectioner tends to put their own spin on the recipe, resulting in the slightest differences in taste, texture and the look. These differences indicate the artisanal quality of the product and necessitate systematic quality assessment, particularly due to the growing demand and expanding distribution (Rahman *et al.*, 2023)^[7], (B. D. Patil *et al.*, 2025)^[1].

Dharur Pedha being a dairy product is also susceptible to variation in quality because milk ingredients are sensitive to heat, moisture, exposure to microbes and storage. Moisture content, fat percentage, protein composition, ash value, pH and acidity are physico-chemical parameters, which play an important role in determining the shelf stability, the texture, mouthfeel and the nutritional profile of the product. As an example, too much moisture can cause spoilage and too much or too little fat or protein can change the typical texture expected by the consumers. Also, the ratio of these ingredients indicates the genuineness of the cooking procedure and compliance with the classic norms. As local manufacturers can use manual methods and changeable ingredients, batch evaluation is necessary to maintain production consistency and quality (Choudhary *et al.*, 2017)^[7].

Another significant factor is the micro-bial safety of Dharur Pedha because it may be contaminated at various levels such as milk sourcing, handling, preparation, packaging, and storage. Milk sweets create the perfect conditions in terms of being a nutrient-rich food that allows the growth of microbes unless hygienic storage and handling are closely followed. Not only does the presence of the spoilage organisms or the presence of pathogenic bacteria reduces the shelf life but also presents health risks to the consumers

especially in areas where temperature regulation is minimal. Thus, a regular microbial assessment will give critical information related to the hygienic quality of the product and will indicate the areas, in which better handling or processing interventions are needed (Owusu-Kwarteng *et al.*, 2020)^[6] (Bandeekar *et al.*, 1998)^[2].

Since the population is growing in terms of their awareness on food safety and considering that the market of regional specialties is also developing, it is necessary to analyze the physico-chemical and microbial properties of Dharur Pedha. This type of assessment will not only protect the health of consumers, but also contribute to the preservation of the long-standing tradition, as the quality, taste, and cultural value of this culturally meaningful sweet will be saved not only to the descendants, but also to the generations to come.

Methodology

1. Sample Collection

Dharur Pedha (S1-S10) were sampled in various retail outlets and local vendors around the Beed district. All the samples were bought in their original state and put into clean and sterile samples immediately to avoid contamination during transportation.

2. Sample Transportation and Storage

All the samples collected, were carried to laboratory under hygienic and controlled condition. Samples were kept at the right temperature until analysis to maintain the physical and microbial integrity.

3. Physico-Chemical Analysis

Standard analytical methods that are followed on dairy products were used to estimate physico-chemical parameters. The parameters included:

- Fat
- Protein
- Lactose
- Sucrose
- Moisture
- Ash
- Acidity
- Total Solids

All tests were conducted under acceptable protocols of published dairy chemistry protocols.

4. Microbial Analysis

The quality of microbiology analysis was performed through standardized methods of microbiology. Tests that were conducted were:

- Total viable bacteria Standard Plate Count (SPC)
- Coliform test to identify the evidence of fecal contamination.
- Fungal contamination: Yeast and mould

All the microbial tests were conducted with aseptic laboratory conditions with sterile equipment and nutrient media.

5. Compilation and Interpretation of Data

All the values were obtained and tabulated and contrasted with the acceptable milk-based sweets. Interpretation of data was done to determine quality, hygiene, and consistency of the samples collected.

Result & Discussion

Table 1: Nutritional tests

Parameters	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Fat (Gm/100gm)	25.9	28	30	31	29	31	25.6	32	28	32
Protein (Gm/100gm)	11	11.5	12.05	11.7	10.9	12	11.4	13.1	10	11.4
Lactose (%)	20	18	20	18.8	19.1	18.8	20	17	19	20
Sucrose (Gm/100gm)	29.22	27	28	29.1	26.85	29.3	27	30	26.7	30.2
Moisture (%)	14	13.4	12.9	13	14.2	12.9	14	11.92	13.12	14
Ash (%)	2	2.1	2.18	2.24	2.11	2.21	2	1.8	1.75	1.95
Acidity (%)	0.25	0.3	0.32	0.35	0.3	0.28	0.32	0.3	0.28	0.33
Total solids (%)	80	0.3	81	78	74.5	79	82	80	79	83

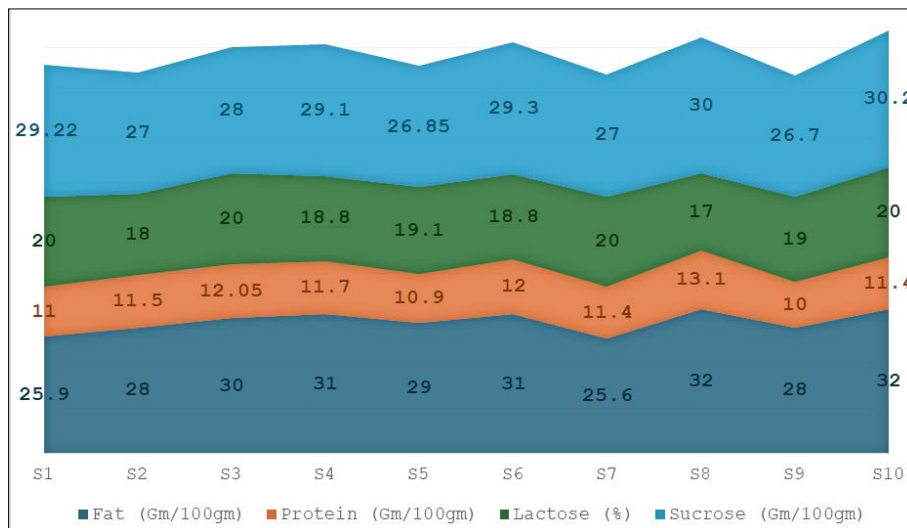


Fig 1: Graphical presentation of Fat, Protein, Lactose and Sucrose in samples

1. Fat Content

Table 1 and fig 1 demonstrates that there is a moderate variation in the fat contents of the 10 samples (S1-S10) as the fat content varies between 25.6 and 32 g/100 g. Samples S4, S6, S8 and S10 have more fat meaning richer formulations that have more ghee or khoa. Other samples such as S1 and S7 have lower fat levels indicating the comparatively light composition. The fat has a great contribution to softness, flavour, and aroma. The general range demonstrates a decent quality, as the variations are explained by the milk quality, time of heating, and the process approaches adopted by every seller.

2. Protein Content

Table 1 and fig1 indicates moderate consistency in the protein levels of the 10 samples (S1-S10), which have a protein level ranging between 10 g and 13.1 g/100 g. The protein of S8 is the highest, this means that milk solids are more concentrated or that khoa is of higher quality. S9 is lowest and this could be because it is more moist or it

reduces less. Protein is associated with firmness and nutritional value. The encountered range is comparable to milk sweets. Such minor differences can be caused by differences in milk source, boiling temperature or technique applied by various vendors in preparing Dharur Pedha (Sonwalkar & Wakde, 2022) [8].

3. Lactose Percentage

Table 1 and fig 1 has recorded a lactose value of 17 percent to 20 percent in the 10 samples (S1-S10), where uniform sugar values are naturally present in milk. Reduced lactose in S8 (17%) could be due to long term heating or caramelisation. An increase in lactose in samples, such as S1, S3, S7, and S 10 (20) indicates the standard milk reduction. Balanced lactose provides natural sweetness and eliminates the crystallisation of sugars. The total lactose sample is in accordance with typical milk-based sweet formulations, which means that there are no harmful heating habits and the quality of milk is similar among the majority of vendors.

4. Sucrose Content

The table 1 and fig1 illustrates that the level of sucrose in 10 samples (S1-S10) is between 26.7 to 30.2 g/100 g, indicating a different level of added sugar. S10 and S8 have the highest level of sucrose, which are sweeter forms and S5 and S9 are less sweet. These changes are mostly based on the preferences of the vendors and demand by the consumers. The range remains reasonable in terms of pedha and does not show the excessive consumption of sugar. Sucrose has effects on taste, texture and preservation. In general, the table indicates the right proportions of sweetness samples with minor variations in formulation.

5. Moisture Content

As shown in Table 1 and fig 2, the moisture content of the 10 samples (S1 to S10) has a moderate variation, as it is between 11.92% and 14.2. Greater moisture of the S5 means a weaker texture and a reduced heating time, whereas the lower moisture of the S8 means more solid and harder pedha. The humidity has a strong influence on shelf life, as moisture level can increase instability and decrease preservation, or the reverse. All samples are kept at acceptable moisture levels in Dharur Pedha meaning there is good innovation of heating without much variation in local sellers (Jha *et al.*, 2014) [5].

6. Ash content

Table 1 and fig 2 indicates a range of ash value ranging between 1.75 and 2.24 in the 10 samples (S1-S10). Ash is a total mineral content. The highest percentage of ash is in S4, which is a sign of more minerals content may be provided by quality milk or more reduction. S9 presents the minimum value which seems to indicate lower mineral density and may be associated with the differentiation of dilution or milk quality. The values are all in normal ranges of milk-based sweets. There are minimal differences because of the source of milk, the type of dairy food that the cattle feed on, and the heating intensity applied by the various vendors (Sonwalkar & Wakde, 2022) [8].

7. Acidity %

The acidity of the 10 samples (S1-S10) were measured at 0.25%-0.35% as indicated in table 1 and fig 2. Greater acidity in S4 (0.35) and S3 (0.32) could be a sign of older milk or longer heating whereas reduced acidity in S1 and S9 is a sign of fresher raw materials. The values are all within a reasonable range of pedha meaning there is no spoilage or too much sourness. The acidity affects taste, stability of microbes and the freshness of the product. In general, Table

1 shows that the preparation of the samples was carried out in terms of generally good milk quality and controlled processing conditions (Fabro *et al.*, 2006) [4].

8. Total solids

As shown in Table 1 and fig 3, total solids are widely different among the 10 samples (S1-S10) (ranging between 74.5% and 83%). The high value of S10, S7 and S1 demonstrates good concentration of milk and high text and low total solids of S5 indicate high moisture and softness. Total solids do influence the characteristics of sweetness, hardness, nutritional value, and shelf life. The variability is due to variation in the heating time, milk quality, and mode of preparation. Regardless of the differences, all samples are within the acceptable range which proves that vendors generally applied proper preparation and concentration.

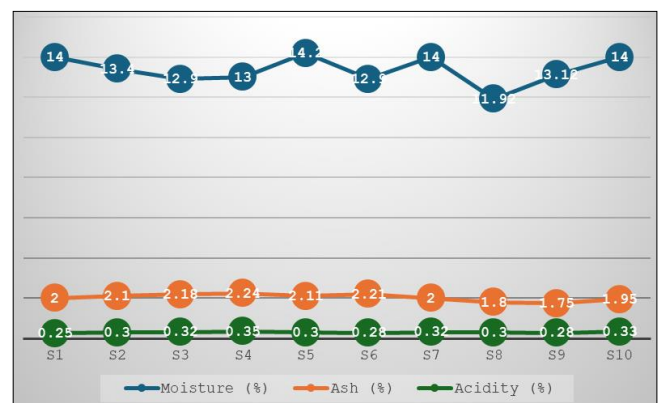


Fig 2: Graphical presentation of Moisture, Ash, Acidity in samples

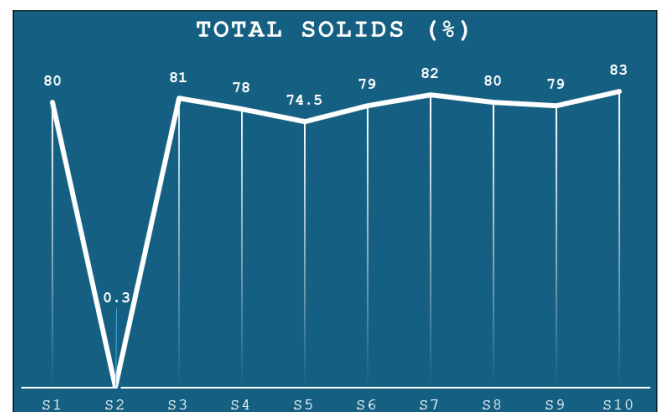


Fig 3: Graphical presentation of Total solids in samples

Table 2: Microbial tests

Parameters	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
SPC (Cfu/gm)	4	2	4	6	2	2	5	2	3	5
Coliform (/gm)	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Yeast and Mould (Cfu/gm)	Absent	Absent	<02	Absent	<04	<06	Absent	Absent	Absent	Absent

9. Standard Plate Count – SPC

Table 2 and fig 4, shows that the SPC values of the 10 samples (S1 to S10) are between 2 and 6 cfu/g, which means very low microbial loading. Sample S4 and S7 have slightly higher counts (6 and 5 cfu/g), although this is within safe limits of sweets based on milk. When there are low counts in S2, S5, S6 and S8 (2 cfu/g), it indicates good hygiene and heat processing during the preparation of

Dharur Pedha. In general, the outcomes of the SPC indicate that the pedha sold in the Beed district meets microbiological safety, contamination is minimal, and sanitary practices are observed to an adequate extent.

10. Coliform Count

Table 2 shows that there are no coliforms in the 10 samples (S1-S10) which implies that the hygienic conditions were

excellent when handling, processing, and packaging milk. The negative test of coliform bacteria validates that the preparation conditions of water, equipment, and storage in the preparation of Dharur Pedha is safe. Coliforms are feces contaminants or poor hygiene indicators and thus their total elimination indicates good manufacturing procedures. This also implies that milk was properly heated and the conditions under which the vendors were operating were safe and therefore the product is not contaminated with any harmful pathogens.

11. Yeast and Mould Count

Table 2 and fig 4 indicates that yeast and mould count is negative in most of the samples (S1, S2, S4, S7, S8, S9, S10), whereas S3 (<02 cfu/g), S5 (<04 cfu/g), and S6 (<06 cfu/g) contain some growth. Such low counts imply minimal fungal contamination, and this implies that there was good drying, controlled moisture and sanitary storage environments. The low values will assure that the products are stable and safe because yeast and mould can cause spoilage in dairy sweets. The low concentration of three samples can be attributed to low exposure of the environment, but it is still within the acceptable inclusive limits.

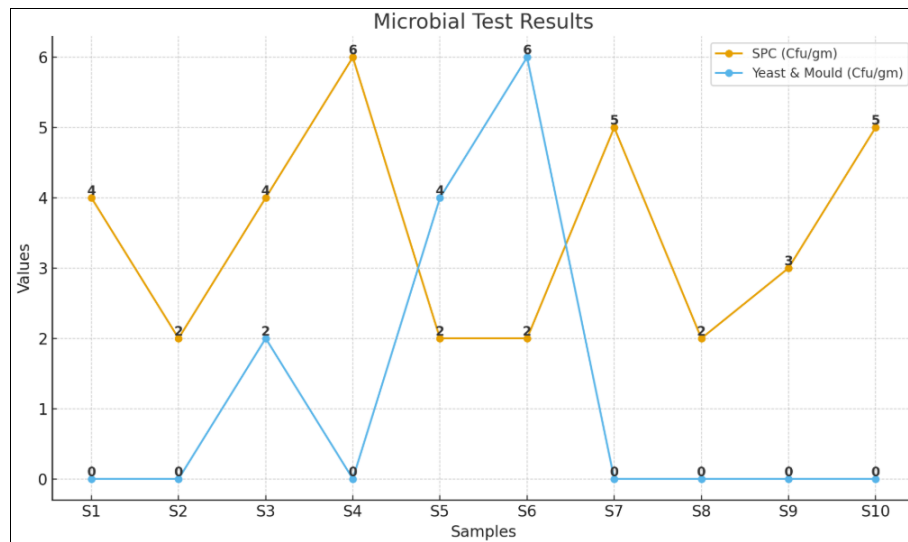


Fig 4: Graphical presentation of SPC and Yeast and Mould Count in samples

Discussion

The sample study of ten Dharur Pedha samples of Beed district showed moderate changes in physico-chemical properties because of the difference in raw milk quality, preparation methods, and heating time that local vendors apply. There were observable changes in fat, protein and total solids with an indication of the artisanal preparation technique and moisture content affected the texture and shelf life. All the parameters were in acceptable limits of regular milk sweets, although these were natural differences. Microbial tests also showed a high level of hygienic standards with low levels of SPC, no coliforms and low levels of yeast and moulds. These results prove that Dharur Pedda sold in the area are microbiologically sound and nutritionally uniform, which points to the good manufacturing practices of the vendors and the safety of consumers.

Conclusion

The sample analysis of ten Dharur Pedha of the Beed district indicates that the product mostly conforms to satisfactory standards of physico-chemical and microbiological quality. Although the natural variations were evident in fat, protein, moisture and overall solids because of the variations in the preparation process and quality of milk, the variations were within the usual spectrum of normal dairy sweets. Microbial analysis revealed very low bacteria counts, total lack of coliforms, and the low growth of yeast and mould, which were good hygiene and safe handling by the vendors. Generally, Dharur Pedha made in the area is safe, nutritional and is

based on its artisan nature. Further observation and observance of hygienic standards will assist in preserving its cultural worth and acceptability to the consumer.

References

- Patil BD, Savekar AS, Kubade KB, Patange DD. Sensory and Physicochemical Quality of Pedha Sold in Kolhapur City of Maharashtra. *Journal of Agriculture Research and Technology*, 2025;50(1):48–53. <https://doi.org/10.56228/JART.2025.50107>
- Bandekar J, Kamat A, Thomas P. Microbiological quality of the dairy product pedha and its improvement using gamma radiation. *Journal of Food Safety*, 1998. <https://doi.org/10.1111/j.1745-4565.1998.tb00216.x>
- Choudhary S, Arora S, Kumari A, Narwal V, Sharma V. Effect of quality of milk on maillard reaction and protein oxidation during preparation of cow and buffalo milk khoa. *Journal of Food Science and Technology*, 2017. <https://doi.org/10.1007/s13197-017-2710-9>
- Fabro MA, Milanese HV, Robert LM, Speranza JL, Murphy M, Rodríguez G, *et al.* Technical Note: Determination of acidity in whole raw milk Comparison of results obtained by two different analytical methods. *Journal of Dairy Science*, 2006. [https://doi.org/10.3168/jds.S0022-0302\(06\)72149-X](https://doi.org/10.3168/jds.S0022-0302(06)72149-X)
- Jha A, Kumar A, Jain P, Om H, Singh R, Bunkar DS. Physico-chemical and sensory changes during the storage of lal pedha. *Journal of Food Science and Technology*, 2014;51(6):1173–1178. <https://doi.org/10.1007/s13197-012-0613-3>

6. Owusu-Kwarteng J, Akabanda F, Agyei D, Jespersen L. Microbial safety of milk production and fermented dairy products in africa. *Microorganisms*, 2020. <https://doi.org/10.3390/microorganisms8050752>
7. Rahman MR, Karim MR, Siddiki MSR, Habib R. Quality of peda prepared from mawa with different sugar levels. *Asian-Australasian Journal of Food Safety and Security*, 2023;7(2):56–61. <https://doi.org/10.3329/aajfss.v7i2.65520>
8. Sonwalkar B, Wakde KC and P. Physico-chemical composition and consumer acceptability of date *Phoenix dactylifera* L. peda. *The Pharma Innovation Journal*, 2022, 11(6).