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Sensory and Physicochemical Quality of *Pedha* Sold in Kolhapur City of Maharashtra

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Abstract

Pedha is a heat desiccated milk product having a satisfying nutritional profile. In this study sensory andphysico chemical qualities of pedha were studied, viz., flavour, body and texture, colour and appearance, and overall acceptability were studied, in chemical qualities included fat, protein, reducing sugar, non-reducing sugar, Total sugar, ash, total solids, moisture, acidity and pH were determinedconsidering all the attributes of sample PS_6 liked very much by the panel of judges, as compare to other sample. The average range of pedha sold in Kolhapur city samples for flavour, body and texture, colour and appearance, and overall acceptability was 6.60±0.05 to 7.47±0.08, 7.07±0.09 to 7.85±0.06, 7.83±0.06 to 7.93±0.03 and 6.94±0.04 to 7.68±0.08, respectively.It was revealed that average range of fat 13.73±0.04 to 19.61±0.04 per cent, protein 12.22±0.06 to 16.60±0.05 per cent, reducing sugar 11.53±0.11 to 16.77±0.08 per cent, non- reducing sugar 32.15±0.21- 40.38±0.23 per cent, ash 2.69±0.04 to 2.93±0.01 per cent, total solid 80.9±0.08to85.70±0.45 per cent, moisture 16.40±0.05 to 19.13 ±0.06 per cent, acidity 0.30±0.008 to 0.21±0.006 per cent and pH 5.97±0.08 to 6.42±0.02 respectively. In physico chemical evaluation of present study, it was concluded that fat, protein, non-reducing sugar, total solid, ash, moisture and acidity was highest in PS3. While pH was observed highest in PS_6 and lowest in PS_3.

Key words : Pedha, Sensory quality, Physico chemical quality.

Khoa is the major product produced by heat desiccation of milk. It is made of either dried or whole milk thickened by heating it in an open iron pan (Londhe and Pal, 2007). Khoa is used as a base material for production of peda, burfi and gulabjamun

Khoa based heat desiccated milk sweet prepared by heating mixer of *khoa* and sugar with addition of natural and/or artificial color and flavor until the desired characteristics texture and flavor develops (Kavita *et al*., 2015). Buffalo milk is preferred over cow and goat milks for preparation of khoa based sweets (peda, kalakand etc), because it gives soft and uniform body with smooth, compact and homogeneous texture to the finished product (Kamble *et al*., 2010).

Pedha is heat desiccated indigenous milk sweet prepared by heating a mixing of khoa and sugar until the desired granular and hard texture and flavor develops. Several varieties of *pedha* are sold in market In Uttar Pradesh, Mathura *pedha* is small round in shape, have burnt chocolate flavour and a longer keeping quality. Gajarola *pedha* are chocolate colour and ghee residue is used for preparing the *pedha* in Gujrat and Western part of the country. White *pedha* asare generally preferred which are usually made from buffalo milk (Patel, 1986). Certain other varieties of *pedha* like Gopal *pedha*, Eliachi *pedha*, Rajkot *pedha* and malai *pedha* are also found in the market. In Maharashtra there are different types of famous *pedha* brands recognized by locality, producer etc. To place few examples from Pune are Chitale, Ghodake and Kaka Halwai *pedha*s. Similarly, Kandi *pedha* from Satara is recognized for its brown

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colour and burnt caramelized flavour. In Jalna district Rajur *pedha* is famous. In district Parbhani, Gangakhed. kalamand saram kundi *pedha* from Osmanabad district are famous.

All the varieties of *pedha* as have distinct characteristics and method of manufacture of these *pedha* varies from region to region. In Kolhapur market popularity and demand of *pedha* is increasing because of peculiar taste of various agencies viz. hoteliers, halwais shops and Rajasthani shops are engaged in marketing of *pedha* in Kolhapur market. The quality of *pedha* varies from shop to shop because due to the difference in method of manufacture, type of milk used, hygienic condition, etc. *pedha* has no PFA and BIF standards. Recently consumers are becoming more quality and health conscious and considering the demand of *pedha* in Kolhapur market, so it is decided to work on quality of *pedha* sold in Kolhapur city.

Materials

All the glasswares of Borosil make were used for analysis of product, All the chemicals used were Analytical M/S Reagent (AR) and Guaranteed Reagent (GR) grade for analytical work which was manufactured by Merk, India Ltd./GlaxoIndia Ltd., Electronic precision weighing balance was used for weighing of samples, ingredients and chemicals, etc. throughout the analysis of *pedha*,, Digital temperature controlled B.O.D. incubator manufactured by M/S. Neutronic, Bombay was used for incubation of petri plates during the study period, Silica Crucible was used in determination of ash content of samples of *pedha*, Electrical water bath was used throughout study period to determine chemical parameters of *pedha* samples,Hot air oven was used for the determination of moisture of *pedha*throughout the study period, Muffle furnace manufactured by Micro Scientific Works Pvt. Ltd. (MSW) Delhi was used for the determination of ash in the *pedha*, Laminar air flow manufactured by Micro-filt Pune (India) was used for the isolation of sample in aseptic condition, Electronic balance model M-3000, capacity 300g was used for weighing during the course of the investigation.

Methodlogy

Selection of pedha selling shops : Preliminary survey was conducted in Kolhapur city, to know the different types of *pedha* available in market and their availability throughout the study period. On the basis of survey, type of khoa*pedha* from six shops have been undertaken and considered for this study.

Collection of pedha samples : *Pedha* samples of predetermined types were collected from selected shops and brought to the laboratory as and when required for analysis. The samples were stored at ambient temperatures in the laboratory till its use for analytical purpose.

Treatment details : The present study was undertaken to evaluate sensory quality, chemical quality and microbial quality of *pedha* sample collected from Kolhapur market. Six famous *pedha* selling shops in Kolhapur city are selected as under, PS_1 - *Pedha* sample 1, PS_2 - *Pedha* sample 2, PS_3 - *Pedha* sample 3, PS_4 - *Pedha* sample 4, PS_5 - *Pedha* sample 5, PS_6 - *Pedha* sample 6.

For each replicationsix different shops were taken from Kolhapur city where *pedha* is prepared and sold in large quantity.

Sensory Evaluation of Pedha : Sensory evaluation of *pedha* was carried out by a panel of five semi trained judges so as to grade the product and to know the acceptability. It was judged for colour and appearance, flavor, taste, body and texture and overall acceptability attributes. Score cards were provided to the

judges comprising "9 point Hedonic scale" developed by Gupta (1976).

Result and Discussion

Sensory Evaluation of Market Samples of Pedha : The Sensory quality of *pedha* sold in Kolhapur city was evaluated for different Sensory attributes such as color and appearance, flavour, taste, body and texture. '9'-point Hedonic scale was used to evaluate the sensorial quality using panel of semi trained judges.

Flavour : The flavour scores of market samples are presented in fig. 1.It was observed that the flavour score of *pedha* sample was ranged from 6.60±0.05 to 7.47±0.08. The maximum flavour score was recorded in PS_6 followed by PS_1 and PS_2. The sample PS6 (7.47±0.08) was significantly superior over rest of the treatments.

Flavour is dependent on sugar, moisture and fat. The level of fat had maximum influence. As the level of fat increased the flavour score also increased substantially. It imparted characteristic and pleasant flavour to the products. Desale *et al*. (2007) reported the effect of compositional variables on the quality of *pedha*..our result agrees with Londhe and Pal (2008). Shete *et al*. (2012) also reported similar variations in the flavour score of market burfi sold in Ahmednagar city. Gotarne *et al*. (2015) reported flavour scored range between from 7.0 - 9.0. Dewani and Jayaprakash (2004). Shinde *et al*. (2015) also reported flavour scored of controlled samples 8.65. Bhutkar *et al*., (2015) reported flavour of red pumpkin *pedha* ranged from 8.0-9.0

Body and Texture : The body and texture score of market samples are presented in fig. 2.score of plain *pedha* for the sample PS_1, PS_2, PS_3, PS_4, PS_5 and PS_6 was 7.50, 7.53, 7.75, 7.07, 7.37 and 7.85 respectively. Maximum score was reported for sample PS_6 (7.85±0.06) while minimum for sample PS_4 (7.07±0.09). Sample PS_3 was found to significantly superior over PS_1, PS_2, PS_4, and PS_5. It was reported that, too low moisture in *pedha* adversely affected the body, while medium sugar, higher moisture and fat produced *pedha* with excellent body and texture. Less moisture in *pedha* resulted in harder body and rough texture. At minimum moisture level when sugar was increased body became little softer, probably due to lowering of protein content.

Londhe and Pal (2008) also reported the significantly variation in body and texture score of *pedha*, Rasane *et al*. (2012) reported body and texture of market sample of *pedha* ranging 6.78-7.18. The results are in close agreement with results attained by shete *et al*. (2012) reported that the body and texture score of different market sample of burfi differed significantly.

Colour and Appearance : The color and appearance scores of market samples, are presented in Fig. 3. From the result, it was reported that (PS_6) had significantly higher score (7.97±0.08) for color and appearance as well as PS_2 and PS_5 (7.83±0.06 and 7.93±0.03) respectively. However, the treatment (PS_1) is at par.The higher score of colour and appearance for *pedha* may be on account of more fat content. The glossy appearance of *pedha* was increased with increased amount of fat. When fat is less or low in the product a dull appearance is observed. The color and appearance score of products of all samples was acceptable to the judges. The variation in the colour of *pedha* might be due to the lack of maintaining proper concentration of synthetic color added and difference in the intensity of heating of khoa at the time of *pedha* making.

Overall Acceptability : The overall acceptability scores of market samples, are

presented in Fig.4. overall acceptability score is the average score worked out from score given by the judges for the different characteristics of the product i.e., color and appearance, flavour, body and texture.

On an average the overall acceptability score of *pedha* sample were acceptable and rated in between good and excellent. The minimum and maximum score was obtained by PS_3 (6.94±0.04) PS_6 (7.68±0.08) respectively.

Proximate Chemical Analysis of Pedha Sold in Kolhapur City : Proximate chemical analysis viz. fat, protein, reducing sugar, non-reducing sugar, ash, total solids, moisture, acidity, and pH.

Fat : It is seen that the fat content of *pedha* samples ranged from 13.73±0.04 to 19.61±0.04. In the respect of fat content in the sample PS_6 contain maximum (19.61±0.04), whereas sample PS_3 and PS_2 contain minimum (13.75±0.07 and 13.73±0.04) respectively. There were significant differences found in the fat content of sample (PS_2) and the rest of treatments. The fat content in PS_2 was found 13.73±0.04 per cent. Sample PS_6 was found to be significantly maximum over the sample PS_4 and PS_5 at 5% level of significance.Dhage *et al*. (2018) studied effect of fat level on quality of *pedha* and he found that the fat content of *pedha* was 18.36 to 12.53%.

Protein : Protein content of market *pedha* samples ranged between 12.22±0.06 to 16.60±0.05 per cent. Maximum protein content was reported in sample PS_2 and minimum in sample PS_6. The mean protein content in *pedha* sample were, 14.25±0.12, 16.60±0.05, 16.15±0.10, 13.60±0.07, 12.25±0.06, and 12.22±0.06 for PS_1, PS_2, PS_3, PS_4, PS_5 and PS_6 respectively. Dhage *et al*. (2018) found that protein content of *pedha* was 14.38 to 17.70%. Bhutkar *et al*. (2015) reported in his research that protein percent range between-14.80 to 14.42, Shinde (2013) reported that ranged between 10.75 -12.50 per cent. Mane (1994) reported the protein content in laboratory made *pedha* is 14.62 percent.Ray *et al*. (2002) carried out protein content was 14.12±1.90 and 16.79±0.12 per cent, respectively. Ghorpade (2004) studiedand he found that the protein content of *pedha* was 14.80 per cent. Patel (2006) reported traditionally made *pedha* contained 14.6 percent protein.

Reducing Sugar : The overall lactose range in between 11.53±0.11 to 16.77±0.08. Sample PS_6 is having higher lactose than all other sample. The sample PS_1 had minimum score 11.53±0.11. Patel (2006) conducted the studies on traditional and mechanized method of *pedha* making. He reported traditionally made *pedha* contained lactose as 15.70 per cent.

Non-reducing Sugar (Sucrose) : Non-reducing sugar (sucrose) content of *pedha* sample ranged between 32.15±0.21-40.38±0.23 percent. Maximum non-reducing sugar content was reported in sample PS3 (40.38±0.23) and minimum non reducing sugar content PS5 (32.15±0.21). This variation in sucrose content reported might be due different proportion of cane sugar added for preparation of *pedha* by the halwais or sweetmaker. Normally for the preparation of plain *pedha* 30 percent sugar is to be used.

Ash : It was reported that the average ash content of *pedha* ranged from 2.69±0.04 to 2.93±0.01 per cent. The ash content was 2.85±0.02, 2.88±0.01, 2.93±0.01, 2.69± 0.04, 2.91±0.01 and 2.90±0.01 per cent for PS_1, PS_2, PS_3, PS_4, PS_5 and PS_6 respectively. Sample PS_6 (2.90±0.01) was found to be significantly superior over sample PS_1 and PS_2 at 5% level of significance. Dhage *et al*. (2018) found that the ash content of *pedha* was 2.69±0.04 to 2.93±0.01%. The research

findings are also agreement with Narwade (2003), Ghorpade (2004), Londhe and Pal (2008), Jha *et al*. (2014).

Total Solid Content : Total solid content of *pedha* sample ranged between 80.9±0.08 to 85.70±0.45 percent. Maximum Total solids content was reported in sample PS_3 (85.70±0.45) and minimum Total solids content PS_4 (80.97±0.08) sample. Average value of Total solid content of *pedha* sold in Kolhapur city showed significant ($P<0.05$) variation. Banjare *et al*. (2015) reported on *pedha* sample in the Total solid percent 76.67 to 87.78% in product. Bhutkar *et al*. (2015) reported on development of low-calorie milk cake and they reported that Total solid per cent is 74.94 - 85.33 in product.

Moisture : Moisture content of sample varies from 16.40±0.05 to 19.13 ±0.06. per cent, respectively. Sample PS_3 have maximum moisture content and sample PS_2 and PS_5 have minimum moisture content. Average value of moisture content of *pedha* sold in Kolhapur city showed significant ($P<0.05$) variation. Narwade (2003) analyzed famous brand of plain *pedha* inhis research work he reported that the moisture content range from 12.50 to 19.00 per cent.

Titratable Acidity : Acidity observed in sample PS3 (0.30±0.008) was higher however, PS2 and PS5 recorded lower acidity (0.21±0.006).Shinde (1979) studied market quality of *pedha* sold in Parbhani city and reported titratable acidity as 0.24 ±0.018 per cent. Yadav *et al*.(1993) reported the chemical composition of laboratory *pedha* as acidity 0.28 per cent.

pH Content : pH in *pedha* sample was ranged from 5.97±0.08 to 6.42±0.02. The maximum pH was recorded for sample PS_5 Despite this sample PS_1, PS_2, PS_4 and PS_6 reported pH as 6.29±0.09, 6.35±0.03, 6.17±0.06 and 6.34±0.02 respectively.

Conclusion

From the present study it is concluded that, *pedha* sample PS6 was found significantly superior to all other sample which were taken for study on the basis of Sensory evaluation and sample PS3 was found slightly inferior.There was significantly variation found in fat, protein, moisture, Total solid, reducing sugar, non reducing sugar, acidity, pH and etc. of all market *pedha* sample. The present investigation, indicated that the significant difference in the Non reducing sugar content i.e. sucrose in the *pedha* samples. results shows that the sugar content in some *pedha* samples is more than normal range. It is due to more amount of sugar added in the product by manufacturer.

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