

## TEXTURAL AND SENSORY CHARACTERISTICS OF MARKET SAMPLES OF PEDA MANUFACTURED IN VARANASI CITY OF INDIA

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### ABSTRACT

Three types of Peda samples (white, yellow and brown) were collected from four major markets of Varanasi city. The samples were evaluated for their textural and sensory qualities. The sensory attributes for yellow and lal peda obtained from the market varied significantly in their colour and appearance scores, ranging for 6.57- 7.64 and 6.92 – 7.64, respectively ( $p < 0.05$ ). Significant difference was observed in body and texture scores for yellow peda, which ranged from 6.78 – 7.78 ( $p < 0.05$ ). Textural properties such as chewiness and gumminess showed wide variation among all types of peda from different markets. The gumminess for white peda ranged from 247.18 to 2037.98, while chewiness ranged from 104.32 to 596.48. Springiness (0.993) and cohesiveness (0.918) were positively correlated, whereas gumminess (-0.937) and chewiness (-0.945) negatively correlated with moisture content of peda.

**Key words:** Sensory evaluation, Textural properties, Type of Peda.

### INTRODUCTION

India produces about 117 million tons of milk annually, out of which about 50% is converted into various traditional dairy products ( Bhasin, 2010). *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*.

*Peda* is an indigenous, *khoa* based, heat desiccated milk sweet prepared from either cow milk, buffalo milk or the combination of both. Mahadevan (1991) reported that the quantity of *peda* produced in India exceeds any other indigenous milk based sweet. *Peda* has been known by different synonyms like *peda*, *penda*, *pera* etc. in different parts of the country. Types of *peda* include *white peda*, *yellow peda*, *brown peda* and *kesar peda*. Also regional variants of *peda* are produced throughout the country namely, *Mathura peda*, *kunthalgiri peda*, *Dharwad peda*, *lal peda* and *bal mithai* (Uttarakhand, caramelized and sugar Hobules coated) *Peda* is offered at religious places as “*Prasad*” and as an

item of menu at many ceremonial functions in Indian society. A large amount of *peda* is offered at temples in Varanasi daily. However, no investigation has been carried out to evaluate the textural and sensory quality of *peda* sold in Varanasi markets. The present study was thus carried out to evaluate the textural and sensory qualities of *white*, *yellow* and *lal peda* samples collected from Varanasi city.

### MATERIALS AND METHODS

**Collection of Samples:** Peda samples of *white*, *yellow* and *lal variants* were collected from four different locations of Varanasi city. The samples were collected periodically from four pre-identified shops within two to three hours of their preparations and packed in cardboard boxes of rectangular shape (10 x 12 cm<sup>2</sup>). The cardboard boxes were packed and sealed in polyethylene bags to prevent gain or loss of moisture during transport. The samples were tempered to room temperature before analysis of different quality parameters.

**Sensory Evaluation:** The sensory evaluation of *peda* samples was conducted by a panel of seven semi-trained judges from the

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Centre of Food Science and Technology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, The panellists were acquainted with the quality attributes and the defects of *peda* under study. Samples were evaluated for flavour, colour and appearance, body and texture sweetness and over all acceptability on the basis of nine point hedonic scale.

**Texture Profile Analysis (TPA):** The Texture Analyser (model TAXT, Stable Micro Systems Ltd., Surrey, UK), equipped with a 50-kg load cell was used with a 75 mm compression platen under 50-kg load cell. The samples were subjected to compression force by probe up to a distance of 5.00 mm two times. The conditions set in the texture analyser for measuring textural properties were as follows: pretest speed- 1mm/sec; test speed- 1mm/sec; post-test speed- 5mm/sec; count- 2; test distance- 5.0 mm; trigger type- auto; trigger force- 5 g; probe- 75 mm compression platen.

**Analysis of Experimental Data:** Correlation analysis was conducted for moisture and textural parameters. The sensory data of all types of *peda* analysed using randomized block design.

## RESULTS AND DISCUSSION

**Sensory Quality of Market *Peda*:** The sensory scores for *market peda* samples are represented graphically in Fig. 1, 2 and 3, respectively.

**Colour and Appearance:** The mean score for colour and appearance of white *peda* samples are graphically presented in Fig.1. The scores obtained from different market samples did not vary significantly ( $p < 0.05$ ). The average score for colour and appearance of *yellow peda* (Fig. 2) and *lal peda* (Fig. 3) varied significantly ( $p < 0.05$ ). Ray *et al.*

(2002) found that *peda* made from buffalo milk was superior to *peda* made from cow milk, because of yellowish colour of cow milk, making it less acceptable compared to *white peda* made from buffalo milk.

**Flavour and Sweetness:** The values obtained from the samples from different markets did not vary significantly. Desale *et al.* (2007) studied the effect of compositional variables on the quality of *peda*. Their findings suggest that maximum sensory scores were obtained for the *peda* containing 30% sugar, 15% moisture and 25% fat. In current findings acceptable sensory quality for sweetness was obtained for all types of *peda*.

**Body and Texture:** The average score for body and texture of *white and lal peda* obtained from different markets did not vary significantly. A significant difference ( $p < 0.05$ ) was observed for body and texture score between samples of *yellow peda* from different markets (Fig. 2).

**Overall Acceptability:** The mean score for overall acceptability of *white, yellow and brown peda* samples obtained from different markets did not vary significantly for all types of *peda* under study.

**Textural Properties of Market *Peda*:** The textural values for *white peda, lal peda* and *yellow peda* samples are shown in Table 1, 2 and 3, respectively. The *white peda* samples showed wide variations in their texture profile among the markets. The values derived from the study showed adhesiveness ranging from 1.92 to 26.55 g.sec, cohesiveness 0.29 to 0.38, gumminess 247.18 to 2037.98 and chewiness 104.32 to 596.48, springiness 0.29 to 0.42 and resilience 0.10 to 0.12 (Table 1). Patel *et al.*

TABLE 1: Textural characteristics of market samples of *white peda*.

Character	Markets				CD
	Market 1	Market 2	Market 3	Market 4	(Critical Difference) p < 0.01
Adhesiveness* (g.sec)	7.21 ± 5.55	26.55 ± 2.47	1.92 ± 12.23	18.77 ± 2.28	28.270 <sup>a</sup>
Springiness *	0.29 ± 0.01	0.36 ± 0.01	0.41 ± 0.01	0.42 ± 0.02	0.041 <sup>b</sup>
Cohesiveness*	0.29 ± 0.01	0.32 ± 0.007	0.35 ± 0.02	0.38 ± 0.02	0.049 <sup>c</sup>
Gumminess*	2037.98 ± 564.83	652.79 ± 53.08	349.69 ± 82.75	247.18 ± 73.07	791.711 <sup>d</sup>
Chewiness*	596.48 ± 164.44	236.12 ± 26.89	144.72 ± 37.31	104.32 ± 27.77	236.982 <sup>e</sup>
Resilience*	0.10 ± 0.007	0.10 ± 0.004	0.10 ± 0.005	0.12 ± 0.009	0.018 <sup>a</sup>

\* Mean from triplicate experiments ± Standard deviation.  
Values with similar abbreviations are non significant.

TABLE 2: Textural characteristics of market samples of *lal peda*.

Character	Markets				CD (Critical Difference) p<0.01
	Market 1	Market 2	Market 3	Market 4	
Adhesiveness* (g.sec)	440.13 ± 243.24	5.43 ± 3.95	147.85 ± 93.47	25.42 ± 17.37	96.895 <sup>a</sup>
Springiness *	0.28 ± 0.04	0.43 ± 0.05	0.54 ± 0.12	0.33 ± 0.04	0.047 <sup>b</sup>
Cohesiveness*	0.25 ± 0.04	0.25 ± 0.05	0.28 ± 0.03	0.30 ± 0.04	0.046 <sup>c</sup>
Gumminess*	527.55 ± 33.20	979.44 ± 866.96	61.57 ± 23.18	161.86 ± 14.77	534.389 <sup>a</sup>
Chewiness*	148.88 ± 14.77	450.79 ± 452.38	35.59 ± 20.79	53.81 ± 2.87	136.660 <sup>d</sup>
Resilience*	0.06 ± 0.01	0.08 ± 0.02	0.04 ± 0.002	0.08 ± 0.009	0.017 <sup>e</sup>

\* Mean from triplicate experiments ± Standard deviation.

Values with similar abbreviations are non significant.

TABLE 3: Textural characteristics of market samples of *yellow peda*.

Character	Markets				CD (Critical Difference) p<0.01
	Market 1	Market 2	Market 3	Market 4	
Adhesiveness* (g.sec)	0.30 ± 0.32	60.00 ± 70.70	3.09 ± 2.11	0.70 ± 0.49	357.790 <sup>a</sup>
Springiness *	0.33 ± 0.01	0.18 ± 0.01	0.50 ± 0.02	0.47 ± 0.01	0.207 <sup>a</sup>
Cohesiveness*	0.28 ± 0.02	0.21 ± 0.01	0.44 ± 0.003	0.39 ± 0.01	0.119 <sup>a</sup>
Gumminess*	792.24 ± 63.94	1027.91 ± 372.55	847.34 ± 21.84	899.83 ± 93.93	1189.063 <sup>a</sup>
Chewiness*	262.82 ± 14.35	195.33 ± 86.16	426.83 ± 11.02	425.91 ± 46.91	620.689 <sup>a</sup>
Resilience*	0.08 ± 0.008	0.07 ± 0.006	0.14 ± 0.004	0.11 ± 0.007	0.037 <sup>a</sup>

\* Mean from triplicate experiments ± Standard deviation.

Values with similar abbreviations are non significant.



FIG 1: Average scores obtained for different sensory attributes of white peda samples. The values for all attributes for sensory evaluation do not differ significantly ( $p < 0.05$ ).

(2006) reported very high gumminess in *white peda* which is in accordance with current findings.

The *yellow peda* samples differed significantly in their textural properties. The

values derived from the study showed adhesiveness ranging from 0.301 to 60.007 g.sec, gumminess 792.24 to 1027.912, chewiness 195.337 to 426.831, springiness 0.186 to 0.504, cohesiveness

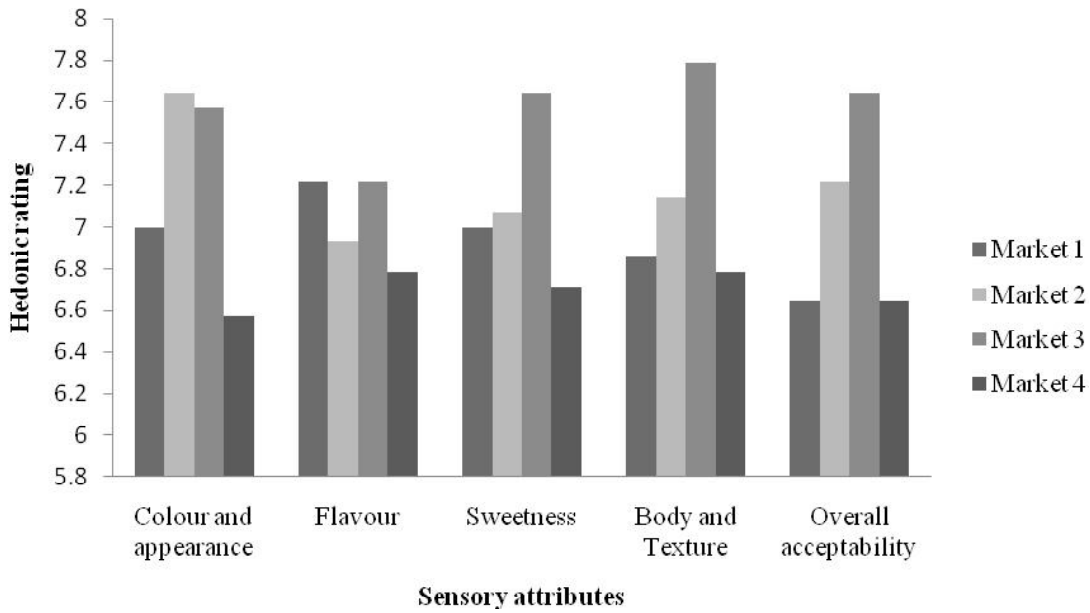


FIG 2: Average scores obtained for different sensory attributes of yellow peda samples. The value for colour and body & texture differ significantly ( $p < 0.05$ ), whereas values for other attributes do not differ significantly.

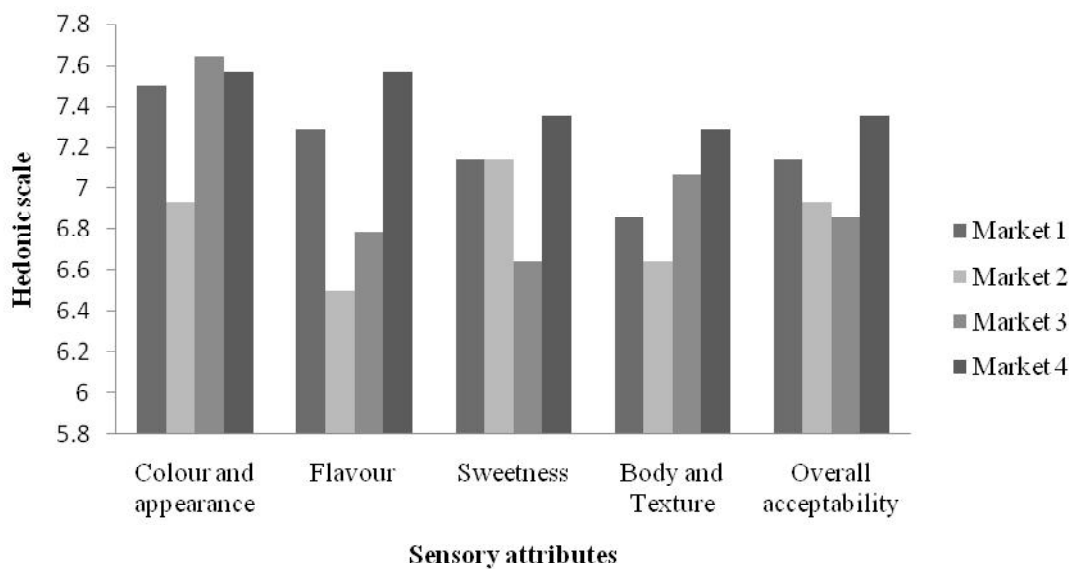


FIG. 3: Average scores obtained for different sensory attributes of lal peda samples. The values for colour and appearance differ significantly, whereas values for other attributes do not vary significantly ( $p < 0.05$ ).

0.214 to 0.44 and resilience 0.07 to 0.144 (Table 3). The findings show wide degree of variations in all the textural properties of all types of *peda* collected from market.

The *brown peda* samples also showed wide variations among samples procured from different markets. Londhe and Pal (2008) found wide variations in chewiness values of *brown peda* collected from different markets, which

was also observed in all the three types of *peda* under present study. The variations may be due to variation in moisture content of *peda*. The moisture content of *white peda* ranged from 21.37 to 31.53 %, *lal peda* 15.95-19.38 % and *yellow peda* 14.34–17.67 %. Ray *et al.* (2002) reported similar levels of moisture content in *peda*.

Correlation analysis of moisture content and textural properties of *peda* samples show that springiness (0.993) and cohesiveness (0.918) are positively correlated, whereas gumminess (-0.937) and chewiness (-0.945) are negatively correlated with moisture content of *peda*.

### CONCLUSIONS

The different types of *peda* samples collected from four different markets of

Varanasi, showed wide variation in their textural and sensory profile. This may be due to the variation in their method of preparation and varying levels of sugar and moisture content. The correlation study indicated that, there is a direct relation between moisture levels and textural variations, which affects the sensory acceptability of the *peda* samples.

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