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RESEARCH PAPER

Process standardization of low sugar, low calorie and fibre enriched *Lal Peda*

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ABSTRACT

Varanasi,the city of gallis and ghats is not only famous for its *Banarasi saree* and *Banarasi paan*, but also famous for the *Lal Peda* loaded with higher amount of sugar and loaded with ghee, the *Peda* is shaped by hand and dusted with semolina and pistachios as a finishing touch. *Lal Peda* is a popular heat desiccated traditional dairy delicacy of eastern India specially Uttar Pradesh. It is prepared by blending of *Khoa* and sugar followed by heat desiccation until characteristic reddish brown colour appears. The *Lal Peda* is deficit in fibre so the developed *Lal Peda* was prepared with addition of oat. This product is manufactured since long time yet not glamorized as other *Khoa* based sweet products like *Burfi*, *Peda* etc. The main reason behind this is, these products centered into specific areas and have not proper focused by research scientists and extension workers. So the experiment was carried out on low calorie, low sugar and fibre enriched *Lal Peda*. The process for the manufacture of low calorie, low sugar and fibre enriched *Lal Peda* was standardized. Optimization of product stages and levels of addition of maltodextrin, sorbitol, oat, sugar and aspartame were used with help of sensory evaluation score. Hence, the formulation with buffalo milk with 3 per cent fat, 2 per cent maltodextrin, 0.50 per cent oat on the basis of milk and 20 per cent sugar and 0.10 per cent aspartame on the basis of *Khoa* were considered to be the most appropriate formulation for preparation of low sugar, low calorie and fibre enriched *Lal Peda*. The proximate composition of developed *Lal Peda* contained 17.95 per cent moisture, 14.28 per cent fat, 16.93 per cent protein, 13.58 per cent lactose, 20.18 per cent sugar, 3.18 per cent ash and 4.18 per cent dietary fibre. Preliminary studies were carried out for screening of fat replacers *i.e.* maltodextrin and sorbitol for replacement of fat. Then various stages like at milk stage, at *Rabri* stage and lastly at pat formation stage for addition of fat replacers were analyzed. As the developed *Lal Peda* was enriched with fibre, oat was used. The stage of addition and various levels were also analyzed. The developed low calorie and fibre enriched *Khoa* was used for preparation of *Lal Peda*. For preparation of *Lal Peda*, various levels of sugar and aspartame as sugar replacement was used. The selection of various stages and levels, the sensory evaluation by semi expert judges was carried out. The developed *Lal Peda* was finalized by screening method.

Key Words : Low sugar, Low calorie, fibre, *Lal Peda*, Process standardization

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In India most of traditional dairy product contains high fat and also high sugar (Pal and Raju, 2007). *Peda* and *Burfi* are the two major *Khoa* based sweets, which are highly popular among Indians, mainly because of their delicious taste and high nutritional value. It has been reported that the quantity of *Peda* produced in India exceeds any other indigenous milk based sweet (Mahadevan, 1991). Fat replacers sometimes referred as fat substitutes or fat replacements are ingredients that mimic some of the roles of fat in food processing. The ideal fat replacer is a safe compound consumed with no health risk. It has all the functional and organoleptic properties of fat (taste and appearance characteristics such as richness, flakiness and sheen) with significantly fewer calories than fat (Hope Warshaw and Marion Franze, 1996).

It can serve as an excellent carrier product for extra nutrient and if enriched or fortified it can satisfy the nutritional needs of the people (Krupa *et al.*, 2011).In India most of traditional dairy food contains high fat and also high sugar (Pal and Raju, 2007).

Oat :

Oats are generally, considered 'healthful', or a health food, being touted commercially as nutritious. The discovery of their cholesterol-lowering properties has led to wider appreciation of oats as human food.

Soluble fibre in oat :

Consumption of oat is believed to lower LDL (bad) cholesterol and possibly to reduce the risk of heart disease. Oats contain more soluble fibre than any other grain, resulting in slower digestion and an extended sensation of fullness. Oat protein is nearly equivalent in quality to soy protein, which World Health Organization research has shown to be equal to meat, milk and egg protein.

***Lal Peda* :**

Varanasi, the city of gallis and ghats is not only famous for its *Banarasi saree* and *Banarasi paan*, but also famous for the *Lal peda* loaded with high sugar and loaded with *Ghee*. *Lal peda* is a popular heat desiccated traditional dairy delicacy of eastern India specially Uttar Pradesh. Very little attention is paid to packaging and sanitary handling practices (Patil, 2003). Onthe commercial scale, the low shelf of products is big challenge faced by the manufacturer (Mishra, 2000; Aneja *et al*., 2002 and Patil, 2005). *Lal Peda* is produced and marketed has limited shelf-life of 5-7 days and consumed fresh. For making it popular outside the traditional manufacturing region, there is a need to have its higher shelf-life.

RESEARCH METHODOLOGY

Low sugar, low calorie and fibre enriched *Lal Peda* was preparedin the Laboratory of Animal Husbandry and Dairying and Centre of Food Science and Technology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi.

Buffalo milk :

Buffalo milk was standardized to 3 per cent fat and 9 per cent SNF.

Artificial sweetener :

Artificial sweeteners *i.e.* aspartame was purchased from market, Varanasi, U.P.

Sugar :

Good quality sugar was obtained from the local market of Varanasi, Uttar Pradesh.

Bulking agents :

High quality bulking agents *i.e.* maltodextrin and sorbitol were purchased from the local market of Varanasi, Uttar Pradesh.

Oat :

High quality oat was purchased from the local market of Varanasi, Uttar Pradesh.

Statistical analysis :

All the data were expressed as mean ± standard deviation of mean and was calculated from three independent experiments. One-way analysis of variance (ANOVA) using Completely Randomized Design (CRD) was applied.

RESULTS AND REMONSTRATION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Fat replacement for preparation of *Khoa* :

This part of experiment was carried out with an

aim to prepare low fat and low calorie *Khoa* by reducing the fat content. The traditional *Lal Peda* contains high amount of fat, which is harmful for the health conscious peoples. Hence, the attempt was made to prepare low fat *Khoa* from buffalo milk. The fat content in buffalo milk was standardized to 3 per cent by using Pearson's square formula. *Khoa* prepared from buffalo milk containing 3 per cent fat without incorporation of fat replacer was unacceptable in terms of sensory attributes because prepared *Khoa* was hard and chewy. So prepared *Khoa* containing 3 per cent fat was unsuitable for preparation of *Khoa*. So two fat replacers *i.e.* maltodextrin and sorbitol were used as fat replacer for preparation of *Khoa*. For preparation of *Khoa* with help of maltodextrin as fat replacer, the stage of addition was finalized. Anexperiment was conducted to use maltodextrin as a fat replacer which being a carbohydrate, (very low in fat) was used for manufacturing low fat and low calorie *Khoa*. The various three stages were selected for addition of maltodextrin.1 per cent maltodextrin on the basis of milk was taken to finalize the stage of addition.

Effect of stage of addition of maltodextrin @1 per cent on the basis milk for preparation of low fat *Khoa* :

The effect of stage of addition of maltodextrin@1 per cent on the basis of milk for preparation of low fat *Khoa* is given in following Table 1 and Fig. 1. The matter related to flavour, body and texture, colour and appearance and overall acceptability are discussed in following heads.

The typical flavour of most desirable quality *Khoa* is mild and cooked flavour accompanied by richness and sweetness due to fat and lactose content in milk used for preparation of *Khoa*. The desired body and texture is one of the having soft, smooth and very fine grains which are cohesively knit in form of a bolus. The comparison has been made with *Khoa* prepared from 6 per cent fat (standardized fat) and *Khoa* prepared 3 per cent fat with maltodextrin as fat substitute. The various stages for addition of maltodextrin was experimented to develop low fat *Khoa*. The maltodextrin @ 1 per cent on the basis of milk was used.

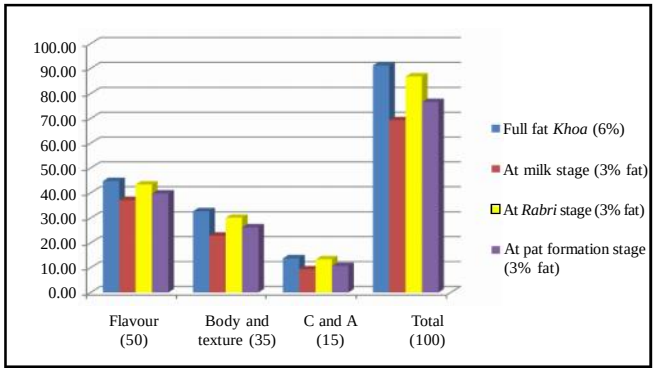

Fig. 1 : Effect of stage of addition of maltodextrin @1 per cent on the basis milk of low fat *Khoa*

Effect of stage of addition of maltodextrin on flavour, body and texture, colour and appearance and overall acceptability score :

For addition of maltodextrin, various stages were tried *i.e.* milk stage, *Rabri* stage and pat formation stage. From these various stages, the *Rabri* stage was found most acceptable by sensory evaluation as compared to other stages. The highest score was obtained amongst these three stages of addition of maltodextrin from milk of 3 per cent fat and incorporating 1 per cent maltodextrin at *Rabri* stage. The prepared *Khoa* was found to have near about flavour, body and texture, colour and appearance and overall acceptability score as compared to full fat *Khoa*. Addition of maltodextrin at various stages had a significant ($P<0.05$) effect on flavour, body and texture, colour and appearance and overall acceptability score of *Khoa*. The maximum overall acceptability score 91.20 (out of 100) was obtained from *Khoa* samples prepared fromfull fat *Khoa* containing 6 per cent fat. The highest score was obtained amongst these three stages of addition of maltodextrin from milk of 3 per cent fat and incorporating 1 per cent maltodextrin

Table 1 : Effect of stage of addition of maltodextrin @1 per cent on the basis milk of low fat *Khoa*

Stage of addition	Flavour (50)	Body and texture (35)	Colour and appearance (15)	Overall acceptability (100)
Full fat *Khoa* (6 % fat)	44.73±0.12	32.70±0.10	13.77±0.21	91.20±0.21
At milk stage	37.13±0.83	22.83±0.25	9.30±0.44	69.27±0.44
At *Rabri* stage	42.37±0.21	28.70±0.26	12.90±0.10	83.97±0.10
At pat formation stage	39.73±0.61	26.20±0.95	10.67±0.23	76.60±0.23

Values represent Mean± standard deviation of score of 10 judges

at *Rabri* stage. Maltodextrin was incorporated at milk stage. The body and texture of developed *Khoa* was very sticky, uneven and unclean.

On the basis of sensory evaluation, addition of bulking agent Maltodextrin for preparation of *Khoa* at *Rabri* stage was finalized for further study.

Level of addition of maltodextrin @1 per cent, 2 per cent and 3 per cent at *Rabri* stage :

The effect of level of addition of maltodextrin @1 per cent, 2 per cent and 3 per cent at *Rabri* stage on the basis of milk for preparation of *Khoa* is given in following Table 2 and Fig. 2. The matter related to flavour, body and texture, colour and appearance and overall acceptability are discussed in following heads.

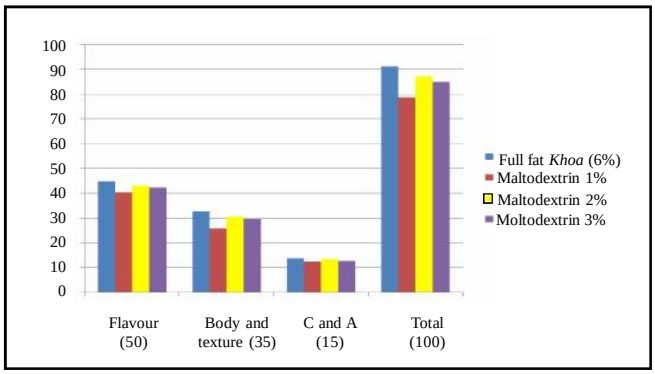

Fig. 2 : Level of addition of maltodextrin @1 per cent, 2 per cent and 3 per cent at *Rabri* stage

The typical flavour of most desirable quality *Khoa* is mild and cooked flavour accompanied by richness and sweetness due to fat and lactose content in milk used for preparation of *Khoa*. The desired body and texture is one of the having soft, smooth and very fine grains which are cohesively knit in form of a bolus. The comparison has been made with *Khoa* prepared from 6 per cent fat (standardized fat) and *Khoa* prepared from 3 per cent fat with maltodextrin as fat substitute. The various levels of maltodextrin were experimented to develop low fat *Khoa*. The maltodextrin @ 1 per cent, 2 per cent and 3 per cent on the basis of milk was used to prepare low calorie *Khoa.*

Effect of level of maltodextrin on flavour, body and texture, colour and appearance and overall acceptability score :

For addition of maltodextrin, various levels were tried *i.e.* maltodextrin 1 per cent, 2 per cent and 3 per cent on the basis of milk was used to prepare low calorie *Khoa* at *Rabri* stage. From these various levels, the addition of 2 per cent maltodextrin at *Rabri* stage was found most acceptable by sensory evaluation as compared to other levels of maltodextrin. So the maximum acceptable flavour score 43.17 out of 50 was obtained from *Khoa* prepared with addition of 2 per cent maltodextrin at *Rabri* stage. The prepared *Khoa* was found to have near about flavour score as compared to full fat *Khoa*. Addition of maltodextrin at various levels had a significant ($P<0.05$) effect on flavour score of *Khoa*. The average overall acceptability score of *Khoa* ranged from 91.20 to 81.27. The maximum overall acceptability score 91.20 (out of 100) was obtained from *Khoa* samples prepared from full fat *Khoa* containing 6 per cent fat. The highest score was obtained amongst these three stages of addition of maltodextrin from milk of 3 per cent fat and incorporating 2 per cent maltodextrin at *Rabri* stage. On the basis of sensory evaluation, addition of bulking agent maltodextrin @2 per cent for preparation of *Khoa* at *Rabri* stage was finalized for further study.

Effect of level of addition of oat @0.5 per cent, 0.75 per cent and 1.0 per cent at *Rabri* stage for preparation of *Khoa* :

The effect of level of addition of oat @0.50 per cent, 0.75 per cent and 1 per cent at *Rabri* stage on the basis of milk for preparation of *Khoa* is given in following Table 3. The matter related to flavour, body and texture, colour and appearance and overall acceptability are discussed in following heads. The effect of level of

Table 2 : Level of addition of maltodextrin @1 per cent, 2 per cent and 3 per cent at *Rabri* stage

Level of addition of maltodextrin	Flavour (50)	Body and texture (35)	Colour and appearance(15)	Overall acceptability (100)
Full fat *Khoa* (6 %)	44.73±0.16	32.70±0.10	13.77±0.21	91.20±0.21
Maltodextrin 1 %	42.37±0.21	28.70±0.27	12.80±0.44	83.87±0.12
Maltodextrin 2 %	43.17±0.06	30.60±0.17	13.43±0.10	87.20±0.12
Maltodextrin 3 %	41.33±0.15	27.70±0.10	12.23±0.23	81.27±0.06

addition of oat @0.50 per cent, 1 per cent and 1.5 per cent at *Rabri* stage on the basis of milk for preparation of *Khoa* is given in following Table 3 and Fig. 3. The matter related to flavour, body and texture, colour and appearance and overall acceptability are discussed in following heads. The typical flavour of most desirable quality *Khoa* is mild and cooked flavour accompanied by richness and sweetness due to fat and lactose content in milk used for preparation of *Khoa*. The desired body and texture is one of the having soft, smooth and very fine grains which are cohesively knit in form of a bolus. The comparison has been made with *Khoa* prepared from 6 per cent fat (standardized fat) and *Khoa* prepared from 3 per cent fat with maltodextrin as fat substitute was already prepared. The various levels of oat were experimented to develop low fat *Khoa* enriched with fibre. The oat @ 0.5, 1 per cent and 1.5 per cent on the basis of milk was used to prepare *Khoa*.

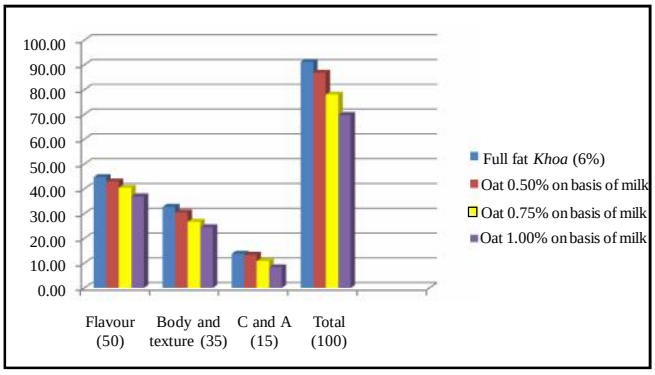

Fig. 3 : Effect of level of addition of oat@0.5 per cent, 0.75 per cent and 1.0 per cent at *Rabri* stage for preparation of *Khoa*

Effect of level of oat on flavour score :

As level of oat increases the flavour, body and texture, colour and appearance and overall acceptability of *Khoa* decreased simultaneously. The average overall acceptability score of *Khoa* ranged from 91.20 to 69.73. The maximum overall acceptability score 91.20 (out of 100) was obtained from *Khoa* samples prepared from full fat *Khoa* containing 6 per cent fat. The highest score was obtained amongst these three stages of addition of oat from milk of 3 per cent fat and incorporating 0.5 per cent oat at *Rabri* stage. Minimum overall acceptability score 69.73 out of 100 was obtained from *Khoa* prepared with addition of 2 per cent maltodextrin at *Rabri* stage. So the maximum acceptable overall acceptability score 82.17 out of 100 was obtained from *Khoa* prepared from addition of 0.5 per cent oat at *Rabri* stage. The prepared *Khoa* was found to have near about overall acceptability score as compared to full fat *Khoa*. Addition of oat at various levels had a significant ($P<0.05$) effect on overall acceptability score of *Khoa*.

On the basis of sensory evaluation, addition of bulking agent maltodextrin @2 per cent at *Rabri* stage and addition of oat @0.50 per cent at *Rabri* stage was finalized for further study for preparation of *Khoa.*

Stage of addition of 2 per cent maltodextrin and 0.50 per cent oat on the basis of milk for preparation low calorie and fibre enriched *Khoa* :

The effect of stage of addition of maltodextrin@2 per cent and 0.50 per cent oat on the basis of milk for preparation of *Khoa* is given in following Table 4 and

Table 3 : Effect of level of addition of oat @0.5 per cent, 0.75 per cent and 1.0 per cent at *Rabri* stage for preparation of *Khoa*

Level of addition of oat	Flavour (50)	Body and texture (35)	Colour and appearance (15)	Overall acceptability (100)
Full fat *Khoa* (6 % fat)	44.73±0.12	32.70±0.10	13.77±0.21	91.20±0.21
Oat @0.50 % on basis of milk	42.73±0.12	28.87±0.06	10.57±0.21	82.17±0.21
Oat@ 0.75 % on basis of milk	40.40±0.17	26.70±0.10	10.03±0.11	77.13±0.11
Oat @1.00% on basis of milk	36.93±0.15	24.47±0.06	8.33±0.06	69.73±0.06

Table 4 : Stage of addition of 2 per cent maltodextrin and 0.50 per cent oat on the basis of milk for preparation low calorie and fibre enriched *Khoa*

Stage of addition of 2% maltodextrin and 0.50% oat	Flavour (50)	Body and texture (35)	Colour and appearance (15)	Overall acceptability (100)
Full fat *Khoa* (6 %)	44.73±0.12	32.70±0.10	13.77±0.21	91.20±0.21
At milk stage	29.83±0.12	25.07±0.15	9.63±0.11	64.53±0.11
At *Rabri* stage	42.30±0.17	28.63±0.15	11.23±0.06	82.17±0.06
At pat formation stage	39.73±0.12	27.13±0.06	10.87±0.06	77.73±0.06

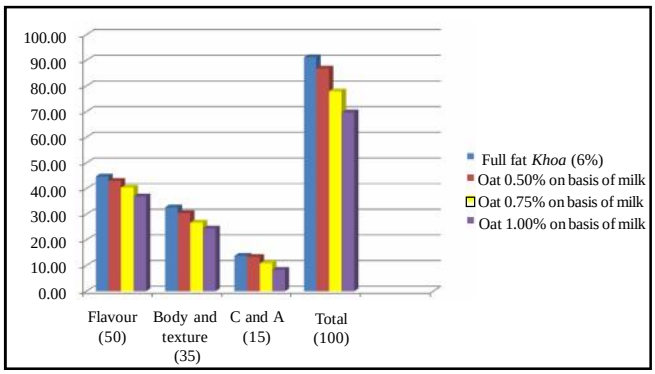

Fig. 4 : Stage of addition of 2 per cent maltodextrin and 0.50 per cent oat on the basis of milk for preparation low calorie and fibre enriched *Khoa*

Fig. 4. The matter related to flavour, body and texture, colour and appearance and overall acceptability are discussed in following heads.

Preliminary trials were conducted for finalization of various stages and levels of bulking agent maltodextrin and oat for preparation of low calorie and fibre enriched *Khoa* for manufacture of developed *Lal Peda*. According to previous trial conducted 2 per cent maltodextrin and 0.50 per cent oat on the basis of milk at *Rabri* stage was finalized. But there was need to conduct a trial of combining effect of these two factors on stage of addition. So *Khoa* was prepared by using 2 per cent maltodextrin and 0.50 per cent oat on the basis of milk at three levels of stages used to prepare low calorie fibre enriched *Khoa*. The comparison has been made with *Khoa* prepared from 6 per cent fat (standardized fat) and *Khoa* prepared from 3 per cent fat with various stages.

Effect of stage of addition of 2 per cent maltodextrin and 0.50 per cent oat on flavour, body and texture, colour and appearance and overall acceptability score :

For addition of 2 per cent maltodextrin and 0.50 per cent oat, various stages were tried *i.e.* milk stage, *Rabri* stage and pat formation stage. From these various stages, the *Rabri* stage was found most acceptable by sensory evaluation as compared to other stages. The prepared *Khoa* was found to have near about flavour score as compared to full fat *Khoa*. Addition of 2 per cent maltodextrin and 0.50 per cent oat at various stages had a significant ($P<0.05$) effect on flavour score of *Khoa*. 2 per cent maltodextrin and 0.50 per cent oat was incorporated at milk stage, the body and texture of developed *Khoa* was very sticky, uneven and unclean.

The average overall acceptability score of *Khoa* ranged from 91.20 to 64.53. The maximum overall acceptability score 91.20 (out of 100) was obtained from *Khoa* samples prepared fromfull fat *Khoa* containing 6 per cent fat. The highest score was obtained amongst these three stages of addition of 2 per cent maltodextrin and 0.50 per cent oat from milk of 3 per cent fat and incorporating 2 per cent maltodextrin and 0.50 per cent oat at *Rabri* stage. Minimum overall acceptability score 64.53 out of 100 was obtained from *Khoa* prepared with addition of maltodextrin at milk stage. So the maximum acceptable overall acceptability score 82.17 out of 100 was obtained from *Khoa* prepared at *Rabri* stage.The prepared *Khoa* was found to have near about overall acceptability score as compared to full fat *Khoa*. Addition of 2 per cent maltodextrin and 0.50 per cent oat at various stages had a significant ($P<0.05$) effect on overall acceptability score of *Khoa*. The overall acceptability of developed *Khoa* was very sticky, uneven and unclean when 2 per cent maltodextrin and 0.50 per cent oat was incorporated at milk stage.

On the sensory evaluation, addition of 2 per cent maltodextrin and 0.50 per cent oat at *Rabri* stage was found most acceptable for preparation of low calorie and fiber enriched *Lal Peda* was finalized for further study.

Addition of sugar and aspartame for preparation of *Lal Peda*:

The effect of addition of sugar and aspartame for preparation of *Lal Peda* is given in following Table 5 and Fig. 5. The matter related to flavour, body and texture,

Table 5 : Addition of sugar and aspartame for preparation of *Lal Peda*

Addition of sugar and aspartame	Flavour (10)	Body and texture (15)	Colour and appearance (5)	Overall acceptability (25)
50% sugar + 0 % aspartame	9.77±0.06	9.13±0.12	4.90±0.10	23.80±0.10
30% sugar + 0.05 % aspartame	9.07±0.12	8.77±0.06	4.67±0.06	22.50±0.06
20% sugar + 0.10 % aspartame	8.73±0.06	8.17±0.06	4.47±0.06	21.37±0.06
10% sugar + 0.15 % aspartame	8.13±0.06	7.83±0.06	4.17±0.06	20.13±0.06
0% sugar + 0.20 % aspartame	6.70±0.17	6.37±0.12	2.57±0.12	15.63±0.12

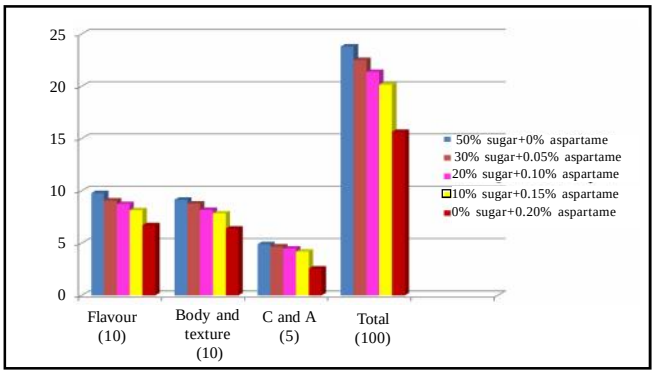

Fig. 5 : Addition of sugar and aspartame for preparation of *Lal Peda*

colour and appearance and overall acceptability are discussed in following heads.

The sensory evaluation of any dairy or food products subjectively measures the impression of human senses. It is well recognized that sensory evaluation is very important tool in determining the acceptability of new food or dairy products. Sugar is a major constituent of traditional *Lal Peda* as well as the developed low calorie, low sugar and fibre enriched *Lal Peda*.Sugar replacement by alternative artificial sweetener, thus, requires addition of appropriate levels of sugar and artificial sweetener. Aspartame was used along with sugar to provide the sweetness in developed *Lal Peda*. The *Khoa* was prepared by using 2 per cent maltodextrin on the basis of milk as bulking agent and 0.50 per cent oat on the basis of milk. The developed *Khoa* was used for preparation of *Lal Peda* on the basis of sensory evaluation. So the developed *Lal Peda* contains maltodextrin and oat as fibre source. On the sensory evaluation the *Lal Peda* prepared from 20 per cent sugar and 0.10 per cent aspartame on the basis of *Khoa* was selected for further storage study. The superior results were obtained from control sample containing 50 per cent sugar and 0 per cent aspartame. As the level of sugar decreased as well as level of artificial sweetener aspartame increased the flavour, body and texture, colour and appearance and overall acceptability scores decreased significantly. But the maximum acceptable score was obtained by addition of 20 per cent sugar and .010 per cent aspartame to replace the sugar by 60 per cent as compared to control *Lal Peda* samples. The developed *Lal Peda* contains low amount of fat and sugar enriched with oat as source of fibre.

On the sensory evaluation addition of 20 per cent sugar and 0.10 per cent aspartame on the basis of *Khoa* was finalized for preparation *Lal Peda* for further storage study.

Effect of sugar and aspartame on flavour, body and texture, colour and appearance and overall acceptability score :

The average overall acceptability score of *Lal Peda* ranged from 23.80 to15.63 (out of 25). The maximum overall acceptability score 23.80 (out of 25) was obtained from *Lal Peda* samples prepared from combinations of 50 per cent sugar and 0 per cent aspartame. Minimum overall acceptability score 15.63 out of 25 was obtained from *Lal Peda* prepared with combinations of 0 per cent sugar and 0.20 per cent aspartame. So the maximum acceptable overall acceptability score 21.37 out of 25 was obtained from *Lal Peda* prepared from 20 per cent sugar and 0.10 per cent aspartame combination on the basis of *Khoa*. As level of sugar decreased and level of aspartame increased, the overall acceptability score of *Lal Peda* decreased significantly ($P<0.05$). Addition of sugar and aspartame for preparation of experimented *Lal Peda* had highly significant effect on overall acceptability scores of developed *Lal Peda*. Bhardwaj (2003) replaced sugar with artificial sweeteners in the preparation of flavoured milks. Based on sensory scores a combination of saccharin and aspartame with the ratio

Table 6 : Gross composition of low sugar, low calorie and fibre enriched *Lal Peda*, normal *Peda* and normal *Lal Peda*

Constituents	Low sugar, low calorie fibre enriched *Lal Peda*	Normal *Peda*	Normal *Lal Peda* (Shanbhu Nath Prajapati)
Moisture (%)	17.95± 0.52	14.67 ± 0.57	---
Fat (%)	14.28± 0.40	22.75 ± 0.40	18.36
Protein (%)	16.93± 0.29	14.67 ± 0.21	13.46
Lactose (%)	13.58± 0.38	15.75 ± 0.35	14.00
Sucrose (%)	20.18± 0.09	30.63 ± 0.12	50.00
Ash (%)	3.18± 0.11	2.32 ± 0.26	3.01
Dietary fibre (%)	4.18 ±.018	--	--

Average of three estimations

20:80 (33mg + 368mg/l) was found to have equal sweetness to that of control samples containing 7 per cent sugar.

Yau *et al.* (1989) studied effects of aspartame on flavour properties of still or carbonated blue berry flavoured milks and found no significant effect on overall flavour intensity, sweetness or blue berry flavour.

Gross composition of low sugar, low calorie and fibre enriched *Lal Peda*, normal *Peda* and normal *Lal Peda* (Table 6).

Conclusion :

Hence, the formulation with buffalo milk with 3 per cent fat, 2 per cent maltodextrin, 0.50 per cent oat on the basis of milk and 20 per cent sugar and 0.10 per cent aspartame on the basis of *Khoa* were considered to be the most appropriate formulation for preparation of low sugar, low calorie and fibre enriched *Lal Peda*. Preliminary studies were carried out for screening of fat replacers *i.e.* maltodextrin and sorbitol for replacement of fat. Then various stages like at milk stage, at *Rabri* stage and lastly at pat formation stage for addition of fat replacers were analyzed. As the developed *Lal Peda* was enriched with fibre, oat was used. The stage of addition and various levels were also analyzed. The developed low calorie and fibre enriched *Khoa* was used for preparation of *Lal Peda*. For preparation of *Lal Peda*, various levels of sugar and aspartame as sugar replacement was used. The selection of various stages and levels, the sensory evaluation by semi expert judges was carried out. The developed *Lal Peda* was finalized by screening method.

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