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Studies on preparation of low fat, sugar free mango shrikhand

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ABSTRACT : In present investigation attempt was made to study on preparation of low fat, sugar free mango shrikhand. For this purpose artificial sweetener sucralose with alphanso mango pulp was incorporated in buffalo skim milk chakka.Five treatments were design as base mix of 70 per cent skim milk chakka 30 per cent alphanso mango pulp added with 40 per cent cane sugar (T_1), 3.0 per cent (T_2), 6.0 per cent (T_3), 9.0 per cent (T_4) and 12.0 per cent (T_5), respectively. It was found that, acceptability score of (T_1), (T_2), (T_3), (T_4) and (T_5) treatments of mango shrikhand sample were obtained 91.96, 85.01, 95.09, 89.36 and 87.37, respectively. On an average fat, protein, acidity, total solids and moisture percentage of treatments (T_1), (T_2), (T_3), (T_4) and (T_5) were 8.65, 5.73, 1.31, 63.47 and 36.53; 1.47, 10.26, 1.56, 36.52 and 63.48; 1.38, 9.99, 1.51, 38.50 and 61.50 ; 1.33, 9.69, 1.45, 40.35 and 59.65 ; 1.29, 9.31, 1.40, 41.78 and 58.22 per cent, respectively. The result of present study concluded that, skim milk chakka, mango pulp and artificial sweetener could successfully used for the preparation of low fat, sugar free mango shrikhand.

KEY WORDS : Low fat, Sugar free mango shrikhand, Skim milk chakka, Sucralose, Sensory evaluation, Chemical composition

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INTRODUCTION

In the recent year trend of cautious towards health, fitness and figure has increased. Energy imbalance between calories expanded and excessive consumption of sugary foods along with more fat, especially saturated fats lead to obesity in Indian population. Obesity being the primary factor behind type II diabetes is leading India towards becoming diabetic capital of the world 2030. So the growing health awareness today has increased demand for food product that support better health consumers are demanding greater variety of low fat, sugar free, that is low calorie products as they strive to make healthier food choices. Mango shrikhand or Amrakhand is mixture of chakka, mango pulp and cane sugar. Fruit base shrikhand has been prepared wherein fruit like apple, papaya (paw-paw), mango gave good result (Baradale *et al.*, 1986; Vagdalkar *et al.*, 2002). In present study mango shrikhand is prepared by mixing skim milk chakka, Alphanso mango pulp and artificial sweetener sucralose available in the market by brand name Natura. Sucralose is chemically known as 1, 6-dichloro-1, 6-dideoxy-β-D-fructofuranosyl-4chloro-4, 1', 6-trichlorogalactosucrose is obtained by selectively chlorinating sucrose). It is a non calorie sweetener and has 400-800 fold sweetens than sucrose and twice as saccharin (Grice and Goldsmith, 2000).

The objective s of present investigation was to reduce fat contents, value addition with improve flavour as well as to reduce calorie contents of finished product with the aim product may suitable for sugar and fat intolerant as well as health cautious people.

MATERIAL AND METHODS

The present experiment was carried out at the Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidypeeth, Akola. Fresh clean buffalo milk

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was procured from Livestock Instructional Farm and used for process investigation as per need of treatments. Milk was separated with cream separator. Buffalo skim milk heated over a burner at 71^{0}C for 10 min., cool at room temperature (30 ^{0}C) and then incubated with 1 per cent starter culture and incubated at temperature of 30 ^{0}C for 12 hours for setting the curd. The curd obtained was tied in muslin cloth and hanged for draining of whey. The chakka was obtained after draining and used as base material for preparation of shrikhand (De, 2009). Good quality alphanso mangos from local market were purchased and separates pulp from stones and skin. The pulp obtained was analyzed for fat, protein, acidity, sugar, TSS and moisture according to standard procedure described in AOAC (1990). Best quality clean, crystalline cane sugar and Sucralose known by the trade name Sugar free Natura was procured and utilized as per treatments.

In present study Mix-A was prepared by mixing 70 per cent buffalo whole milk chakka and 30 per cent alphanso mango pulp and was used in control (T_1) and Mix-B was prepared by mixing 70 per cent skim milk chakka and 30 per cent alphanso mango pulp and used as per treatments. Thus, mix and artificial sweetener sucralose was mixed in such way that aim to get 100 per cent finished product as these are 60 per cent Mix-A + 40 per cent cane sugar (T_1), 97 per cent Mix-B + 3 per cent artificial sweetner Sucralose (T_2), 94 per cent Mix-B + 6 per cent artificial sweetener Sucralose (T_3), 91 per cent Mix-B + 9 per cent artificial sweetener Sucralose (T_4), 88 per cent Mix-B + 12 per cent artificial sweetener Sucralose (T_5). Sensory evaluation and chemical analysis was done immediately after preparation.

Sensory evaluation :

A panel of experienced judges examined the sample according to the sensory parameters like flavour (45), body and texture (35), colour and appearance (20) this way by 100 point evaluation score card reported by Pal and Gupta (1985).

Chemical analysis :

All samples were chemically analyzed for measuring fat, protein, acidity, total solids and moisture according to standard procedures laid down in manual of FSSAI (2012).

Data obtained from different parameters of different treatments was statistically analyzed by using Completely Randomized Design (CRD) as described by Panse and Sukhatme (1967). Analysis of variance (ANOVA) test was done to find out the statistical difference among the different treatments.

RESULTS AND DISCUSSION

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

Sensory evaluation :

The score for colour and appearance, body and texture, flavor and overall acceptability are summarized.

Colour and appearance :

The mean value foe colour and appearance score (out of 20) for mango shrikhand prepared with 60 per cent Mix-A and 40 per cent cane sugar (T_1), 97 per cent Mix-B and 3 per cent Sucralose (T_2), 94 per cent Mix-B and 6 per cent Sucralose (T_3), 91 per cent Mix-B and 9 per cent Sucralose(T_4), 88 per cent Mix-B and 12 per cent Sucralose (T_5) were 17.52, 16.11, 18.40, 17.44 and 17.48, respectively (Table 1). The data shows that statistically significant differences at 5 per cent level of significance were found among all the treatments in respect to colour and appearance score.

Body and texture :

The average body and texture score (out of 35) for the treatments (T_1), (T_2), (T_3) , (T_4) and (T_5) were 33.04, 34.31, 33.18, 31.82 and 30.57, respectively (Table 1). It is observed that statistically significant differences at 5 per cent level of significance among all the treatments in respect of body and texture score were obtained.

Flavour :

The average flavour score (out of 45) were recorded as 34.59, 43.51, 40.10 and 39.32 for mango shrikhand prepared from treatments (T_1), (T_2), (T_3), (T_4) and (T_5), respectively. Statistically significant differences at 5 per cent level of significance were found among all the treatments in respect of flavour score.

Overall acceptability :

The mean value for overall acceptability score (out of 100) for the treatments (T_1), (T_2), (T_3), (T_4) and (T_5) were 91.96,

Table 1 : Average score of various sensory characteristics of different treatments of mango shrikhand

Sensory parameters	Treatments					F test	S.E. ±	C.D. (P=0.05)
	T_1	T_2	T_3	T_4	T_5			
Colour and appearance (20)	17.52	16.11	18.40	17.44	17.48	Sig.	0.298	0.880
Body and texture (35)	33.04	34.31	33.18	31.82	30.57	Sig.	0.232	0.685
Flavour (45)	41.40	34.59	43.51	40.10	39.32	Sig.	0.120	0.355
Overall acceptability	91.96	85.01	95.09	89.36	87.37	Sig.	0.362	1.067

Sig. = Significant

85.01, 95.09, 89.36 and 87.37, respectively (Table 1). Statistically significant differences at 5 per cent level of significance were found among all the treatments in respect of overall acceptability score.

Chemical analysis :

The parameters undergone for chemical analysis for different treatments of mango shrikhand are presented in Table 2.

Fat :

The average fat content of mango shrikhand prepared with 60 per cent Mix-A (70 % buffalo whole milk chakka and 30 % alphanso mango pulp) + 40 per cent cane sugar (T_1), 97 per cent Mix-B + 3 per cent artificial sweetener Sucralose (T_2), 94 per cent Mix-B + 6 per cent artificial sweetener Sucralose (T_3), 91 per cent Mix-B + 9 per cent artificial sweetener Sucralose (T_4), 88 per cent Mix-B + 12 per cent artificial sweetener Sucralose (T_5). Were 8.65 per cent, 1.47 per cent, 1.38 per cent, 1.33 per cent, 1.29 per cent, respectively (Table 2). Shukla *et al.* (2007) prepared shrikhand by traditional and UF process and reported fat content of buffalo whole milk shrikhand and skim milk shrikhand 7.26 per cent and 6.0 per cent, respectively. Mehta (2013) reported on proximate analysis of branded shrikhand and concluded that in Aarey brand of variety mango shrikhand contains fat 5.34 per cent.

In this study fat content of controle (T_1) is highest among all the treatments due to use of whole milk chakka while fat content of treatments T_2 to T_5 decreases significantly with increase level of sucralose. Statistically significant differences at 5 per cent level of significance were found among all the treatments in respect of fat content.

Protein :

The average protein content of treatments (T_1), (T_2), (T_3), (T_4) and (T_5) were 5.73 per cent, 10.26 per cent, 9.99 per cent, 9.69 per cent and 9.31 per cent, respectively (Table 2). Shukla *et al.* (2007) prepared shrikhand by traditional and UF process method and reported protein content of buffalo whole milk shrikhand and skim milk shrikhand 10.82 per cent and 9.73 per cent, respectively. Mehata (2013) on proximate analysis of shrikhand reported 9.2 per cent. In this experiment protein content of control (T_1) is lowest among all the treatments due to addition of cane sugar and use of whole milk chakka while protein content of treatments T_2 was highest then decreases significantly with increase level of sucralose due to increase in dry matter content of product. Statistically significant differences at 5 per cent level of significance were found among all the treatments in respect of protein content.

Acidity :

The mean values for acidity of mango were recorded as 1.31, 1.56, 1.51, 1.45 and 1.40 for treatments (T_1), (T_2), (T_3), (T_4) and (T_5), respectively. Shukla *et al.* (2007) prepared shrikhand by traditional and UF process method and reported acidity of buffalo whole milk shrikhand and skim milk shrikhand and 1.08 per cent and 1.11 per cent, respectively. Mehta (2013) on proximate analysis of branded shrikhand and concluded that in Aarey brand of variety mango shrikhand contains titra-table acidity 0.91 per cent.

In present study per cent acidity of T_2 is highest among all the treatments while acidity significantly decreases from treatments T_2 to T_5 with increasing level of sucralose due to increase in dry matter content of product. Statistically significant differences at 5 per cent level of significance were found among all the treatments in respect of acidity.

Total solid :

The average total solid contents of treatments (T_1), (T_2), (T_3), (T_4) and (T_5) were 63.47 per cent, 36.52 per cent, 38.50 per cent, 40.35 per cent and 41.78 per cent, respectively (Table 2). Sharma (2006) reported, total solid content of shrikhand was 58.0 per cent. Shukla *et al.* (2007) prepared shrikhand by traditional and UF process and reported total solids content of buffalo whole milk shrikhand and skim milk shrikhand and 58.60 per cent and 58.78 per cent, respectively. Mehta (2013) experimented on proximate analysis of branded shrikhand and concluded that in Aarey brand of variety mango shrikhand contains total solid 54.27 per cent.

In present investigation total solid content of control ($T_{1)}$ is highest among all the treatments due to addition of cane sugar while in treatment (T_2) total solid content was lowest but gradually it increases significantly with increase level of sucralose might be due to increase in dry matter content of

Table 2 : Average chemical composition of different treatments of mango shrikhand

Parameters (%)	Treatments					F Test	S.E. ±	C.D. (P=0.05)
	T_1	T_2	T_3	T_4	T_5			
Fat	8.65	1.47	1.38	1.33	1.29	Sig.	0.046	0.135
Protein	5.73	10.26	9.99	9.69	9.31	Sig.	0.047	0.37
Acidity	1.31	1.56	1.51	1.45	1.40	Sig.	0.008	0.023
Total solid	63.47	36.52	38.50	40.35	41.78	Sig.	0.164	0.484
Moisture	36.53	63.48	61.50	59.65	58.22	Sig.	0.164	0.484

Sig. = Significant

product the data shows statistically significant differences at 5 per cent level of significance were found among all the treatments in respect of total solid content.

Moisture content :

The mean value for moisture percentage of (T_1), (T_2), (T_3), (T_4) and (T_5) were observed 36.53 per cent, 63.48 per cent, 61.50 per cent, 59.62 per cent and 58.22 per cent, respectively (Table 2). The moisture content recorded highest in (T_2) compare with all other treatment. However the moisture content of the mango shrikhand significantly decreases with the increase in level of sucralose and might be due to dry matter content of the product. The results are supported by Mehata (2013) reported mango shrikhand contains moisture 45.73 per cent. The results are in line with the Shukla *et al*. (2007) prepared mango shrikhand from buffalo whole milk and skim milk and found 41.4 per cent and 41.22 per cent, respectively.

Conclusion :

Quality of mango shrikhand prepared by using 6 per cent artificial sweetener sucralose was nearly similar to the shrikhand prepared by using cane sugar. Sensory evaluation indicates that, there was no appreciable difference between the mango shrikhand prepared by 6 per cent sucralose compared with mango shrikhand prepared by cane sugar. The chemical analysis of mango shrikhand showed that, the fat content of finished product was low resultant into low calories. Thus, it can be concluded that, mango shrikhand could be prepared by using artificial sweetener sucralose up to 6 per cent level is suitable for consumption to health cautious, fat and sugar intolerant peoples.

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