Effect of incorporation of sapota pulp and cocoa powder on the physico-chemical and microbiological characteristics of shrikhand

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ABSTRACT

The present investigation was made with an attempt to develop shrikhand by partial addition of different level of sapota pulp and cocoa powder and to evaluate its effect on nutritional and microbial quality. The sapota pulp was incorporated at 7, 14 and 21 percent levels. The cocoa powder at the rate of 2% was incorporated in all samples including control. Physico-chemical analysis, total solids, acidity, carbohydrate, moisture, fat, protein, ash, antioxidant and TPA, was done for estimating nutritional content safety. The shrikhand with 14% level sapota pulp was found to be highly acceptable. Physico-chemical and nutritional quality has been evaluated.

Key words: Microbiological characteristic, Nutritional, Physico-chemical, Shrikhand.

INTRODUCTION

Shrikhand is one of the most popular fermented indigenous milk products for taste and therapeutic value. It contains appreciable amount of milk protein and phospholipids and is obtained by lactic acid fermentation through the action of Lactobacillus bulgaricus, Streptococcus lactis, and Streptococcus thermophilus. Shrikhand must contain a minimum of 6% fat and a minimum of 8.5% solid not fat. It is obtained by the removal of whey from curd and mixed with sugar, colour and flavor. It is an important milk product from economic and dietary point of view. Fruits are considered as good source of mineral and vitamins and hence Shrikhand with fruit will not only improve its flavor but also its overall nutritional quality and the taste (Shambharkar, 2011). Cocoa powder contains several minerals including calcium, copper, magnesium, phosphorus, sodium and zinc. All of these minerals are found in greater quantities in cocoa powder than either cocoa butter or cocoa liquor (Steinberg, 2003).

“Shrikhand is the product obtained from chakka or skimmed milk chakka to which milk fat is added. It may contain fruit, nuts, sugar, cardamom, saffron and other spices. It shall not contain any added coloring and artificial flavouring substances” (PFA Standard). PFA specifications of shrikhand are as: total solids content minimum 58.0%, milk fat (on dry basis) content minimum 8.5%, milk protein content (on dry basis) minimum 9.0%, titratable acidity (as lactic acid) maximum 1.4%, sucrose content (on dry basis) maximum 72.5%, total ash content (on dry basis) maximum 0.9 percent.

Hence, the present study was carried out in the Department of Warner School of Food and Dairy Technology Sam Higginbottom Institute of Agriculture Technology and Sciences, Allahabad (UP) India with a view to evaluate the effect of incorporation of sapota and cocoa powder on physico-chemical and microbiological characteristics of shrikhand.

MATERIALS AND METHODS

Buffalo milk was standardized to 6.0% fat and 9.0% SNF level by adding skim milk powder. The standardized buffalo milk was heated to 85°C for 30 minutes, and cooled to 25°C. The milk was then inoculated by lactic starter culture at the rate of 2% and incubated at 25°C for 10-12 hours to form a firm coagulum (dahi). The dahi transferred to a muslin cloth and hunged for 15-16 hour for the expulsion of whey and to form chakka. Different variations were made by combining varying ratio of Sapota pulp to chakka. Cocoa pulp (2%) and sugar (28%) was added on chakka. The product was prepared following the procedure cited by Ganguly (1959).
The chemical analysis of samples was done in terms of total solids by procedure laid down in IS 2802, 1964(9), fat, protein, carbohydrate, acidity, moisture (AOAC, 1990), ash (Ranganna, 1986) and anti oxidant by DPPH method. Microbiological test for coliform was determined as per the procedure given by (APHA) standard method for the examination of Dairy products (1992). Four treatments and five replications were done. The data thus obtained were subjected to statistical analysis (ANOVA).

**RESULTS AND DISCUSSION**

**Fat:** The highest mean fat percentage was recorded in the Shrikhand sample of $T_0$ (8.50), $T_1$ (8.14) and $T_2$ (7.42) (Table 1), followed by $T_3$ (7.28). There was a significant difference in Shrikhand on the average fat percentage of $T_0 - T_2$, $T_0 - T_3$, $T_1 - T_3$, and non-significant in $T_0 - T_1$, $T_1 - T_2$, $T_2 - T_3$ treatment which may be ascribed to addition of different level of sapota pulp and cocoa powder in the experimental treatments of shrikhand.

**Total solid:** The highest mean solid percentage was recorded in the shrikhand sample of $T_0$ (61.96), $T_1$ (61.38) and $T_2$ (60.40), followed by $T_3$ (59.68). There was a significant difference in Shrikhand on the average total solid percentage of $T_0 - T_2$, $T_0 - T_3$, $T_1 - T_3$, $T_2 - T_3$, $T_3 - T_3$, and $T_2 - T_3$ treatment which may be attributed to addition of different level of sapota pulp and cocoa powder in the experimental treatments of shrikhand.

**Moisture:** The highest mean moisture percentage was recorded in the shrikhand sample of $T_0$ (38.04), $T_1$ (38.62) and $T_2$ (39.60), followed by $T_3$ (40.32). There was a significant difference in Shrikhand on the average fat percentage of $T_0 - T_2$, $T_0 - T_3$, $T_0 - T_3$, $T_1 - T_3$, $T_1 - T_3$, and $T_2 - T_3$ treatment which may be ascribed to addition of different level of Sapota pulp and cocoa powder in the experimental treatments of shrikhand.

**Acidity:** The mean Lactic acid percentage was recorded in the shrikhand sample $T_0$ (0.67), $T_1$ (0.71), and $T_3$ (0.79), followed by $T_2$ (0.66).

**Protein:** The highest mean protein percentage was recorded in the Shrikhand sample of $T_0$ (7.60), $T_1$ (6.90) and $T_3$ (6.30), followed by $T_2$ (5.72). There was a non-significant difference in shrikhand on the average protein percentage of $T_0 - T_2$, $T_0 - T_3$, $T_0 - T_3$, $T_1 - T_2$, $T_1 - T_3$, and $T_2 - T_3$ treatment which may be ascribed to addition of different level of sapota pulp and cocoa powder in the experimental treatments of Shrikhand.

**Carbohydrate:** The highest mean carbohydrate percentage was recorded in the Shrikhand sample of $T_0$ (45.36), $T_1$ (48.64) and $T_2$ (45.81), followed by $T_3$ (45.94). There was a non-significant difference in shrikhand on the average carbohydrate percentage of $T_0 - T_2$, $T_0 - T_3$, $T_1 - T_2$, $T_1 - T_3$, and $T_2 - T_3$ treatment which may be ascribed to addition of different level of sapota pulp and cocoa powder in the experimental treatments of shrikhand.

**Antioxidant:** The highest mean antioxidant percentage was recorded in the Shrikhand sample of $T_0$ (11.05), $T_1$ (24.15) and $T_2$ (30.20), followed by $T_3$ (38.95). There was a non-significant difference in shrikhand on the average antioxidant percentage of $T_0 - T_2$, $T_0 - T_3$, $T_0 - T_3$, $T_1 - T_2$, $T_1 - T_3$, and $T_2 - T_3$ treatment which may be ascribed to addition of different level of sapota pulp and cocoa powder in the experimental treatments of shrikhand.

**Microbiological parameter**

**Coliform:** It is evident from the experiment that the coliform count in control and experimental sample were 100 percent negative.

**CONCLUSION**

In view of experimental results obtained during the present investigation it may be concluded that shrikhand having $T_2$ with 14% sapota pulp and 2% cocoa powder is best in physico-chemical characteristics and microbiological parameter having maximum total solids, acidity, ash, fat, protein, carbohydrate, moisture, antioxidant and negative in coliform test.

**Table: 1:** Effect of percentage incorporation of sapota pulp on physico-chemical & microbiological characteristic of cocoa shrikhand

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Mean values of physico chemical Test</th>
<th>Mean Values of Microbiological test</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Total Solid (%)</td>
<td>Fat (%)</td>
</tr>
<tr>
<td>$T_0$</td>
<td>61.96</td>
<td>8.50</td>
</tr>
<tr>
<td>$T_1$</td>
<td>61.38</td>
<td>8.14</td>
</tr>
<tr>
<td>$T_2$</td>
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<td>7.72</td>
</tr>
<tr>
<td>$T_3$</td>
<td>59.68</td>
<td>7.78</td>
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<td>0.32</td>
</tr>
<tr>
<td>C. D. (P = 0.05)</td>
<td>0.38</td>
<td>0.70</td>
</tr>
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REFERENCES
IS 2802 (1964): Ice-cream FAD 19: Dairy Products and Equipment