CHEMICAL AND SENSORY ATTRIBUTES OF NOODLES SUPPLEMENTED WITH SKIM MILK POWDER

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ABSTRACT

Dairy and fish proteins were fortified very rarely to food stuffs. In this present investigation, the preparation of noodles added with skim milk powder and its chemical and sensory qualities were discussed. Three concentrations of SMP were fortified at 5%, 7.5% and 10% levels. In all the three levels protein enrichment has not spoiled the quality of noodles. Among the three levels, 7.5% was highly accepted due to its palatability. Electron Micrograph studies on this sample revealed porosity in the new product. This product can be kept for 60 days in vacuum packed polythene containers. The coliform count was totally absent. Yeast and mould count and standard plate count were well below permissible limits.

Key words: Noodle, Skim Milk Powder, Protein, Fortification

INTRODUCTION

Fortification of food stuffs with soyabeans, corn, tapioca and dairy protein concentrates are uncommon. However, in developing countries, where protein consumption is more limited, this type of fortification is essential (Hahn, 1993). Among dairy products, skim milk and whey with less fat and high protein content were used for this purpose (Dewani and Jayaprakasha, 2002). In this present investigation, skimmed milk powder was used to enrich noodles prepared with the laboratory model Noodle Extruder. Chemical, microbiological, sensory and textural qualities of noodles were analyzed as per the procedures advocated by Camilla et al. (2008).

MATERIALS AND METHODS

Skim milk powder obtained from the market (Amul) was used. The protein content was 35.30%, fat 1.25%, lactose 51% and minerals 8%. This skim milk powder with concentration of 5%, 7.5% and 10% were added to 1000 g of refined wheat flour and then sufficient water (300 ml) and salt (2 g / 100g of flour) were added to form dough. The dough was passed through the noodle extruder and made into thin sheets. The sheets were out into fine noodles, sun dried for 12 hours followed by oven drying at 55°C for 5 hours and finally packed in polythene containers for further studies.

The samples were analyzed for Crude Protein, Fat, Ether Extract, Crude Fibre and Total Ash as per the method of AOAC (1990). Major minerals viz. Calcium and Iron were estimated by Atomic Absorption Spectrometry and Phosphorus by Colorimetric method.

The sensory evaluation was undertaken using 9 point Hedonic Scale (Singh et al., 1989). Microbial studies were carried out for standard plate count, yeast and mould count and coliform count. Scanning electron microscope (LEO Stereoscan 440) was used to study the texture of noodles (Wang et al., 1999). The data were subjected to statistical analysis as per Snedecor and Cochran (1994).
RESULTS AND DISCUSSION

Protein content of noodles increased as the level of addition of skim milk powder increased. However, the levels of carbohydrate and fibre decreased with the substitution levels of protein source. Calcium and phosphorus level increased while iron level decreased with the addition of SMP (Table 1). These findings were in accordance with Kadharmestan et al. (1998) for protein and Niturkar et al., (1992) for carbohydrates. However, significant difference (P>0.05) was observed in the noodles fortified with SMP at different levels. These results were in conformity with Suchitra et al., (2003).

The calcium content of noodles enriched with SMP increased for 34.8 to 37.80 mg/100g. These results corroborated with reports of Schauen and Renner (1987). Phosphorus level of noodles increased from 195.17 to 203 mg/100g. On contrary, there was a significant decrease in the iron level by supplementing SMP. These results were in good agreement with Riaz (1992).

Colour, flavour and texture score were given in Table 2 for the new product. The scores for colour and flavour increased whereas for texture, the scores were decreased with the level of supplementation. This is in conformity with Towler, (1982);Over all acceptability score decreased considerably in all three concentrations (6.83, 6.33 and 5.55) when compared to control (7.33).

Coliform count was absent in all the levels of study. However standard plate count and yeast and mould count were present after 30 to 60 days of storage as indicated in Table 3.

The bacteriological count of noodles both standard plate count and yeast and mould count significantly increased during storage period. However, these levels were within permissible limit prescribed by Singh et al. (2000) for standard plate count of 103 to 105. The standard plate count of noodles enriched with SMP at 5% level increased from 138.83 to 287.5 cfu/g during storage. The yeast and mould count of noodles supplemented with 5% SMP at '0' day was 11.83 and increased to 59.66 cfu/g. However, the yeast and mould count was below the normal value (80 cfu/g) as reported (www.saurashtra specialities.com).

The micrograph of noodles enriched with 7.5% SMP showed a highly porous structure. The grains were amorphous and seemed to have a fibrous nature. Large cavities present in the structure and the surface was found to be rough and irregular. The high porosity may be attributed to the cause for higher total solids loss during cooking of noodles. These findings were in accordance with the observation of Donnelly (1982). The amorphous spongy and irregular structure with cotton ball like appearances accounts for the swelling of noodles during cooking and syneresis during draining due to high porosity.

ACKNOWLEDGEMENT

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REFERENCES


### Table 1
Chemical parameters and mineral profile of enriched noodles*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>5%</th>
<th>7.5%</th>
<th>10%</th>
<th>Control</th>
<th>F - Value</th>
<th>CD =</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protein (%)</strong></td>
<td>14.59 ± 0.15&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15.79 ± 0.08&lt;sup&gt;c&lt;/sup&gt;</td>
<td>16.67 ± 0.14&lt;sup&gt;d&lt;/sup&gt;</td>
<td>18.09 ± 0.16&lt;sup&gt;a&lt;/sup&gt;</td>
<td>413.57**</td>
<td>0.46</td>
</tr>
<tr>
<td><strong>Carbohydrate (%)</strong></td>
<td>83.7 ± 0.15&lt;sup&gt;f&lt;/sup&gt;</td>
<td>82.59 ± 0.15&lt;sup&gt;e&lt;/sup&gt;</td>
<td>82.2 ± 0.008&lt;sup&gt;f&lt;/sup&gt;</td>
<td>85.56 ± 0.18&lt;sup&gt;b&lt;/sup&gt;</td>
<td>816.18**</td>
<td>0.47</td>
</tr>
<tr>
<td><strong>Fat (%)</strong></td>
<td>0.55 ± 0.01&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.56 ± 0.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.56 ± 0.01&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.54 ± 0.01&lt;sup&gt;a&lt;/sup&gt;</td>
<td>212.75**</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Fibre (%)</strong></td>
<td>0.2 ± 0.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.20 ± 0.00&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>0.19 ± 0.01&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.22 ± 0.00&lt;sup&gt;c&lt;/sup&gt;</td>
<td>24.93**</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Ash (%)</strong></td>
<td>0.87 ± 0.01&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.24 ± 0.02&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.40 ± 0.01&lt;sup&gt;f&lt;/sup&gt;</td>
<td>0.59 ± 0.01&lt;sup&gt;a&lt;/sup&gt;</td>
<td>644.35**</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Ca mg / 100g</strong></td>
<td>34.80 ± 0.88&lt;sup&gt;b&lt;/sup&gt;</td>
<td>35.20 ± 0.09&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>37.80 ± 0.85&lt;sup&gt;c&lt;/sup&gt;</td>
<td>28.61 ± 0.89&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.35**</td>
<td>4.36</td>
</tr>
<tr>
<td><strong>P mg / 100 g</strong></td>
<td>199.33 ± 2.62</td>
<td>202.67 ± 1.33</td>
<td>203.00 ± 2.34</td>
<td>195.17 ± 3.09</td>
<td>NS</td>
<td>4.36</td>
</tr>
<tr>
<td><strong>Fe mg / 100 g</strong></td>
<td>3.05 ± 0.04&lt;sup&gt;d&lt;/sup&gt;</td>
<td>2.81 ± 0.05&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.72 ± 0.04&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>3.15 ± 0.08&lt;sup&gt;d&lt;/sup&gt;</td>
<td>24.90**</td>
<td>0.17</td>
</tr>
</tbody>
</table>

* Average of Six trials (Mean ± S.E)  ** Highly significant (P < 0.01)

Mean values bearing different superscripts in a row differ significantly (P < 0.01)

### Table 2
Sensory evaluation of noodles enriched with SMP

<table>
<thead>
<tr>
<th>Physical Parameter</th>
<th>5%</th>
<th>7.5%</th>
<th>10%</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colour</strong></td>
<td>7.6±0.49</td>
<td>7.50±0.43</td>
<td>7.83±0.31</td>
<td>7.50±0.50</td>
</tr>
<tr>
<td><strong>Flavour</strong></td>
<td>7.67±0.42</td>
<td>8.00±0.26</td>
<td>7.67±0.61</td>
<td>7.00±0.37</td>
</tr>
<tr>
<td><strong>Texture</strong></td>
<td>7.00±0.31</td>
<td>6.67±0.21</td>
<td>5.33±0.21</td>
<td>7.50±0.22</td>
</tr>
<tr>
<td><strong>Overall acceptability</strong></td>
<td>6.83±0.12</td>
<td>6.33±0.33</td>
<td>5.50±0.22</td>
<td>7.33±0.61</td>
</tr>
</tbody>
</table>

### Table 3
Estimated standard plate count and Yeast mould count in noodles (cfu/gm)

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