EFFECT OF FENUGREEK SEEDS FLOUR BLENDING ON SENSORY AND CHEMICAL CHARACTERISTICS OF SEMOLINA IDLI

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ABSTRACT
The present study was carried out to prepare value added semolina Idli by incorporation of different treatments of fenugreek seeds flour i.e raw, soaked and germinated and to assess their sensory acceptability and nutrient contents. Fenugreek seeds flour was blended at 5%, 10%, 15% and 20% for T1, T2, T3 and T4 treatment respectively. Findings revealed (T1) was most acceptable for its colour, flavour, texture, taste and overall acceptability. It was true for all Raw, Soaked and Germinated treatments. Statistical analysis at P≤0.05 showed that there was significant difference among all the treatments. Nutrient composition was improved for Protein, Ash, Dietary fibre and Mineral whereas Fat, Carbohydrate, Moisture and Energy level was decreased after value addition of fenugreek seeds flour at different levels. Germinated fenugreek seeds flour blends were found superior in nutritional quality compared to other flours blends.

Keywords: Semolina, fenugreek, Raw seeds, Soaked seeds, Germinated seeds

INTRODUCTION
Wheat (triticum) is a worldwide cultivated crop from the arid areas of Middle East to alluvial plains of Asia, America and Australia. Semolina is the purified middling of hard wheat and is used in making pasta, breakfast cereals and puddings. In North India semolina is known as “Suji” and in South India, “Rava” or “Ravey”. (Gisslen et al, 2001) Semolina is a good source of carbohydrate and protein and is an average source of dietary fibre.

Fenugreek (trigonella faenum gracccum) is an erect annual herb native to Southern Europe and Asia. It is commonly known as “Methi” in India (Wikipedia, 2008). Fenugreek seeds are rich source of protein (25%), lysine, tryptophan and dietary fiber (24%). They are also rich in polysaccharide galactomannan and are a good source of calcium, iron and β-carotene. (Gopalan et al, 2007) Owing to their many properties fenugreek seeds are one of the most valuable spices for controlling glucose metabolism and for the prevention and treatment of type II diabetes (Scott, 2007). Fenugreek seeds are one of the richest sources of phytoestrogens and selenium and thus are a very useful spice for women who have low estrogens levels (Sri et al, 2008). Fenugreek seeds may have anti-tumorigenic
effects too. Although semolina is widely used in India cuisines, it is considered nutritionally poor due to deficiency of essential amino acids such as lysine and theonine. Since fenugreek seeds are very rich in essential amino acids, the blending of fenugreek seeds flour in suitable proportion with a poor source of protein like semolina can increase the protein contents of blended products (Hooda et al, 2004). Due to several medicinal and nutritional properties of fenugreek seeds, the inclusion of fenugreek seeds flour with common foods like wheat flour and semolina can be exploited to prepare good alternative food products for people having certain diseases (Jood et al, 2007) and for common people as well.

OBJECTIVES
1. To standardize the level of fenugreek seeds (raw, soaked and germinated) flour for blending with semolina idli on the basis of sensory analysis.
2. To find out sensory characteristics of semolina idli prepared by incorporating fenugreek seeds flour.
3. To determine chemical composition of semolina idli blended with fenugreek seeds flour.

MATERIALS AND METHODS
The present study was carried out in the research laboratory of Foods & Nutrition, Department of Ethelind School of Home Science, Sam Higginbottom Institute of Agriculture, Technology & Sciences, (Formerly Allahabad Agricultural Institute-Deemed University), Allahabad. Three major treatments i.e raw, soaked and germinated fenugreek seeds flour was taken along with control group each treatment was standardised at 5%, 10%, 15% and 20% level of blending.
The treatments were replicated four times. For sensory evaluation ‘9’ point hedonic scale was used by 6 panel judges to get the sensory acceptability of the product. Nutrient content was analysed by using AOAC (1980) procedures and the data were further statistically compared for 3x5 factorial design and critical difference techniques. (Fisher, 1955)
RESULT AND DISCUSSION
The findings are shown in Table I & II. Table I shows the average scores for sensory characteristics of semolina Idli blended with fenugreek seeds flour. Among different treatments raw fenugreek seeds flour blending at 5% (T₁) shows highest scores for colour, flavour and texture. Taste and overall acceptability scores show that T₁ (5%) gets highest scores among all treatments. It can be concluded that as the level of fenugreek seeds flour increases its amber yellowish colour dominate which makes the semolina Idli less acceptable. Therefore T₁ is considered the best among treatments as far as sensory characteristics are concerned. Statistical analysis shows that there is significant difference among them. Table II shows the nutrient composition of semolina Idli. Nutrient analysis indicates that semolina Idli blended with raw fenugreek seeds flour has highest Energy content i.e 181 kcal/100g followed by soaked fenugreek seeds flour (177 kcal/100g) and germinated fenugreek seeds flour (172 kcal/100g) while control (T₀) contains 193 kcal/100g of Energy. Control (T₀) sample shows the highest level (28.3g) of Carbohydrate, while it decreases to 26.1g, 25.8g and 25.4g for raw, soaked and germinated fenugreek seeds flour blended semolina Idlis respectively. In case of Protein, control (T₀) sample shows lower value (14.5g) in comparison to treatments i.e 15.6g, 15.2g, 15.0g for raw, soaked and germinated fenugreek seeds flour blended semolina Idlis respectively. Among the treatments raw fenugreek seeds flour blended semolina Idli shows the highest level of Fat i.e 1.9g followed by 1.4g for soaked and 1.1g for germinated fenugreek seeds flour blended Idlis. This is more or less similar to the findings obtained by (Shirani & Ravindran (2008). In case of Moisture, control (T₀) sample shows the highest value (54g) in comparison to treatments i.e 51.3g, 53.2g, 50.7g for raw, soaked and germinated fenugreek seeds flour blended semolina Idlis respectively. In case of Ash, control (T₀) sample showed lower value in comparison to treatments. Germinated fenugreek seeds flour has highest Dietary fibre content (5.2g) followed by soaked fenugreek seeds flour (5.1g) and raw fenugreek seeds flour (4.9g) while control (T₀) contains 3.9g of Dietary fibre. In case of Iron, control (T₀) sample shows lower value in comparison to treatments. Similarly in case of Calcium, control (T₀) sample shows lower value in comparison to treatments.

Table I: Average score for sensory characteristics of fenugreek seeds flour blended semolina idli

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Raw fenugreek seeds flour</th>
<th>Soaked fenugreek seeds flour</th>
<th>Germinated fenugreek seeds flour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory Attributes</td>
<td>T₀ (Control)</td>
<td>T₁</td>
<td>T₂</td>
</tr>
<tr>
<td>Colour</td>
<td>7</td>
<td>6.8</td>
<td>6.2</td>
</tr>
<tr>
<td>Flavors</td>
<td>6.73</td>
<td>6.8</td>
<td>6.3</td>
</tr>
<tr>
<td>Texture</td>
<td>6.8</td>
<td>6.5</td>
<td>6.2</td>
</tr>
<tr>
<td>Taste</td>
<td>6.8</td>
<td>6.8</td>
<td>6.4</td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>6.68</td>
<td>6.27</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Statistical Analysis - ANOVA at P≤0.05 was applied for all the treatment and significant result was obtained.
Table II: Average nutrient contents of fenugreek seeds flour blended semolina Idli

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Control (T₀)</th>
<th>Raw fenugreek seeds flour</th>
<th>Soaked fenugreek seeds flour</th>
<th>Germinated fenugreek seeds flour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total energy (kcal)</td>
<td>193</td>
<td>181</td>
<td>177</td>
<td>172</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>28.3</td>
<td>26.1</td>
<td>25.8</td>
<td>25.4</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>14.5</td>
<td>15.6</td>
<td>15.2</td>
<td>15</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>1.9</td>
<td>1.6</td>
<td>1.4</td>
<td>1.1</td>
</tr>
<tr>
<td>Moisture (%)</td>
<td>54</td>
<td>51.3</td>
<td>53.2</td>
<td>50.7</td>
</tr>
<tr>
<td>Ash (mg)</td>
<td>1.1</td>
<td>1.4</td>
<td>1.6</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Major nutrients

Minor nutrients

Iron (mg) | 1.1 | 2.82 | 2.9 | 2.9
Calcium (mg) | 18.1 | 26.9 | 27 | 27.2

S=Significant, NS= No Significant

CONCLUSION
On the basis of sensory evaluation and nutrient analysis of the treatments T₁ (5 % fenugreek seeds flour) is found to be the best. It can be concluded that value addition of semolina Idli with fenugreek seeds flour increases Protein, Ash, Dietary fibre, Iron and Calcium contents while decreases the Moisture, Fat, Carbohydrate and Energy contents. Among all the treatment combinations of the product, the treatment T₁ with germinated fenugreek Seeds flour is the most beneficial in terms of nutrients.

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