FINGER MILLET PASTA FORTIFIED WITH PLANT AND ANIMAL PROTEIN AND THEIR SENSORY QUALITIES

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ABSTRACT

Pasta were prepared by using finger millet composite flour, the protein sources are defatted soy flour and whey protein concentrate. Fortification of the protein content from 13.12 per cent in control to 17.78 per cent in pasta made from finger millet with composite flour sensory evaluation scores indicated non significant difference among the control and experimental products for texture. Fortification with defatted soy flour and whey protein concentrate helped in improving the sensory profile as well as protein content.

INTRODUCTION

Finger millet (Eleusine coracana) is major cereal crop of Karnataka. It has good acceptability product prepared from finger millet such as finger millet malt and finger millet bakery products. Finger millet is rich in calcium and iron and has a good amino acid profile which is closer to milk. In developed countries many convenience foods are prepared by extrusion technology and extruded products such as noodles and pasta products are popularly consumed.

An extruded product represents spaghetti, macaroni, vermicelli, elbow and noodles which are consumed worldwide. Pasta is usually prepared from durum wheat as its main ingredient, can also be prepared from hard or soft wheat flour by adding various protein sources. Warren et al. (1983), studied the pasta products prepared from durum wheat, corn flour and soy flour. Gable et al. (1967) and Paulsen (1961) prepared fortified pasta using non fat dry milk and soy flour, respectively. The fortified pasta products overall acceptability were found to be good and as unfortified products.

Per capita consumption of pasta products per year in Italy, was about 25 kg, in Italy, USA 8.2 kg Australia 3.5 kg and Japan 1.1 kg. However, in India per capita consumption as low as 80 gms (Miskelly, 1993). Trends in production of pasta products has been increasing in India, in the recent past it went up from 4.73 lakh tons in 1990 to 5.39 lakh tons during 1996 (Vetrivani et al., 2000).

MATERIAL AND METHODS

Protein source used: Both plant and animal protein sources were used in this study. The sources are defatted soy flour (DSF) and whey protein concentrate (WPC - 70%).

Pasta production: Finger millet pasta was extruded by using 50 per cent of finger millet flour (FMF), 40 per cent refined wheat flour (RWF) and 10 per cent defatted soy flour (DSF) in one set. In another set instead of defatted soy flour, 10 per cent of WPC was used for the formulation of pasta. Similarly, the formulation was done using refined finger millet flour (RFMF) keeping the other ingredient constant. The blends were extruded in dolly pasta machine and extrusion as follows.

FMF / RRFM (50%) + RWF (40%) +
DSF / WPC (10%)
↓
Pre mixing in pasta extruder (2 Min.)
↓
Adding cold water (360 ml)
↓
Remixing (10 min.)
↓
Extruded and cut attaching cutter (Using shell shape die)
↓
Oven drying (Temperature at 60° C)
↓
FINGER MILLET PASTA

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The composite flour was extruded in shell shape die and dried in hot air drier at 60° C for 3 hours and the final moisture content was 7 per cent.

Analysis

Protein: Protein content in pasta from finger millet composite flour products were determined by using microkjeldahl method (AOAC, 1980).

Sensory evaluation: Semi trained panel members conducted sensory evaluation using 5 point hedonic scale. Univariant analysis of variance was applied on the sensory mean score.

Moisture content: It was estimated by taking about 10 g sample in petridish and dried in a hot air oven at 80°C till the weight of the petridish with its content was constant. Each time before weighing the petridish was cooled in dedicator. Moisture content of the sample was expressed in percentage (AOAC, 1980).

Moisture content (%) = Initial weight of sample - final weight of sample / weight of sample x100

RESULTS AND DISCUSSION

The protein content of pasta products formulated from finger millet composite flour, ranged from 14.48 to 17.78 per cent (Table 1), as compared with (13.12 per cent) in the controlled pasta. The maximum protein content was found to be in pasta from FMF+RWF+DSF followed by RPMF+RWF+WPC. However, protein content was found to be lowest in control pasta.

The mean sensory score with respect to appearance ranged from 3.8 to 4.1 maximum appearance was found with the control and among the experimental products with RFMF + RWF + DSF (Table-2). Statistically significant difference was found at 5 % level. The texture of pasta was found maximum with RFMF + RWF + WPC and lowest was found with FMF + RWF + DSF. It showed that there was significant difference between the products. Maximum score for flavour was found in RPMF + RWF + WPC, however, lowest was found in FMF + RWF + DSF and RPMF + RWF + WPC. However, difference was statistically non significant. Over all acceptability scores was found to be maximum with RFMF + RWF + WPC and lowest with control. Statistically significant difference was not found with respect to over all acceptability.

| Table 1. Per cent of protein in pasta from finger millet composite flour |
|---------------------------------|-------------------------------|
| Composite flour                  | Protein content of dry basis (g/100g) |
| Control (RWF)                   | 13.12                        |
| FMF + RWF + DSF                 | 15.11                        |
| FMF + RWF + WPC                 | 17.78                        |
| RPMF + RWF + DSF                | 14.48                        |
| RPMF + RWF + WPC                | 16.62                        |
| Mean                            | 15.15                        |
| SEM ±                           | 0.545                        |
| F-Value                         | 21.27*                       |
| C D                             | 1.40                         |

Note: * Significant at 5% level.

FMF + RWF + DSF - Finger millet flour + Refined wheat flour + Defatted soy flour
FMF + RWF + WPC - Finger millet flour + Refined wheat flour + Whey protein concentrate
RFMF + RWF + DSF - Refined Finger millet flour + Refined wheat flour + Defatted soy flour
RFMF + RWF + WPC - Refined Finger millet flour + Refined wheat flour + Whey protein concentrate

The protein content of pasta with finger millet composite flour was 15.50 gms. The protein was found in FMF + RWF + WPC (17.78g), Nielsen (1988) reported that, addition of WPC to durum wheat, the total protein content of durum wheat gets increased. Whey and whey derived products besides being nutritional ingredients in various foods can also be used as functional ingredients providing flavour, texture, colour and aeration properties in a variety of foods (Kinsells 1985; Morr and Feeding 1990; Jayaprakash 1992; De Wit and Kessel 1996).
Table 2. Mean sensory score of pasta from finger millet composite flour

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean F-value</th>
<th>Control (RWF)</th>
<th>FMF + (RWF)</th>
<th>FMF + RWF + DFS WPC</th>
<th>RWF + RWF + DFS WPC</th>
<th>RFMF + RWF + DFS WPC</th>
<th>RFMF + RWF + RFMF + WPC</th>
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</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>4.1</td>
<td>3.6</td>
<td>3.8</td>
<td>3.9</td>
<td>3.8</td>
<td>1.6</td>
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</tr>
<tr>
<td>Texture</td>
<td>3.7</td>
<td>3.4</td>
<td>3.5</td>
<td>3.9</td>
<td>4.0</td>
<td>2.21*</td>
<td></td>
</tr>
<tr>
<td>Flavour</td>
<td>3.7</td>
<td>3.5</td>
<td>3.7</td>
<td>3.5</td>
<td>3.8</td>
<td>0.74*</td>
<td></td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>3.7</td>
<td>3.6</td>
<td>3.8</td>
<td>3.8</td>
<td>4.0</td>
<td>0.64*</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 5 % level NS-Non significant Maximum score - 5

CONCLUSIONS

The fortification of finger millet with high quality protein source resulted in pasta products exhibiting differences in texture as evaluated by semi trained sensory panel. The addition of protein sources also increased the protein content of finger millet pasta.

REFERENCES


