EFFECT OF REFINED WHEAT FLOUR ON FUNCTIONAL, NUTRITIONAL AND SENSORY CHARACTERISTICS OF EXTRUDED RECONSTITUTED SKIM MILK PANEER

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ABSTRACT

The suggested article focuses on the use of skim milk powder in the preparation of reconstituted skim milk paneer as well as the use of the ingredient refined wheat flour, which have been great binding properties in various food products. The findings show that adding refined wheat flour in extruded reconstituted skim milk paneer food has a positive impact on its functional and nutritional qualities as well as sensory characteristics. An attempt was made to expose the effect of refined wheat flour on extruded reconstituted skim milk paneer in this context. At 5, 7.5, 10 and 12.5 per cent refined wheat flour was incorporated. Among these 12.5 per cent level (refined wheat flour) had found significantly ($p=.05$) lower in moisture (5.72 %), fat (16.51 %) and protein (43.55 %) than control (7.07, 19.33 and 51.34 %) and higher in carbohydrates contents (32.45 %) when compared to control (19.50 %). The water absorption and oil absorption index were discovered to have a substantial impact on functional properties of extruded paneer. The 10 per cent level of treatment was found significantly ($p=.05$) higher in (body and texture 7.46) and overall acceptability (7.46); whereas lower scores was recorded by 12.5 per cent level with 6.24 body & texture and 6.45 overall acceptability score. The significant impact of refined wheat flour on function, nutritional and sensory characteristics of extruded reconstituted skim milk paneer which has been favourable conditions for the production of a new functional product with high great functional value.

Keyword: Extruded reconstituted skim milk paneer, refined wheat flour, WAI, OAI and sensory characteristics.

I. INTRODUCTION

Extrusion technology is a process of forcing a material to flow under a variety of conditions including kneading, melting and/or shear, through an orifice (die) which is specifically designed to shape and/or expand the material to achieve various products and wide popular due to due to its automated control, high capacity, continuous operation, high productivity, versatility, adaptability, energy efficiency, low cost [1]. Paneer is soft cheese, popular in Indian subcontinent; it is obtained by heat and acid coagulation of milk at higher temperature and different coagulants are used is lactic acid, citric acid, sour milk and tartaric acid [2;3]. Refined wheat flour (Maida) is a sophisticated carbohydrates, all cereals belonging to this class free their fiber and micro nutrient content material inside the refining procedure. Eating to tons delicate carbohydrates can purpose fitness issues starting from cavities to gastric inflammation and constipation [4]. The bran of wheat 97% of fiber is also misplaced so white flour includes much less nutritional value. Refining procedure for ingredients like white flour put off many critical vitamins from the meals being refined including B vitamins, Unsaturated Fatty Acids, Calcium, Iron, Magnesium, Phosphorus and Vitamin E [5].

II. METHODOLOGY

Nandini brand skim milk powder was procured from the KMF outlets, Bengaluru. White flour was procured from More Retail Limited, Mumbai.

Preparation of paneer from reconstituted skim milk

The reconstituted skim milk will be prepared as per outlined by [2].
Preparation of extruded reconstituted skim milk paneer using reconstituted skim milk

Refined wheat flour was added at 5, 7.5, 10 and 12 % levels by weight of paneer to prepare the dough. The dough is passed through single screw extruder (manufactured by Milk-Tech Engineers, Bengaluru). The geared motor of 60 rpm with VFD AC drive 1 Hp. The mixer had 0.5 Hp gear motor with 60 rpm. The cutter is connected with extruder for cutting the product in specific size and diameter which had 1 - 200 rpm of 0.25 Hp with PMDC motor with rpm controller. The hopper is material of 3 mm thick AISI-316 SS. It shall be horizontal open type having transparent lid with a port to add water while kneading. It has stainless steel paddle type mixer to knead the feed. It have SS screw to extrude the kneaded mass which can be moved clock and counter clock wise direction just by pressing R/F switch is house in barrel. After extrusion it was frying by sunflower oil to obtained ready to eat extruded type food.

Sensory evaluation

The organoleptic quality of extruded paneer has been evaluate at regular intervals by semi trained judges on a 9-point hedonic scale. The samples for evaluation was coded appropriately before serving the samples to the judges for sensory evaluation. Sensory evaluation of the samples is carried out in the sensory evaluation lab. The panelists are requested to grade the sample on the basis of sensory attributes: colour and appearance, flavour, body & texture and overall acceptability.

Functional Properties

Water Solubility Index (WSI) and Water Absorption Index (WAI) were determined as per the method outlined by [6]. Oil Absorption Index (OAI) was determined as per the method describe by [7].

Nutritional Quality

Moisture, Fat and Protein content of the sample was estimated as per procedure of [8]

III. RESULTS AND DISCUSSION

To standardize the development of extruded paneer, the reconstituted skim milk was prepared for the preparation of paneer afterwards the different levels of white flour was tries to see the acceptability of the product over the control prepared. The product samples are served to the panel of judges for adjudging the quality with respect to color and appearance, flavor, body and texture and overall acceptability. In this section several changes and caused in solubility, absorption due to white flour has been discussed.

Effect of blending different levels of refined wheat flour on the sensory characteristics of extruded reconstituted skim milk paneer

The characteristic color of extruded reconstituted skim milk paneer like product is yellowish. It was observed from result obtained that, T3 secured slightly highest score (7.72) compare to other treatments. This might be due to the fact that increase in the levels of refined wheat flour increased the color and appearance become light yellowish color due to the content of high carbohydrates (Table 1). The color and appearance score for control and all treated samples was found to be non significant (P=.05). [9] was also reported non significant effect of wheat flour on color and appearance score up to 10 % level in bread.

The flavor, body and texture was very important sensory attributes of extruded reconstituted skim milk paneer. It was observed that T3 secured highest (flavor 7.49), (body and texture 7.46) than other treatments. As the increasing the levels of refined wheat flour the crunchiness of the product was increased at a certain levels afterwards it become hard texture not easy to break. [10] founds green gram flour which imparts good aroma while baking. Similar results was found by [11] range of flavor score was 7.00 to 7.66.

The sample T3 awarded significantly (P=.05) highest overall acceptability score of 7.46 compared to control (7.21), T1 (7.28), T2 (7.29) and T4 (6.45). As the level of refined wheat flour increasing up to 10 per cent, there was increasing in the overall acceptability scores. The increasing in score could be due to the yellowish color, good flavor and crunchy body & texture. [9] reported overall acceptability score was significantly increased with increasing the refined wheat flour levels. Findings are also similar with [12] in wheat-sprouted soybean flour based bread. The extruded product prepared from the multi cereal composite mix sample (50:50) had significantly better appearance (7.5), colour (7.35), flavour (7.3), texture (7.6), taste (7.1), mouth feel (7.1), and overall acceptability (7.6) compare with control sample prepared with maida (100 %) [13].
Table 1: Effect of blending different levels of refined wheat flour on sensory characteristics of extruded reconstituted skim milk paneer

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Sensory characteristics</th>
<th>Color and appearance</th>
<th>Flavor</th>
<th>Body and texture</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0 (control)</td>
<td></td>
<td>7.60</td>
<td>7.38</td>
<td>7.25a</td>
<td>7.21a</td>
</tr>
<tr>
<td>T1 (5 %)</td>
<td></td>
<td>7.63</td>
<td>7.42</td>
<td>7.27b</td>
<td>7.28a</td>
</tr>
<tr>
<td>T2 (7.5 %)</td>
<td></td>
<td>7.66</td>
<td>7.44</td>
<td>7.28a</td>
<td>7.29a</td>
</tr>
<tr>
<td>T3 (10 %)</td>
<td></td>
<td>7.70</td>
<td>7.49</td>
<td>7.46b</td>
<td>7.46b</td>
</tr>
<tr>
<td>T4 (12.5 %)</td>
<td></td>
<td>7.72</td>
<td>7.41</td>
<td>6.24c</td>
<td>6.45c</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td></td>
<td>N.S.</td>
<td>N.S.</td>
<td>0.16</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Note:
Scores were given as per 9-point hedonic scale
*All values are average of three trials
Similar superscripts indicate non-significant at corresponding critical difference (CD)

T0 = Control
T1 = Product was prepared by blending refined wheat flour at 5.0 % level
T2 = Product was prepared by blending refined wheat flour at 7.5 % level
T3 = Product was prepared by blending refined wheat flour at 10.0 % level
T4 = Product was prepared by blending refined wheat flour at 12.5 % level

Effect of blending different levels of refined wheat flour on functional properties of extruded reconstituted skim milk paneer

The WSI of control and treatments T1, T2, T3 and T4 were found to be 6.65, 6.55, 6.33, 6.30 and 6.23 per cent respectively. It was observed that WSI was slightly decreased as the increasing the level of refined wheat flour but statistically non-significant (P=0.05). [14] reported significant decreasing of WSI (9.50 to 8.00 %) may be due to significantly (P=0.05) decreasing of protein content in the extruded reconstituted skim milk paneer. Protein and starch content as well as gluten strength had been effect the water absorption and solubility of flours [15]. From fig. 1 the WAI of control sample (6.31 per cent) was found significantly higher to T3 (5.74 per cent) and T4 (5.62 per cent). It was observed that significant decreasing of WAI as the increasing the level of refined wheat flour this could be due to significant (P=0.05) reduction of protein per cent (T4) as the protein are important in water absorption of the products. [16] found decreasing in WAI with increasing the levels of refined wheat flour. Similar results was also observed by [14]. The OAI of T4 sample was significantly higher (7.65 per cent) to control sample (7.33 per cent). It was observed that OAI decreased with increasing the level of refined wheat flour. [17] observed refined wheat flour was recorded higher oil absorption capacity (139.60 %) compare to chickpea flour (127.05 %) and date powder (112.80 %) based biscuits due to inclusion of lower fat levels upon increase of the proportion of other flours. The different values of OAC among different flours could be attributed to the variability in the levels of hydrophobic side chains of amino acids which possibly interact with the non polar side chain of the lipid moieties through hydrophobic interaction [18]. The high oil absorption by refined wheat flour may be due to the changes happening in the starch molecule as gelatinization as well as hydrophobicity and lipophilicity of wheat gluten [19].
Effect of blending different levels of refined wheat flour on functional properties of extruded reconstituted skim milk paneer

It was observed that higher moisture content in case of control may be due to composition of paneer. Whereas, for the treatments refined wheat flour was blended with paneer. It was showed statistically significant difference between control (7.07 per cent) and T₃ (5.85 per cent) as well as T₄ (5.72 per cent) sample. Similar findings from [20] reported that cookies had significant decrease in moisture content. [21] showed the substitution of pitaya peel flour for refined wheat flour with significantly decreased of moisture content in cookies.

The fat content of control and treatments T₁, T₂, T₃ and T₄ were found to be 19.33, 17.92, 17.32, 17.02 and 16.51 per cent respectively. Table showed significant (P=.05) decreasing in fat content with increasing the level of refined wheat flour could be due to added refined wheat flour itself contain less fat than fat per cent in paneer. [22] found fat content in the range of 16.73 to 13.54 per cent in wheat-oat flour based biscuits. Similar trends of decreasing in fat content was observed by [23].

The protein per cent in control was significantly (P=.05) higher (51.34) compared to T₁ (47.35 per cent), T₂ (45.63 per cent), T₃ (44.96 per cent) & T₄ (43.55 per cent) and between treated samples were also found significant difference. The significant reduction of protein per cent may be due to lower per cent of protein in refined wheat flour than in paneer and higher per cent of carbohydrates in refined wheat flour. Similarly various results was observed by [24, 25 and 26].

The carbohydrates content of control and treatments T₁, T₂, T₃ and T₄ were found to be 19.50, 25.33, 28.09, 30.24 and 32.45 per cent respectively. We can observed the significant (P=.05) increased in carbohydrates content with increasing the refined wheat flour amount. Higher amount of carbohydrates (80 %) was present in refined wheat flour could cause significantly (P=.05) higher carbohydrates. Similar results was reported by [27] with nutri rich extruded products from small millets. Yadav et al. (2012) found high carbohydrates per cent in the biscuits.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Moisture (per cent)</th>
<th>Fat</th>
<th>Protein</th>
<th>Carbohydrates (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₀</td>
<td>7.07</td>
<td>19.33</td>
<td>51.34</td>
<td>19.50</td>
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<tr>
<td>T₁</td>
<td></td>
<td></td>
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<td>T₂</td>
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<td>T₃</td>
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<td>T₄</td>
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</table>

Table 2: Effect of blending different levels of refined wheat flour on nutritional characteristics of extruded reconstituted skim milk paneer
CONCLUSION

The scientific findings of this study, it can be concluded that extruded reconstituted skim milk paneer made from refined wheat flour with 10 per cent was found to be more acceptable in terms of the nutritional and sensory quality parameters. Using skim milk powder and refined wheat flour makes significant improvement in the functional properties of the extruded paneer.

REFERENCES


