FORMULATION AND PROXIMATE ANALYSIS OF SOYA FLOUR – CARROT POMACE BISCUITS

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ABSTRACT

Defatted soya flour is made entirely from defatted soy meal and is currently used worldwide by commercial processors. Similarly carrot pomace is a by-product obtained during carrot juice processing. It has good residual amount of all the vitamins, minerals and dietary fibre. The use of carrot pomace powder as an ingredient in the biscuit manufacturing not only increases its nutritional value but also helps in by-product utilization. This paper presents formulation and proximate analysis of soya flour - carrot pomace biscuits to enhance the nutritional value. The proportion of refined wheat flour and defatted soya flour were 95:5, 89:8, 83:11, 77:14, 71:17 and with these flour blends, the level of carrot pomace powder (CPP) used for making biscuit samples were 0, 3,6,9,12% respectively. The biscuits were evaluated for its quality on the basis of proximate analysis and sensory test. On the basis of analysis moisture content, fibre content and β-carotene level increased with increasing the amount of carrot pomace powder from 3 to 12% respectively in flour blends. Similarly the protein content increased linearly with the increase in the content of defatted soya flour in biscuits.

Key words: Refined wheat flour, Defatted Soy Flour (DSF), Carrot Pomace Powder (CPP), Sensory Evaluation, Proximate Analysis.

1. Introduction:

Biscuit is an unleavened crisp, sweet pastry made from wheat flour, shortening (hydrogenated fat) & sugar, and is usually made light by the addition of baking powder (a mixture of sodium carbonate, sodium bi-phosphate & cereal flour) (Saghir Ahmad et al, 2014).It is a product that is usually consumed by the people of all sections due to its convenient size and reasonable price; so if it can be made nutritionally good by the use of functional ingredients and will provide nutrients that is good for health.The use of carrot pomace powder as an ingredient in the biscuit manufacturing not only increases its nutritional value but also helps in by-product utilization.

Soyabean falls into Leguminosae family and is the best source of vegetarian protein that can be consumed by every sections of the society. The world soybean production is currently 219.8 million metric tons out of which India produced 9.3 million metric tons constituting about 4% of the total world production. Out of this...
production, less than 10% is directly used for human consumption (Gandhi, 2006). Defatted soya flour is made entirely from defatted soy meal and is currently used worldwide by commercial processors.

The carrot (Daucuscarota) is a root vegetable, usually orange, purple, red, white or yellow in color, with a crisp texture when fresh. It is a rich source of β-carotene and contains other vitamins, like thiamine, riboflavin, vitamin B-complex and minerals. Carrot pomace is a by-product obtained during carrot juice processing. It has good residual amount of all the vitamins, minerals and dietary fibre. The use of carrot pomace powder as an ingredient in the biscuit manufacturing not only increases its nutritional value but also helps in by-product utilization. The purpose of this paper presents formulation and proximate analysis of soya flour - carrot pomace biscuits to enhance the nutritional value.

2. Materials and Methods:
2.1 Preparation of carrot pomace powder:
A juice mixer grinder cum food processor was used to extract carrot juice. A hot air oven was used for drying carrot pomace, which could regulate drying air temperature upto 250°C with ± 2°C accuracy. The material was ground to pass through the sieve of 2 mm size. The pomace was stored in sealed polythene bag for further use.

2.2 Flowchart for the preparation of DSF and CPP incorporated biscuits:-
Preheat oven for 15 minutes at 150° C.

The shortening and sugar powder is creamed until light and fluffy.

The weighed quantity of refined wheat flour, defatted soya flour and carrot pomace powder is sieved and is then mixed properly with above mix with two drops of vanilla essence.

Then milk powder and salt is added to it.

It is mixed well to a proper consistency like a soft dough

Then a spoon full of dough is poured on a greased tray.

It is then baked in an electric oven at 150°C for 30 minutes.

The baked biscuits were cooled for about 30 minutes, packed into LDPE bags.
2.3 Proximate Analysis:
Moisture content was determined by AACC, 1969. Carbohydrate content by Anthrone method, Fat is determined in Soxhlet apparatus, Total ash, Protein content, Beta carotene, Crude fibre and Energy were determined by using standard AOAC procedures.

2.4 Sensory Analysis: Sensory analysis was done using 9 point hedonic scale

3. Results and discussion:
3.1 Sensory Evaluation of biscuits:-
Sensory evaluation for the biscuits were conducted using 6 test samples having different ratios of defatted soya flour and carrot pomace powder. These samples were tested with the help of a 9 member panel.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Control</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>7</td>
<td>7.3</td>
<td>7.6</td>
<td>7.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>6.6</td>
<td>6.7</td>
<td>7.1</td>
<td>7.1</td>
<td>7.6</td>
<td>7.7</td>
</tr>
<tr>
<td>Flavor</td>
<td>6.8</td>
<td>6.6</td>
<td>7</td>
<td>6.9</td>
<td>7.4</td>
<td>7.1</td>
</tr>
<tr>
<td>Taste</td>
<td>7.1</td>
<td>7.2</td>
<td>7.1</td>
<td>7.4</td>
<td>7.2</td>
<td></td>
</tr>
<tr>
<td>Texture</td>
<td>6.7</td>
<td>7</td>
<td>7.1</td>
<td>7.8</td>
<td>7.2</td>
<td>7.9</td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>6.8</td>
<td>6.9</td>
<td>7.1</td>
<td>7.2</td>
<td>7.4</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Sensory analysis:-
Appearance
The score for appearance was found highest in sample E with a score of 7.8 as compared to other biscuits.

Colour
The colour of the biscuit was highest for the one with high proportion of defatted soya flour and carrot pomace powder.

Flavour
The flavour for sample D was highest with a score of 7.4 due to optimum content of both defatted soya flour and carrot pomace powder.

Taste
The taste of sample D was highest with a score of 7.4 as compared to other biscuits.
Texture
The score for texture was highest for the sample E with a score of 7.9 due to high proportion of defatted soya flour.

Overall acceptability
The overall acceptability of sample E was highest as compared to other biscuits with a score of 7.5. The increased acceptability was due to high content of defatted soya flour and carrot pomace powder.

![Fig. 3.1 sensory analysis of different formulations](image)

### 3.2 Proximate Analysis

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.C(%)</td>
<td>2.73</td>
<td>2.76</td>
<td>2.86</td>
<td>2.90</td>
<td>2.96</td>
<td>3.01</td>
</tr>
<tr>
<td>Carbohydrate(%)</td>
<td>68</td>
<td>66.51</td>
<td>65.97</td>
<td>64.38</td>
<td>63.34</td>
<td>61.28</td>
</tr>
<tr>
<td>Total ash (%)</td>
<td>0.64</td>
<td>0.70</td>
<td>0.76</td>
<td>0.92</td>
<td>1.02</td>
<td>1.96</td>
</tr>
<tr>
<td>Protein (%)</td>
<td>7.86</td>
<td>8.06</td>
<td>9.01</td>
<td>9.25</td>
<td>9.34</td>
<td>9.53</td>
</tr>
<tr>
<td>Betacarotene (mcg)</td>
<td>0.496</td>
<td>0.547</td>
<td>0.645</td>
<td>1.29</td>
<td>2.23</td>
<td>2.58</td>
</tr>
<tr>
<td>Crude fiber(%)</td>
<td>0.12</td>
<td>0.48</td>
<td>0.64</td>
<td>1.02</td>
<td>2.12</td>
<td>2.82</td>
</tr>
<tr>
<td>Energy (kCal)</td>
<td>492.41</td>
<td>489.61</td>
<td>481.70</td>
<td>460.25</td>
<td>423.5</td>
<td>411.8</td>
</tr>
</tbody>
</table>

The moisture content was recorded high for sample E (3.01%) followed by sample D (2.96%) and least was recorded in Control sample (2.73%), as sample E contains higher amount of carrot pomace powder it recorded highest moisture content. Carbohydrate content of the control sample exhibited higher value (68%), followed by sample A (66.51%) and least was observed in sample E (61.28%). Same trend was seen in the parameters like fat content and energy because control sample was entirely made up of refined wheat flour which is rich in carbohydrate, fat and
energy when compared with the carrot pomace powder and defatted soy flour. Next to control sample, sample A (21.59%) recorded highest fat content and least was seen in sample E (21.40%) which contains highest amount of defatted soy flour. Energy was high in control sample (492.41kcals) followed by sample B (481.70kcals), least was recorded in sample E (411.80%).

Total ash (1.96%), beta carotene and crude fibre (2.82%) contents were high in sample E as this sample contains high amount of carrot pomace powder and defatted soy flour when compared with the other formulated samples and control sample. Significant differences were observed among the samples and also the control in beta carotene content in which highest was recorded in sample E (2.58mcg), followed by sample D (2.12mcg) and least was recorded in control sample (0.496mcg).

4. Conclusions

On the basis of nutritional and sensory quality, biscuit when incorporated with blends 17% defatted soya flour and 12% carrot pomace powder resulted in better quality. This functional biscuit is nutritionally more superior to that of whole wheat flour biscuit. It can be use as a vehicle for protein fortification and other nutritional improvement as biscuit is widely accepted bakery product in India.

References


3. Yzoneet., al (1982) reported that enrichment of bread with defatted soy flour at 0 to 12% with 2% intervals of wheat flour improved the nutritional quality with an increase in protein content from 13.4% to 18.0% percent.


8. Walde et al. 1992, carrot is a rich source of β-carotene and contains other vitamins, like thiamine, riboflavin, vitamin B-complex and minerals.

10. Addo et al, 1993, in the study found that as DFS usually undergoes processing, the active lipoxygenase-2 might have added undesirable aroma compounds at higher replacement resulting in less acceptability of DFS supplemented products.
