Development and quality assessment of garlic small bread (Garlic Pav) prepared by using refined wheat flour, pearl millet flour, sago flour and garlic

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Abstract

Bread is a simple food that has been eaten throughout history. From the ancient Egyptians discovering it, to British peasants collectively bringing their dough to the local bakehouse, and even causing a national revolution in France. Bread is an important, yet delicious and healthy food that is well-loved. The aim of this research was to develop garlic small bread (garlic pav) using refined wheat flour, pearl millet flour, sago flour and garlic. The consumption of garlic small bread (garlic pav) can be beneficial to health in numerous and significant ways. The flour composition of refined wheat flour, pearl millet flour, sago flour and garlic were mixed at different proportion levels (T1) 95:2.5:2.5:15, (T2)85:7.5:7.5:15, (T3) 75:12.5:12.5:15 while the refined wheat flour bread (T0) 100:0:0:0 was served as control sample. The prepared breads were analysed through various Physico-chemical, microbiological and sensory attributes. All treatments were replicated three times and the data obtained during investigation were statistically analyzed by using analysis of variance (ANOVA) and critical difference (C.D.) techniques. The satisfactory result of bread was for T1 protein (8.32%), fat (2.50%), ash (1.94%), and carbohydrate (63.13%) as comparable to control without adversely affecting the sensory parameters which was high in T2 colour and appearance (7.8). Flavour and taste (8.4) and overall acceptability (7.9). based on the findings it can be concluded that beneficial ingredients like pearl millet flour, sago flour and garlic can be mixed together to prepared small bread (PAV). The nutrition parameters of prepared garlic small bread are beneficial for help in curing blood system and heart disease.

Keywords: Pearl millet flour, sago flour, garlic and small bread (PAV)

Introduction

Small bread is a derivative of the Portuguese word “pão” which means bread. Pav is also known as small bread or soft bread. Small bread or pav is a fermented bakery product, arranged in two contrasting colors. The upper area is creamy brown in color and the lower section is creamy white and less fluffy compared to the upper section. It tastes like sliced or loaf bread. The main ingredient is Maida or refined wheat flour. Other ingredients include salt, water, yeast, stabilizers (butter) and preservatives (calciumpyropionate). Sanjay (2020) [14] small bread is prepared by a series of process involving mixing, kneading, proofing, shaping, baking. Pav is one of the oldest and largest consumed foodstuffs and is consumed across the world by all age groups. Agarwal et al., (2017) [1]. Small bread or pav is a common food item in Mumbai, Maharashtra and is used in many recipes, especially snacks like Vada pav, pav bhaji, misal pav, dabeli & masala pav. It comprises of three or four rows of pav or bread merged together, arranged in slabs or “ladi”. Sanjay (2020) [14].

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>250 Kcal</td>
</tr>
<tr>
<td>Protein</td>
<td>7.14 g</td>
</tr>
<tr>
<td>Total lipid (fat)</td>
<td>3.57 g</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>50 g</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>143 mg</td>
</tr>
<tr>
<td>Potassium (k)</td>
<td>71 mg</td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>482 mg</td>
</tr>
<tr>
<td>Vitamin B3 (Niacin)</td>
<td>3.929 mg</td>
</tr>
<tr>
<td>Vitamin B9 (Folic acid)</td>
<td>89 µg</td>
</tr>
</tbody>
</table>

Source: USDA Nutrient database

Table 1: Nutrient Content of 100 g of Small Bread (Pav)
Refined wheat flour: Flour is also called as refined flour, white flour or maida from the Indian subcontinent is obtained from wheat. Patel et al., (2021) [13] It is the basic structural component of most bakery products. Wheat flour contains two proteins-gliadin and glutenin which form gluten by addition of water. No other cereal flours form gluten. Maida is finely milled without any bran, refined, and bleached, it closely resembles cake flour. Maida is used extensively in Central Asian cuisine and cuisine from the Indian subcontinent, such as Flatbreads (naan), tandoori roti, Bhatoora, fast foods, baked goods such as pastries, bread, pav, several varieties of sweets, and traditional flatbreads. Srilakshmi, (2003)[16].

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
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</tr>
<tr>
<td>Moisture</td>
<td>13</td>
</tr>
<tr>
<td>Protein</td>
<td>10</td>
</tr>
<tr>
<td>Total lipid (fat)</td>
<td>3.33</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>72</td>
</tr>
<tr>
<td>Dietary fiber</td>
<td>3.3</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>3.6</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: USDA Nutrient Database

Table 2: Nutritional Value of Refined Wheat Flour Per 100g

Sago Flour: Sago (Tapioca) is a type of starch extracted from the core of certain tropical palm stems, especially those of Metroxylon sagu. It is a major staple food for the lowland peoples of New Guinea and the Moluccas, where it is called saksak, rabia and sago. The largest supply of sago comes from Southeast Asia, particularly Indonesia and Malaysia. It is traditionally cooked and eaten in various forms, such as rolled into balls, mixed with boiling water to form a glue-like paste (papeda), or as a pancake. Kumari et al., (2019)[10] Sago has low calorie and fat content, which are good for diet. Its protein content is very low and free from casein and gluten. In addition, sago is safe to be consumed by diabetic people because it does not raise blood glucose level immediately (low glycemic index) Ashtosh (2017) [4]. As a resistant starch, sago can prevent the risk of constipation and colon cancer. Sago even can substitute wheat flour in producing white bread, biscuit and cookie. The substitution in the range of 30%-40% will not give any effect related to the quality of product. Karim (2008)[8].

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Amount</th>
</tr>
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<tbody>
<tr>
<td>Energy</td>
<td>375 kcal</td>
</tr>
<tr>
<td>Moisture</td>
<td>14</td>
</tr>
<tr>
<td>Protein</td>
<td>3.21</td>
</tr>
<tr>
<td>Fat</td>
<td>0.65</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>81.55</td>
</tr>
<tr>
<td>Dietary fiber</td>
<td>3.1</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>62</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>0.31</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>31</td>
</tr>
</tbody>
</table>

Source: USDA Nutrient Database

Table 3: Nutrient Composition of Sago per 100 g

Pearl millet flour: Pearl millet (Cenchrus americanus) is the most widely grown type of millet. Pearl millet also known as Grano (Spanish), bajra (Hindi). The pearl millet, is known for its culinary uses as well as health benefits. It is cultivated in countries of Africa and the Indian subcontinent since prehistoric times. Manning et al., (2010) [11] Pearl millet contains substantial amount of minerals such as iron, calcium, zinc and high level of fat. It is nutritionally comparable and even superior to major cereals due to high energy and protein value Fasasi (2009) [6]. It is also a rich source of dietary fiber and micronutrients while starch is the major constituent of pearl millet Sehgal et al., (2007) [15]. As a food source, it is non-glutinous and non-acid forming, so as soothing and easy to digest Amit et al., (2018)[3]. Pearl millet is a superior cereal with regard to nutritional quality and presents several health benefits Krishnan et al., (2011) [9]. Moreover, Pearl millet is a potent source of antioxidants, due to its phenolic content and is a staple food substitute for celiac patients. Udaybeer et al., (2017) [13].

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
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</tr>
<tr>
<td>Protein</td>
<td>11.6</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>67.1</td>
</tr>
<tr>
<td>Dietary fiber</td>
<td>1.2</td>
</tr>
<tr>
<td>Fat</td>
<td>5.0</td>
</tr>
<tr>
<td>Vitamin A (mcg)</td>
<td>132.0</td>
</tr>
<tr>
<td>Folic acid (mcg)</td>
<td>45.5</td>
</tr>
<tr>
<td>Vitamin E (µg)</td>
<td>23</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>42.0</td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td>97.0</td>
</tr>
<tr>
<td>Phosphorus (mg)</td>
<td>360</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>10.9</td>
</tr>
</tbody>
</table>

Source: USDA Nutrient database

Table 4: Nutrient Content of Pearl Millet Flour Per 100 g

Garlic: Garlic (Allium sativum) is a species in the onion genus, Allium. Garlic is widely used around the world for its pungent flavour as a seasoning or condiment. Garlic cloves are used for consumption (raw or cooked) or for medicinal purposes. They have a characteristic pungent, spicy flavour that mellows and sweetens considerably with cooking. Katzer, Gernot (2009) [7]. The distinctive aroma is mainly due to organosulfur compounds including allicin present in fresh garlic clove. Ahmad et al., (1984) [2] Garlic is loaded with good source of vitamins and minerals like manganese, selenium, vitamin C, vitamin B6, and other antioxidants, including allicin as well as enzyme, saponins, flavonoids. Garlic may be applied to different kinds of bread, usually in a medium of butter or oil, to create a variety of classic dishes, such as garlic bread, garlic toast. Clark & Melissa (2008) [5].

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>149</td>
</tr>
<tr>
<td>Moisture</td>
<td>59</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>33.06</td>
</tr>
<tr>
<td>Dietary fiber</td>
<td>2.1</td>
</tr>
<tr>
<td>Fat</td>
<td>0.5</td>
</tr>
<tr>
<td>Protein</td>
<td>6.36</td>
</tr>
<tr>
<td>Vitamin B6 (mg)</td>
<td>1.2350</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>5.0</td>
</tr>
<tr>
<td>Choline (mg)</td>
<td>23.2</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>31.2</td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td>14.2</td>
</tr>
</tbody>
</table>

Source: USDA Nutrient Database

Table 5: Nutritional value of Garlic per 100 g

Materials and Methods
The present investigation entitled “Development and Quality

~ 1996 ~
Assessment of Garlic Small Bread (Garlic Pav) prepared by using Refined Wheat Flour, Pearl Millet Flour, Sago Flour and Garlic had been conducted for the preparation of Garlic Small Bread (garlic Pav) using Pearl millet flour, sago flour and garlic in different proportions in Food Technology Lab of “Warner Collage of Dairy Technology” Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, U.P. (211007).

Plan of work

Treatment combination

T0: Control prepared from refined wheat flour (100:00:00:00)

T1: Experimental sample prepared from refined wheat flour, Pearl millet flour, Sago flour and Garlic (95:2.5:2.5:15)

T2: Experimental sample prepared from refined wheat flour, Pearl millet flour, Sago flour and Garlic (85:7.5:7.5:15)

T3: Experimental sample prepared from refined wheat flour, Pearl millet flour, Sago flour and Garlic (75:12.5:12.5:15)

Table 6: Treatment combination for control and experimental garlic small bread (garlic pav)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refined wheat flour (%)</td>
<td>100</td>
<td>95</td>
<td>85</td>
<td>75</td>
</tr>
<tr>
<td>Pearl millet flour (%)</td>
<td>-</td>
<td>2.5</td>
<td>7.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Sago flour (%)</td>
<td>-</td>
<td>2.5</td>
<td>7.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Garlic (%)</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Fig 1: Flow diagram of Pearl millet flour

Fig 2: Flow diagram of Sago flour

Fig 3: Flow diagram of Garlic paste

Fig 4: Flow Diagram for Manufacturing of Control and Experimental Garlic Small Bread (Pav)
Result and Discussion
The data collected and tabulated under the study are presented with appropriate illustration and discussed in this chapter.

Table 7: Average data for different parameters of control and experiments (in percent)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Treatments</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T0</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
</tr>
<tr>
<td><strong>Chemical analysis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat</td>
<td>2.97</td>
<td>2.50</td>
<td>2.20</td>
<td>2.05</td>
</tr>
<tr>
<td>Protein</td>
<td>8.51</td>
<td>8.32</td>
<td>8.06</td>
<td>7.89</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>62.43</td>
<td>63.13</td>
<td>63.21</td>
<td>63.62</td>
</tr>
<tr>
<td>Acidity</td>
<td>0.39</td>
<td>0.38</td>
<td>0.36</td>
<td>0.34</td>
</tr>
<tr>
<td>Ash</td>
<td>1.92</td>
<td>1.94</td>
<td>1.64</td>
<td>1.57</td>
</tr>
<tr>
<td>Moisture</td>
<td>24.17</td>
<td>24.11</td>
<td>24.89</td>
<td>24.87</td>
</tr>
<tr>
<td>Antioxidant (TBHQ) (mg/kg)</td>
<td>(BLQ)10.0</td>
<td>(BLQ)10.0</td>
<td>(BLQ)10.0</td>
<td>(BLQ)10.0</td>
</tr>
<tr>
<td><strong>Microbiological analysis (×10⁻³ cfu/ g)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yeast &amp; Mould count</td>
<td>577.33</td>
<td>235.66</td>
<td>230.66</td>
<td>174.33</td>
</tr>
<tr>
<td>SPC</td>
<td>957.33</td>
<td>886.66</td>
<td>884.66</td>
<td>777.66</td>
</tr>
<tr>
<td>Coliform</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td><strong>Organoleptic scores (9-point Hedonic scale)</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colour and Appearance</td>
<td>7.4</td>
<td>7.4</td>
<td>7.8</td>
<td>7.0</td>
</tr>
<tr>
<td>Body and Texture</td>
<td>8.2</td>
<td>7.8</td>
<td>7.7</td>
<td>7.4</td>
</tr>
<tr>
<td>Flavour and Taste</td>
<td>8.0</td>
<td>7.8</td>
<td>8.4</td>
<td>7.9</td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>7.8</td>
<td>7.6</td>
<td>7.9</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Physico-Chemical Analysis of Garlic Small Bread (Garlic Pav): The main findings of the experiment are being summarized here

**Fat percentage**
There was significant difference in fat percentage of different treatment combinations. Maximum fat percentage was recorded in the sample of T0 (2.97) followed by T1 (2.50), T2 (2.20) and T3 (2.05).

**Protein percentage**
There was significant difference in protein percentage of different treatment combinations. Maximum protein percentage was recorded in the sample of T0 (8.51) followed by T1 (8.32), T2 (8.06) and T3 (7.89).

**Carbohydrate percentage**
There was significant difference in carbohydrate percentage of different treatment combinations. Maximum carbohydrate percentage was recorded in the sample of T3 (63.62) followed by T2 (63.21), T1 (63.13) and T0 (62.43).

**Acidity percentage**
There was significant difference in acidity percentage of different treatment combinations. Maximum acidity percentage was recorded in the sample of T0 (0.39) followed by T1 (0.38), T2 (0.36) and T3 (0.34).

**Ash percentage**
There was significant difference in ash percentage of different treatment combinations. Maximum ash percentage was recorded in the sample of T1 (1.94) followed by T0 (1.92), T2 (1.64) and T3 (1.57).

**Moisture percentage**
There was significant difference in moisture percentage of different treatment combinations. Maximum moisture percentage was recorded in the sample of T2 (24.89) followed by T3 (24.87), T0 (24.17) and T1 (24.11).

**Antioxidant**
There was no significant difference in antioxidant of different treatment combinations. T0 (10.0), T1 (10.0), T2 (10.0) and T3 (10.0).
The results obtained from physico-chemical, microbiological and organoleptic analysis concluded that garlic small bread (garlic pav) can be prepared satisfactorily by the addition of pearl millet flour, sago flour and garlic. From the above findings T2 (85:7.5:7.5:15) was found to be most favourable treatment in terms of organoleptic properties (colour & appearance, flavour & taste and overall acceptability) and it obtained maximum score. In terms of nutritional properties T0 (100:00:00:00) and T1(95:2.5:2.5:15) found to be most satisfactory treatment and it obtained maximum score (protein, fat, ash, and acidity). Hence as a result, it can be stated that utilising refined wheat flour, pearl millet flour, sago flour, and garlic, can be successfully used for the preparation of garlic small bread (garlic pav).

References
4. Ashotosh K, Singh Shanker Suwan, Nath N. Preparation and quality assessment of bread prepared by using wheat
flour, tapioca sago flour (Sabudana) and oat meal (Daliya). The Pharma Innovation. 2017;6(8, Part F):399.


