Sensory and Analytical Study of Oats Chocolate Chips Cookies

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Abstract: A study was conducted for sensory analysis and analytical study of oats chocolate chips cookies. The cookies made were nutritious products for all peoples. The product on the whole composed of oats and wheat flour or all purpose flour and other ingredients such as dark chocolate and sugar. The product was made with three different formulations such as 20:80, 30:70, 40:60 (oats: wheat flour) respectively. Sensory evaluation was done for acceptability of the product and analytical study was conducted to analyze chemical composition of product. Result from sensory analysis was shown that product is acceptable.

Keywords: chocolate chips cookies, cereals, B-glucans, amino acids etc.

1. Introduction

Oats (Avena Sativa L.) ranks around sixth in the world cereals production statistics following wheat, maize, rice, barley and sorghum. They are good source of proteins, fibre and minerals. The amount of oats used for human consumption has increased progressively, the fact health effects of oats benefits mainly on the total dietary fibre and B-glucan content (Ahmad Mushtaq et al., 2014) [1]. The bran and germ of oats also contain phytochemicals including tocopherols, tocotrienols, phenolic compounds and plant sterols, thought to have a beneficial effect on health (oats for health booklet) [29]. Oats is the only cereal containing a globulin or legume like protein avenalin, as the major (80%) storage proteins. Globulins are characterized by water solubility; because of this property (health and drugs: disease, prescription and medication) [7]. Oats is reported as, they used for their antioxidants, anti-inflammatory, moisturizing and even ultraviolet protecting properties. As a grain without gluten, oat flour and bran are used as an alternative food for persons suffering celiac disease. As a health food oats have received extensive attention in recent times for their ability to lower serum cholesterol level (www.truehealthmedicine.com) [30].

Chocolate is the most commonly craved food in the world. Initially it was thought of as a luxury item, but now it is considered to be a medicine. Cocoa contains large concentration of flavonoids, epicatechin, catechin and procyanidins. The nitrogenous compounds of cocoa include both proteins and the methylxanthine theobromine and caffeine. They are central nervous system stimulants, diuretics and smooth muscle relaxants. Cocoa also contains minerals such as potassium, phosphorus, copper, iron, zinc and magnesium which potentiate health benefits of chocolate (Latif R., 2013) [13].

Wheat (Triticum aestivum-L) constitutes a major source of most of the diet containing moisture; 12.0, protein; 10.0, lipids, (fat); 1.6, carbohydrates; 72.6, fiber; 1.3, and ash; 1.4 g/100g respectively. Whole wheat flour contained 43 mg Ca, 284 mg P and 45 mg iron. Wheat is the major contributor of protein content of daily diet (Wahab Said et al., 2014) [28].

Composition of oats:

<table>
<thead>
<tr>
<th>Table 1: Composition of oats</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
</tr>
<tr>
<td>Carbohydrates</td>
</tr>
<tr>
<td>Dietary fibre</td>
</tr>
<tr>
<td>Fats</td>
</tr>
<tr>
<td>Proteins</td>
</tr>
<tr>
<td><strong>Vitamins</strong></td>
</tr>
<tr>
<td>Thiamine (B₁)</td>
</tr>
<tr>
<td>Riboflavin (B₂)</td>
</tr>
<tr>
<td>Niacin (B₃)</td>
</tr>
<tr>
<td>Pantothenic acid (B₅)</td>
</tr>
<tr>
<td>Folate (B₉)</td>
</tr>
<tr>
<td><strong>Trace minerals</strong></td>
</tr>
<tr>
<td>Calcium</td>
</tr>
<tr>
<td>Iron</td>
</tr>
<tr>
<td>Magnesium</td>
</tr>
<tr>
<td>Manganese</td>
</tr>
<tr>
<td>Phosphorus</td>
</tr>
<tr>
<td>Potassium</td>
</tr>
<tr>
<td>Zinc</td>
</tr>
<tr>
<td><strong>Other constituents</strong></td>
</tr>
<tr>
<td>β-glucan (soluble fibre)</td>
</tr>
</tbody>
</table>

Reference - USDA national nutrient database


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## Composition of Dark Chocolate

<table>
<thead>
<tr>
<th>Table 2: Composition of Dark Chocolate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
</tr>
<tr>
<td>Total fat</td>
</tr>
<tr>
<td>Cholesterol</td>
</tr>
<tr>
<td>Total carbohydrates</td>
</tr>
<tr>
<td>Dietary fiber</td>
</tr>
<tr>
<td>Sugar</td>
</tr>
<tr>
<td>Proteins</td>
</tr>
<tr>
<td>Minerals</td>
</tr>
<tr>
<td>Sodium</td>
</tr>
<tr>
<td>Calcium</td>
</tr>
<tr>
<td>Iron</td>
</tr>
<tr>
<td>Vitamins A</td>
</tr>
</tbody>
</table>

Reference - USDA national nutrient database

### Material and Methods:

1. **Preparation of composite flour**
   Three different samples were prepared with combination of oat flour and wheat flour in it. Wheat flour or All-purpose flour was also added in cookies and some artificial flavoring agents like vanilla added. All cookies were baked in a pre-warmed oven at 150°c.

2. **Material**
   a) Oats
   b) Wheat flour or All-purpose flour
   c) Sugar
   d) Butter
   e) Dark chocolate
   f) Milk

   **Flow chart for preparation of cookies**
   - Wheat flour + oats + salt
   - Creaming of butter, sugar
   - Addition of baking powder and soda in flour
   - Mixing of this flour composition in creamed butter
   - Kneaded to homogenous mass and addition of dark chocolates
   - Rolling
   - Cutting
   - Baking (150°c, 10 mins)
   - Baking (150°c, 10 mins)
   - Cooling
   - Packaging

   **Analytical Methods:**
   **A. Determination of moisture content**
   Moisture was estimated by weighing 10g of ground sample and subjected to hot air oven at 110 for 4 hrs at 1 hr interval to check weight of sample. It was again weighed after cooling in desiccators until the constant weight was obtained. The resultant loss in weight was calculated as moisture content.

   \[ \text{Moisture content} = \frac{W_2 - W_1 \times 100}{W_2 - W} \]

   Where, \( W_1 \) = weight of empty petridish
   \( W_2 \) = weight of petridish with sample before drying
   \( W \) = weight of petridish with sample after drying to constant weight

   **B. Determination of fats**
   10g of ground sample was weighed accurately to thimble and defatted with the petroleum ether in soxhlet apparatus for 6-8hrs at 80degree. The resultant ether was evaporated and lipid content was calculated

   \[ \% \text{fats} = \frac{W_2 - W_1 \times 100}{W} \]

   Where, \( W_2 \) = weight of flask with oil (g)
   \( W_1 \) = weight of empty flask
   \( W \) = weight of initial sample

   **C. Determination of proteins**
   Proteins were determined by micro-kjeldhal method using 10g of ground sample by digesting the same with concentrated H2SO4 containing catalyst mixture 3-4 hours at 100 degree. It was then distilled with 40% of NaOH and liberated ammonia was trapped in per cent of boric acid and then it was titrated with 0.1 N HCl using mixed indicator. The percentage was estimated in the sample sung multiplying factor 6.25.

   \[ \text{Nitrogen} \% = \frac{\text{sample titre} - \text{blank titre} \times \text{normality of HCl} \times 14 \times 100}{\text{weight of sample}} \times 100 \]

   \[ \text{Protein} \% = \text{Nitrogen} \% \times 6.25 \]

   **D. Determination of carbohydrates**
   100 mg of sample was weighed accurately in the test tube and kept in hot water bath for 3 hours for hydrolysis followed by the centrifugation by addition of distilled water to make volume 100ml. Now take 0.5 and 1ml and addition of anthrone reagent to it and heat for 20 mins of hot water bath. The optical density was measured at 480 nm using colorimeter.

   \[ \text{Amount of carbohydrate in 100mg of sample} = \frac{\text{mg of sample} \times 100}{\text{volume of test sample}} \]

   **E. Determination of ash content**
   10g of sample was weighted into crucible which was heated at low flame till all the material was completely charred and cooled. Then it was kept in muffle furnace for about 5 hrs at 600 degree. It was again cooled in desiccator and weighed and repeated until two consecutive weights were constant. The percent ash was calculated by knowing the difference between initial and final weight.

   \[ \text{Total ash} = \frac{(w_2 - w) \times 100}{W_1 - w} \]

   Where, \( w \) = weight of empty dish
   \( W_1 \) = weight of dish with sample
   \( W_2 \) = weight of dish with ash
Result of Sensory Analysis:
Hedonic rating scale was used for the overall acceptability, results as follow:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Organoleptic scoring (overall acceptability)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Color</td>
</tr>
<tr>
<td>S1</td>
<td>7</td>
</tr>
<tr>
<td>S2</td>
<td>7</td>
</tr>
<tr>
<td>S3</td>
<td>8</td>
</tr>
</tbody>
</table>

- Better renal (kidney) functions
- Lower Body Mass Index (BMI)

Health benefits of Oats:
1. Antioxidant properties of oats
2. Cholesterol lowering property
3. Anti inflammatory and anti proliferation
4. Lowering glycaemic response or ability to reducing post prandial glucose level

Health benefits of dark chocolate:
- Lower blood pressure
- Improved cardiovascular health
- Better brain performance
- Reduced risk of stroke

References

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[20] Pepsico nutrition: health and wellness


[22] Popa Alexandra (Jurcoane), Suta Denisha, Recent advances in oat based functional cereal products, Romanian biotechnological letters, vol.17, No.6, 7717-7725, 2012.


[30] when B-glucan is incorporated into bread and cookies, American society for clinical nutrition, 78, 221-227,

[31] www.trueHealth medicine.com ( raw oats for gastrointestinal health)

[32] www.eatforhealth.gov.in ( oats for health booklet)