

PROCESS STANDARDIZATION AND PREPARATION OF COOKIES BY INCORPORATION OF DIFFERENT LEVELS OF OAT BRAN

ABDUL RAHEEM MI^{1*}, PATIL PS¹, SHAIKH SABOOR², KATKE SD³

¹Department Food Science & Technology, Queen's College of Food Technology & Research Foundation, Aurangabad, Maharashtra, India. ²Department Food Trade & Business Management, Queen's College of Food Technology & Research Foundation, Aurangabad, Maharashtra, India. ³Department Food Chemistry & Nutrition, Queen's College of Food Technology & Research Foundation, Aurangabad, Maharashtra, India. Email: raheem272001@yahoo.com

Received: 27 March 2016, Revised and Accepted: 02 April 2016

ABSTRACT

Objectives: There is increasing concern about the diet of people and its implications for long- and short-term health. This study was carried out to study effect of different levels of oat bran on physicochemical, nutritional, and organoleptic proprieties of bakery products like cookies to improve the health as well as nutritional profile.

Methods: This study was carried out using four different samples of cookies prepared by incorporation of different levels of oat bran by replacing wheat flour, i.e., 0% (T₀), 10% (T₁), 20% (T₂), and 30% (T₃) and keeping other all ingredients constant.

Results: These samples were analyzed for their nutritional composition and sensory evaluation. The sensory evaluation of oat cookies shows the total score obtained for the control sample T₀, sample T₁, sample T₂, and sample T₃. Among the oat cookies, the sample T₂ recorded the highest score in which 20% oat bran was added.

Conclusion: From this study, it can be concluded that oat bran can be incorporated in wheat flour of cookies up to 20% level is highly acceptable by the consumers. Since these cereals based baked products are part of our daily diet and are an excellent vehicle for an addition of ingredients such as oat bran as fiber source. These types of ingredients can be easily adopted by bakeries and housewives. To prepare such value-added health food required by a particular segment of the population who are prone to fiber related problems and consider food as medicine.

Keywords: Nutritional, Organoleptic evaluation, Dietary fibers, Treatments, Standardization.

INTRODUCTION

Today, we find that the people are becoming more and more aware about their health and various problems related to it. Thus, with changing lifestyle and the changing mindsets of people they are also making a trend toward eating nutritious as well as healthy food.

Oat (*Avena sativa* L.) is most commonly cultivated species related to family Gramineae. The other names used for oats are groats, oatmeal, oat straw, oat bran, etc. In India, it is better known as "Jae." Oat that is not of Indian origin, nowadays, it is gaining more and more importance in India as well due to nutritive value [1].

Oat bran contains soluble as well as insoluble dietary fibers, B vitamins, proteins, iron and zinc and low fats. Oat based products guarantees reduction of serum cholesterol, maintain blood sugar level, and lowering the demand for insulin production. The dietary fiber that is present in oat especially beta glucan has been proved to reduce blood serum cholesterol level significantly [2].

In recent years in India, bakery products have become popular among different cross sections of the population due to an increased demand for convenience foods. Bread and cookies accounting for 80% of total bakery products produced in the country [3].

The present investigation is carried out to improve the quality of cookies by incorporation of different levels of oat bran.

METHODS

This study was conducted at Department of Food Science and Technology, Queen's College of Food Technology and Research

Foundation, Aurangabad, Maharashtra. Raw materials required for this experiments were procured from Aurangabad.

Oat bran

Refined oat bran with slight brownish in color, free from impurities, and great fiber content is used.

Wheat flour

Refined wheat flour with creamy white color and free from bean fragments.

Shortening

Sunflower trade hydrogenated vegetable oil, baking powder, milk powder, sugar, and honey are purchased in the local market of Aurangabad.

Baking powder

Baking powder was purchased from local market of Aurangabad. This was used as a leavening agent.

Milk powder

Spray dried milk powder was used purchased from local market of Aurangabad to provide desired moisture content.

Sugar

Sugar was purchased from local market of Aurangabad. Sugar was used as sweetener also plays an important role in caramalization.

Honey

Honey was purchased from local market of Aurangabad. Honey has a good medicinal value.

Procedure for the preparation of oat cookies

1. Sieve the wheat flour and add baking powder and oat bran into it. This process is also known as "creaming"
2. Mix the fat with powdered sugar and this process is called as "creaming of fat"
3. Add small amount of honey, i.e., 0.5 g to the mixture
4. Knead the dough if required add milk to the dough to make it soft
5. Make the balls and rolled it
6. Then, grease the tray with butter and keep the cut cookies in tray
7. Preheat the oven at about 375°F. Bake the rolls in oven at 200°C for 12-15 minutes or till done
8. Remove it and cool it on cooling rack. And pack it in a packaging material [4,5].

Treatments

For preparation of oat cookies, oat bran is used under different levels as under (Table 1):

- T_0 = Control
- T_1 = 10%
- T_2 = 20%
- T_3 = 30%.

Oat bran was used at 10%, 20%, and 30%. It was incorporated in the standardized formula of cookies with a slight modification of standardized process. Both the portion of dough were rolled and placed over each other and rolled tightly. The rolled dough was baked for 10-20 minutes at 200°C.

Analytical procedure

Physical analysis

1. Diameter: The diameter was measured in mm with the help of scale
2. Thickness: Thickness was measured in mm using scale
3. Spread ratio: Spread ratio was calculated by method given by AOAC [6].

Chemical analysis

- Estimation of moisture content of cookies: Moisture can be determined by hot air oven at 105°C [6]
- Estimation of ash of cookies: Ash content can be determined by burning sample in muffle furnace at 550°C for 4 h [6]
- Determination of fiber: Total fiber content can be determined by phenol – Sulphuric acid method [6]
- Determination of fat: - Fat content can be determined by extraction of sample in a soxhlet apparatus for 6-8 h using hexane or ether as a solvent which is further evaporated and residues are weighed [7]
- Sensory evaluation: The sensory characteristics such as general appearance flavor and color, texture, and overall acceptability were evaluated. The judges were provided with Hedonic scale scorecard [7].

RESULT AND DISCUSSION

The present investigation was undertaken to evaluate the quality as well as the acceptability of cookies prepared by incorporation of oat bran. The chemical, physical analysis and organoleptic evaluation of oat cookies had been carried out. Similarly, the cost of production of oat cookies was also calculated.

Physicochemical composition and energy value of oat bran

The chemical composition of oat bran is carried out and results are reported in Table 2.

The results showed that oat bran contains 10.7% protein and 1.2% fat. It is also an excellent source of vitamin B complex. Crude fiber and ash content are found to be 3.6% and 1.9%, respectively, while the moisture content of oat bran is found to be 11.5%. Oat bran ash is high in magnesium, potassium, and phosphorus. The energy value is found to be 255 Kcal [8].

Physical properties of cookies prepared by incorporation of different levels of oat bran

The physical characteristics of cookies prepared replacing wheat flour with 0-30% oat bran are presented in Table 3.

The amount of water used for making dough was increased with increasing level of oat bran in the formulation. The thickness of oat cookies (T_1 , T_2 , and T_3) was greater than that of the control cookies (T_0). The diameter of the cookies was decreased gradually with the increasing proportion of oat bran. The spread ratio of the cookies was decreased significantly with increasing level of oat bran in cookies.

Chemical composition of cookies prepared by incorporation of different levels of oat bran

Proximate composition of cookies prepared by incorporation of different levels of oat bran is presented in Table 4.

The moisture content of oat cookies (T_1 , T_2 , and T_3) was higher than that of control cookies (T_0). This is due to the addition of different levels of oat bran, i.e., 10%, 20%, and 30% in sample T_1 , T_2 , and T_3 respectively.

The fat content of oat cookies is decreased with increasing oat bran and decreasing wheat flour due to low-fat content of oat bran. The

Table 1: Oat cookies were prepared under different levels of oat bran

Ingredients	Control (T_0)	T_1	T_2	T_3
Wheat flour (g)	100	90	80	70
Shortening (g)	70	70	70	70
Sugar (g)	65	65	65	65
Baking powder (g)	1.5	1.5	1.5	1.5
Honey (g)	0.5	0.5	0.5	0.5
Skim milk powder (g)	5	5	5	5
Oat bran (g)	-	10	20	30

Table 2: Physicochemical composition of oat bran

Parameters	Composition
Water (g)	11.5
Energy (kcal)	255
Protein (g)	10.7
Total lipid (g)	1.2
Carbohydrates (g)	53.3
Fiber (g)	3.6
Ash (g)	1.9

Table 3: Physical properties of oat cookies

Sample	Diameter (mm)	Thickness (mm)	Spread ratio
Standard T_0	62	6	10.33
Sample T_1	61	6.5	9.38
Sample T_2	60	7	8.57
Sample T_3	59.5	7.3	8.15

Table 4: Chemical composition of oat cookies

Sample	Composition (%)			
	Moisture	Ash	Fat	Fiber content
Standard T_0	2.2	0.70	28	0.10
Sample T_1	2.4	1.05	27.9	1.55
Sample T_2	2.5	2.17	27.4	3.23
Sample T_3	2.7	2.56	27.1	5.24

Table 5: Sensory evaluation of oat cookies

Sample	Color	Flavor	Texture	Taste	Overall acceptability	Total score
Standard T ₀	7.5	8	6.5	7.5	8	37.5
Sample T ₁	6	7.5	6	7	6	32.5
Sample T ₂	8	7.5	7	8	7.5	38
Sample T ₃	6.5	7	6	6	6	31.5

ash content of oat cookies was more than the control cookies, and this was attributed to higher ash content of oat bran. The fiber content of control sample T₀, sample T₁, sample T₂, and sample T₃ was 0.10, 1.55, 3.23, 5.24 respectively. Hence, the sample T₂ and sample T₃ having the maximum amount of fiber which provides the more fiber content as compared to standard. As a result, it increases the dietary fiber content in daily requirement [9,10].

Sensory evaluation of oat cookies

Sensory evaluation of oat cookies, presented in Table 5, shows the total score obtained for the control sample T₀, sample T₁, sample T₂, and sample T₃. Among the oat cookies, the sample T₂ recorded the highest score in which 20% oat bran was added.

The overall acceptability and the texture of oat cookies were significantly affected by increased level of oat bran. With the increasing level of oat bran, the sensory score for texture and flour of cookies decreased sharply due to increasing level of fiber which is responsible for giving chewing taste to the product. However, there was no marked reduction in the scores for appearance and color of cookies. The control sample T₀ had the maximum overall acceptability followed by sample T₁, T₂, and T₃.

Sample T₂ containing 20% oat bran found to have overall acceptability close to control sample (T₀), whereas cookies containing 30% oat bran was almost unacceptable to the panelist [11,12].

CONCLUSION

From this study, it can be concluded that oat bran can be incorporated in wheat flour of cookies up to 20% level is highly acceptable by the consumers. Since these cereals based baked products are part of our daily diet and are an excellent vehicle for an addition of ingredients like oat bran as fiber source. These types of ingredients can be easily adopted by bakeries and housewives. To prepare such value-added health food required by particular segment of the population who are prone to fiber related problems and consider food as medicine.

REFERENCES

1. Singh M. Preparation of high fiber muffins with oat bran. *J Food Packag* 2007;2:22-4.
2. Hall JM. Dietary fiber methodology. *Cereal Food World* 1989;34(7):526-8.
3. Davidson I. *Biscuit Baking Technology: Processing and Engineering Manual*. 2nd ed. Academic Press: Elsevier; 2016. p. 1-34.
4. Kissley LT. Effects of flour lipids on cookies quality. *Cereal Chem* 1971;18:655-62.
5. Doesher LC. Effect of sugar and flour cookies spread evaluated by time laps photography. *Cereal Chem* 1987;64(3):163-7.
6. AOAC. *Official Method of Analysis*. 12th ed. Washington, DC: Association of Official Analytical Chemist; 2000.
7. AOAC. *Officials of Analysis*. 15th ed. Washington, DC: Association of Official Analytical Chemist; 1995.
8. Biel W, Bobko K, Maciorowski R. Chemical composition and nutritive value of husked and naked oats grain. *J Cereal Sci* 2009;49(3):413-8.
9. Chavan RS. *Biscuits, Cookies, and Crackers: Chemistry and Manufacture*. Kundli, India: Encyclopedia of Food and Health; 2016. p. 437-44.
10. Sharma P, Velu V, Indrani D, Singh RP. Effect of dried guduchi (*Tinospora cordifolia*) leaf powder on rheological, organoleptic and nutritional characteristics of cookies. *Food Res Int* 2013;50(2):704-9.
11. Duta ED, Culetu A. Evaluation of rheological, physicochemical, thermal, mechanical and sensory properties of oat-based gluten free cookies. *J Food Eng* 2015;162:1-8.
12. Sidhu JS. Effect of adding wheat bran and germ fractions on the chemical composition of high-fiber toast bread. *Food Chem* 1999;67(4):365-71.