Effect of Using Cardamom Powder and Sesame Seeds Powder on Pan Bread

Reham R. Abdel Samea
Home Economics Department, Faculty of Specific Education
Kafr-Elsheikh University, Egypt.

Abstract

In the present study, the effect of using cardamom and sesame powder at levels 5 and 10 % on chemical composition, caloric value, sensory and physical properties of pan bread were evaluated. The results indicated that pan bread with 5 and 10% cardamom powder recorded the highest value of moisture (10.26±0.15 and 10.40±0.10 g/100g.).Sesame seeds powder 5and 10% reduced moisture content in pan bread (5.08±0.10 and 6.50±0.10 g/100g.), respectively. Sesame seeds powder (5 and 10 %) raised protein content of pan bread (13.48±0.01 and 14.47±0.01 g/100g.), respectively. Sesame seeds powder 5 and 10% raised fat content (5.57±0.01 and 5.77±0.06 g/100g.), respectively.Cardamom powder and sesame seeds powder 5 and 10% increased ash content (0.73±0.01, 0.97±0.02, 0.57±0.01 and 0.72±0.01 g/100g.), respectively. Using cardamom powder and sesame seeds powder in preparing pan bread raised fiber content (1.95±0.01, 2.11±0.01, 0.93±0.01 and 1.03±0.01 g/100g.),carbohydrates content decreased in pan bread prepared with cardamom powder and sesame seeds powder 5 and 10% (73.29±0.10, 72.23±0.23, 74.37±0.10 and 71.51±0.11 g/100g.).Pan bread prepared with cardamom powder 5 and 10% recorded lower values of calories (366.59±0.11 and 366.08±0.15 k.cal/100g) than pan bread prepared with sesame seeds powder 5% and 10% (401.37±0.11 and 395.85 ±0.15 k.cal/100g.). All pan bread samples were accepted .All physical properties of pan bread improved by using cardamom and sesame seeds powder.

Key words: Pan bread, cardamom, sesame, chemical composition, sensory and physical evaluation.

Introduction

Recently, consumer's awareness of the need to eat high quality and healthy foods-known as functional foods which contain ingredients that provide additional health benefits beyond the basic nutritional requirements is increasing **(Ndife and Abbo, 2009)**. Therefore, the trend is to produce specially breads made from whole grain flour and other functional ingredients known as health breads or functional foods **(Dewettinck *et al.*, 2008)** . Bread is a staple food that closely related to people's daily life. It consists of flour, leavening agents and water. It is popular around the world and one of the oldest foods. Bread is usually known as important source of carbohydrates in the food pyramid to ensure that a person can get enough nutrition that needed by the body **(Sivam *et al.*, 2010)**. **). Bayomy, (2006)**, reported that bread is the most basic food consumed in different regions of the world . Population increasing in the universe and particularly in the Egypt, leads to a progressive production of wheat in a higher percentage of the day to day and try to get another source of flour. The bread and its flavor vary from different ingredients and bread styles around the world. To change food habits and reduce pressure on wheat, it was necessary to use commodities other than wheat to produce suitable food products. Bread and baked products are the most important sources of dietary fiber in the total food consumption .White bread has more popular because of its organoleptic properties **(Ingram and Shapter, 2006)**.There are increasing demands toward consumption of high fiber breads due to their promoting properties **(Stanley and Lina, 2006)**.Cardamom belongs to the Zingiberaceae family containing various phytochemical compounds such as phenols, starch, tannins, terpenoids, flavonoids, proteins and sterols, which are also known as perennial herbs **(Moulai *et al.*, 2020).**Cardamom is sometimes called cardamom or cardamum is a spice prepared from the seeds of several plants in the genera *Elettaria* and *Amomum* in the family Zingiberaceae. Both genera are innate to the Indian subcontinent and Indonesia. They are acknowledged by their small pits shells: triangular in cross-section and spindle-shaped, with a thin, frail outer crust and small, black seeds; *Elettaria* pods are light green and smaller, while *Amomum* shucksare larger and dark brown **(Negi *et al.*, 2019)**.Cardamom is known as 'Queen of Spices'. The aroma and

flavor of cardamom are obtained from the essential oils. Cardamom contains terpinene, sabinene, limonene, 1,8-cineole, fatty acids, sugar, starch, proteins etc. The whole, decorticated seeds, and fully grounded into powder forms of cardamom are used as flavoring agent in dairy and food industry. Cardamom is used in preparation of sweets, milk and milk products (like khoa, gulabjamun, sandesh, basundi, etc.), bakery products, cakes, bread, flavored pickles, rice and meat preparations, alcoholic and nonalcoholic beverages, frozen desserts, candies, puddings, condiments, relishes, gravies **(Kishorbhai *et al.*,2018)**.

Ratiba *et al*.,(2006) studied effect of cardamom, thyme and clove powder on the composition and quality of white soft cheese made from goat's milk .Cardamom, thyme and clove improved the flavor and quality of white soft cheese made from goats' milk. From the studied found that cardamom and clove was used as a natural preservative in goat's cheese with improved flavor when stored at 6±1ºC for 45 days **. Bhatt and Verma, (2016)** studied on development of herbal food product- bael (aegle marmelos) fruit toffee with objective to prepare toffee by incorporation of various herbs like cardamom and cinnamon. The 0.5% of cardamom and 1.0% of cinnamon were achieved highest score of sensory evaluation. A good ragi malt beverage was prepared using sugar powder with encapsulated cardamom mixed with malted ragi (finger millet) flour. This can be used in culinary sweets, flavoring of milk and milk products.

Sesame (*Sesamum indicum* L.) is foremost grown for its edible seeds and oil. It is used about 65% with regard to oil extraction and 35% with regard to food. Sesame seeds have many health benefits are due to its nutritional content, including fibers, vitamins, minerals, natural oils and organic compounds **(Singh *et al.*, 2016)**. Range of chemical composition of sesame was within limits 50–60% oil, 18–25% protein, 13.5% carbohydrate and 5% ash **(Elleuch *et al.*, 2007)**. Sesame seeds are much appreciated in bakery, candy industry and other food specialties as snacks, cookies and fermented food like soybean and peanut, sesame seed can be processed to make sesame milk (**Fitrotin *et al.*, 2015**). African countries use the seeds as spice, seed oil, frying vegetables and meat, eaten raw or fried and used in confections such as candy and baking **(Anilakumar *et al.*, 2010)**. The nutrient, particularly crude protein

and fiber contents of sesame seed were very high to warrant their consideration for use to complement cereal-based products to meet the recommended daily nutrient intake of human **(National Research Council, 1989)**.Sesame (*Sesamum indicum* L.) seeds is a very old crop. It's consumes raw or toasted and used in many foods such as candy and pastry products to improves taste of the products. Sesame seeds a rich source of protein, also it contain a high amount of calcium. Sesame seeds also considered to be a useful food to health **(Randhawa, 2008 and Pal, 2010)**.

The proximate chemical composition of sesame seeds (*Sesame indicum*) indicates that it has significant amounts of proteins that can be used to produce composite flour with improved protein content for bread production (**Quasem *et al,* 2009 and Pathak *et al,* 2014).**Thus, the present study was designed to evaluate effects of cardamom and sesame seeds powders added as different ratios 5 and 10 % to pan bread formula as partial substitution of wheat flour on chemical composition , caloric value, sensory characteristics and physical properties of pan bread.

Materials and methods

Materials

Wheat flour (72% extraction) was obtained from Al Doha Company , 10th Ramadan, Egypt, the other ingredients such yeast and salt was obtained from local markets. Cardamom and sesame seeds were collected from Sakha Agricultural Research Station, Kafrelsheikh city, Egypt.

Methods

Preparation of Cardamom Powder and Sesame Seeds powder

Cardamom and sesame seeds were washed with clean tap water, drained and sun dried in a single layer on stainless steel trays, placed on elevated platforms for 6 hours. The cardamom and sesame seeds were toasted using a microwave oven (SAMSUNG MT1088SB, Tianjin, China) at 2600C for 3 minutes. The seeds were then dry milled into powder using a hammer mill. The dry cardamom and sesame seeds were finally sieved through a 0.5 mm mesh screen and packed into clean plastic containers until needed for further use.

Preparation of pan bread

Pan bread was prepared according to **Lazaridou *et al.*, (2007)** as follows: yeast (2%) was dissolved in 174 ml warm water (35°C) and then added to the dry ingredients (2% NaCl, 2% sugar and 300 g wheat flour 72 % extraction). The shortening (2%) was then added and the mixture was kneaded for 4 min in (kenwood kneader) at a low speed then for 2 min at high speed. The dough was fermented for 30 min at 30°C and 80-85% relative humidity in a fermentation cabinet. The dough was divided into 150g pieces, placed in the pan and proofed under the same conditions for 45min. Bread dough were baked at 240 °C for 20–25 min following steaming for 10s. Baked pan bread as cooled down at room temperature for 60 min.

Proximate chemical composition

Cardamom ,sesame powder and prepared pan bread were analyzed for chemical composition. Moisture, crude protein, fat, ash and crude fiber content were determined according to **A.O.A.C. (1995)**. Carbohydrate contents were estimated by difference. 100% - (%Moisture + % Crude Protein + % Fat + % Ash + % Crude Fiber). All analyses were carried out in triplicate.

Caloric values

Caloric values of cardamom, sesame powder and pan bread were calculated according to **A.O.A.C. (2010)** using the following equation:

Caloric value (K.cal/100 g) = (protein x4)+ (carbohydrate content x4) + (fat content x 9).

Sensory evaluation

Loaves were cooled for 2 h after baking at room temperature (25±3 º C) in a sealed plastic bag. The loaves were then sliced separately into smaller slices with the aid of a bread knife. Samples were evaluated for the attributes of appearance, taste, flavor, interal color, external color,chewiness, volume, texture and acceptance on a 10-point hedonic scale (from like extremely = 10 to dislike extremely = 1) according to **Watts *et al.*, (1989).** Sensory evaluation of pan bread was carried out with 20 panelists comprising of food stuff and postgraduate students from Faculty of Specific Education, Kafrelsheikh University. Testing was done in the Nutrition and Food ScienceLaboratory. The panelists were sitted

in such a way that they could not see the rating of each other.Samples were randomly coded and served in plain coloured plastic plates and each assessor was provided with a cup of drinking water to rinse his/her mouth after testing each sample to avoid residual effect. The assessors were asked to taste and score the bread loaves based on their preference and acceptance of each of them.

Physical properties

Physical properties of prepared pan bread were evaluated by Measuring loaf weight before and after baking, baking loss, diameter, height, volume and specific volume, 30 min. after removal from the oven. Loaf weight (g) before , after baking and baking loss (g) were measured by using sensitive balance (WJ, china). Diameter and height (cm) were measured using a measuring ruler . The volume (cm^3) of prepared pan bread was determined by rapeseed displacement method (**A.A.C.C.2000)**,The specific volume of the loaf was calculated according to **(A.A.C.C.2000)** using the following equation: Specific volume (cm^3 /g) =loaf weight/ loaf volume. All objective measurements were done on triplicates and the main value was calculated.

Statistical analysis:

Study data are presented as) mean ± SE). The statistical analysis was done using SPSS program, (verion 28.0 SPSS Inc., Chieago, USA). Dunk test multiple range post-hoc test was used. The results were analyzed using one-way analysis variance (ANOVA). The data considered significant differences in $P \leq 0.05$ **(Snedecor and Cochran, 1980)**.

Results and Discussion

Chemical composition of cardamom and sesame powder

Chemical composition of cardamom and sesame powder showed in Table (1). Results indicated that sesame seeds powder recorded higher value of crude protein and crude fat (17.84±0.10 and 56.60±0.11 g/100g), (9.10±0.10 and 9.70±0.02 g/100g), respectively than cardamom powder. Cardamom powder recorded higher value of moisture, ash , crude fiber and carbohydrates (8.55±0.01, 6.70±0.11, 23.88±0.05 and 42.07±0.10 g/100g) respectively than sesame seeds powder. Sesame seeds powder contained total energy than cardamom powder (627.16±0.10 and

293.18±0.01 K.cal./ 100 g), respectively, it may be due to protein and fat content in sesame seeds powder. Significant differences at p < 0.05were observed between samples for moisture , protein , fat , ash ,fiber , carbohydrates and energy value. These results were in agreement with (**Hassan *et al*., 2019)** who found that sesame seeds contain (5.20,24.10,58, 3.96,6.48 and 7.46 g/100g), respectively for moisture , protein , fat , ash ,fiber and carbohydrates. **Zainab *et al*.,(2023)** studied the proximate analysis of sesame seed flour, They found that chemical composition of sesame flour contained moisture (4.15%), crude protein (20.61%), crude fat (40%), ash (3.89%) and crude fiber (3.76%). **Abbas *et al*.,(2022)** studied the proximate analysis of sesame seeds, research found that sesame flour contained moisture, fat, protein, ash and fiber as 4.50%, 40.21%, 22.13%, 4.20% and 3.46%, respectively. These results agreed with those obtained by (**Namiki , 2007)** who reported that sesame seed contained 22.3% protein. Also, sesame paste characterized with its higher fat content(58%)

Table (1) : Chemical composition of cardamom and sesame seeds powder as (g/100g).

Samples / Chemical composition	Cardamom powder	Sesame seeds powder
Moisture	8.55±0.01 a	4.55±0.11 b
Crude protein	9.10±0.10 b	17.84±0.10 a
Crude fat	9.70±0.02 b	56.60±0.11 a
Ash	6.70±0.11 a	2.62±0.15 b
Crude fiber	23.88±0.05 a	6.79±0.01 b
Carbohydrates	42.07±0.10 a	11.60±0.01 b
Energy (K.cal./ 100g.)	293.18±0.01b	627.16±0.10 a

**: $p < 0.05$. Means followed by a common letter within the same row are not significantly different using Duncan's Multiple Range test.

Chemical composition of prepared pan bread

Chemical composition of pan bread prepared using 5 and 10% cardamom and sesame seeds powder. Pan bread prepared with 5 and 10% cardamom powder recorded the highest value of moisture

(10.26±0.15 and 10.40±0.10 g/100g.), respectively, there were non significant differences at $p < 0.05$ were found between them . Sesame seeds powder 5and 10% reduced moisture content in pan bread (5.08±0.10 and 6.50±0.10 g/100g.), respectively. Significant differences were found between control and the other samples. The low moisture content of pan bread prepared with sesame seeds powder may be attributed to the high fat content of the sesame seeds powder (56.60±0.11 g/100g) which may have influenced negatively water retention of the bread samples . Sesame seeds powder (5 and 10 %) raised protein content of pan bread (13.48±0.005 and 14.47±0.01 g/100g.), respectively, compared with cardamom powder (5 and 10 %) which reduce protein content of pan bread (10.10±0.10 and 10.29±0.01 g/100g.), respectively compared with control (11.45±0.01 g/100g.). The high protein content of pan bread prepared with sesame seeds powder may be attributes to high protein content **(**17.84±0.10 g/100g.) of sesame seeds powder. Significant differences at $p < 0.05$ were found between pan bread prepared with sesame seeds powder and cardamom powder, it may be due to difference between protein content in tested powders (Table 1). These results were in agreement with (**Pathak *et al*., 2014**) who found that sesame seeds had significant amounts of proteins that can be used to produce composite flour with improved protein content for bread production . Sesame seeds powder 5 and 10% raised fat content of pan bread (5.57±0.01 and 5.77±0.06 g/100g.), respectively, compared with pan bread prepared with cardamom powder 5 and 10% and control (3.67±0.01, 4.00±0.01 and 2.07±0.01 g/100g.), respectively**.** The high fat content of pan bread prepared with sesame seeds powder may be attributes to high fat content of sesame seeds powder **(**56.60±0.11 g/100g.). Non significant differences at $p < 0.05$ were found between pan bread prepared with 5 and 10 % sesame seeds powder 5 and 10 % . Significant differences were found between pan bread prepared with cardamom powder 5 and 10 % . Significant differences at $p < 0.05$ were found between pan bread prepared with powders and control . Results were in agreement with **Hassan *et al* .,(2019)** who found that the protein content of the sesame paste crackers was significantly higher than control sample , the same trend was also noticed in fat content of tested crackers.

Cardamom powder and sesame seeds powder 5 and 10% increased ash content significantly in pan bread compared with control (0.73±0.01 ,0.97±0.02 , 0.57±0.01 and 0.72±0.01 g/100g.), respectively, compared with control (0.42±0.01 g/100g.). Using cardamom powder and sesame seeds powder in preparing pan bread raised fiber content significantly compared with control . It recorded (1.95±0.01, 2.11±0.01, 0.93±0.01 and 1.03±0.01 g/100g.), respectively in pan bread prepared with cardamom powder 5 ,10 % , pan bread prepared with sesame seeds powder 5 and 10 % and (0.77±0.01 g/100g.) for control . The high fibers content of pan bread prepared with cardamom and sesame seeds powder may be attributes to high fibers content in powders **(**23.88±0.05 and 6.79±0.01 g/100g.), respectively. Results were in agreement with **Hassan *et al* .,(2019)** who found that fiber content showed a significant difference between crackers formulas, where fiber content increased with increasing sesame paste substitution levels. Bread and baked products are the most important sources of dietary fiber in the total food consumption. High fiber bread is one of the known products categorized in functional food which is health beneficial **(Galisteo *etal*., 2008)**.Carbohydrates content decreased in pan bread prepared with cardamom powder and sesame seeds powder compared with control (73.45±0.10, 72.47±0.23, 76.22±0.10 and 73.22±0.11 g/100g.), respectively in pan bread prepared with cardamom powder 5 ,10 % , pan bread prepared with sesame seeds powder 5 and 10 % and (78.23±0.07 g/100g.) for control.Significant differences at $p < 0.05$ were found between samples. These results were in the same line of (**Sayed, 2014**) who found that control pan bread contained (13.10 ±0.07,4.94 ±0.14,0.95 ±0.08,0.59±0.03 and 80.42 ±0.14 g/100g.), respectively for protein , fat , ash, fiber and carbohydrates and **Iombor *et al*.,(2016)** who found that wheat sesame composite bread 10% contained (7.64 ±0.00, 13.57 ±0.00 and 1.38 ±0.00 g/100g.), respectively for moisture , protein and fiber. **(Hassan *et al*., 2019)**found that protein content of the sesame paste crackers was significantly higher than control sample, crackers containing sesame paste had a higher total fiber content compared to control cracker. Fortification of sesame seeds to functional foods can help increase the antioxidant potential of food products and provide additional health benefits. Sesame seeds are easy to incorporate into a wide

range of food products, including bread, bars, cookies, pasta, cereals, and snacks. They can be utilized to enhance the nutritional efficiency and antioxidant potential of any functional food, including whole seeds, flour, and oil, making them a versatile and convenient option for fortification to eradicate malnutrition **(Małecki *et al*.,2020).**

Table (2): Chemical composition of pan bread as (g/100 g)

Chemical composition	control	Pan bread prepared with cardamom powder 5%	Pan bread prepared with cardamom powder 10%	Pan bread prepared with sesame seeds powder 5%	Pan bread prepared with sesame seeds powder 10%
Moisture	7.06±0.05 b	10.26±0.15 a	10.40±0.10 a	5.08±0.10 d	6.50±0.10 c
Crude protein	11.45±0.01 c	10.10±0.10 e	10.29±0.01 d	13.48±0.01 b	14.47±0.01 a
Crude fat	2.07±0.01 d	3.67±0.01 c	4.00±0.01 b	5.57±0.01 a	5.77±0.06 a
Ash	0.42±0.01 d	0.73±0.01 b	0.97±0.02 a	0.57±0.01 c	0.72±0.01 b
Crude fiber	0.77±0.01 e	1.95±0.01 b	2.11±0.01 a	0.93±0.01 d	1.03±0.01 c
Carbohydrates	78.23±0.07 a	73.29±0.10 c	72.23±0.23 d	74.37±0.10 b	71.51±0.11 e

**: $p < 0.05$. Means followed by a common letter within the same row are not significantly different using Duncan's Multiple Range test.

Caloric values of prepared pan bread

Data in Table (3) presented the caloric values of prepared pan bread. Pan bread prepared with 5% and 10% sesame seeds powder recorded the highest values of calories (401.37±0.11and 395.85±0.15 k.cal/100g.), respectively . Pan bread prepared with cardamom powder 5 and 10% recorded lower values than pan bread prepared with sesame seeds powder 5% and 10% (366.59±0.11 and 366.08±0.15 k.cal/100g.), respectively, it may be due to low calories value of protein , fat and carbohydrates for cardamom powder. Significant differences at $p < 0.05$ were found

between samples for protein , fat and carbohydrates calories. Non significant differences at $p < 0.05$ were found between pan bread prepared with 5 and 10 % cardamom powder for total caloric values, while significant differences were observed between pan bread prepared with 5 and 10 % sesame seeds powder and control. The improvement of the nutritional quality of food products to meet consumers` needs was focus of various studies worldwide **(Pierarski,2009). Makinde and Akinoso, (2014)** found that the increased supplementation of wheat flour with sesame flour significantly affected the chemical quality of composite bread. The values for moisture, protein, fat, fiber and ash increased with increasing levels of sesame supplementation .

Table (3): Caloric values of pan bread (k.cal./100g)

Samples	Sources of calories			Total caloric values
	Protein	Fat	Carbohydrates	
Caloric values				
control	45.80±0.11 c	18.63±0.11 e	312.92±0.10 c	377.35±0.01 c
Pan bread prepared with 5% cardamom powder	40.40±0.01 e	33.03±0.15 d	293.16±0.20 b	366.59±0.11 d
Pan bread prepared with 10%cardamom powder	41.16±0.12 d	36.00±0.01 c	288.92±0.11 d	366.08±0.15 d
Pan bread prepared with 5%sesame seeds powder	53.92±0.10 b	50.13±0.11 b	297.32±0.01 a	401.37±0.11 a
Pan bread prepared with 10%sesame seeds powder	57.88±0.10 a	51.93±0.02 a	286.04±0.15 e	395.85±0.15 b

**: $p < 0.05$. Means followed by a common letter within the same row are not significantly different using Duncan's Multiple Range.

Sensory evaluation of prepared pan bread

Sensory evaluation continues to play a significant part in evaluate the quality of food because it measures what consumers really perceive and among the fundamental characteristics related with quality are surfaces flavor, color, taste and texture **(Bryhni *et al*.,2002).**

Table (4) showed sensory evaluation of pan bread. For appearance , control and pan bread prepared with sesame seeds powder 10% recorded the highest values (9.20±1.45 and 9.10±1.28), respectively. Appearance value decreased with increasing cardamom powder level, but it increased with increasing sesame seeds powder level. There were non significant differences at $p < 0.05$ were found between samples for appearance values. **Gernah and and Anyam, (2014)** said that taste is a sensation perceived by the tongue and is influenced by texture, flavor and the composition of the food . Cardamom and sesame seeds powder 10% had a good effect on taste value (8.60±0.84 and 8.40±0.84), respectively. Control recorded the highest value (9.20±0.91). For flavor , control and pan bread prepared with cardamom powder recorded the highest values (8.90±0.87, 9.00±1.49 and 9.10±1.28), respectively , while pan bread prepared with sesame seeds powder 5and 10% recorded the lowest value (8.30±1.82 and 8.80±0.78), respectively. Non significant differences at $p < 0.05$ were found between samples. Color serves as an important consumer appeal factor for the initial acceptability of the baked product. Internal color recorded the highest value for control and pan bread prepared with 5% and 10 % cardamom powder (9.12±1.28, 9.00±1.52 and 8.80±1.03), respectively. **Makinde and Akinoso (2014)** mentioned that, crust color is a very substantial parameter in bread making that reflect the appropriateness of raw material used for the production and provides information about the quality of the bakery product. External color value recorded the highest value for control and pan bread prepared with 5% and 10 % (9.40±0.96, 8.80±0.63 and 9.00±1.56), respectively, while it decreased for pan bread prepared with sesame seeds powder (8.20±1.22 and 8.70±0.82), respectively. Non significant differences at $p < 0.05$ were found between samples. Color changes might be due to caramelization, dextrinization of starch or Millard reactions involving the interaction of reducing sugars with proteins **(Omran and Hussien,**

2015). For chewiness values , pan bread prepared with cardamom and sesame seeds powder 5 and 10 % were nearby control , it recorded (8.20 ± 0.11, 7.90 ± 0.21, 8.00 ± 0.10 and 8.10 ± 0.63), respectively compared with control (8.70 ± 0.20). There were non significant differences at $p < 0.05$ were found between pan bread prepared with 5% cardamom powder and control. Using cardamom and sesame seeds powders 5 and 10 % effect significantly at $p < 0.05$ on chewiness values compared with control .For volume, non significant differences at $p < 0.05$ were found between samples, control and pan bread prepared with sesame seeds powder 5 and 10 % recorded the highest values (9.10±0.87, 8.60±1.42 and 9.00±0.94), respectively**,** while, cardamom powder decreased pan bread volume values (8.40±1.42 and 8.30±1.05), respectively. Texture is extremely important to the consumer. Texture is used by the consumer as an indicator of food quality **(Mian *et al.*, 2009).** For texture, control recorded the highest value followed by pan bread prepared with 5% cardamom powder and pan bread prepared with 10 % sesame seeds powder (9.00±1.24, 8.70±1.33 and 8.60±1.34), respectively. Significant differences between 5% sesame seeds powder and control . For acceptance , all pan bread samples were accepted . These results were in the same line of **(Gernah and and Anyam, 2014).** Non significant differences at $p < 0.05$ were found between samples. The obtained results are similar to those reported by **Hashempour *et al*., (2018)** they found sensory evaluation of puffed corn snack with 5% and 10% sesame powder had the highest score from flavor and aroma point. However the greatest percentage of sesame gives a definite odor to commercial cookies, especially the cookies with 20% sesame as well as for bread supplemented with up to 10% sesame (**Hernández *et al*., 2014 and Mohamed, 2018**). **Prakash *et al*.,(2018)** have utilized sesame seeds as a major source of protein to overcome malnutrition and the products were highly acceptable**.** In general, the baking properties of composite flour are often impaired as well as the organoleptic attributes of the products, because of the dilution of the gluten content **(Jideani and Onwubali, 2009).**

Table (4): Sensory evaluation of pan bread

Sensory evaluation	control	Pan bread prepared with 5% cardamom powder	Pan bread prepared with 10% cardamom powder	Pan bread prepared with 5% sesame seeds powder	Pan bread prepared with 10% sesame seeds powder
Appearance	9.20±1.45 a	8.80±1.31 a	8.50±1.58 a	8.40±1.95 a	9.10±1.28 a
Taste	9.20±0.91 a	8.20±1.31 b	8.60±0.84 a	8.30±1.76 b	8.40±0.84 b
Flavor	8.90±0.87 a	9.00±1.49 a	9.10±1.28 a	8.30±1.82 a	8.80±0.78 a
Internal color	9.12±1.28 a	9.00±1.52 a	8.80±1.03 a	7.90±1.72 a	8.30±1.15 a
External color	9.40±0.96 a	8.80±0.63 ab	9.00±1.56 ab	8.20±1.22 b	8.70±0.82 ab
Chewiness	8.70 ± 0.20 a	8.20 ± 0.11 ab	7.90 ± 0.21 b	8.00 ± 0.10 b	8.10 ± 0.63 b
Volume	9.10±0.87 a	8.40±1.42 a	8.30±1.05 a	8.60±1.42 a	9.00±0.94 a
Texture	9.00±1.24 a	8.70±1.33 a	7.80±1.39 ab	7.10±1.52 b	8.60±1.34 a
Acceptance	9.20±0.91 a	8.50±1.35 a	8.80±1.22 a	8.20±1.81 a	8.80±1.03 a

**: $p < 0.05$. Means followed by a common letter within the same row are not significantly different using Duncan's Multiple Range test.

Physical properties of prepared pan bread

Table (5) showed physical properties of prepared pan bread included (loaf weight before and after baking , baking loss(g), diameter (cm), height (cm), volume (cm^3) and specific volume(cm^3).

Results indicated that loaf weight before baking recorded the highest values in pan bread prepared with cardamom and sesame seeds powder 5 and 10 % (100.11±1.00, 100.13±0.57 , 100.16±0.57 and 100.23±0.57g), respectively compared with control (100.00±0.57)g. Non significant differences at $p < 0.05$ were found

between samples . Loaf weight after baking increased by using cardamom and sesame seeds powder 5 and 10 % (91.13±1.52,91.17±1.00, 91.20±1.00 and 91.33±0.57 g) compared with control (91.00±1.00 g). Non significant differences at $p < 0.05$ were found between samples .Increased loaf weight could be related with the high water capacity of the substituted flours. This increase in weight may be desired by consumers as there is the tendency to buy products that will give better fill **(Chinelo and Nnenna, 2016)**. Baking loss decreased with using cardamom and sesame seeds powder 5 and 10 % (08.98±0.57, 08.96±0.57, 08.96±0.57 and 08.90±1.00 g), respectively compared with control (09.00±0.57 g) .Non significant differences at $p < 0.05$ were found between samples. Diameter increased with using cardamom and seeds powder 5 and 10% (33.50±0.50, 34.00±0.25 , 34.80±0.20 and 35.83±0.15 cm), respectively compared with control (32.86±0.11 cm). Significant differences at $p < 0.05$ were found between pan bread prepared with cardamom powder 5 and 10%. Significant differences at $p < 0.05$ were found between pan bread prepared with 5 and 10 % sesame seeds powder compared with control. Height increased with use 5 and 10 % cardamom and seeds powders (1.60±0.10, 1.66±0.05, 1.70±0.10 and 1.96±0.05cm), respectively compared with control (1.53±0.05 cm). Significant differences at $p < 0.05$ were found between pan bread prepared with 5 and 10 % sesame seeds powder compared with control. Non significant differences at $p < 0.05$ were found between pan bread prepared with cardamom powder 5 and 10%. Volume increased by using cardamom and seeds powders 5 and 10% (519.00±0.11, 522.00±0.10, 522.66±0.12 and 523.27±0.15 cm^3) respectively compared with control (517.00±0.10 cm^3). Significant differences at $p < 0.05$ were found between pan bread prepared with 5 and 10 % cardamom powder compared with control. Non significant differences at $p < 0.05$ were found between pan bread prepared with 5 and 10 % sesame seeds powder. Specific volume increased by using cardamom and seeds powders 5 and 10% (5.69 ±0.11, 5.72±0.12, 5.73±0.15 and 5.72 ±0.11 cm^3 /g) respectively compared with control (5.68 ± 0.01 cm^3 /g). The specific volume of all the samples including control was lower than 6 cm^3/g which is the specific volume for standard bread according to China Grain Products Research and Development Institute **(Lin *et al.*, 2009).**

Non significant differences at $p < 0.05$ were found between samples. All physical properties of pan bread improved by using cardamom and sesame seeds powders. The improvement in the loaf volume, loaf weight and specific volume could be attributed to the increase in structure forming proteins in the sesame flour added which could have enhanced the ability of the dough to rise during proofing resulting in an increase the bread volume (**Bibiana *et al.*,2014**). **Lombor *et al.*,(2016)** found that substituting whole wheat flour with up to 20% sesame seed flours would significantly ($p<0.05$) improve the loaf volume, loaf weight and specific volume.

Table (5): Physical properties of prepared pan bread

Physical properties / pan bread	control	Pan bread prepared with 5% cardamom powder	Pan bread prepared with 10% cardamom powder	Pan bread prepared with 5% sesame seeds powder	Pan bread prepared with 10% sesame seeds powder
Loaf weight before baking (g)	100.00±0.57 a	100.11±1.00 a	100.13±0.57 a	100.16±0.57 a	100.23±0.57 a
Loaf weight after baking (g)	91.00±1.00 a	91.13±1.52 a	91.17±1.00 a	91.20±1.00 a	91.33±0.57 a
Baking loss (g)	09.00±0.57 ab	08.98±0.57 ab	08.96±0.57 ab	08.96±0.57 ab	08.90±1.00 ab
Diameter (cm)	32.86±0.11 d	33.50±0.50 c	34.00±0.25 b	34.80±0.20 b	35.83±0.15 a
Height (cm)	1.53±0.05 d	1.60±0.10 cd	1.66±0.05 bc	1.70±0.10 b	1.96±0.05 a
Volume (cm^3)	517.00±0.10 d	519.00±0.11 c	522.00±0.10 b	522.66±0.12 a	523.27±0.15 a
Specific volume(cm^3/g)	٥,٦٨ ±0.01 a	0.11 a 5.69±	5.72 ±0.12a	0.15 5.73±a	5.72 ±0.11 a

**: $p < 0.05$. Means followed by a common letter within the same row are not significantly different using Duncan's Multiple Range test.

Conclusion

From the obviously results, it can be recommended that cardamom and sesame seeds powders could be successfully added as a function, natural nutrient source, with remarkable health benefits and increasing consumer acceptance. This study also revealed that cardamom and sesame seeds powders (5 and 10%) enhances fat , ash and fibers in pan bread . Based on the current study, it is recommended that breads production from cardamom and sesame seeds powders and wheat composite flours should be given emphasis and processors should be encouraged to utilize the potential nutrient source of cardamom and sesame seeds powders. Since such breads are a good source of dietary fiber, which may also be of benefit in the prevention of cardiovascular diseases and cancers. Bakery industries should be encouraged to incorporate cardamom and sesame in bakery products for consumers to get its health benefit.

References

A.A.C.C.(2000). An approved Methods of American Association of Cereal Chemists, Published by American Association of Cereal Chemists. St.,Paul. Minnesota**.**

Abbas, S.; Sharif, M. K.; Sibt,E. M.; Fikre, T. T.; Sultan, M. T.; Anwar, M. J.; Sadiq, B. (2022). Nutritional and Therapeutic Potential of Sesame Seeds. Journal of Food Quality, vol. 2022.

Anilakumar, K.R.; Pal, A.; Khanum, F. and Bawa, A.S.(2010). Nutritional, Medicinal and Industrial Uses of Sesame (*Sesamum indicum* L.) Seeds. Agriculturae Conspectus Scientificus, 75 (4) : 159-168.

A.O.A.C.(1995).“Official Methods of Analysis”Association Official Analytical Chemists of the 16 edition. International, Washington, D.C.

A.O.A.C. (2010). Official Methods of Analysis. Association of Official Analytical Chemists. 18th edn. Washington D.C. USA; p. 172-188.

Bayomy, H.M.(2006). Chemical composition and Nutritional Studies on Bread in Behera Governorate.M.SC.Thesis, Faculty of Agriculture,Alexandria University,Damanhour,Egypt.

Bhatt, D.K. and Verma, S.A.(2016). Study on Development of Herbal Food Product-Bael (Aegle Marmelos) Fruit Toffee**.** IOSR

Journal of Environmental Science, Toxicology and Food Technology ; 10(3): 05–14.

Bibiana, I.; Grace, N.; Julius, A.(2014). Quality Evaluation of Composite Bread Produced from Wheat, Maize and Orange Fleshed Sweet Potato Flours. American Journal of Food Science and Technology,2(4):109-115**.**

Bryhni, E.A.; Kjos, N.P.; Ofstad, R. and Hunt, M.(2002). Polyunsaturated Fat and Fish Oil in Diets for Growing-Finishing Pigs: Effects on Fatty Acid Composition and Meat, Fat and Sausage Quality. Meat Science,62:1-8.

Chinelo, V.; E.; Nnenna, A. O.(2016). Evaluation of Suitability of Substituting Wheat Flour with Sweet Potato and Tiger Nut Flours in Bread Making. Open Agriculture,1: 173–178.

Dewettinck, K.;Van, B.F.; Kuhne, B.; Courtens,T. and Gellynck, X. (2008). Nutritional Value of Bread :Influence of Processing Food Interaction and Consumer Perception. Review Journal of Cereal Science,48:243-257.

Elleuch, M.; Besbes, S.; Roiseux, O.; Blecker, C. and Attia, H.(2007). Quality Characteristics of Sesame Seeds and By-products. Food Chemistry, 103:641-650.

Fitrotin, U.; Utami, T.; Hastuti, P. and Santoso,U.(2015). Antioxidant properties of fermented Sesame milk using *Lactobacillus plantarum* Dad 13. International Research Journal *of* Biological Sciences,4(6):56-61.

Galisteo, M. ; Duarte, J. and Zarzuelo, A. (2008). Effects of dietary fibers on disturbances clustered in the metabolic syndrome. Journal of Nutritional Biochemistry, 19: 71-75.

Gernah, D. I. and Anyam, K.(2014). Production and Quality Assessment of Protein–Rich Crackers from Blends of Wheat and Defatted Sesame Flours. International Journal of Food Processing Technology, 1: 27-31.

Hashempour,B.F.; Torbati,M.; Azadmard,D.S. and Savage, G.P. (2018). Quality properties of puffed corn snacks incorporated with sesame seed powder. Food Science and Nutrition, 6(1):85-93.

Hassan, H.A.K.; Raouf, M.A.E.; Galal, A.I.G.; Mohamed, F.M.A. and Nady, A.M.F.(2109). Development and Evaluation of Nutritional Value of Sesame Crackers for Supplementing Primary School Children. Middle East Journal of Applied Sciences,

9(2):494-501.

Hernández, M.A.; García,P.A.D.; Calle, D.D.J.; Duarte, C.(2014). Develop of A sweet Cookie with Toasted Sesame and Ground, Tecnología Química, 34 (3) :240-250.

Ingram,C. and Shapter, S.(2006). Bread. Anness Publishing, Dewey Edition **.**

Jideani, V. and Onwubali, F. (2009). Optimisation of wheat-sprouted soybean flour bread using response surface methodology. African Journal of Biotechnolology, 8 (22): 6364-6373.

Kishorbhai , D.; Jadav, B. and Mehta, M.(2018). Cardamom: Chemistry, Medicinal Properties, Applications in Dairy and Food Industry: A . Research and Reviews: Journal of Dairy Science and Technology, 7(3): 9-19.

Lazaridou, A.; Duta, D.; Papageorgiou, M.; Belc, N. and Biliaderis, C. G. (2007). Effects of Hydrocolloids on Dough Rheology and Bread Quality Parameters in Gluten-Free Formulations. Journal of Food Engineering, 79**:**1033–1047.

Lin, L.; Liu, H.; Yu, Y.; Lin, S.D. and Mau, J. (2009). Quality and Antioxidant Property of Buck Wheat Enhanced Wheat Bread. Food Chemistry, 37: 461- 467.

Lombor, T.T.; Onah, M.I.; Girgih, A.T. (2016) Evaluation of the Nutritional Quality and Consumer Acceptability of Wheat- Sesame (Triticum aestivum-Sesame indicum) Composite Bread Blends. Journal of Nutrition Health Food Science , 4(3):1-7.

Makinde, F. M. and Akinoso, R. (2014). Physical, nutritional and sensory qualities of bread samples made with wheat and black sesame (*Sesamum indicum* Linn) flours. International Food Research Journal, 21(4): 1635-1640.

Małecki, J.; Tomasevic, I.; Djekic, I.and Sołowiej, B. G.(2020). The Effect of Protein Source on the Physicochemical, Nutritional Properties and Microstructure of High-Protein Bars Intended for Physically Active People. Foods, 9(10), 1467.

Mian, K.S.; Masood, S.B. ; Faqir ,M.A and Haq, N.(2009). Preparation of Fiber and Mineral Enriched Defatted Rice Bran Supplemented Biscuits. Pakistan Journal of Nutrition , 8 (5): 571–577.

Mohamed, A.K. (2018). Quality of Bread Fortified with Different Levels of Groundnut and Sesame Flour M.Sc. Thesis .College of

Agriculture Studies, Sudan University of Science and Technology, Sudan.

Moulai,H. F.; Mokhtaria, Y.B.; Soumla, K. and Abdelkader,H.(2020). Chemical Composition and Antimicrobial Properties of Elettaria cardamomum Extract. Pharmacogn Journal, 12(5):1058–1063.

Namiki, M., (2007). Nutraceutical Functions of Sesame: A review. Critical Reviews in Food Science and Nutrition, 47(7): 651-673.

National Research Council Recommended Dietary Allowance (1989),(11th ed.), National Academy Press, Washington DC.

Ndife,J. and Abbo,E.(2009). Functional Foods: Prospects and Challenges in Nigerian Journal of Food Science and Technology,1(5):1-6.

Negi, J.; Prashar, B. and Gupta, J. (2019) 'Sitopaladi Churna As Anti-Tussive: A Review', International Journal of Healthand Clinical Research, 2(6):1–5.

Omran, A.A and Hussien, H.A. (2015). Production and Evaluation of Gluten-Free Cookies from Broken Rice and Sweet Potato. Advances in Food Sciences, 37(4):184-191.

Pal, A. (2010). Nutritional, Medicinal and Industrial Uses of Sesame(*Sesamu indicum*L.)Seeds- An Overview. Agriculture Conspectus Scientifics,75(4): 159-168.

Pathak, N.A.; Rai, R.K. and Bhat, K.V.(2014). Value Addition in Sesame:Aperspective on Bioactive Components for Enhancing Utility and Profitability Pharmacognosy Reviews.8(13):147-155.

Pierarski, F. V. (2009). Pumpkin Leaf: Physical-Chemical Characterization, Mineral and Addition Effect in Mass Rheology and Sensorial Quality of Bread Containing Dietary Fiber. Curitiba, Brazil: Federal University of Paraná, MSc Thesis.

Prakash, K.; Naik, S. N.; Vadivel, D.; Hariprasad, P.; Gandhi, D.; Saravanadevi, S. (2018). Utilization of Defatted Sesame Cake in Enhancing the Nutritional and Functional Characteristics of Biscuits. Journal of Food Processing and Preservation , 42(9):e 13751.

Quasem, J.M.; Mazahreh, A.S. and Abu-Alruz, K. (2009). Development of vegetable based milk from decorticated sesame *(Sesamum Indicum)*. American Journal of Applied Sciences,6(5): 888-896.

Randhawa, M. (2008). Black seeds, *Nigella Sativa*, Deserves More Attention. Journal of Ayub Medical College Abbottabad, 20(2):1-2.

Ratiba, B.A.; Wedad ,A.M. and Mohamed, O.(2006). Effect of Cardamom, Thyme and Clove Powder on the Composition and Quality of White Soft Cheese Made From Goat's Milk. Assiut Journal of Agriculture Science ,37(4): 139–157.

Sayed, A.E.F.(2014).Evaluation of Pomegranate Peel Fortified Pan Bread on Body Weight Loss. International Journal of Nutritional and Food Sciences,3(5):411-420.

Singh,J.; Sindhu,S.C.; Sindhu, A.;Yadav,A.(2016). Development and Evaluation of Value Added Biscuits From Dehydrated Shiitake (*Lentinusedodes*) Mushroom.International Journal of Current Research,8(3):27155-27159.

Sivam, A.S.; Sun,W.D.; Quek, S.Y.and Perera, C.O.(2010). Properties of Bread Dough with Added Fiber Polyscaccharides and Pheolic Antioxidans:Areview Journal of Food Science,75(8):163-174.

Snedecor, G. and Cochran, W. (1980). Statistical methods.,7th Ed., Iowa State University Press, Ames, USA (90).

Stanly, P.C. and Linda, S.Y.(2006). Baked Products: Science, Technology and Practice. Blackwell Publishing Ltd.36-37.

Watts, B.M.; Ylimaki, L.E.; Jeffery, L.E. and Elias, L.G. (1989). Basic Sensory Methods for Food Evaluation. IDRC, Canada.

Zainab, I.; Muhammad, A.; Noor, A.; Aasma, A.; Farhan,S. and Aftab, A.(2023). Nutritional Profiling and Sensory Attributes of Sesame Seed-Enriched Bars. International Journal of Food Properties, 26(2): 2978-2994.

تأثير استخدام مسحوق الحبهان ومسحوق بذورالسمسم على خبز الطاسة

***ريهام رفعت عبد السميع**
قسم الاقتصاد المنزلي ، كلية التربية النوعية ،
جامعة كفر الشيخ ،مصر.

الملخص العربى :

في هذه الدراسة ، تم تقييم تأثير استخدام مسحوق الحبهان وبذور السمسم بنسبة ٥،١٠٪ على التركيب الكيميائي والقيمة السعرية والخصائص الحسية والفيزيائية لخبز الطاسة . أشارت النتائج الى أن خبز الطاسة الذى يحتوى على ٥،١٠٪ من مسحوق الحبهان سجل أعلى قيمة رطوبة (١٠,٢٦±٠,١٥ و١٠,٤٠±٠,١٠ جم/١٠٠ جرام). قلل مسحوق بذور السمسم ٥ و١٠٪ من محتوى الرطوبة في خبز الطاسة (٥,٠٨±٠,١٠، ٦,٥٠±٠,١٠ جم/١٠٠ جم)، على التوالي. أدى استخدام مسحوق بذور السمسم (٥ و ١٠٪) إلى زيادة محتوى البروتين في خبز الطاسة (١٣,٤٨ ± ٠,٠١ و ١٤,٤٧ ± ٠,٠١ جم / ١٠٠ جم) على التوالي. رفع مسحوق بذور السمسم ٥ و١٠٪ من محتوى الدهون (٥,٥٧±٠,٠١ و٥,٧٧±٠,٠٦ جم/١٠٠ جم)، على التوالي. زاد مسحوق الحبهان ومسحوق بذور السمسم ٥ و١٠٪من محتوى الرماد (٠,٧٣ ±٠,٠١، ٠,٩٧±٠,٠٢ ، ٠,٥٧ ±٠,٠١ ، ٠,٧٢ ±٠,٠١ جم/١٠٠ جم)، على التوالي . باستخدام مسحوق الحبهان ومسحوق بذور السمسم في تحضير خبز الطاسة ارتفع محتوى الألياف (١,٩٥±٠,٠١، ٢,١١±٠,٠١، ٠,٩٣±٠,٠١ و١,٠٣±٠,٠١ جم/١٠٠ جم)، انخفض محتوى الكربوهيدرات في خبز الطاسة المحضر بمسحوق الحبهان ومسحوق بذور السمسم (٧٣,٢٩ ± ٠,١٠، ٧٢,٢٣ ± ٠,٢٣، ٧٤,٣٧ ± ٠,١٠ و ٧١,٥١ ± ٠,١١ جم / ١٠٠ جم). سجل خبز الطاسة المحضر بمسحوق الحبهان ٥ و ١٠٪ قيمًا أقل من السعرات الحرارية (٣٦٦,٥٩±٠,١١ و ٣٦٦,٠٨±٠,١٥ سعر حراري/١٠٠جم) من خبز الطاسة المحضر بمسحوق بذور السمسم ٥٪ و ١٠٪(٤٠١,٣٧±٠,١١ و ٣٩٥,٨٥±٠,١٥ سعر حراري/١٠٠جم) .كانت جميع عينات خبز الطاسة مقبولة حسيا . تحسنت جميع الخواص الفيزيائية لخبز الطاسة باستخدام مسحوق بذور الحبهان والسمسم.

الكلمات المفتاحية : خبز الطاسة ، الحبهان ،السمسم، التركيب الكيميائي ، التقييم الحسى والفيزيائي .