NUTRITIONAL EVALUATION OF FINO BREAD PREPARED USING CINNAMON AND GINGER POWDER

By

Reham R. Abdel Samea

Home Economics Department,

Faculty of Specific Education

Kafr-Elsheikh University, Egypt

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Mansoura University

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Abstract:

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 categories in functional food which is health beneficial. The aim of present study was utilize of cinnamon powder and ginger powder (CP and GP) as a good source of nutritive value to produce value add fino bread based on 3,5% CP and 3,5%GP . Chemical composition, caloric value of CP , GP and fino bread were determined. Sensory and physical evaluation of fino bread were investigated. Results showed that significant decreases in moisture and protein were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP compared with control. Significant increases in fat, ash, fibers and carbohydrates were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP compared with control. Significant decreases in protein calories were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (43.60±0.01, 40.80 ± 0.10, 40.40±0.10 and 38.40±0.02 k.cal./100g.), respectively compared with control, while significant increases in fat calories were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (26.10±0.10 , 29.70 ±0.011, 23.40±0.02 and 24.30 ±0.15 k.cal./100g.) , respectively compared with control (22.50±0.10 k.cal./100g.). Significant increases in carbohydrates calories were found in prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (259.20±0.11, 270.20±0.05, 295.20±0.10 and 297.20± 0.11 k.cal./100g.) compared with control (252.00±0.10 k.cal./100g.) . Significant increases in total calories were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (328.90±0.11, 340.70±0.10, 359.90±0.11 and 359.00±0.10k.cal./100g.), respectively compared with control

* Home Economic Department, Specific Education Faculty, Port Said University, Egypt

(321.30±0.02 k.cal./100g.). Fino bread prepared using3% CP had higher score in sensory evaluation compared with control. Physical properties affected with different levels of CP and GP. Utilization of CP and GP improved the nutritional value of prepared fino bread.

Key words: Bread , Chemical Composition , Caloric values, Sensory and Physical Evaluation.

Introduction

Bread is an important food product that is cherished across the entire continents because of its sensorial and textural properties. Bread has been used as human food since ancient times and has been contributing over 50% of dietary energy due to its high carbohydrate content **(Akubor, 2008 and Mastromatteo *et al*., 2013).** Bread has always been one of the most popular and appealing food products due to its superior nutritional, sensorial and textural characteristics, ready to eat convenience as well as cost competitiveness **(Tsatsu, 2009).** White bread lacks fiber which exposes one to constipation problems due to slow intestinal food movement . Interest in the use of spices for bakery products had grown rapidly because of the increasing consumers awareness on functional foods (**Tokusoglu *et al*., 2015**). There are three main types of bread made from wheat flour: Baladi (a rough brown flat loaf, 82% extraction), Shami (a white flat loaf, 76% extraction) and fino (a longe loaf like french bread or hot dog buns, 72%extraction) (**Adams, 2016)**.Herbs are the important segment of human diet and can be used as ingredient in the formulation of bread. Besides their aesthetical value, herbs provide antimicrobial, antioxidative and preservative effects (**Balestra *et al*., 2011)**.Cinnamon used in food flavors as sweet spices, with pungent taste in as a condiment (**Kim *et al*., 2006)**. Cinnamon contains nutritive values of carbohydrates, protein, fat, fiber, moisture and ash **(Maryam *et al*., 2021).** Ginger powder contained nutritional compounds, these ingredients can be utilized to become better nutritional value of food by adding ginger powder (**Tusneem *et al*., 2017)**. White bread has more popular because of its organoleptic properties **(Ingram and Shapter,2006),** however , there are increasing demands

toward consumption of high fiber breads due to their health promoting properties **(Stanley and Linda,2006)**.The aim of this research is to utilize cinnamon and ginger powder as a good source of nutrients in fino bread to produce value add fino bread based on cinnamon and ginger powder, investigation of their effect on caloric value , sensory and physical properties of fino bread .

Materials and methods

Materials

Dried cinnamon sticks and ginger fruits were purchased from Sakha Agricultural Research Station,Kafrelsheikh city, Egypt. Commercial ingredients for baking were obtained from local markets.Chemicals were purchased from Sigma-Aldrich Co. (St. Louis, MO, USA).

Methods

Preparation of CP and GP

Preparation of CP and GP done accoding to **Shirshir *et al*., (2012).** The bark of cinnamon was taken and ground to powdered form by using a hammer mill (Moulinex, France), sieved through a 150 mm sieve and stored in air tight containers. Fresh ginger roots (Zingiber officinale Roscoe) were washed with cold water, sorting, grading, peeling, slicing and sundried for 20 hr up to the moisture have contained 7 -8 %.After that the dried ginger slices were grounded to a fine powder using a high-speed blender mill (25000/min), (WK-1000A; Qing Zhou Machinery Co., Ltd.), and then stored in polyethene bags at 4°C until analysis. **Preparation of fino bread**

Fino bread samples were processed using mixtures prepared as per **Kamel e*t al*., (2018)** with some modifications. First, active dry yeast (1.5g) activated in warm water (as reported by the Farinograph test) contains 2g dry sugar. Ingredients (flour mixture (100g), sodium chloride (1.5g), bread improver (1g) were added and the mixture was added and kneaded, then ghee (1g) was mixed with a dough. The dough was fermented at 30°C for 30 minutes in a fermentation cabinet below 80-85% humidity. Then the dough is rolled out, divided into gram pieces, which are placed in the trays and held under the trays under the same conditions for 45 minutes. Dough

loaves were baked at 325°C for 10-15 minutes after steaming for 10 seconds. The baked loaves were left to cool at room temperature for 60 minutes.

Proximate chemical composition

Moisture, crude protein, crude fat, ash , crude fiber and carbohydrates (by difference) of CP, GP and fino bread were done according **A.O.A.C(2012).**

Caloric value

Caloric value of CP , GP and fino bread was calculated according to **Lawrence, (1965)** using the following equation:

Caloric value (K.cal/100 g) = (protein content x 4) + (carbohydrate content x4) + (fat content x 9).

Estimation amounts of fino bread (g) consumed to cover children requirements of protein and caloric levels:

The G.D.R of energy were calculated using the equation reported by **FAO/WHO/UNU (1985)**.

$$\text{G.D.R} = \frac{\text{Energy daily requirements of children (2500 k.cal./day)}}{\text{Energy value (k.cal/100g food)}}$$

Grams consumed of fino bread to cover the daily requirements of protein for children (males 11-14 years) were calculated using the daily requirements for children (45g) as given by **N.R.C.F.N.(1989)**.

The G.D.R of protein was calculated using the equation given by **FAO/ WHO/ UNU (1985).**

$$\text{G.D.R of protein} = \frac{\text{Protein daily requirements of children (45g/day)}}{\text{Protein content (g / 100g food)}}$$

Estimation amounts of fino bread consumed to cover adults requirements of protein and caloric levels:

The G.D.R of energy was calculated using the equation reported

FAO/WHO/UNU(1985).

$$G.D.R = \frac{\text{Energy daily requirements of adult man (2900 k.cal./day)}}{\text{Energy value (k.cal/100g food)}}$$

Grams consumed of fino bread to cover the daily requirements of protein for adult man (25-50 years) were calculated using the daily requirements for adult man (63g) as given by **N.R.C.F.N.(1989)**.

The G.D.R of protein was calculated using the equation given by **FAO/ WHO/ UNU (1985).**

$$\text{G.D.R of protein} = \frac{\text{Protein daily requirements of adult man (63g/day)}}{\text{Protein content (g/100g food)}}$$

Sensory evaluation

Loaves were cooled for 1-2 h at room temperature (25±3 º C) in a sealed plastic bag. Prepared fino bread was then cut into 2 x 3 x 5 cm slices using a bread knife. Fino bread was evaluated by 20 panelists (staff in faculty of specific education , Kafrelsheikh University) for appearance, taste, odor, internal color, external color, chewing, texture and acceptance on a 9-point hedonic scale (from like extremely = 9 to dislike extremely = 1) according to **Watts *et al.*, (1989)**.

Physical evaluation

Physical properties of fino bread was evaluated for loaf weight , baking loss , loaf length, loaf height, loaf volume and specific volume , 1 h. after removal from the oven. The loaf weight (g) before and after baking was determined by measuring the weight of loaf sample with sensitive balance (WJ, china), baking loss was calculated by differences, loaf height (cm) was measured using a measuring ruler , loaf volume (cm^3) was determined by rapeseed displacement method (**A.A.C.C., 2000**).

All objective measurements were done on triplicates and the main value was calculated.

Statistical analysis

The mean and the standard deviations was calculated. The obtained data were subjected to analysis of variance one-way. The mean value of

treatments was compared according to Duncan's multiple range test. The data were analyzed using SPSS (version 28) according to (**Steel and Torrie, 1980)**.

Results and Discussion

Chemical composition of CP and GP

Chemical composition (g./100g.) of CP and GP are presented in Table (1). These results showed that significant increases in moisture, crude protein and ash were found in CP (7.88±0.20 , 10.30±0.10 and 5.33±0.01 g/100g), respectively compared with GP (4.90±0.10 , 3.30±0.02 , 3.10±0.02 g/100g), respectively. Significant increases in crude fat, crude fiber and carbohydrates were found in CP (4.33±0.01 , 12.00±0.20 and 72.37±0.01 g/100g), respectively compared with GP (2.95±0.02, 2.99±0.02 and 70.55±0.10 g/100g). The obtained results in the same line of **Bharti and Sundhi, (2020)** who found that cinnamon contained (3.99,1.24, 3.60 and 80.59) g/100 g, respectively for protein , fat, ash and carbohydrates. **Ogbuewu *et al.*, (2012)** studied the chemical composition of ginger rhizome powder, they found that ginger powder contained (6.32±0.35, 5.45±0.46,6.48±0.38, 6.57±0.18 and 10.36 ±0.67 g/100g), respectively for moisture, crude protein , fat, ash and crude fiber. Significant increases in total calories were found in GP (349.95±0.20 K.cal./ 100g.**)** compared with CP (341.65±0.10 K.cal./ 100g).

Cinnamon is a good source of energy (247 k.cal/ 100g) **Bharti and Sunidi, (2020)**.

Ginger powder contained protein (9%), carbohydrates (60–70%), crude fiber (3–8%) and about 8% ash in study of **Khan *et al.*, (2016)** . Tender ginger contained 93. 40%, 3.80%, 2.65%, 3.80%, 7.30%, and 338.80 kcal, respectively for moisture, ash, protein, fat, fiber and energy on dry weight bases **(Dashrath and Rita, 2021**). Chemical composition of ginger powder registed 8.23%,5.68 %, 6.23%, 11.24 and 6.82% , respectively for moisture, protein , fat , fiber and carbohydrates **Abeer, (2021)**.

Table (1) : Chemical composition of CP and GP as (g/100g).

Samples / Chemical composition	CP	GP
Moisture	4.90±0.10 [b]	7.88±0.20 [a]
Crude protein	3.30±0.02 [b]	10.30±0.10 [a]
Crude fat	4.33±0.01 [a]	2.95±0.02 [b]
Ash	3.10±0.02 [b]	5.33±0.01 [a]
Crude fiber	12.00±0.20 [a]	2.99±0.02 [b]
Carbohydrates	72.37±0.01 [a]	70.55±0.10 [b]
Total calories (K.cal./ 100g.)	341.65±0.10 [b]	349.95±0.20 [a]

*****Means values in the same row which is not followed by the same letter indicate significant differences at $p < 0.05$.

Chemical composition of fino bread

In the past decades, consumers have chosen foods not only for their nutritional values but also for their additional health benefits **(Menard, 2003).**Chemical composition (g./100g.) of fino bread prepared using (3 and 5%) of CP and GP are presented in Table (2). Nutrient composition of the bread samples was affected with increase in the percentage of CP and GP. The results showed that significant decreases in moisture were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (19.10 ± 0.10, 16.00 ± 0.01, 12.00 ± 0.06 and 11.60 ± 0.05g./100g.), respectively compared with control (21.60± 0.10g./100g.) , it may be due to mositure content in tested powders (Table1). Mosiure content effects on shelf life of products **.**Significant increases in crude fat were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (2.90 ± 0.01, 3.30± 0.01, 2.60 ± 0.01 and 2.70 ± 0.02 g./100g.), respectively compared with control (2.50 ± 0.02 g./100g.) , it may be due to fat content in tested powders. Significant increases in ash were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (0.50 ± 0.01, 0.55± 0.01, 0.60 ± 0.01 and 0.80 ± 0.01 g./100g.), respectively compared with control (0.40 ± 0.01 g./100g.) , it may be due to ash content in tested powders. The obtained results were in the same line of **Ayesha *et al*.,(2023).**Significant increases in crude fiber were found in fino bread

prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (1.80 ± 0.01, 2.40 ± 0.01, 0.90 ± 0.01 and 1.00 ± 0.01 g./100g.), respectively. compared with control (0.80± 0.01 g./100g.) , it may be due to crude fiber content in tested powders. Significant decreases in protein were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (10.90 ± 0.01, 10.20 ± 0.02, 10.10 ± 0.01 and 9.60 ± 0.03 g./100g.), respectively compared with control (11.70± 0.01 g./100g.), it may be due to crude protein content in tested powders . Non significant differences were found in fino bread at levels 5% CP and 3% GP. The obtained results were in the same line of **Ayesha *et al*.,(2023).** Significant increases in carbohydrates were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (64.80± 0.10, 67.55 ± 0.03 , 73.80 ± 0.11 and 74.30 ± 0.01g./100g.), respectively compared with control (63.00 ± 0.01g./100g.), it may be due to carbohydrates content in tested powders.

The increase in fat , ash, fibers and carbohydrates contents of ginger powder incorporated fino bread could be due to the presence of them in ginger **Singh *et al*., (2012)**.

Table (2): Chemical composition of fino bread prepared using CP and GP as (g./100 g.) at different levels compared with control.

Samples / Chemical composition	Fino bread control	Fino bread prepared using 3% CP	Fino bread prepared using 5% CP	Fino bread prepared using 3% GP	Fino bread prepared using 5% GP
Moisture	21.60± 0.10 ^{a}	19.10 ± 0.10^{b}	16.00 ± 0.01 ^{c}	12.00 ± 0.06 ^{d}	11.60 ± 0.05 ^{e}
Crude protein	11.70± 0.01 ^{a}	10.90 ± 0.01 ^{b}	10.20 ± 0.02 ^{c}	10.10 ± 0.01 ^{c}	9.60 ± 0.03 ^{d}
Crude fat	2.50 ± 0.02 ^{e}	2.90 ± 0.01 ^{b}	3.30± 0.01 ^{a}	2.60 ± 0.01 ^{d}	2.70 ± 0.02 ^{c}
Ash	0.40 ± 0.01 ^{e}	0.50 ± 0.01 ^{d}	0.55± 0.01 ^{c}	0.60 ± 0.01 ^{b}	0.80 ± 0.01 ^{a}
Crude fiber	0.80± 0.01 ^{e}	1.80 ± 0.01 ^{b}	2.40 ± 0.01 ^{a}	0.90 ± 0.01 ^{d}	1.00 ± 0.01 ^{c}
Carbohydrates	63.00 ± 0.01 ^{d}	64.80± 0.10 ^{c}	67.55 ± 0.03 ^{b}	73.80 ± 0.11 ^{a}	74.30 ± 0.01^{a}

Means values in the same row which is not followed by the same letter indicate significant differences at $p < 0.05$.

Caloric values of fino bread

Caloric value of fino bread prepared using 3 and 5% of CP and GP are presented in Table (3). Significant decreases in protein calories were found in prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (43.60±0.01, 40.80 ± 0.10, 40.40±0.10 and 38.40±0.02 k.cal./100g. , respectively compared with control (46.80±0.10 k.cal./100g) , it due to reduction of protein content in experimental fino bread compared with control . Significant increases in fat calories were found in prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (26.10±0.10 , 29.70 ±0.011, 23.40±0.02 and 24.30 ±0.15 k.cal./100g.) , respectively compared with control (22.50±0.10 k.cal./100g.), it due to reduction of fat content in experimental fino bread compared with control. Significant increases in carbohydrate calories were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (259.20±0.11, 270.20±0.05, 295.20±0.10 and 297.20± 0.11 k.cal./100g.), respectively compared with control (252.00± 0.10 k.cal./100g.), it due to increase in carbohydrates content in experimental fino bread compared with control . Significant increase in total calories were found in fino bread prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (328.90±0.11, 340.70±0.10, 359.90±0.11 and 359.00±0.10k.cal./100g.), respectively compared with control (321.30±0.02 k.cal./100g.). Total calories recorded higher values in fino bread prepared using GP than fino bread prepared using CP. The obtained results were in agreement with **Ayesha *et al*.,(2023)** who found that energy value for cinnamon powder was (169.78± 2.36) and energy value for ginger powder (348.65±2.00 k.cal/ 100g).

Table (3): Caloric values (k.cal./100g.) of experimental fino bread and control

Samples	Sources of calories			Total caloric values
	Protein	Fat	Carbohydrates	
Caloric values				
Fino bread control	46.80±0.10 [a]	22.50±0.10 [e]	252.00± 0.10 [e]	321.30±0.02 [e]
Fino bread prepared using3% CP	43.60±0.01 [b]	26.10±0.10 [b]	259.20±0.11 [d]	328.90±0.11 [d]
Fino bread prepared using 5% CP	40.80 ± 0.10 [c]	29.70 ±0.011[a]	270.20±0.05 [c]	340.70±0.10 [c]
Fino bread prepared using 3% GP	40.40±0.10 [c]	23.40±0.02 [d]	295.20±0.10 [b]	359.90±0.11 [a]
Fino bread prepared using 5%GP	38.40±0.02 [d]	24.30 ±0.15 [c]	297.20±0.11 [a]	359.00±0.10 [b]

*****Means values in the same column which is not followed by the same letter indicate significant differences at $p < 0.05$.

Estimation amounts of fino bread (g) consumed to cover daily children requirements of protein and caloric levels

As compared with **FAO/ WHO (1985)** pattern, the results in Table (4) show the estimated amount of fino bread to cover daily children requirements of protein and calories. The daily requirements of protein could be covered when consumed (384.61- 468.75 g) of prepared fino bread for males (11-14) years. Significant increases in amounts consumed to cover daily children requirements of protein were found in prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (412.84± 0.11, 441.17 ±0.01, 445.54 ±0.10 and 468.75 ±0.11 g), respectively compared with control (384.61±0.10 g). For calories, to cover daily children requirements need to consumed (696.37 to 778.08 g) of fino bread daily . Significant decreases in amount consumed to cover daily children requirements of calories were found in fino bread prepared using 3,5 % CP and fino bread prepared using

3,5 % GP (760.10±0.11, 733.78±0.01, 694.63±0.10 and 696.37±0.02 g), respectively compared with control (778.08±0.11 g).

Table (4): The amount of prepared fino bread (g) consumed to cover daily children requirements of protein and calories.

Fino bread	*G.D.R g of protein	*G.D.R g of calories
	** Males (11-14 years) (45 g)	** Males (11-14 years) (2500 k.cal.)
	grams of fino bread	
Fino bread control	384.61±0.10 [e]	778.08±0.11 [a]
Fino bread prepared using 3% CP	412.84± 0.11[d]	760.10±0.11 [b]
Fino bread prepared using 5% CP	441.17 ±0.01 [c]	733.78±0.01 [c]
Fino bread prepared using 3%GP	445.54 ±0.10 [b]	694.63±0.10 [e]
Fino bread prepared using 5%GP	468.75 ±0.11 [a]	696.37±0.02 [d]

*G.D.R grams consumed of prepared fino bread to cover the daily requirements for male children ((11-14 years) of protein and calories.

** Recommended levels of protein and calories according to FAO/WHO (1985).

*****Means values in the same column which is not followed by the same letter indicate significant differences at $p < 0.05$**.**

Estimation amounts of prepared fino bread (g) consumed to cover daily adults requirements of protein and caloric levels

As compared with **FAO/WHO (1985)** pattern, the results in Table (5) show the estimated amounts of prepared fino bread samples to cover the daily adults requirements of protein levels in different samples. The daily adults requirements of protein could be covered when consumed 538.46-656.25 g of prepared fino bread for adult man from 25-50 years. Significant increases in amount consumed to cover daily children requirements of protein were found in prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (577.98 ±0.11, 617.65±0.01, 623.76±0.01 and 656.25± 0.11 g), respectively compared with control (538.46± 0.10 g.).Significant decreases in amount consumed to cover daily children requirements of calories were found in prepared using 3,5 % CP and fino bread prepared using 3,5 % GP (881.72±0.10, 851.18±0.01, 805.77±0.01 and 807.79±0.01 g.) , respectively compared with control (902.58±0.11 g.).

Table (5): Estimation amounts of prepared fino bread (g) consumed to cover daily adults requirements of protein and calories.

Fino bread	*G.D.R g of protein	*G.D.R g of calories
	** adult man (25-50 years) (63 g)	** adult man (25-50 years) (2900 k.cal.)
	grams of fino bread	
Fino bread control	538.46± 0.10 [e]	902.58±0.11 [a]
Fino bread prepared using 3% CP	577.98 ±0.11[d]	881.72 ±0.10 [b]
Fino bread prepared using 5% CP	617.65±0.01 [c]	851.18±0.01 [c]
Fino bread prepared using 3% GP	623.76±0.01 [b]	805.77±0.01 [e]
Fino bread prepared using 5%GP	656.25± 0.11 [a]	807.79±0.01 [d]

*G.D.R grams consumed of prepared fino bread to cover the daily requirements for adult man ((25-50 years) of protein and calories.

** Recommended levels of protein and calories according to FAO/WHO (1985).

*****Means values in the same column which is not followed by the same letter indicate significant differences at $p < 0.05$.

Sensory evaluation of prepared fino bread

Sensory characteristics of prepared fino bread showed in Table (6).

For appearance , the results indicated that non significant differences were found between fino bread prepared using 3, 5 % CP and 3 % GP (8.70±0.52, 8.20 ± 0.98 and 8.00 ± 0.89), respectively compared with control (8.80± 0.41). Fino bread prepared using3% CP had higher score in appearance compared with control .

For taste , the results indicated that non significant differences were found between fino bread prepared using3, 5% CP and 3, 5%GP (7.80 ± 0.75, 7.50 ± 0.84, 7.70 ± 0.52 and 7.20 ± 0.75), respectively .Control samples recorded the highest value (8.50±0.84). Fino bread prepared using3% CP had higher score in taste compared with control . Taste difference may be due to taste of powders .

For flavor, results indicated that non significant differences were found between fino bread prepared using5% CP , 3 and 5% GP (7.70 ± 0.52 , 7.30 ± 0.82 and 7.20 ± 0.75 ,respectively. Non significant differences were

found between fino bread prepared using3,5% CP (8.30±0.82,7.70±0.52), respectively compared with control (8.50±0.84). Fino bread prepared using3% CP had higher score in flavor compared with control . Flavor scores due to flavor of added powders which effect on bread flavor .

Color of bread is one of the important factors in sensory evaluation (**Matos and Rosell,2012**) depending of their perception of bread type**.** The color of bread was changed and become whiter by increasing levels of starch in the formula. Because of browning of regular baked products depends to a large of the presence protein. So the bread samples with high level of fiber content, low protein and starch have darker color and negative effect on consumers overall acceptability **(Yassen *et al*.,2012).**

For internal color, non significant differences were found between fino bread prepared using 3%CP, 3 and 5%GP (7.70 ± 0.82, 8.00 ± 0.63 and 8.20 ± 0.41), respectively. Non significant differences were found between fino bread prepared using 3% CP compared with control (9.00±0.63). Fino bread prepared using3% CP had higher score in internal color compared with control .

For external color, non significant differences were found between fino bread prepared using3,5 %CP and 3%GP (8.50 ± 0.55, 8.50± 0.55, 8.40± 0.55 and 8.00± 0.63), respectively compared with control (8.70±0.52). Significant differences were found between fino bread prepared using 5% GP (7.70±0.52) compared with control. Fino bread prepared using5% GP had lowest score in external color. These results are confirmed by **Hu *et al*. (2007)**, who found that the dark color of cookies has immediately connected to the highest fiber content in ginger powder. Furthermore, the browning of the cookies could also happen may be caused to caramelization and Maillard reactions, as the protein in ginger and wheat flour is reacted with sugar during the baking process **(Mohsen *et al*., 2009).** Colour analysis of the crust indicated that samples with the addition of CP and GP had darker crust, this can be ascribed to the darkening effects of Maillard and caramelization browning due its high sugar content, as

previously hypothesized **(Shittu *et al*., 2008)** which could be attributed by the higher brownness index (BI) also studied earlier by **(Das *et al*., 2012).**

For chewing, non significant differences were found between fino bread prepared using 3,5%CP, 3 and 5%GP(8.30 ± 0.52, 7.80 ± 0.41, 8.00 ± 0.63 and 7.90 ± 0.63), respectively. Significant differences were found between fino bread prepared using3% CP compared with control (8.80±0.41), this could be due to attributed to change in protein quantity, quality and water absorption . Fino bread prepared using3% CP had higher score in chewing compared with control .

For texture, non significant differences were found between fino bread prepared using3,5% and 3% GP (8.30 ± 0.52, 8.50 ± 0.55 and 8.20 ± 0.75), respectively. Significant differences were found between fino bread prepared using 5% GP(7.50±0.55) compared with control. Fino bread prepared using3% CP had higher score in texture compared with control .

For acceptance non significant differences were found between fino bread prepared using 3,5%CP, 3 and 5%GP (8.50 ± 0.55, 8.20 ± 0.41and 8.20 ± 0.41), respectively. Significant differences were found between fino bread prepared using 5% GP (7.70±0.52) compared with control. Fino bread prepared using3% CP had higher accepted sample compared with control . Results were in agreement with **Abeer (2021)** found that sensory properties of biscuits made from wheat flour and its blends with at different ginger levels 5, 10 and 15%, was acceptable for color, taste and crispness/aroma in biscuit samples when added 5 and 10% ginger, also cake replacement of 72% and 82% yield extraction by ginger powder highly acceptable score of appearance, taste, odor, texture, crust color, crumb color and acceptability by panelists, formula with 3% ginger powder gave more acceptable.

Our results were in the same line of **Sujata *et al*.,(2017)** they found that sensory evaluation of bread incorporated with different level of cinnamon(1.5,2.5,3.5 and 4.5%) , the sensory score of bread incorporated with 2.5 % level cinnamon scored highest score in all sensory parameter. **Sara (2018)** concluded that all prepared cake replacement of 72 and 82 % yield extraction by ginger powder highly acceptable score of appearance,

taste, odor, texture, curst color, crumb color and acceptability by the panellists. But formulae with 3.0% ginger powder gave more acceptable than 6%.

Table (6): Sensory evaluation of fino bread prepared using CP and GP at different levels compared with control .

Samples / Sensory evaluation	Fino bread control	Fino bread prepared using 3% CP	Fino bread prepared using 5% CP	Fino bread prepared using 3% GP	Fino bread prepared using 5% GP
appearance	8.80 ± 0.41 ^{a}	8.70 ± 0.52 ^{a}	8.20 ± 0.98 ^{ab}	8.00 ± 0.89 ^{ab}	7.70 ± 0.52 ^{b}
Taste	8.50 ± 0.55 ^{a}	7.80 ± 0.75 ^{ab}	7.50 ± 0.84 ^{b}	7.70 ± 0.52 ^{ab}	7.20 ± 0.75 ^{b}
Flavor	8.50± 0.84 ^{a}	8.30 ± 0.82 ^{a}	7.70 ± 0.52 ^{ab}	7.30 ± 0.82 ^{b}	7.20 ± 0.75 ^{b}
Internal color	9.00 ± 0.63 ^{a}	8.50 ± 0.55 ^{ab}	7.70 ± 0.82 ^{c}	8.00 ± 0.63 ^{bc}	8.20 ± 0.41 ^{bc}
External color	8.70 ± 0.52 ^{a}	8.50 ± 0.55 ^{a}	8.40± 0.55 ^{a}	8.00± 0.63 ^{ab}	7.70 ± 0.52 ^{b}
Chewiness	8.80 ± 0.41 ^{a}	8.30 ± 0.52 ^{ab}	7.80 ± 0.41 ^{b}	8.00 ± 0.63 ^{b}	7.90 ± 0.63 ^{b}
Texture	8.70 ± 0.52 ^{a}	8.30 ± 0.52 ^{a}	8.50 ± 0.55 ^{a}	8.20 ± 0.75 ^{ab}	7.50 ± 0.55 ^{b}
Acceptance	8.50± 0.55 ^{a}	8.50 ± 0.55 ^{a}	8.20 ± 0.41 ^{ab}	8.20 ± 0.41 ^{ab}	7.70 ± 0.52 ^{b}

*Means values in the same row which is not followed by the same letter indicate significant differences at $p < 0.05$.

Physical properties of prepared fino bread

Physical properties of fino bread showed in Table (7) . Significant increases in loaf weight before baking were found in fino bread prepared using 3 % CP and fino bread prepared using 3,5 % GP (101.00 ± 1.00, 101.20 ± 1.00 and 101.40 ± 1.00 g.), respectively compared with control (100.30 ± 0.58g.), while non significant increases in loaf weight before baking were found in fino bread prepared using 5% CP (102.00 ± 1.00 g.) compared with control. Significant increases in loaf weight after baking were found in fino bread prepared using 3, 5%CP , 3 and 5% GP (76.70±0.01,78.00±0.10,72.40±0.10 and 74.20±0.10 g.) compared with control (71.30±0.20 g.). Substitution levels of CP and GP resulted in increasing loaf weight . Fino bread prepared using 5% GP recorded the highest value. Significant decreases in baking loss values were found in fino

bread prepared using 3, 5%CP , 3 and 5% GP (24.30 ± 0.01, 24.00 ± 0.29, 28.80± 1.00 and 27.20 ± 10 g.) compared with control (29.00 ± 0.50 g.), addition of CP and GP reduced baking loss of fino bread. Using CP and GP resulted in reduction of baking loss in fino bread. Fino bread prepared using 5% GP recorded the lowest value. The composite flour absorbed water but during baking, it lost water. The loaf weight is determined by the amount of moisture and carbon dioxide diffused out of the loaf during baking (**Shittu *et al.*,2007).**The least weight for the control could be due to reduction of the quantity of gluten inthe dough with addition of composite flour resulting to less retention of carbon dioxide gas anda dense texture. Higher loaf weight and volume have positive economic value on the bread atthe retail level. In other words, loaf weight and volume reduction during baking is unacceptable economic quality to bakers as people prefer bread with high loaf weight as it is believed to have more value (**Adebowale *et al.*, 2009)**

Significant increases in loaf length were found in fino bread prepared using 3, 5%CP (19.80 ± 0.15 and 20.30 ± 0.10 cm), respectively compared with control (19.10 ± 0.10 cm). Fino bread prepared using 5% GP recorded the highest value. Significant increases in loaf length were found in fino bread prepared using 3,5%GP (19.10 ± 0.10 and 19.70 ± 0.15 cm), respectively compared with control. Fino bread prepared using 5% GP recorded the highest value. Significant increases in loaf height were found in fino bread prepared using 3, 5%CP , 3 and 5% GP (3.40 ± 0.06,3.90 ± 0.06, 3.40± 0.06 and 3.50± 0.10 cm), respectively compared with control (3.30 ± 0.06 cm). Fino bread prepared using 5% GP recorded the highest value.

Significant increases in loaf volume were found in fino bread prepared using 3, 5%CP , 3 and 5% GP (1002 ± 1.00, 1004.70 ± 0.58, 1001.30 ± 0.58 and 1003.30 ± 0.58 **cm^3**), respectively compared with control (999.70 ± 0.58 cm^3). Fino bread prepared using 5% GP recorded the highest value.Loaf volume is regarded as one of the most important characteristics of baked products, since it provides a qualitative measurement of baking performance (**Kohajdová and Karovičová,**

2008). Loaf volume is affected by the quantity and quality of protein in the flour (**Badifu *et al.*, 2005).**

Table (7): Physical properties of fino bread prepared with CP and GP at different levels .

Physical properties / Samples	Fino bread control	Fino bread prepared using 3% CP	Fino bread prepared using 5% CP	Fino bread prepared using 3% GP	Fino bread prepared using 5% GP
Loaf weight before baking (g)	100.30 ± 0.58 ^{b}	101.00 ± 1.00 ^{b}	102.00 ± 1.00 ^{a}	101.20 ± 1.00 ^{b}	101.40 ± 1.00 ^{b}
Loaf weight after baking (g)	71.30±0.20 ^{e}	76.70±0.01 ^{b}	78.00±0.10 ^{a}	72.40±0.10 ^{d}	74.20±0.10 ^{c}
Loaf weight loss (g)	29.00 ± 0.50 ^{a}	24.30 ± 0.01 ^{e}	24.00 ± 0.29 ^{d}	28.80± 1.00 ^{b}	27.20 ± 10 ^{c}
Loaf length (cm)	19.10 ± 0.10 ^{c}	19.80 ± 0.15 ^{b}	20.30 ± 0.10 ^{a}	19.10 ± 0.1 ^{c}	19.70 ± 0.15 ^{b}
Loaf height (cm)	3.30 ± 0.06 ^{c}	3.40 ± 0.06 ^{bc}	3.90 ± 0.06 ^{a}	3.40± 0.06 ^{bc}	3.50± 0.10 ^{b}
Volume (cm^3 / 100g)	999.70 ± 0.58 ^{d}	1002 ± 1.00 ^{c}	1004.70 ± 0.58 ^{a}	1001.30 ± 0.58 ^{c}	1003.30 ± 0.58 ^{b}

*****Means values in the same row which is not followed by the same letter indicate significant differences at $p < 0.05$

Conclusion

In conclusion, the results suggested that using cinnamon and ginger powder increased most of principle nutrients, decreased moisture content . Cinnamon and ginger powder increased caloric value of fino bread. Fino bread prepared using cinnamon and ginger powders is recommended to considered functional food, nutritional and healthy benefit to human health with acceptable sensory and physical properties.

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التقييم الغذائى لخبز الفينو المحضر باستخدام مسحوق القرفة والزنجبيل

ريهام رفعت عبد السميع

الملخص العربي:

يعد الخبز من أهم مصادر الألياف الغذائية في إجمالي استهلاك الغذاء. ويعتبر الخبز عالي الألياف أحد فئات المنتجات المعروفة في الأغذية الوظيفية المفيدة للصحة. كان الهدف من الدراسة الحالية هو الاستفادة من مسحوق القرفة ومسحوق الزنجبيل (CP وGP) كمصدر جيد للقيمة الغذائية لإنتاج خبز الفينو ذو قيمة اضافية على أساس مسحوق القرفة ٣،٥٪ ومسحوق الزنجبيل٣،٥٪ . تم تحديد التركيب الكيميائي والقيمة الحرارية لخبز الفينو المحضر باستخدام مسحوق القرفة والزنجبيل . تم دراسة التقييم الحسي والفيزيائى لخبز الفينو. أظهرت النتائج وجود انخفاض معنوي في الرطوبة والبروتين في خبز الفينو المحضر باستخدام مسحوق القرفة ٣، ٥٪ وخبز الفينو المحضر باستخدام مسحوق الزنجبيل ٣، ٥٪ مقارنة بالعينة الضابطة . وجدت زيادات معنوية في الدهون والرماد والألياف والكربوهيدرات في خبز الفينو المحضر باستخدام مسحوق القرفة ٣، ٥٪ وخبز الفينو المحضر باستخدام مسحوق الزنجبيل ٣، ٥٪ مقارنة مع العينة الضابطة. وجد انخفاض كبير في السعرات الحرارية للبروتين في خبز الفينو المحضر باستخدام مسحوق القرفة ٣، ٥٪ وخبز الفينو المحضر باستخدام مسحوق الزنجبيل ٣، ٥٪ (٤٣,٦ ± ٠,٠١، ٨٠,٤٠ ± ٠,١٠، ٤٠,٤٠± ٠,١٠ و ٣٨,٤٠±٠,٠٢كيلو كالوري / ١٠٠ جرام)، على التوالي مقارنة بالعينة الضابطة (٤٦,٨٠ كيلوكالورى /١٠٠جم) ، في حين وجدت زيادات معنوية في السعرات الحرارية من الدهون في خبز الفينو المحضر باستخدام مسحوق القرفة ٣، ٥٪ وخبز الفينو المحضر باستخدام مسحوق الزنجبيل ٣، ٥٪ (٢٦,١٠ ±٠,١٠ ، ٢٩,٧٠±٠,١١ ، ٢٣,٤٠±٠,٠٢ و ٢٤,٣٠± ٠,١٥كيلو كالوري/١٠٠جرام)، على التوالي مقارنة بالعينة الضابطة (٢٢,٥٠ ±١٥كيلو كالوري/١٠٠جرام ٠,١٠) . وجدت زيادات معنوية في السعرات الحرارية من الكربوهيدرات (٢٥٩,٢٠±٠,١١، ٢٧٠,٢٠ ±٠,٠٥ ، ٢٩٥,٢٠ ± ٠,١٠ ، ٢٩٧,٢٠ ±٠,١١ كيلو كالوري/١٠٠جرام) مقارنة بالعينة الضابطة (٢٩٧,٢٠ ± ٠,١١ كيلو كالوري/١٠٠جرام) .ووجدت زيادة كبيرة في السعرات الحرارية الكلية في خبز الفينو المحضر باستخدام مسحوق القرفة ٣، ٥٪ وخبز الفينو المحضر باستخدام مسحوق الزنجبيل ٣، ٥٪ (٣٢٨,٩٠ ±٠,١١، ٣٤٠,٧٠ ±٠,١٠ ، ٣٥٩,٩ ± ٠,١١ و ٣٥٩,٠٠±٠,١٠ كيلو كالوري/١٠٠ جرام)، على التوالي مقارنة بالعينة الضابطة (٣٢١,٣٠±٠,٠٢ كيلو كالوري. / ١٠٠ جرام.). حصل خبز الفينو المحضر باستخدام ٣٪ من مسحوق القرفة على اعلى قيمة في التقييم الحسي مقارنة بالعينة الضابطة. تأثرت الخواص الفيزيائية بمستويات مختلفة من مسحوق القرفة والزنجبيل . ادى استخدام مسحوق القرفة والزنجبيل أدى إلى تحسين القيمة الغذائية لخبز الفينو المحضر.

الكلمات المفتاحية : الخبز ، التركيب الكيميائى، قيم السعرات الحرارية ، التقييم الحسى والفيزيائى .