The Effect of Different Amounts of Olive Oil on Sensory Properties of Ciabatta Bread

Pinar Gumus[1*]

[1*] Kilis 7 Aralik University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Kilis, Turkey, (ORCID: 0000-0003-4085-9859),
dr.pinargumus@gmail.com

Abstract

Ciabatta is a classic Italian bread type that has become popular around the world in recent years. It is characterized by crisp crust, large and irregular crumb grain. The objective of this study was to evaluate the effect of the use of different amounts of olive oil on the sensory properties of ciabatta bread samples. To determine the best mixture of bread, different amounts of olive oil were used to produce ciabatta bread. The sensory properties of three different kinds of bread (type I, type II, type III) were investigated such as shape and symmetry, crust color and crumb color, stickiness, mouthfeel, taste and aroma and overall assessment. Ash, moisture and protein content were also analyzed. In this study, when the sensory properties of the ciabatta breads were examined, it was observed that the effects of different amounts of olive oil on shape and symmetry, crust color and crumb color, stickiness, mouthfeel, taste and aroma and overall assessment of all ciabatta breads were not found statistically important (p>0.05). It was also found that ash and protein content was not significantly affected (p>0.05).

Keywords: Olive oil, Ciabatta, Bread, Sensory.

Farklı Miktarlarda Zeytinyağı Kullanımının Ciabatta Ekmeğinin Duyusal Özelliklerine Etkisi

Öz

Ciabatta, son yıllarda dünya çapında popüler hale gelen klasik bir İtalyan ekmeği türüdür. Gevrek kabuğu, büyük ve düzensiz ekmek içi gözenek yapısı ile bilinmektedir. Bu çalışmanın amacı, farklı miktarlarda zeytinyağı kullanımının ciabatta ekmeği örneklerinin duyusal özellikleri üzerindeki etkisini değerlendirmektir. En iyi ekmek karışımını belirlemek için ciabatta ekmeği üretiminde farklı miktarlarda zeytinyağı kullanılmıştır. Üç farklı ekmek çeşidinin (tip I, tip II, tip III) şekil ve simetri, kabuk rengi ve ekmek içi rengi, yapışkanlık, ağız hissi, tat ve aroma ve de genel değerlendirme gibi duyusal özellikleri incelenmiştir. Kül, nem ve protein içeriği de analiz edilmiştir. Bu çalışmada ciabatta ekmeklerinin duyusal özellikleri incelendiğinde, ciabatta ekmeklerinin tamamında farklı miktarlarda zeytinyağı kullanımının şekil ve simetri, kabuk rengi ve ekmek iç rengi, yapışkanlık, ağız hissi, tat ve aroma ve genel değerlendirme üzerine etkilerinin istatistiksel olarak önemli olmadığı görülmüştür (p>0.05). Kül ve protein içeriğinin de önemli ölçüde etkilenmediği bulunmuştur (p>0.05).

Anahtar Kelimeler: Zeytinyağı, Ciabatta, Ekmek, Duyusal.

* Corresponding Author: dr.pinargumus@gmail.com

1. Introduction

Bread that is one of the oldest foods is generally known as significant source of carbohydrates [1]. It is one of the main nutrients within the cereal and cereal-based products throughout the world from past to present [2],[3],[4]. Different types of bread are produced in the world. Flatbread, phyllo and chickpea leavened bread are unique to Turkey and are the most well-known bread varieties in the world. The most well-known types of bread are baguette (France), muffin (Eastern Europe), bagel (France), chapatti (South Asia), naan (India), tiger bread (Netherlands), tortilla (Mexico) and ciabatta bread (Italy) [5].

Ciabatta is a classic bread type from Italy's Lake Como region [6],[7]. Crispy crust is one of the most leading features used to determine the level of freshness and quality of ciabatta bread. There are lots of recipes for this bread with a thick crust and plenty of pores [6],[8]. This typical Italian bread obtained from wheat flour and yeast used as ingredients like water, salt and olive oil and flavor providers [9].

Olive oil is the main source of dietary fat in the Mediterranean diet that is highly consumed and suggested for health. Olive oil is an important food product that is highly consumed and suggested for health. The useful role of olive oil in a healthy diet has been proven in many studies around the world. A diet that includes olive oil as the main source of fat has been associated with health benefits related to cardiovascular disease, diabetes, stroke and cancer [10],[11],[12].

In this study, three different amounts of olive oil were used in ciabatta type bread production. The effect of different amounts of olive oil on sensory characteristics of bread was investigated. Ash, moisture and protein content were also analyzed.

2. Material and Method

2.1. Materials

All ingredients shown in Table 1 were used for the production of ciabatta type bread; wheat flour (Piyale, Istanbul, Turkey), ciabatta yeast mixture (Pakmaya, Kocaeli, Turkey), olive oil (Yudum Balikesir, Turkey). Three different types of ciabatta bread were produced as shown in Figure 1.

2.2. Method

2.2.1. Production of Ciabatta Bread

The formulations of three ciabatta type breads were carried out as indicated in Table 1. Productions of ciabatta type bread were conducted according to previously described method by [7],[13],[14] with minor modifications when the amounts of water, salt, ciabatta yeast mixture and wheat flour were kept constant, different amounts of olive oil were used in ciabatta bread production. Type I was prepared as control group. According to Figure 1, all ingredients (wheat flour, ciabatta yeast mixture, salt, olive oil and ice water) were taken into the mixer. The kneading process was completed in 20 minutes, 5 minutes at low speed and 15 minutes at high speed (Kitchen Aid, Artisan, USA). The dough taken from the mixer was put into fermentation for 60-90 min. Then the dough was shaped and placed in the bowl and it was left for 50 minutes for proofing. All breads were baked for 20-30 minutes by giving plenty of water vapour in an oven at 200-220°C.

Table 1. Bread formulations

Composition	Types of Bread		
	Type I	*Type II*	*Type III*
Wheat Flour (g)	*500 g*	*500 g*	*500 g*
Water (ml)	*425 ml*	*425 ml*	*425 ml*
Ciabatta Yeast Mixture (g)	*25 g*	*25 g*	*25 g*
Olive Oil (g)	*10 g*	*15 g*	*20 g*
Salt (g)	*7.5 g*	*7.5 g*	*7.5 g*

2.2.2. Chemical Composition

Following methods were used to determine moisture and ash content [15], protein content of the ciabatta type bread samples [16].

2.2.3. Sensory Analysis

Sensory evaluation of ciabatta type breads was been carried out by a panelist group according to previously described study with some modifications by [17],[18]. Ciabatta type breads were determined for shape and symmetry, crumb colour, porosity, crust colour, bread stickiness, mouthfeel, taste and aroma and overall acceptability using the hedonic scale from 1 (dislike extremely) to 5 (like extremely).

2.2.4. Statistical Analysis

Experimental data for sensory evaluation was measured by using analysis of variance (ANOVA) and the significant differences were determined by Duncan's test [19].
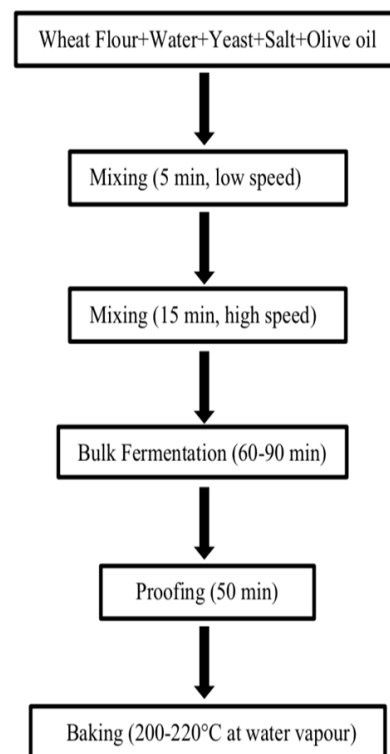

Figure 1. Production of Ciabatta Bread

3. Results and Discussion

3.1. Ash, Moisture and Protein Content

Ash contents of ciabatta breads with different amounts of olive oil are shown in Figure 2. It can be seen that the ash contents of ciabatta breads were 1.07%, 1.05% and 1.08%, respectively. There were also no significant differences among (p>0.05) breads with respect to ash content (Figure 2). Similar results have been observed elsewhere. Pasqualone et al. [20] reported that ash content in bread was 1.8 g/100g. Barisik and Tavman [21] stated that ash contents of bread samples varied between 1.62-2.45%. Specifications for ciabatta flour include that ash content 0.45–0.55% [13].
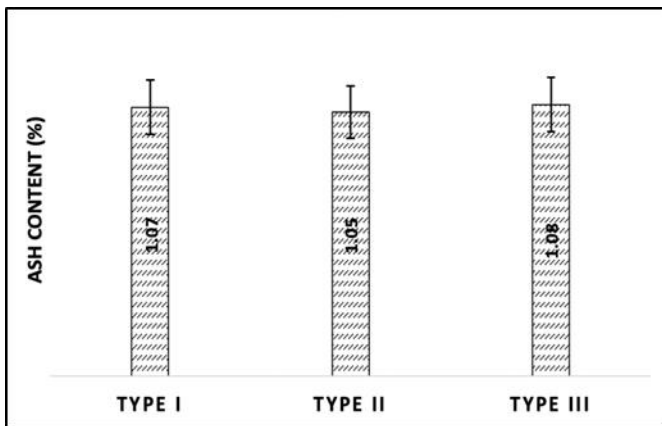

Figure 2. Ash Contents of Ciabatta Breads

Protein contents of ciabatta breads with different amounts of olive oil are shown in Figure 3. It can be seen that the protein contents of ciabatta breads were 17.13%, 16.23% and 15.71%, respectively. There were also no statistically differences among (p>0.05) breads with respect to protein content (Figure 3). Pasqualone et al. [20] found that protein content in bread was 8.5 g/100g. Barisik and Tavman [21] observed that protein contents of bread samples varied between 4.44-13.37%. Specifications for ciabatta flour include that protein content 12.5–14.0% [13].
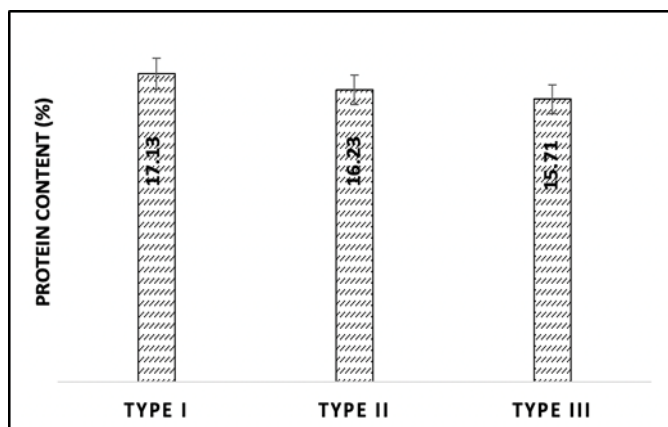

Figure 3. Protein Contents of Ciabatta Breads

Moisture contents of ciabatta breads with different amounts of olive oil are shown in Figure 4. It can be seen that the moisture contents of ciabatta breads were 26.30%, 29.54% and 22.32%, respectively. There were no significant differences between type I and type II bread (p>0.05). There were no significant differences between type I and type III bread (p>0.05). There were significant differences between type II and type III bread (p<0.05) with

respect to moisture content (Figure 4). Altamirano-Fortoul and Rosell [22] found that both the crust and crumb moisture content of ciabatta bread, which were 10.8g/100g and 37.3 g/100 g, respectively.
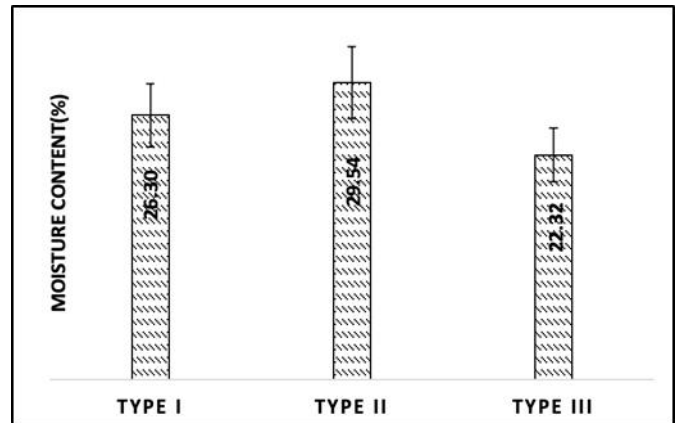

Figure 4. Moisture Contents of Ciabatta Breads

3.2. Sensory Evaluation

Sensory evaluation is important in detecting the acceptance of consumers on this formulation of ciabatta type bread. Results of the sensory evaluation are represented by a radar chart, making the results directly vivid and clear. The sensory evaluation radar maps of the three samples (Type-I, Type-II, Type-III) are shown in Figure 5. The differences and similarities of all sensory attributes was easily indicated with the radar plot.

Table 2. Sensory characteristics of Ciabatta Breads

	Types of Bread		
Sample	*Type I*	*Type II*	*Type III*
Shape and Symmetry	*4.00±0.71A*	*3.60±1.14A*	*4.00±1.00A*
Crust Colour	*3.40±1.14A*	*3.80±0.84A*	*4.40±0.89A*
Porosity	*3.60±0.89A*	*3.40±0.89A*	*3.00±1.87A*
Crumb Colour	*3.20±0.84A*	*3.80±0.84A*	*3.80±0.84A*
Bread Stickiness	*3.00±1.58A*	*3.80±0.84A*	*3.60±0.89A*
Mouthfeel	*3.00±0.71A*	*3.80±0.45A*	*3.80±1.10A*
Taste and Aroma	*2.80±0.84A*	*3.60±0.55A*	*3.80±1.10A*
Overall Acceptability	*2.80±0.84A*	*4.00±0.71A*	*4.00±1.00A*

For each parameter, Different letters in a row, indicate significant differences (p < 0.05) among bread samples.

The sensory characteristics of ciabatta type bread added with different amounts of olive oil are summarized in Table 2. There were no significant differences for eight attributes (p>0.05) (Table 2). According to the Duncan test, there were no statistically significant differences among types of bread regarding shape and symmetry (p=0.545), crust color (p=0.145), and crumb color (p=0.302), stickiness (p=0.318), mouthfeel (p=0.156), taste and aroma (p=0.104) and overall assessment (p=0.06). Vurro et al. [23] studied the use of durum wheat oil in the reformulation of Focaccia, another type of traditional Italian bread, whose classic sensory attributes are due to the presence of relevant amounts of oil in its formulation. The sensory properties of focaccia with durum wheat oil were compared with those of focaccia prepared with olive oil and sunflower oil. It was found that the type of oil significantly influenced the sensory properties of focaccia.
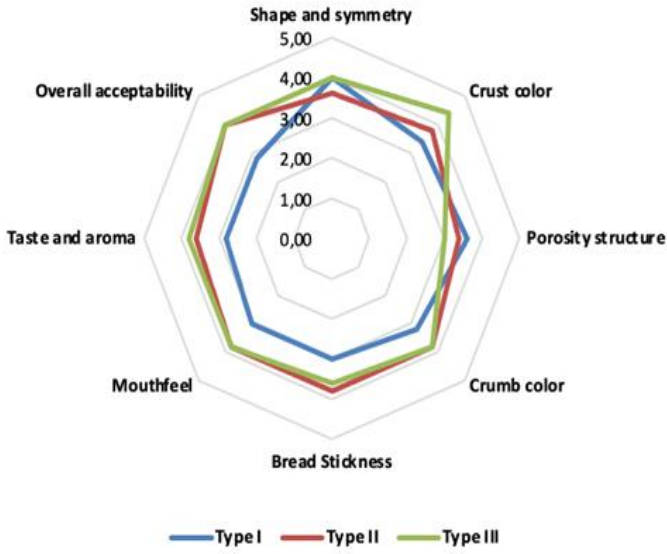
Figure 5. Radar diagram of different amounts of olive oils on the sensory properties of ciabatta bread samples.

4. Conclusions and Recommendations

The effect of the use of different amounts of olive oil on the sensory properties of ciabatta bread samples was evaluated. Considering the data obtained from this study, it was observed that the application of different amounts of olive oil on shape and symmetry, crust color and crumb color, stickiness, mouthfeel, taste and aroma and overall acceptability of breads was not affected. To better understand the effect of the use of different amounts of olive oil on ciabatta bread oxidative stability and antioxidant activity can be measured in further studies.

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