



Effect of whisking time on quality of egg omelette: A sensory experiment at home during covid-19 lockdown

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Abstract

Eggs are the encapsulated source of proteins and essential fatty acids which are consumed as an animal product. The egg white has forming property and the egg yolk imparts emulsifying property; making it a huge culinary ingredient. However, scarce information has been reported about omelette, its types and standardized recipe. In this study, effect of whisking time on quality of egg omelette was investigated by using home based sensory experiment. The eggs were whisked for different whisking time i.e. 1, 2, 3, 4, 5 minutes and were evaluated for physical parameters like volume and volume expansion ratio. The prepared egg omelette samples were evaluated for physical parameters like thickness, diameter and % sponginess. A descriptive profiling of product for different sensorial attributes with a numerical rating for overall acceptability using 9 point hedonic rating scale was carried out. The result showed that as the whisking time increased the egg volume also increased but gradually decreased after a certain whisking time. There was no significant change in weight, but the whisking time significantly affected on thickness, diameter and sponginess of the cooked egg omelettes. There was increase in thickness up to sample WEO-3 (5.06±0.11) of prepared egg omelette but maximum diameter was observed in the sample WEO-5 (16.26±0.46) prepared by whisking it for 4 to 5 minutes with large deviation. In case of sponginess, the sample WEO-3 (96.38±0.04) gave more spongy structure with least deviation. Sample WEO-3 showed lighter colour, characteristic Rubberiness and sponginess, texture wise characteristic bite and hardness with highest overall acceptability. This study can be a stepping stone in further standardization of process parameters to get a uniform product every time.

Keywords: egg, omelette, home-based sensory, experiment, whisking

Introduction

Eggs are the encapsulated source of nutrients with a moderate calorie source (140kcal/100gm) and have a huge culinary potential. The particular interest is due to well balanced and diversified nutrients with high digestibility. (Sophie Rehaalt-Godbert *et al.*, 2019) [8] Therapeutically, the nutrients present in whole egg are helpful in body building and maintenance of body and organs. Thereby, eggs were introduced as functional food in many therapeutic diets. (Fateme Moradi *et al.*, 2020) [5] From prehistoric times eggs are consumed as an animal product which provides essential amino acids as well as minerals, fats and vitamins. (Ajay Ramdurg *et al.*, 2007) [12] The egg proteins have ideal balance of amino acids and also an excellent source of essential fatty acids. The high nutritional value, the low caloric content, blandness, and the easy digestibility are the attributes that make eggs an important ingredient. (Kateryna Lomakina and Kamila Mikova, 2006) [4] The egg functionality has vital quality characteristics such as coagulation and denaturation of egg protein. The unique aerating ability by whisking or whipping the egg proteins are well known and are used as foaming properties for bakery and confectionary product. (Muhammed Yuceer and Hatice Asik, 2020) The rapid ability to absorb on the air- liquid interface during whisking and the formation of cohesive visco-elastic film by way of intermolecular interaction is the foaming ability of egg white protein. The egg yolk imparts emulsifying property due to presence of phospholipids and lipoproteins. (Kateryna Lomakina and Kamila Mikova, 2006) [4]

On this wise, eggs are used as a major ingredient in plethora of recipes and vital component of products. (E.A. Sauter and C. F. Petersen, 1980) [9] The eggs can be consumed as boiled eggs, poached eggs, shirred eggs, baked eggs, scrambled eggs and omelettes. There are many health components present in egg which gets easily assimilated when converted into these cooked forms. Among them omelette is an easy to make dish, usually consumed at breakfast, brunch or as a mid-day snack. (Valerii Sukmanov *et al.*, 2014) [10] Omelette provides immunity boosting and dense content of nutrients. (Fateme Moradi *et al.*, 2020) [5] Omelette may be defined as a cuisine made by beaten eggs, cooked flat round in frying pan.

However, scarce information has been reported about omelette, its types and standardized recipe. The standardized recipe provides a consistent quality produce with the help of exact procedure, equipments and ingredients. This ensures yielding high quality product every time with less wastage, standard portion size/cost and assured nutritional content. (Zainab Hussain, 2017) [2]

Although, the studies mentioned of egg omelettes from previous literature have more of indirect approach. Hence, the purpose of this study was to evaluate the effect of whisking time on quality of egg omelette by conducting a home based sensory experiment during COVID-19 Lockdown.

Materials and Methods

Material

White Table Eggs, Refined Sunflower Oil and Salt used in

this study were procured from local market of Kolhapur city.

Methods

1. Preparation of egg omelette

A basic process for preparation of egg omelette is given in figure no. 1.

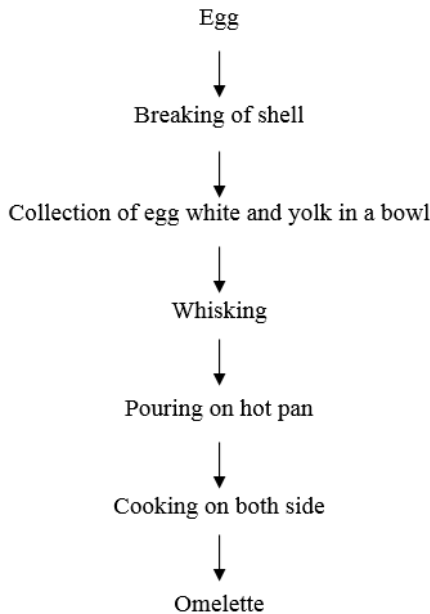


Fig 1: Flowchart for preparation of Egg Omelette

2. Effect of whisking time on physical quality of egg

The eggs were whisked for different whisking time i.e. 1, 2, 3, 4 and 5 minutes and were evaluated for physical parameters like volume and volume expansion ratio. The eggs were break shell opened and collected into a measuring cylinder and volume was measured as V1. Then the liquid eggs were transferred to a bowl and hand whisked for different whisking time using beating blade. Again the content was transferred into the measuring cylinder and volume after whisking was measured as V2. The volume expansion was calculated using following formula (Alaka Ignatius Chukwuemeka *et al.*, 2015)^[1].

$$Volume\ Expansion\ Ratio = \frac{V2}{V1}$$

3. Effect of whisking time on physical quality of egg omelette:

The whisked egg was cooked in frying pan containing 5 ml oil until it gets cooked. The prepared egg omelette samples were evaluated for physical parameters like thickness, diameter and % sponginess. The % sponginess was determined by stacking four omelette pieces of 2cm x 2cm dimension. The height (H1) was determined using calibrated scale and the pieces were compressed to 50% of height for 10 sec. The compression was released and pieces were left to regain the height (H2). The % sponginess was calculated using following formula.

$$\%Sponginess = \frac{H2}{H1} \times 100$$

4. Effect of whisking time on sensory attributes of egg omelette:

A descriptive profiling of product for different sensorial attributes with a numerical rating for overall acceptability using 9 point hedonic rating scale was carried out.

5. Statistical Analysis

The results obtained for each test were taken as an average of 3 independent observations, and were evaluated for determining the standard deviation.

Result & Discussion

1. Effect of whisking time on physical quality of egg

The result shows that as the whisking time increases the egg volume also increases which was attributed as property of egg to enclose and retain air when whisked. This property helps in giving desirable characteristics in products like cake. The leavening power of egg protein encloses air in small bubbles, which are distributed throughout the dough and on baking the air expands and the dough becomes firm holding its porous structure. Table 1 shows increase in volume after whisking till 4 minutes. But the whisking time from 4 to 5 minutes shows decrease in volume. This might be due to overbeating of eggs which breaks the protein matrix and thus escape the trapped gas.

Table 1: Effect of whisking time on physical quality of egg

Sample Code	Volume of egg (ml)	Volume of egg after whisking (ml)	Volume Expansion after whisking
WEO-1	50	52.3±0.58	1.04±0.01
WEO-2	50	81.7±0.10	1.63±0.02
WEO-3	50	89.9±0.49	1.79±0.02
WEO-4	50	100.6±0.36	2.01±0.01
WEO-5	50	97.7±0.61	1.95±0.02

2. Effect of whisking time on physical quality of egg omelette

The result showed that as the egg whisking time increases the physical quality of omelette gets increased. There was no significant change in weight, but the whisking time significantly affected on thickness, diameter and sponginess. The increase in thickness up to 3 minutes of whisking time was attributed to the air entrapment property and further reduction in thickness may be due to weakening of the protein network because of over whisking. Maximum diameter was observed in the sample prepared by whisking it for 4 to 5 minutes. The larger deviations in the measured values of diameter for these two samples justify the weakening of protein network and thus, shows increased liquidity. Whisking for 3 minutes was found optimal as the deviation was least in the diameter values. In case of sponginess, the sample with 3 minutes whisking gave more spongy structure with least deviation as compared to other whisked samples. This may be due to entrapment of air in the protein matrix formed by optimal whisking of the egg.

Table 2: Effect of whisking time on physical quality of egg omelette

Sample Code	Thickness of Omelette (mm)	Diameter of Omelette (cm)	Sponginess (%)
WEO-1	3.33±0.57	15.00±0.28	84.51±0.09
WEO-2	4.33±0.57	15.43±0.11	93.36±0.05
WEO-3	5.06±0.11	15.50±0.10	96.38±0.04
WEO-4	4.16±0.15	16.06±0.40	90.21±0.18
WEO-5	3.00±0.20	16.26±0.46	83.29±0.24

3. Effect of whisking time on sensory attributes of Egg Omelette

The result shows that the whisking time has remarkable impact on the sensory attributes of the product. In case of appearance of the product as the whisking time increases the structure of the product becomes less compact giving lighter structure. As the product becomes much lighter the surface contact of the product to the heated pan becomes less. In case of sample WEO-1 the contact was much more due to its heaviness and hence the surface of the sample was of much darker in colour. In case of sample WEO-3 the colour was lighter. The Rubberiness of the sample was a measure

of structural characteristics associated with denaturation of protein. After 3 minutes of whisking it becomes more rubbery and leading to product remain in mouth for longer time which can get justified from the results of texture. A whisking time gives a product with softer texture and less bite. So, as rubberiness increases it improves the textural property with respect to bite. In the sample WEO-4 and WEO-5 the product becomes chewy and requires more mastication which leads to reduced acceptability especially with respect to mouthfeel. The sensory description for sponginess was in-line with the results obtained in physical quality evaluation.

Table 3: Effect of whisking time on sensory attributes of Egg Omelette

Sample Code	Appearance	Rubberiness	Sponginess	Texture	Overall Acceptability (9 point hedonic rating)
WEO-1	Large dark brown patches and more compact structure	Very less	Less spongy	Less bite and soft	6
WEO-2	Small dark brown patches and slightly compact	Less	Moderately spongy	Good bite but soft	7
WEO-3	Faint brown patches and slightly porous	Characteristic	Characteristic	Characteristic bite & hardness	9
WEO-4	Moderate faint brown patches with porous structure	Slightly rubbery	Moderately spongy	Chewy and requires more mastication	5
WEO-5	Few patches and highly porous	Moderately rubbery	Less spongy	Chewy and requires more mastication as well as disintegrates into small crumbly pieces	4

Conclusion

From the literature it was observed that there is a scarcity of information about standardized process and impact of process parameters on omelette quality. Hence, the study was aimed to know the effect of whisking time on omelette quality. It was observed that whisking the egg for an optimal time improves the product quality but above which it gets drastically reduced. Whisking of egg for 3 minutes can be considered as a process parameter to achieve an omelette with highest sensory acceptability. In this way, this study will be a stepping stone in further standardization of process parameters to get a uniform product every time and can motivate researchers to implement home based strategies in product or process development during COVID-19 lockdown phase.

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