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Rheological, Physical and Sensory Properties of Mayonnaise Formulated with Sesame Oil

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ABSTRACT: Fat has an important role in creating texture, color and viscosity; but, it might be a source of many diseases in human. Mayonnaise is one of the most widely used sauces that contains fat in its formulation. There is an increase demand in reduction of the amount of fat in the diet or use of unsaturated fat. In the present study, mayonnaise samples containing various amounts of sesame oil were produced. Physical and sensory properties were carried out. Furthermore, the consistency coefficient and flow behavior index were calculated as rheological parameters. All mayonnaise samples fitted by power-low model exhibited non-Newtonian and pseudoplastic behavior. Mayonnaise containing 100% sesame oil showed maximum redness and minimum lightness. The sensory results demonstrated that increasing in the amount of sesame oil led to a reduction in overall acceptability. In conclusion, sesame oil at levels of 20% was recommended to be used in mayonnaise formulation for enhancing the nutritional value of mayonnaise.

Keywords: *Mayonnaise, Physical Properties, Rheological, Sensory, Sesame Oil.*

Introduction

Mayonnaise is known as one of the oldest and most widely used sauces in the world. The composition of mayonnaises is very close to that of various dressings (Štern *et al*., 2008). It is a sort of semi-solid, oil-in-water emulsion which typically contains high amount of fat (Depree & Savage, 2001). The emulsion is conventionally prepared by carefully mixing of egg yolk, vinegar, oil, spices and some optional ingredients such as sugar, salt or sweeteners (Depree & Savage, 2001). The carefully mixing of mayonnaise resulted to retain closely packed foam of oil droplets and to pronounced viscoelastic properties. Mayonnaise has time dependent characteristic and also pseudoplastic and thixotropic behavior (Goshawk *et al*., 1998; Peressini *et al*., 1998). Fats are a dominant composition of mayonnaise. They have many important functions on a food emulsion and contribute to sensory properties of foods such as appearance, flavor, texture and mouthfeel (McClements & Demetriades, 1998). They also have effects on rheological properties and shelf life of food emulsion (Štern *et al*., 2007).

Over the past decade, the consumption of food products which have a high nutritional value has become more than just a trend. Most of consumers stick to nutritional guidelines regarding fat consumption due to importance of type and amount of fat. There is also pressure on the food industry to moderate the consumption of fat in the diet

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or use unsaturated fat (Liu *et al*., 2007). It is recognized that the amount and type of fat consumed may cause several diseases such as obesity, some type of cancer, hypertension, gallbladder and cardiovascular diseases (Aghdaei *et al*., 2014; Liu *et al*., 2007) . In addition, it is well known that intake of saturated fat is accompanying with increased risk of coronary heart disease and high blood cholesterol (Aslanzadeh *et al*., 2012). These disadvantages have prompted a consumer to be more interest to demand reduced fat products or to use fat and oils with high nutrition of value.

Sesame is produced most in part of the world such as Asia and Africa. In fact, the main producers of sesame are India, china, Saudi Arabia, Thailand, Egypt, Sudan and Bangladesh (Elleuch *et al*., 2007). Sesame oil is known to have beneficial constituents to the health (Lee & Choe, 2012). It can be named as one of the best edible oils because of the special texture and high nutrition of value. Furthermore, it contains high amount of lignan compounds such as sesamol, sesamin, sesamolin, sesaminol, sesamolinol which particularly resulted to the inhibition of lipid oxidation (Lee *et al*., 2008). Sesame oil contains high concentration of mono-unsaturated fatty acids and tocopherols and other phenolic compounds that makes it resistant to oxidation.

Several attempts have been made to investigate the potential of some component to be used with the aim of enhancing the nutritional value of mayonnaise, reducing its caloric value and decreasing the public health concern worldwide (Shen *et al*., 2011; Tippetts & Martini, 2009). Thaiudom and Khantarat (2011) showed that 50% fat-substituted with sodium octenyl succinate could be used as a fat replacer to stabilize and increase the storage time of mayonnaise. For mayonnaise production, sunflower, corn, canola and olive oils can be used. Di Mattia *et al*. (2015) reported that mayonnaise produced with extra-virgin olive oil had the lowest firmness and consistency as compared to peanut or sunflower oils. They improved their work by doing supplementary research and confirmed the main effect of olive phenolic compounds on mayonnaise quality and stability (Giacintucci *et al*., 2016). Moreover, the rheological characteristics of mayonnaise was investigated in various studies because of its significance for designing food processing operations (mixing, pumping, heating, cooling), controlling product quality during production, choosing of formulation, creating a certain consistency of mayonnaise, optimization of process conditions, storage and transportation (Dail & Seffe, 1990; Sánchez *et al*., 2011).

Literature review shows that there is rarely a published data on sesame oil in mayonnaise formulation. Additionally, to the best of our knowledge, no previous study concerning the effect of sesame oil on rheological behavior of mayonnaise was available. Therefore, the objective of this research was to explore the optimum value of sesame oil for mayonnaise formulation. The effect of sesame oil on physical and sensory properties of mayonnaise was also investigated. Furthermore, the viscosity measurement and rheological characteristics of mayonnaise formulated with sesame oil were studied.

Materials and Methods

- *Materials*

Guar gum was purchased from Lucid Colloids Ltd., Mumbai, India. Sodium benzoate was obtained from Titran Company, Russia. Sesame oil was supplied from Samar Company, Ardakan, Yazd. Other ingredients such as sunflower oil (Ghoncheh Company), acetic acid, egg, mustard, salt and sugar were all purchased from local supermarkets. The amount of ingredients used in basic formulation of mayonnaise samples were formulated according to Table 1.

Table 1. Percentage recipe of basic formulation of mayonnaise

Ingredients	Oil	Egg yolk	Vinegar	Mustard	Sugar	Salt	Xhantan	Guar	Citric acid	Potassium sorbate	Sodium Benzoate	Water
Amount (g/100g)	65	9	7	0.3	5	1	0.11	0.04	0.03	0.03	0.03	12.5

-Preparation of mayonnaise

Mayonnaise samples containing various amounts of sesame oil were coded according to Table 2. These samples are obtained by decreasing the amount of sunflower oil from 100% to 0.

Table 2. Coding mayonnaise samples containing different sesame oil concentrations

Sample Code	Sunflower oil (%)	Sesame oil (%)
S.O.1	100	0
S.O.2	80	20
S.O.3	60	40
S.O.4	50	50
S.O.5	40	60
S.O.6	20	80
S.O.7	0	100

The mayonnaise samples were prepared in a three-step procedure. The first step was to mix all powder materials such as sugar, salt, mustard, stabilizers (xanthan and guar gums), sorbate, benzoate and water using a standard mixer (Braun, Type 4191 Turbo, 600 Watt, Spain) with a speed of 1000 rpm. Egg was also added to the mixer during stirring. Oil was then very slowly added and mixed with the water phase for 5 minutes. Finally, vinegar was gradually blended in. All the mixers were carefully homogenized with the homogenizer (IKA, Ultra Turrax, T-18, Germany). The emulsions were placed in glass container and stored in a refrigerator (+4℃) for examination after 7 and 30 days of storage. All the ingredients were at room temperature when used. pH, acidity, color, storage stability and viscosity measurements and rheological and sensory characteristics were carried out on the samples.

-pH measurements

The pH values of the samples were determined at temperature of 25℃ using pH meter (Metrohm, model691, Switzerland) according to Iran National Standard no. 2454. For doing the experiment, the solution of 5% mayonnaises was prepared. Each pH measurement of mayonnaises was carried out in triplicate order.

-Acidity measurements

The acidity values were measured according to Iran National Standard no. 2454. For each experiment, 15 g of sample was diluted in 200ml distil water. Then, titration was performed with 0.1N NaOH in the presence of phenol phetalin indicator. Three different samples were taken for each experiment.

-Color measurements

The color of mayonnaise samples were measured in the L*, a*, b* system using a Colorimeter (Hunter lab-colorflex, USA). In this color system, L* denotes the lightness ranging from black to white and a* value ranges from – (greenness) to + (redness) and b* ranges from – (blueness) to + (yellowness). Samples of mayonnaise were poured into the cells. The samples must fill the cells completely to avoid air bubbles.

-Storage stability

Emulsions are thermodynamically unstable systems. The quality and stability of the product might be at risk by substituting one ingredient with another (Tippetts & Martini, 2009). Thus, it is critical to understand how the replacer changes the stability of the product. Mayonnaise stability was determined by monitoring the samples at 7th and 30th days of storage. In all experiments, 10 g of each sample (M_0) was transferred to a test tube and placed in water bath (Model BM402, Iran) at 80℃ for 30 min. Subsequently, the test tubes were cooled to room temperature with cold water. The samples were then centrifuged for 10 min at 3000 rpm (Hettich, Roto silent/K, Germany). The weight of the precipitated fraction (M_1) was measured, and the emulsion stability was described as follow:

$$Stability\ (\%) = {}^{M_0}/_{M_1} \times 100 \quad (1)$$

-Viscosity measurements

The viscosity measurements were carried out in a rotating viscometer (Viscotech, Spain) with rotation speed of 200 rpm. Samples were carefully loaded into the test viscometer cup. Once the viscometer showed a stable numerical number, the viscosity value was recorded. All the tests were performed in triplicate order at 25℃ with water circulation using water bath.

-Rheological behavior

The rheological measurements of the samples were performed using a rheometer (Physical MCR301, ANTON paar, Austria) equipped with a temperature-control unit (Julabo Labor technik, F12, Germany). The flow properties were analyzed using a plate-plate configuration having a diameter of 40 mm and the gap of 1mm. The temperature was constant (25 ± 0.1℃) by circulating water from a constant temperature circulator. On the lower plate, 1–2 ml of sample was placed and paraffin oil was used to cover the samples for preventing dehydration. There was also special care to minimize emulsion softening at the loading time of the sample on the plate. Before measuring, samples were remained 5 min between the plates for temperature equilibration.

In general, for performing quantitative comparison of samples, it is required to fit the experimental data to some forms of mathematical model or equation. There are some useful flow models purposed for fitting the experiments data such as Carreau, Herschel–Bulkley and Power law equation to study the rheological behavior (Liu *et al*., 2007; Peressini *et al*., 1998). Here, the shear stress–shear rate data were analyzed using Power law model which is the simplest of the available models as follows:

$$\tau = K\gamma^n \quad (2)$$

where, τ is shear stress (Pa), γ is shear rate (s^{-1}), K is the flow consistency index ($Pa.s^n$) and n is the flow behavior index (dimensionless). By fitting the obtained data to Power law model, the values of flow behavior index and consistency coefficient were calculated.

-Sensory evaluation

Sensory analysis of mayonnaise samples was conducted for various parameters after 30-days of refrigeration storage. The panelists were trained to be familiar with scaling procedures and attributes of mayonnaise samples under study (Azhagu Saravana Babu *et al*., 2016). Sensory characteristics including color, taste, odor, texture, state, appearance, mouthfeel and overall acceptability were evaluated with 10 trained panelists (5 men and 5 women) whose age ranged from 25 to 35 years using a 5-point hedonic scale (1 = the least, the lowest; 5 = the most, the highest). All mayonnaise samples coded with four-digit random numbers were served on a tray in random order. Sensory assessment was carried out under light and water was provided to clean the palate between two samples (Rahmati *et al*., 2014; Shen *et al*., 2011; Salehi & Kashaninejad, 2017).

-Statistical analysis

All the tests were carried out in triplicate order. A one-way analysis of variance (ANOVA) and Tukey's test were used to establish the significance of differences in obtained experimental data. Data management and analysis were performed using SPSS (version 16.0, Chicago, IL, USA) and stated as mean ± standard deviation.

Results and Discussion

-pH and acidity measurements of mayonnaise samples

The pH and acidity values of samples at 7th and 30th days of storage are presented in Table 3. Regarding the pH for mayonnaise samples on 7th days of storage, only the S.O.4 sample had significant difference with blank sample (S.O.1), S.O.2 and S.O.3, while the others did not have significant differences. The maximum and minimum pH values were obtained for S.O.4 and S.O.2, respectively. In addition, on the 30th days of storage, the maximum pH value was obtained for S.O.4 sample. For all the samples, only a little increase or decrease in pH values were observed. This increase or decrease of pH could be interpreted according to Karas *et al*. (2002) who showed that the higher the water content and the more microbial loadings in the samples might cause the growth of acid tolerant microorganisms, for instance lactic acid bacteria. Thus, owing to the activity of lactic acid bacteria, the pH decreased during storage. There is another reason that stated an increase in pH value might be due to the dissociated acetic acid that is slightly soluble in oil (Xiong *et al*., 2000).

Considering the acidity value, the maximum acidity at 7th and 30th days of storage were obtained for blank samples with the value of 0.763 and 0.770, respectively. In addition, the minimum value was 0.600 which was obtained for S.O.4 sample.

-Color measurements

The color of mayonnaise is one of the effective parameters on overall acceptance by the consumers. The lightness (L-value) of mayonnaise had a significant impact on its appearance. Color measurements of samples at 30 days of storage are presented in Table 3. As shown, the L^* values showed significant ($p \leq 0.05$) differences among all the mayonnaise formulations. The lightness of mayonnaise prepared with 100% sunflower oil (L^* values of 81.22) were significantly (($p \leq 0.05$) higher than those of mayonnaise contained sesame oil. However, the lowest lightness was found for mayonnaise formulated with 100% sesame oil (S.O.7) as indicated by L^* values of 72.22. From this data, one might understand that increasing the amount of sesame oil will lead to an increase in a^* values and the color of mayonnaise changes toward red. The maximum b-value (yellowness) was also achieved for S.O.7 sample containing 100% sesame oil. The statistical analysis of b^* values depicted that the various samples had meaningful difference with each other. These finding are consistent with the data obtained by Amin *et al.* (2014) who showed that the L* and b^* values of low fat mayonnaise formulated with sunflower oil were significantly ($P \leq 0.05$) higher and lower than mayonnaises prepared with sesame oil, respectively.

-Stability test of mayonnaise samples

Regarding the mayonnaises stability, it can be seen from the data in Table 3 that the samples S.O.1 (100% sunflower oil) and S.O.2 (80% sunflower oil and 20% sesame oil) have the highest stability at 7th and 30th days of storage. In addition, the S.O.7 sample contained 100% sesame oil shows reduced stability at 7th and 30th days of storage. These findings might support the hypothesis that reduction in stability of mayonnaise is related to the amount and kind of fatty acids in the oils (Moslavac *et al*., 2012; Ennouri *et al*., 2005). The obtained results also match those observed in earlier studies carried out by Saberi and Mohamadifar (2012). They investigated the effect of various plants oils such as corn, sunflower, soyabean and canola oils on the stability of mayonnaise during 7th and 30th days of storage. Their results revealed that the mayonnaise samples produced with sunflower and soy bean remained more

Table 3. pH, acidity, color and stability determinations of mayonnaise samples

Variables			Samples						
			S.O.1	S.O.2	S.O.3	S.O.4	S.O.5	S.O.6	S.O.7
7 (day)	pH		3.833±0.015[b]	3.800±0.010[b]	3.816±0.020[b]	4.000±0.020[a]	3.880±0.020[ab]	3.930±0.020[ab]	3.950±0.010[ab]
	Acidity		0.763±0.015[a]	0.740±0.005[b]	0.730±0.001[b]	0.600±0.010[e]	0.690±0.010[c]	0.650±0.010[d]	0.690±0.010[c]
	Stability		100.000±2.000[a]	100.000±3.000[a]	95.000±1.000[b]	95.000±1.000[b]	94.000±1.000[b]	94.500±1.000[b]	93.607±0.012[b]
30 (day)	pH		3.834±0.031[c]	3.833±0.035[c]	3.823±0.025[c]	4.000±0.090[a]	3.890±0.020[bc]	3.933±0.035[ab]	3.940±0.020[ab]
	Acidity		0.770±0.020[a]	0.750±0.010[b]	0.740±0.010[b]	0.600±0.010[e]	0.680±0.010[c]	0.650±0.001[d]	0.690±0.001[c]
	Color	L^*	81.220±0.030[a]	79.380±0.010[b]	76.220±0.020[d]	77.820±0.040[c]	75.180±0.010[e]	73.180±0.020[f]	72.220±0.010[g]
		a^*	-2.220±0.030[a]	-2.450±0.010[b]	-2.430±0.040[b]	-1.220±0.040[d]	-1.820±0.010[e]	-1.180±0.060[d]	-1.080±0.010[c]
		b^*	16.710±0.010[d]	17.630±0.050[c]	14.120±0.010[g]	14.220±0.010[f]	14.280±0.020[e]	19.110±0.010[b]	24.360±0.010[a]
	Stability		100.000±1.000[a]	100.100±0.500[a]	94.000±2.000[b]	93.000±2.000[b]	94.000±2.000[b]	93.102±0.000[b]	89.200±0.200[c]

Values in each column followed by same letters are not significantly different ($p \leq 0.05$)

stable than the samples produced with corn and canola oils.

-Viscosity measurements of mayonnaise samples

The viscosity measurements on the 7th and 30th days of storage are shown in Table 4. The analytical analysis of the obtained results revealed that on the 7th days of storage, all the samples have significant differences. The maximum and minimum viscosity was obtained for S.O.1 and S.O.7 samples, respectively at both 7th and 30th days of storage. These results are in agreement with Ennouri *et al*. (2005) findings which showed that a decrease in viscosity value of mayonnaise samples might be due to reduction in the amount of unsaturated fatty acids and also linoleic acids.

-Rheological properties

One of the important fractions of mayonnaise is fats and oils. Overall acceptance of mayonnaise is due to its taste and high concentration of oil which improves the texture and mouthfeel of mayonnaise (Štern *et al*., 2008). Oils in mayonnaise also have a remarkable influence on rheological properties. Knowing about these properties is very useful in producing appropriate consistency and quality control of product during production and storage of mayonnaise (Kostyra & Baryłko-Pikielna, 2007). In this research, the Power law model was used to explain the relationship between shear rate and shear stress. The parameters of different samples including *k*, the consistency coefficient and *n*, the flow behavior index were determined.

As shown in Table 4, the consistency coefficient (K) related to the viscosity is the highest value for S.O.1 sample. However, S.O.7 with 100% sesame oil has the lowest value at 7th and 30th days of storage. It means that viscosity (by regarding to consistency) decreases with a reduction in the amount of sunflower oil. Consistency coefficient of S.O.1 and S.O.7 samples was 62.591±0.002 and 52.425±0.001 ($Pa.S^n$), respectively on the 7th and 30th days of storage. Furthermore, flow behavior index values of samples were achieved in the range of 0.160 to 0.204 and 0.211 to 0.244 on the 7th and 30th days of storage, respectively. The determined correlation coefficients (r^2) were ranged from 0.976 to 0.995 which indicated that the results for this model are justified. In addition, differences between mayonnaise samples were found to be significant ($P < 0.05$) with respect to the mentioned Power law parameters. These results might be related to the differences in the type and amount of fatty acids of sunflower and sesame oil (Moslavac *et al*., 2012). Since the amount of saturated fatty acids in sesame oil is higher than sunflower oil; therefore, the increase in the concentration of sesame oil in mayonnaise formulation have caused a decrease in viscosity and consistency coefficient.

Figures 1a and b show the flow curves of mayonnaise samples formulated using various amount of sesame oil on the 7th and 30th days of storage, respectively. It is clear that the relationship between shear stress and shear rate is nonlinear. The flow behavior index (n) was also found to be less than 1. Therefore, the mayonnaise samples show pseudoplastic behavior that was reported earlier by researches (Peressini *et al*., 1998; Worrasinchai *et al*., 2006). An increase in the amount of sesame oil resulted a reduction in consistency and an enhancement in index flow. It means that sunflower oil had a greater effect on flow parameters (i.e. K and n) of samples. Moreover, shear thinning and non-Newtonian flow characteristic of mayonnaises were observed. This may occurs because of different composition and properties of sunflower and sesame oils which cause differences in viscosity of these oil-in-water emulsions. Similar results were reported in the literature in which Moslavac *et al*. (2012) investigated the addition of olive oil (30% and 50%) and a decrease in the amount of sunflower oil in mayonnaise formulation that resulted lower shear stress values and smaller thixotropic loop area.

-Sensory evaluation

Scores of sensory evaluation for mayonnaise samples are shown in Table 5. The color, taste and odour scores of S.O.2 mayonnaise samples were (P > 0.05) higher than the others. Concerning the appearance, there were no significant differences among S.O.1, S.O.2 and S.O.3 samples and also between S.O.5 and S.O.6 samples. The S.O.7 sample obtained the lowest score for texture and state. The highest score for overall acceptance (4.71) was given to S.O.2 sample containing 20 % sesame oil. In addition, the lowest overall acceptance score was obtained when 100% sesame oil was used. These results suggested that an increase in sesame oil more than 20% reduced the acceptability by panelist. The sensory results of the present research are in agreement with Amin *et al*. (2014) who studied the development of low fat mayonnaise containing various types of oils. They showed that sunflower and soyabean oils were the most sensorial acceptable oils as compared to sesame, corn and olive oils.

Table 4. Viscosity measurements and model-fitting flow equation parameters of mayonnaise samples

Sample	7 (days)				30 (days)			
	K (Pa.s^n)	n	R	η_a (MPa s)	K (Pa.s^n)	n	R	η_a (MPa s)
S.O.1	78.921±0.479^a	0.162±0.0010^e	0.976	2985.000±4.000^a	62.721±0.029^a	0.211±0.0040^f	0.978	2801.000±1.000^a
S.O.2	69.111±0.003^b	0.182±0.0002^c	0.993	2977.667±3.055^b	60.231±0.002^e	0.218±0.0002^e	0.994	2754.667±0.500^b
S.O.3	66.522±0.078^e	0.161±0.0004^f	0.987	2865.000±2.000^c	60.121±0.002^c	0.234±0.0002^a	0.991	2676.000±2.000^c
S.O.4	68.501±0.004^c	0.172±0.0002^d	0.988	2754.000±1.000^e	60.402±0.001^b	0.231±0.0002^c	0.988	2632.000±2.000^e
S.O.5	66.372±0.003^f	0.160±0.0003^b	0.985	2765.000±1.000^d	53.223±0.125^e	0.221±0.0003^d	0.985	2642.000±2.000^d
S.O.6	67.325±0.002^e	0.203±0.0004^g	0.995	2731.000±1.000^f	54.711±0.004^d	0.237±0.0003^b	0.982	2612.000±0.000^f
S.O.7	62.591±0.002^d	0.204±0.0002^a	0.994	2651.607±1.000^g	52.425±0.001^b	0.244±0.0020^c	0.995	2603.000±0.200^g

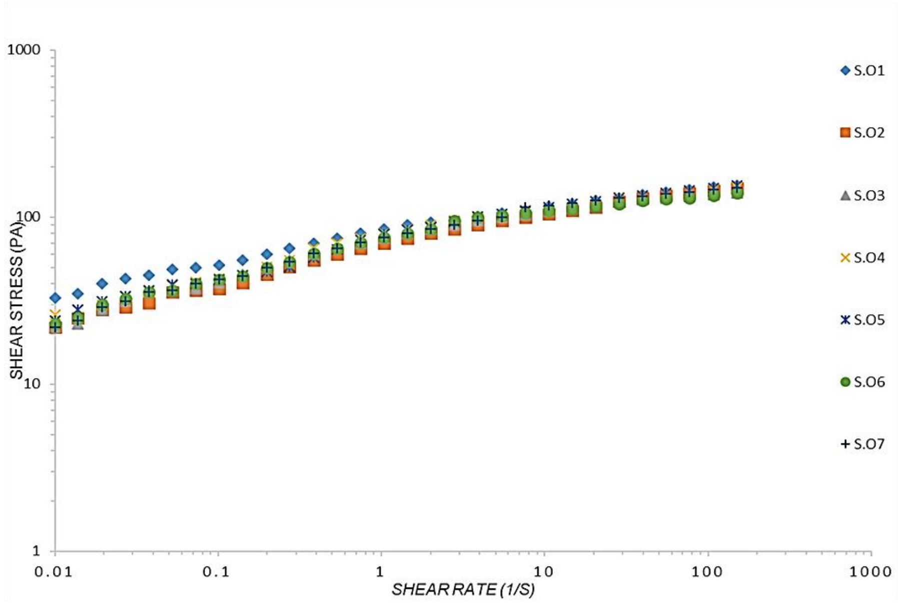
Values in each column followed by same letters are not significantly different (p≤0.05)
K, consistency coefficient (Pa s^n); n, flow behavior index (dimensionless); η_a, viscosity (MPa s)

Table 5. Sensory evaluation of mayonnaise samples

sample	taste	color	odour	texture	state	appearance	mouthfeel	Overall acceptability
S.O.1	4.710±0.020^b	4.710±0.020^b	4.570±0.010^a	4.570±0.020^b	4.480±0.010^b	4.850±0.000^a	4.420±0.010^d	4.510±0.020^c
S.O.2	4.850±0.010^a	4.850±0.040^a	4.570±0.010^a	4.140±0.020^d	4.470±0.020^b	4.850±0.010^a	5.000±0.020^a	4.710±0.020^a
S.O.3	4.420±0.030^c	4.420±0.010^c	4.000±0.020^c	4.421±0.001^c	4.570±0.010^a	4.714±0.001^a	4.420±0.010^d	4.570±0.020^b
S.O.4	4.000±0.100^e	4.420±0.010^c	3.870±0.010^d	4.570±0.010^b	4.410±0.010^c	4.280±0.020^b	5.000±0.030^a	4.280±0.020^d
S.O.5	4.000±0.020^e	4.420±0.010^c	4.280±0.010^b	4.710±0.010^a	4.420±0.010^c	4.000±0.020^c	4.000±0.100^e	4.280±0.001^d
S.O.6	4.140±0.002^d	4.140±0.010^a	4.000±0.050^c	4.710±0.010^a	4.280±0.010^d	4.000±0.250^c	4.710±0.010^b	4.280±0.005^d
S.O.7	3.850±0.010^f	4.280±0.020^d	3.850±0.010^e	4.420±0.010^c	4.150±0.010^e	3.710±0.002^d	4.570±0.020^c	4.140±0.020^e

Values in each column followed by same letters are not significantly different (p≤0.05)

a



b

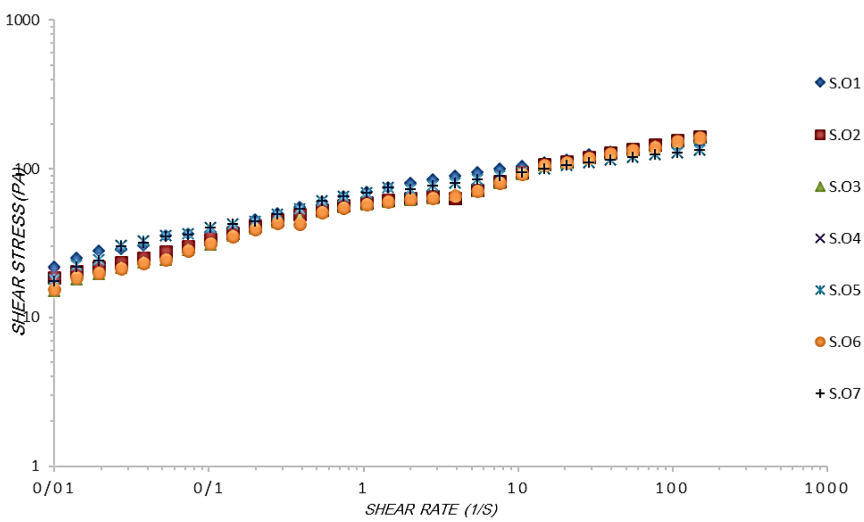


Fig. 1. Flow curves of mayonnaise samples at (a) 7th and (b) 30th day of storage.

Conclusion

The adverse health effect of over intake of fats and increased demand for mayonnaise with high nutritional value has caused to investigate a suitable formulation for this product. To produce such mayonnaise, some technical problems such as poor texture, flavor, appearance, stability, and mouthfeel must be considered to obtain a product with the same quality attributes as conventional mayonnaise. Although several projects have been carried out to reach this subject, little attention has been devoted to evaluate sesame oil in the formulation. The current study was undertaken to design mayonnaise samples formulated with sesame oil due to its high nutritional value and evaluate the physical, sensorial and rheological properties of produced mayonnaise. The results indicated that an increase in sesame oil concentration caused a decrease in values of viscosity, consistency coefficient and stability of samples. The experimental results have shown that regarding the taste, color, odour, appearance, mouthfeel and overall acceptability, the samples containing 20% sesame oil obtained the highest score. It is therefore recommended to use sesame oil at the concentration of 20% in mayonnaise formulation. The findings of this research could be useful for food industries to improve their products qualitatively.

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