



Possibility of using Tragacanth gum and whey powder as an egg substitute in mayonnaise

S.S. Amiri Aghdai^{1*}, M. Khomeiri², M. Aalami³

Received: 2013.11.16

Accepted: 2014.05.03

Introduction: Mayonnaise is typical oil in water emulsion prepared from vegetable oil, egg yolk, vinegar, sugar, salt, mustard and a variety of food additives. Among its ingredients, egg yolk is most critical in term of stability of the mayonnaise. Nevertheless, one main problem with egg yolk is its high cholesterol content; therefore different attempts have been carried out to develop low cholesterol sauces with similar characteristics to the real mayonnaise. Employing another emulsifier in addition to egg yolk, or completely replace this important ingredient, provides several advantages, including a decrease in cholesterol content. Therefore, several protein products such as whey and soy protein have been evaluated as emulsifying agents in oil / water emulsions. On the other hand, to achieve mayonnaise with appropriate emulsion properties and high stability, several investigations have been conducted mostly using proteins with various emulsifiers and gums such as xanthan and guar gums. According to the studies identified, whey powder and Tragacanth gum have considerable emulsification and consistency properties. Therefore, the goal of this research was to investigate of the effect of gum tragacanth and whey powder as an emulsifying agent in mayonnaise.

Material and methods:

Raw materials characterization

Raw materials were used in this research in order to production of mayonnaise included vegetable oil (Alia Golestan Company), water, egg, vinegar (Varda company), spices, gum tragacanth (herbal local market in Gorgan city) and whey powder (Pegah dairy company).

pH measurement and stability test

pH was determined using AOAC standard method (AOAC 2005) at 25 °C. The samples were assessed for the stability test after 24 h storage at 35 °C. Mayonnaise stability was determined after centrifugation (10 min, 2,500 rpm), and was expressed as the volume of separated phase to the total emulsion volume.

Color measurement

Mayonnaise samples were measured for color in the L*, a*, b* system using a Lovibond Colorimeter (Lovibond CAMSystem500).

Sensory analysis

After 1 day storage sensory characteristics including appearance, color, odor, texture, taste, and overall acceptability were evaluated by 14 semi-trained panel on 5-point hedonic scale (1 0 the least or the lowest; 5 0 the most or the highest).

Viscosity measurement

Viscosity measurements were performed after 24 h storage using a Brookfield viscometer Model RVDV-II (Engineering Lab Inc., Stoughton, Mass., U.S.A) with a spindle no.7 at 25°C.

Texture analysis

Mayonnaise samples were stored in refrigerator for 24 h until texture analysis. The measurements were carried out using a Brookfield texture analyzer (Brookfield LFRA texture analyzer model number 4500 texture proLite) equipped with a 38 mm diameter cylindrical probe at 25 °C.

1-Lecturer, Department of Food Science and Technology, Baharan Institute of High Education.

2 and 3-Associate Professor and Associate Professor, Department of Food Science and Technology, University of Agricultural Sciences and Natural Resources.

(*- Corresponding Author amiri516@yahoo.com)

Statistical analysis

In this study, to evaluate the effect of gum Tragacanth and whey powder on physicochemical and sensory characteristics of low cholesterol mayonnaise, statistical design was used by statistical software minitab (16) which eventually combining multiple of 10 mixed were obtained and also to draw the charts and calculation software Excel 2010 and minitab (16) were used. For this purpose, to show the relationship of each of the dependent variables in the regression model with independent variables, their mixed contour diagram was drawn by the mentioned software from the appropriate equations and also to model data, the coefficient of determination of R^2 model was determined.

Results and Discussions: The results of physicochemical, rheological and sensory tests of low cholesterol mayonnaise have been illustrated in table 1. In terms of stability, viscosity and textural properties, samples containing whey powder and gum tragacanth were appropriate as an egg substitute. Except M5, M8 and M10 samples, other samples were stable, completely. On the other hand, the maximum and minimum viscosity was observed in M6 and M5, respectively. The highest preference belonged to M9.

Table 1 – Experimental results for viscosity, hardness, adhesiveness, cohesiveness, stability and total acceptability for each sample.

sample	Viscosity(cp)	Hardness(g)	Adhessivness(mj)	Cohesiveness	Stability (%)	L*	acceptability
M1	8460	213	6.6	0.66	100	81.2	4.28
M2	8615	215.6	6.7	0.65	100	77.6	4
M3	9390	223.2	7.4	0.63	100	77.3	4.14
M4	10910	268.5	9	0.63	100	77.6	3.71
M5	4315	100.6	4.9	0.76	54.3	70.2	4.14
M6	13998	301.5	18.2	0.63	100	78.4	4.28
M7	9925	240	7.7	0.65	100	77.3	4.28
M8	5580	125	5.3	0.69	58.5	74.1	4.28
M9	9700	226.5	7.6	0.66	100	70.2	4.57
M10	5505	111	5.2	0.71	78.7	65.1	4.28

The numbers were obtained from 3 replications.

Considering optimization of low cholesterol mayonnaise formulation and study of its properties, it was revealed that 2.17 g egg, 5.28 g whey powder and 2.74 g tragacanth was an appropriate mixture in order to substitute egg in mayonnaise and making of low cholesterol product.

Keywords: Mayonnaise; Tragacanth gum; Optimization; Whey powder.