To study the physico chemical properties of flavoured mayonnaise

Gaikwad MP, Syed HM and Shinde DD

Abstract
This study aimed to evaluate the addition of skim milk powder and oil was the main ingredient and these mayonnaise are eggless mayonnaise or fat reduced mayonnaise. In skim milk powder protein, carbohydrate and mineral (mainly calcium) are present. Isoflavones, saponins and phytosterols these are the phytochemical present in soybean oil. Saponins enhance immune function and bind to cholesterol to limit its absorption in the intestine. Phytosterols and other components of soy have been reported to lower cholesterol. Isoflavones may reduced the risk of hormone dependent cancers such as breast and prostate cancer. In selected flavoured mayonnaise sample content the physico chemical properties of colour 7.8, hardness 27.5, density 4.46, refractive index 1.4746, specific gravity 0.926, total solid 65.7, carbohydrate 49.54, fat 38.64, protein 34.51, moisture 35.3, acidity 0.42, ash 0.32, pH 3.54, acid value 0.56 and peroxide value 6.5.

Keywords: physico chemical properties, flavoured mayonnaise, skim milk powder protein, Isoflavones

Introduction
The word mayonnaise was not used for a dressing before the start of the 19th century. Mayonnaise belongs to the food products widely consumed in Europe. It has been in existence origin France. It is first produced commercially in early 1900s, becoming popular in America from 1917 to 1927 and recently in Japan where sales increased by 21% in the years from 1987 to 1990. Because of its low pH and high fat content, mayonnaise is relatively resistance to microbial spoilage (Depree and savage, 2001) [4].

Mayonnaise the oil-in-water emulsion where oil is the discontinuous phase and water is the continuous phase obtained by emulsifying edible vegetable oil in an aqueous phase (Pradhanganga and Adhikari, 2015).

Iranian national standard has specified three types of mayonnaise regarding the fat content 1) ordinary mayonnaise with min. 66% fat, 2) reduced fat mayonnaise with min. 25% fat reductions compared to the ordinary one, 3) low-fat mayonnaise with 50% fat reduction as compared to the ordinary counterpart. Among the most evident examples are dressing for which well known variants “reduced - fat”, “light low - fat” and “fat - free” have been developed (Sabaghian et al., 2014).

Mayonnaise is an oil-in-water emulsion containing 70-80% fat. Oil in water emulsions consist of finely dispersed droplets of oil in a continuous phase of water or a dilute aqueous solution. Droplet size range is from less than 1μm to 20μm or more. This emulsion is formed by mixing the eggs, vinegar and spices, and then slowly feeding the oil, resulting in a closed-packed foam of oil droplets or coarse emulsion. Dissimilarly, if the aqueous and oil phases are mixed at once the result is a water-in-oil emulsion, whose viscosity is similar to the oil from which it was made (Depree and Savage, 2001) [4]. Vegetable oils, the main ingredient in mayonnaise, have an important function in an emulsion; they contribute to the taste, the appearance, the texture and the oxidative stability of the emulsion in a very specific way (Moslavac et al., 2012) [10].

The main role in mayonnaise production is composition ratio of oil phase and the addition of various emulsifier, stabilizer and thickener. Texture depends on oil, the more oil is used then the better texture is resulted. Oil has important function in characteristic of rheology. Fat as one of the main ingredients, has positive influence on the rheological properties and sensory characteristic of final product. High fat intake as associated with increased risk of obesity, some types of cancer, cardiovascular diseases, and hypertension. The production of low fat mayonnaise is normally associated with some technical problems such as poor texture, flavour, appearance stability, and mouth feel (Amin et al., 2014) [3].

Skim milk powder acts as binder for improving the functional properties and maintaining the nutritional value of low value binder’s used. Stabilizer can be used 1g/kg or in combination.
Stabilizer used mainly are guar gum, xanthan gum and pectin etc used singly or in combination. Water is used to make 100% in the mayonnaise formulation (Pradhanganga and Adhikari).

**Materials and methods**  
**Materials**  
Grinder, Hot air oven, Soxhlet apparatus, Atomic absorption spectroscopy, Microjeldhal apparatus, Muffle furnace and titration unit.

**Method’s**  
**Moisture content**  
Moisture content will be measured using a drying-oven. (AOAC, 1995).

**Carbohydrates content**  

**Protein Content**  
Total nitrogen content will be measured using the standard Kjeldahl methods. (AOAC, 1990) [1].

**Fat Content**  
The fat content will be determined by Soxhlet apparatus. (A.O.A.C., 1990) [1].

**Ash Content**  
Total Ash content will be determined according to the method described in (AOAC, 1990) [1].

**Mineral content**  
Mineral content will be determined according to the method described in (AOAC, 1990) [1].

**Specific Gravity**  
Specific gravity determined by specific gravity bottle.

**Result and discussion**  
**Physical properties of flavoured mayonnaise**  
The physical properties of flavoured mayonnaise such as hardness, density, colour, refractive index and specific gravity were studied. The results on physical characteristics of flavoured mayonnaise are given in table-1.

<table>
<thead>
<tr>
<th>Table 1: Physical properties of flavoured mayonnaise</th>
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<tbody>
<tr>
<td><strong>Physical property</strong></td>
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<td>T₀</td>
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<td>T₁</td>
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<tr>
<td>T₂</td>
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<tr>
<td>T₃</td>
</tr>
<tr>
<td>SE (±)</td>
</tr>
<tr>
<td>CD at 5%</td>
</tr>
</tbody>
</table>

*Each value represents the average of three determinations

T₀-35% SMP +75% Oil +0% Cardamom flavour  
T₁-35% SMP +75% Oil + 0.5% Cardamom flavour  
T₂-35% SMP +75% Oil + 1% Cardamom flavour  
T₃-35% SMP +75% Oil + 1.5% Cardamom flavour

The results obtained in table 8 showed that physical properties of flavoured mayonnaise. The hardness of control sample was found to be 10.27 g, which was considerably lower compared to other formulations. The maximum hardness was recoed by T₁ (28.86 g) followed by T₂ and T₃.

Colour of flavoured mayonnaise in T₀ sample was yellow creamish because of the usage of 75% of soyabean oil and in T₁, T₂, T₃ formulation content higher skim milk powder that the colour was creamish white. Refractive index of flavored mayonnaise was lower in T₁ were 1.4731(Abbes, 27 °C) and specific gravity of flavoured mayonnaise T₂ was higher 0.926 (mg/ml) respectively.

Oils have own refractive index so their refractive index were considered to identify oils and fats, discover any adulteration, and perceive their impurities. Refractive index is directly dependent on oil fatty acids such that the more unsaturated oil or the higher iodine value, the higher refractive index. The present result was more or less similar with Talkit et al., (2012) [13].

**Chemical properties of flavoured mayonnaise**  
The chemical properties of flavoured mayonnaise viz., moisture, fat, carbohydrate, protein, ash, acidity and pH were analysed. The results obtained given in table 2.

<table>
<thead>
<tr>
<th>Table 2: Chemical properties of flavoured mayonnaise</th>
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<tr>
<td><strong>Chemical properties g/100g</strong></td>
</tr>
<tr>
<td>T₀</td>
</tr>
<tr>
<td>T₁</td>
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<tr>
<td>T₂</td>
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T₂- 35% SMP +75% Oil + 1% Cardamom flavour  
T₃- 35% SMP +75% Oil + 1.5% Cardamom flavour

From the present investigation it was observed that the chemical properties of flavoured mayonnaise. The highest moisture was observed for T₂ 35.3 (g/100g). Amin et al., (2014) [5] reported that the higher moisture content of the low fat mayonnaise which consequently diluted the colour of the...
sample producing of creamish white colour, which was more preferred by the panelists than the yellow colour of the full fat mayonnaise resulted from the high concentration of oil. Akoh and Min, (2002) water is considered a key component when replacing fat using a carbohydrate based fat replacer. Water forms a gel like structure with the xanthan gum, which enhance texture of T1, T2, T3 because of low fat mayonnaise. Ford et al., (2004) reported that fat content emulsified product could be reduced by replacing the fat droplets with biopolymers such as gums and starch. The fat content lower in T1, T2, T3 because of used the lower soyabean oil, less or more similar result to Evanuarini et al., (2015) Carbohydrates observed for highest in the T2 sample 49.54 (g/100g), the protein content for lower in sample T1 were 34.74 (g/100g).

The ash content observed lower in sample T0 were 0.31 and higher in T1 were 0.34 (g/100g) more or less similar result to Johary et al., (2015) and Aghadei et al., (2014), acidity of the flavoured mayonnaise observed in the formulation lower in T0 sample and higher in T3 were 0.43, 0.43 (g/100g), pH of flavoured mayonnaise higher in T2 and lower T1 were 3.81, 2.60 (g/100g) respectively more or less similar result to Pradhanganag and Adhikari, (2015) and Aizpurua and Filho, (2005).

**Mineral composition of flavoured mayonnaise**
Efforts were made to analyze the mineral content of flavoured mayonnaise. Table-3 shows the composition of the minerals, i.e., Ca, Mg, Fe and Zn.

Table 3: Mineral content of flavoured mayonnaise

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Calcium (mg/100g)</th>
<th>Magnesium (mg/100g)</th>
<th>Iron (mg/100g)</th>
<th>Zinc (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>1300</td>
<td>150</td>
<td>1.35</td>
<td>2.60</td>
</tr>
<tr>
<td>T1</td>
<td>1250</td>
<td>130</td>
<td>1.25</td>
<td>2.35</td>
</tr>
<tr>
<td>T2</td>
<td>1260</td>
<td>125</td>
<td>1.23</td>
<td>2.30</td>
</tr>
<tr>
<td>T3</td>
<td>1265</td>
<td>130</td>
<td>1.23</td>
<td>2.35</td>
</tr>
<tr>
<td>SE (±)</td>
<td>0.026</td>
<td>0.200</td>
<td>0.293</td>
<td>0.014</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>0.0783</td>
<td>0.5871</td>
<td>0.8561</td>
<td>0.0415</td>
</tr>
</tbody>
</table>

*Each value represents the average of three determinations

The mineral of flavoured mayonnaise possessed Calcium in T0 1300 mg/100g which was a control sample, T1 has 1250 mg/100g of calcium which was lowest among all prepared formulations, the calcium content of T2 and T3 were at moderate level against control sample. The Magnesium content was found higher in T0 sample which was 150mg/100g and lowest in T2 125mg/100g. The iron content of flavoured mayonnaise in control was observed to be highest among all 1.35mg/100g followed by T1 1.25 mg/100g. The zinc content of flavoured mayonnaise for T0, T1, T2 and T3 were given to 2.60, 2.35, 2.30 and 2.35 (mg/100g) respectively.

**Summery and conclusion**
The physico chemical properties of flavoured mayonnaise that content highest moisture was observed for T2 35.3 (g/100g). Carbohydrates observed for highest in the T2 sample 49.54 (g/100g), the protein content for lower in sample T1 were 34.74 (g/100g). The ash content observed lower in sample T0 were 0.31 and higher in T1 were 0.34 (g/100g). Acidity of the flavoured mayonnaise observed in the formulation lower in T0 sample and higher in T1 were 0.43, 0.43 (g/100g), pH of flavoured mayonnaise higher in T0 and lower T3 were 3.81, 3.67 (g/100g).

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The peroxide value detect the degree of unsaturation in oil. Peroxide value of flavoured mayonnaise for T0, T2, T3 and T4 were 7.3, 6.1, 6.5 and 6.3(meqO2/kg oil) respectively. Saponification value of flavoured mayonnaise observed for T0, T2, T3 and T4 were 0.65, 0.77, 0.75 and 0.77(KOH/g of oil) respectively. Acid value of control sample i.e. higher fat content mayonnaise than the lower fat content mayonnaise of T0, T1, T2, T3, reading observed were 0.58, 0.51, 0.56 and 0.53(mg KOH/g of oil). Iodine value observed to be 144.5, 141.7, 143.2 and 141.21(g of I2/100g of oil) for T0, T2, T3 and T4 sample respectively.

**References**
12. Sebaghian A, Ghazani SM, Marangoni AG. Quality and