STUDIES REGARDING OBTAINMENT AND THE CHARACTERIZATION OF DIFFERENT TYPES OF HOMEMADE CHOCOLATE WITH FRUIT ADDITION

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Abstract

It is known that homemade chocolate is the most important and popular sweet product used in the diet of children and adults, due to its attractive taste and caloric value.

The special nutritional qualities of chocolate are conferred by compounds with biological activity in its composition. The representative compounds from chocolate are antioxidants, macro- and micronutrients, sugar, and stimulants such as caffeine and theobromine.

In our study we show how fruits addition can influence the physico-chemical properties of homemade chocolate. The used fruits were been frozen fruit.

Experimental part is based on some physico-chemical determination (content of water, dry content, total mineral content et al.) in order to evaluate the nutritional characteristics of the product.

Key words: *chocolate, diet, sour cherry fruit, caloric value*

Introduction

The history of chocolate starts from the cocoa tree cultivated by the Mayan populations of the Yucatan in the 6th century AD, which would have left us a fruit, compared, since then, with gold. Chocolate came to Europe in the 16th century. From that moment, the modern chocolate industry has developed, and cocoa seeds are now processed in different ways [1].

Nowadays, chocolate is recognized for its beneficial health qualities. Thus, it is shown that, eaten in moderate amounts, chocolate is lauded for its remarkable antioxidant potential due to the high content of biologically active phenolic compounds from cocoa powder.

The purpose of this study was to evaluate the physical, chemical characteristics (content of water, dry content, total mineral content, total antioxidant capacity) and sensory aspects in case of simple homemade chocolate and homemade chocolate with fruit addition, in order to evaluate the nutritional characteristics of the chocolate products.

Material and Methods

Chemicals and materials: All chemicals and reagents were analytical grade or purest quality purchased from Sigma, Merck, Aldrich and Fluka, bidistilled water was used. Absorption determination for CUPRAC and total polyphenols content was made using SPECORD 205 spectrophotometer by Analytik Jena.

Humidity, dry mater and total mineral content

Samples weight was measured by using a digital balance with a sensitivity of 0.001 g. Gravimetric method was used to determine the moisture of samples, using a moisture analyzer Nabertherm model 6/11 with automated programming and electronic display. The level of moisture was tested for all samples by heating a known weight of sample in the hot air oven (100±5°C) until constant weight [2].

Moisture content can be determined from total solid content (TSC) as below [3]:

Moisture (%) = 100 – TSC(%), where total solid content (TSC) represent dry matter.

In order to determine the total mineral content (ash), the samples were washed with deionised water, dried, chopped, dried and then calcined in the Nabertherm LE4 oven (Germany), at 505 ^{0}C. The temperature was gradually raised to 505 ° C (when the ash became gray-white and the mass of crucible with the burned sample remained constant).

Evaluation of total antioxidant capacity (TAC) by CUPRAC method: CUPRAC method [4-9] depends upon the reduction of cupric neocuproine complex to the cuprous neocuproine complex by a reductant at low pH. The neocuproine complex can be monitored at 450 nm.
As reference substance, we have used Trolox (6- hydroxy-2,5,7,8-tetramethilcroman-2-carboxylic acid), an antioxidant with a structure similar to vitamin E. Reagents: 0.01M $CuCl_2$, 7.5·10-3M neocuproine (2,9-Dimethyl-1,10-phenanthroline) and acetate buffer. 1mL 0.01M $CuCl_2$ solution were mixed with 1mL neocuproine (7.5·10-3M) and 1 mL acetate buffer. At this solution was added 1.1 mL sample (alcoholic extract). For blank it was used ethanol 20%. The absorption was read after 1/2 hours at 20°C, at 450 nm. All determinations were performed in triplicate. Total antioxidant capacity (TAC) by CUPRAC in all samples were expressed as mmol Trolox/g fresh weight (FW).

All analytical determinations were made in triplicate.

Samples preparation: The following ingredients were used to make homemade chocolate: 250 g powdered milk, 250 g sugar, 150 g margarine, 50 g cocoa, 50 g sour cherries and 90 mL water. The ingredients are homogenized by heating.

Results and discussion

The obtained data regarding water content and dry mater content in our homemade chocolate samples are represented in fig. 1.

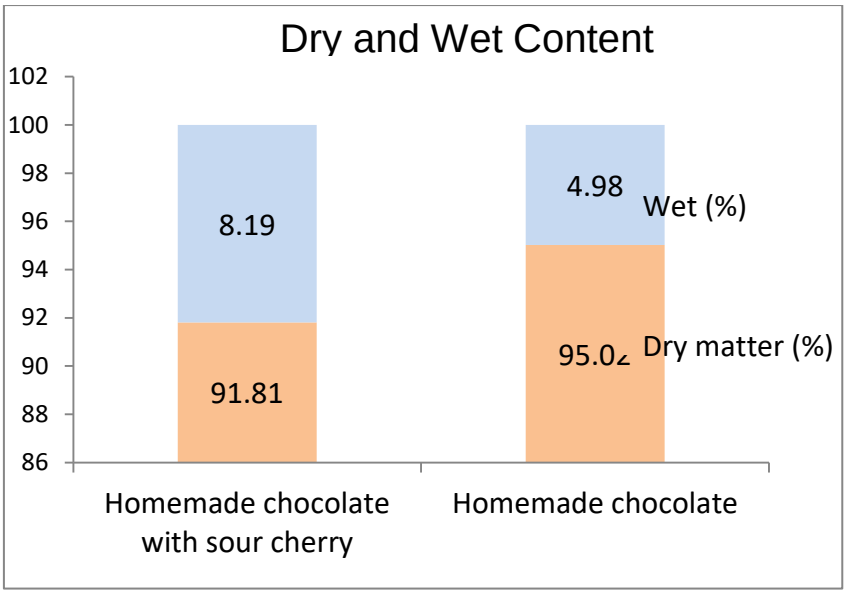

Figure 1. Content of humidity and dry mater in homemade chocolate samples

In the present study water content values are higher in homemade chocolate with fruit addition (8.19%) that in simple homemade chocolate (4,98%). This can be explained by the fact that the fruits come with a water content.
The different values in water content are depending on the recipe for the preparation of chocolate and also on the quantities and type of ingredient used.

In fig. 2 we are presenting total mineral content (ash) values.

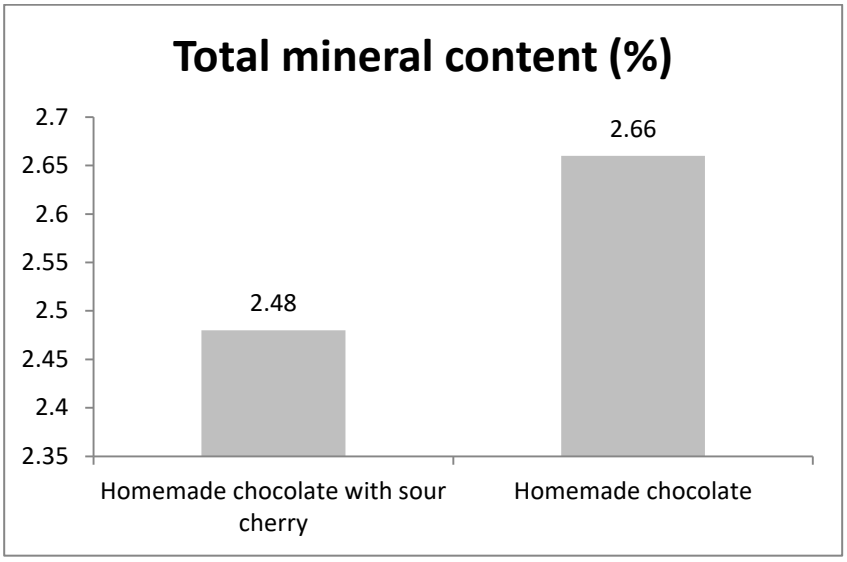

Figure 2. Total mineral content in homemade chocolate samples

The content of total mineral substances is higher in simple homemade chocolate.

The results for total antioxidant capacity (TAC) by CUPRAC method are presented in figure 3 and figure 4.

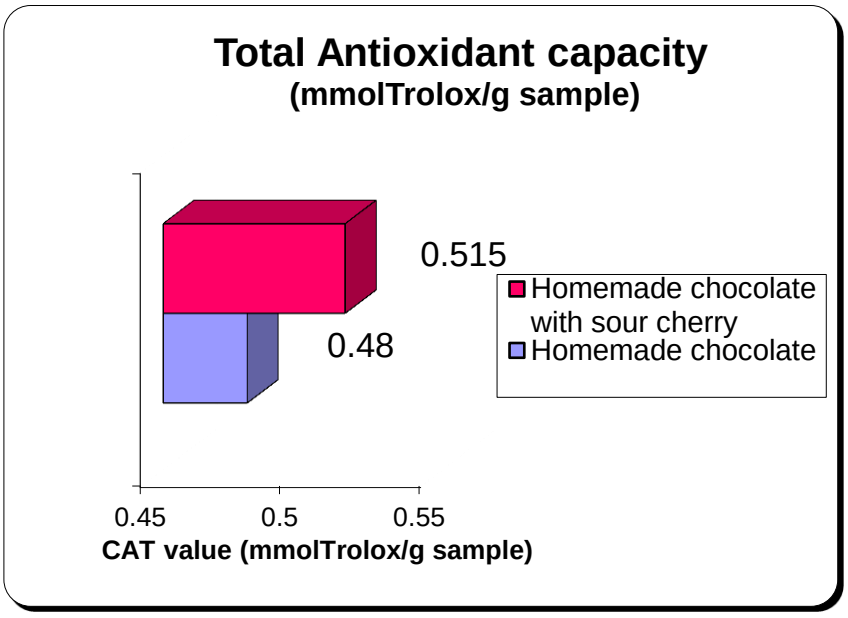

Figure 3. Total antioxidant capacity of homemade chocolate samples

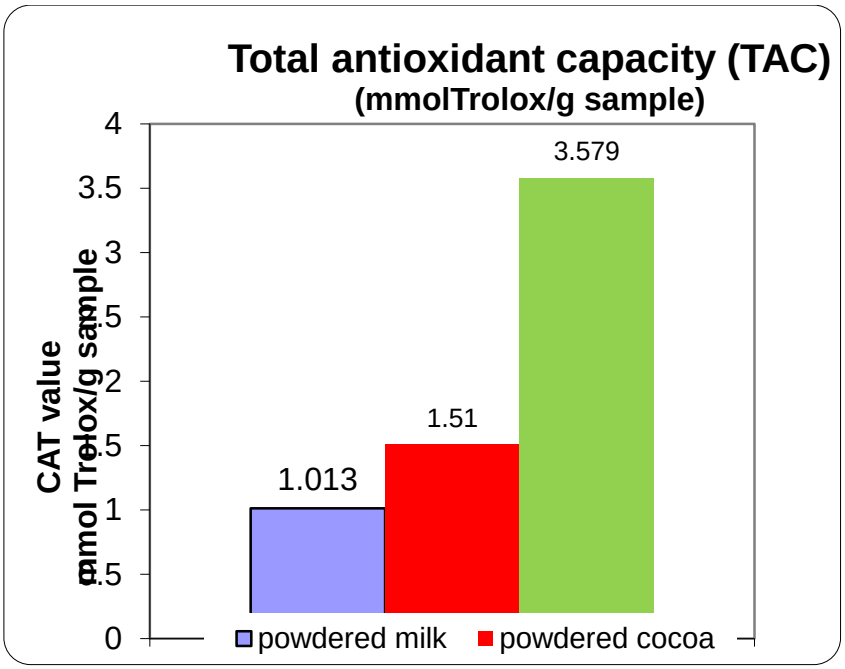

Figure 4. Total antioxidant capacity of ingredients used for obtained homemade chocolate

The TAC value is between 0.48 and 3.60 mmolTrolox/g sample. The ingredients have higher TAC values. The highest TAC value is in the case of cherry fruits.It was expected that more value would be for cocoa. It seems that the cocoa used was old or of poor quality. It is noted that the chocolate has a low TAC value, because she is obtained by heat treatment of the ingredients.

The results obtained from the processing of the data from the sensory analysis data sheet suggest that, overall, simple homemade chocolate was the most appreciated in terms of consistency (see fig.5).

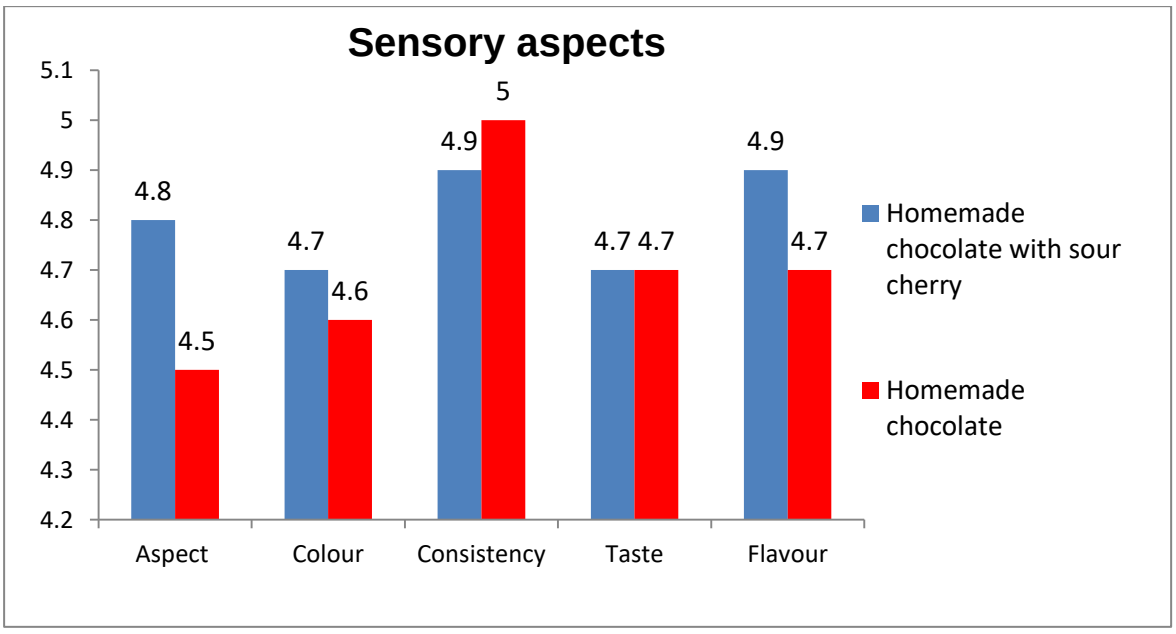

Figure 5. Sensory aspects for homemade chocolate

In contrast, homemade chocolate with fruit is more appreciated for its colour, appearance/aspect and flavour.

Conclusion

Homemade chocolate is a food with high nutritional value, attractive appearance, which is at the same time an important source of energy. Due to the antioxidants contained in cocoa powder, as well as the fruits added to our recipe, which are high in vitamin C, homemade chocolate is a food product successfully used to combat cell aging due to the free radical initiation process and prevention of oxidative stress with negative role on health.

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