

Original Article

Assessment Of Milk Fat Content And Certain Heavy Metals In Various Cheese Types (W. Libya).

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ABSTRACT

Purpose: The objective of this study was to determine some of heavy metals (Pb & Cd), milk fat and solid materials in dry weight percentage with digestion in cheeses which comparing with Libyan standards.

Method: This study was conducted in Center for Food and Drug Control in Tripoli Branch by used five different samples from local and imported of processed cheeses which called (Alwald aldhaki, Alrebeyh, Al-Moutamaiez, Al-Moutafawek and Daily). The samples were collected from the markets of Sabratha city in western Libya.

Results: Moreover, results showed that the milk fat and solid materials in dry weight were (39.9 & 55.1%, 41.5 & 60.3%, 40.8 & 53.9%, 53.3 & 50.6% and 43.6 & 50.4%) as order respectively, this mean that were conforming to standard specifications. According to that results, amounts of heavy-metal in dairy products are considered not to be of great concern to public health.

Conclusion: The study recommended encouraging dairy industry in Libya to consume these types of cheeses, through strict control for food transportation and stores.

Keywords: Milkfat, solid materials, Heavy metals, and Cheeses.

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INTRODUCTION:

Cheese is one of the most common and consumed foods around the world. According to⁽¹⁾ that "cheese is the most diverse group of dairy products and is arguably the most academically interesting and scientifically challenging. In fact, that cheese is made from milk, and that milk comes from various animals like goats, sheep, cows, camels, and buffalo". In addition, there are several rich sources such as minerals, protein, carbohydrates and vitamins that come from eating cheeses⁽²⁾. Most cheese makers expedite the curdling process with rennet, lactic acid, or plant extracts, such as the vegetable rennet produced from wild artichokes, fig leaves, safflower, or melon. There are a large number of different names (varieties) of cheeses resulted from the long history of cheese manufacturing⁽³⁾. Moreover, Libya becomes one of the more countries consumption to the dairy products especially, types of processed cheeses. There are three major constituents which include protein (casein), fat and water (brine) for all cheeses properties⁽⁴⁾. The features exhibited by a cheese are affected by the fatty acid composition of the milk utilized in its making⁽⁵⁾.

The formulate processed cheeses have many other optional ingredients depending upon the desired flavour, colour and functional characteristics, other than natural cheese is often a blend of cheeses. A study by⁽⁶⁾ has shown that optional ingredients may include dairy ingredients, condiments and preservatives. "The determination of heavy metals in dairy products, especially cheese, presents various challenges, due to the complexity of the matrix and the extremely low levels of concentration, in which the elements are found"⁽⁷⁾. The toxicity represents a severe risk which is caused by heavy metals in food and feed. Moreover, the toxicity of cadmium (Cd) and lead (Pb) content of cheese is due to several factors – in particular – the manufacturing process, environmental conditions and the possible contamination during several methods of the manufacturing processes⁽⁸⁾. As triangles cheeses are easy and palatable to eat in children, on the other hand, the increased concentrations of heavy metals (especially Cd and Pb) are particularly more sensitive in children, due to their tissues and organs accumulate high concentrations of contaminants in their health⁽⁹⁾. Trace metals have been also related to many diseases such as; cardiovascular diseases, depressed growth, nervous and immune system disorders, increased spontaneous abortions, impaired

fertility and elevated death rate among infants has been mentioned by

⁽¹⁰⁾. Finally, the aim of this work was to identify the concentrations of some heavy metals, milk fat and solid materials in dry weight in processed cheeses to evaluate to what extent these metals may be present in dairy products for human consumption as comparing with Libyan standards.

METHODS AND MATERIALS:

Sampling and analysis

The data for this study was collected from five different types of processed cheeses which namely (Alwald aldhaki, Alrebeyh, Al-Moutamaiez, Al-Moutafawek and Daily) were randomly purchased from various supermarkets in the Sabratha city in Libya. All samples were conducted in the Control Center for Food and Drug in Tripoli branch. Furthermore, samples preparation and analyzed milk fat and solid materials in dry weight by a used wet digestion Gerber method in a chemical lab. As for being known that the purpose from this manual method is identified the solid materials and milk fat in dry weight. The Gerber Method is the primary and rapid testing method in Europe and worldwide⁽¹¹⁾.

The samples then are analyzed for some heavy metals content (Cd & Pb) in another door by using systems 200 series AA and Graphite Tube Atomizer (GTA 120). Duplicate of (0.5g) of each sample and then added (5 ml) of nitric acid and put on a heater for 4 to 5 hours of hydrogen peroxide by concentrated 30% and kept samples for 30min, then added hydrogen peroxide again and Filtered with water-distilled. Finally, put samples on Atomic Spectrometer (AA 200 & GTA 120) via concentrated 70% of nitric acid. As to be shown in (Table 2).

Statistical analysis

All statistical analyses were carried out using the Excel 2013 software. The obtained data on the content of the studied were compared with standard specification.

RESULTS:

This study was carried out to estimate the concentration of milk fat, solid materials in dry weight and some metal contents of different types of cheese. According to results showed that the milk fat and solid materials in dry weight for each type were (39.9 & 55.1%, 41.5

& 60.3%, 40.8 & 53.9%, 53.3 & 50.6% and 43.6 & 50.4%) respectively (Table 1).

Table 1- Concentration of milk fat and solid materials in dry weight (%).

(%)Milk fat in dry weight	(%) Dry solid materials	Type
%39.90	%55.10	Alwald aldhaki
%41.50	%60.30	Alrebeyh
%40.80	%53.90	Al-Moutamaiez
%53.30	%50.60	Al-Moutafawek
%43.60	%50.40	Daily

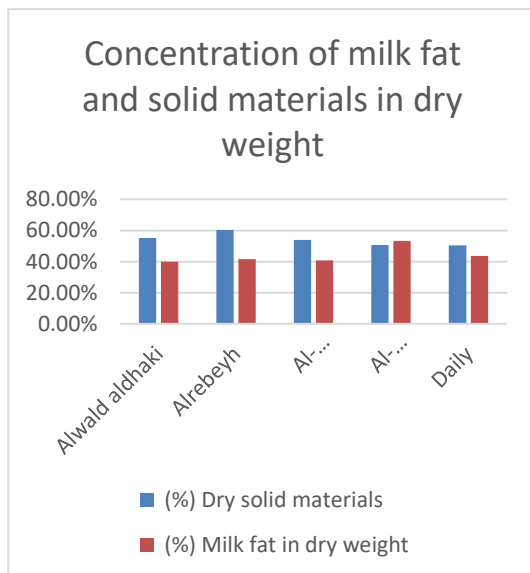


Figure 1- concentration of milk fat and solid materials in dry weight.

Metal contents Cadmium (Cd) and Lead (Pb) of the samples were determined by AA 200 & GTA 120. During digestion procedures and analysis, the average Cd content was 0.00005 mg/kg in the samples are reported in (Table 2), contrast by Pb was 0.0006 mg/kg.

Table 2 - Types, weight and some heavy metals for each type of cheese

Pb	Cd	Weight	Cheese Type
0.0006	0.00005	0.368	Alwald aldhaki
1	1	0.234	Alrebeyh
1	1	0.7	Al-Moutamaiez
1	1	0.484	Al-Moutafawek
1	1	0.333	Daily

Maximum limits of some heavy metals allowed in cheese (µg.kg).

Food products	Cd	Pb	Food products
Cheese	0.05	0.25	Cheese

As to result, that all concentration was the same, so put number 1 to represent that (Table 2).

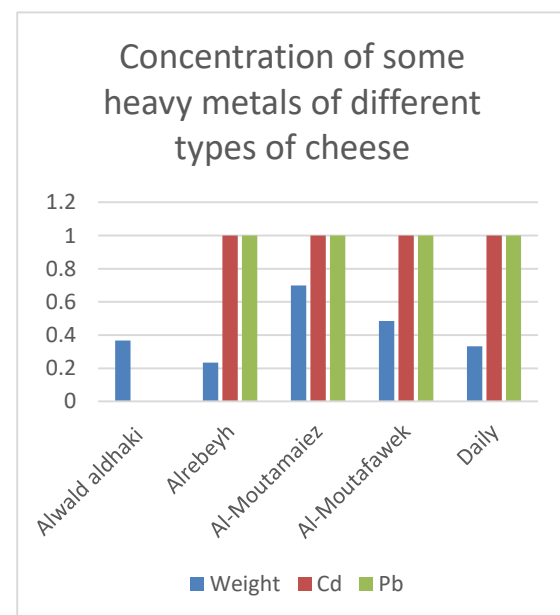


Figure 2- concentration of Cadmium (Cd) and Lead (Pb) in different types of cheese.

DISCUSSION:

The main aim of this study was to compare five types of cheese that were represented in the topic. The proportion of milk fat was (53.3 %) in Al-Moutafawek type of samples (Table1), which were slightly higher concentration compared with other types of cheese. In addition, the proportion of solid materials was a higher concentration in Alrebeyh type (60.30%). That be known the Libyan standard

requirements noted that the proportion of milk fat and solid materials with dry weight ($\leq 50\%$). Hence, means that all results were almost similar to that specification, as to be shown by (Table & Figure 1). Moreover, the concentration of these metals was in the Cd and Pb that means no significant differences were observed among different types of cheese in terms. In comparison with Libyan standards in metal content of Cd 0.05 mg/kg and Pb 0.25 mg/kg. In all samples of milk and its products were contain cadmium in an amount less than the authorized limit¹². In the cheese samples results, there were no significant differences between kinds of cheese in terms of metal content, the average value of this study was compared. This is confirmed by other studies¹⁰. Consequently, confirmed by this previous study¹³ that the samples was not present a major threat to public health regarding heavy metal contamination.

CONCLUSION:

According to the results obtained, there are no significant differences between kinds of cheese in terms of metal content, milk fat and dry solid materials as to be compared by Libyan standards. In this context, can be concluded that the five different types of cheese are free from

contamination of some metal and considered not to be of great concern to public health.

As to be mentioned above, consumption of processed cheeses which is high in Libya, therefore it should be maintained on cheeses manufacture and control for all imported dairy products.

RECOMMENDATIONS

According to the information that has been collected in this paper regarding the Control Center for Food and Drug sector functioning in Libya the following suggestions are made for a better future plan to eliminate health hazard.

- Further investigations of the levels of metals and milk fat in bigger number in cheese and also in other dairy products.
- Food products transportation and stores should be monitored over a longer term.

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