



Estimation of some preservatives in dairy products available in the local market

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Dairy is considered one of the basic foods that humans eat on a daily basis, and some chemicals that are allowed to use in the food industry as Preservatives can be used in the food industry as materials can enhance certain of the product's physical properties or as preservatives that act as antimicrobials to keep food as fresh as possible. but in defined proportions that agree to set standards. Humans who are subjected to it get allergies, intestinal infections, and other health problems. The study examined some kinds of imported cheese and milk cream that were sold in Baghdad's market places. to detect some chemicals in them and estimate their quantities, and they included formaldehyde, hydrogen peroxide, and benzoic acid. The study's findings indicated that the samples were free of formaldehyde and hydrogen peroxide, which was identified using reagents and basic chemical methods, while benzoic acid was detected using high-performance liquid chromatography technology., and indicated that the samples contained benzoic acid within the permissible limits, which do not cause health damage to the consumer. The results obtained are in line with the required standards. Iraqi. Humiliation as a solid proof that these goods are safe for ingestion for people and are free of chemical additives.

Keywords: Benzoic acid, dairy products, cheese, and preservatives.

INTRODUCTION

Obtaining good quality food has been and still is the main goal of human since his existence on the surface of the earth. Food safety is a essential for its quality, and what is meant by food safety is that it is free or contains acceptable and safe levels of chemicals, impurities, or additives that are naturally present, or any other substance that makes it Food is severely or chronically harmful to health, and food quality can be considered a composite characteristic of food that determines its value to consumers and their acceptance of it (Belli,P., Cantafora, A.&others2013).

The importance of chemical preservatives has increased with food. The increase of processed food production, and these substances are added to foods deliberately to stop or delay spoilage and loss of nutritional value due to microbial, enzymatic and chemical changes, which leads to prolonging the storage life of these foods (Egyption standerd1954).

The daily dairy product consumption is essential for maintaining and stay healthy. They contain high amounts of fats, proteins, mineral salts, calcium, phosphorus, and fat-soluble vitamins, Their manufacture is a critical and essential step in ensuring food safety, and it must comply with all applicable laws and regulations(Gul,O,2013). In

order to preserve dairy products' nutrient content, natural chemical composition, and physical characteristics, chemicals are added as food additives or preservatives. The most common added to dairy products as neutralizers to extend shelf life and prevent microbial degradation and alteration during storage are *sodium carbonate*, *bicarbonate of sodium*, *benzoic acid* and its salts, *hydrogen peroxide*, and *formaldehyde* (Huda,J,2016,Huda,J,2018). Continued consumption of these chemicals could harm consumers and risk the health of society (Jahed,Kr,2007).

Preservatives are defined by the European Union as Food additives include substances added. to increase its storage life by avoiding microbial deterioration. This included *calcium benzoate E213*, *sodium benzoate E211*, *potassium benzoate E212*, and *benzoic acid E210*. Also, there is *sorbic acid E200*, *potassium sorbate E202*, and *calcium sorbate E203*. *Formaldehyde*, H_2O_2 , and other chemicals that are added singly or in combination. The available concentrations of these materials have already been determined by the European Union (Karima,M and Fajim,A,2012).

Food preservatives, particularly acidic ones, are frequently made with benzoic acid and its salts. Benzoate salts work best in an acidic environment. Used to preserve

dairy products, jams, fruit juices, tomato paste, and pickles in amounts that don't exceed 0.1% and don't go beyond what's safe for human consumption. Additionally, lotions and toothpaste also contain benzoic acid. Cosmetics, pharmaceuticals, industrial goods, and breath fresheners. Analytical techniques like HPLC, TLC, GC, and electrophoresis are used. Benzoic acid and its salts in foods (Ling,E,R1963)..

MATERIALS AND METHO

Collection of samples

Samples of some types cheese and milk cream were collected from Baghdad market shop, in June 2022. (Show in Table 1)

Chemical Tests

Hydrogen peroxide detection (Pien 1953).(Pien.JandLafontne,D.)

Mix 2 ml of sample and 2 ml of hydrochloric acid (1% each) in a test tube. The mixture was carefully mixed then added 2 ml of potassium iodide (10%). Took the tube in hot water bath (80 °C) for 1 minute, cooled under running water, and added 2 ml of a starch solution (1%), Blue indicator indicates hydrogen peroxide presence in sample.

Formalin detection

According to Hehner's test (Ling, 1963)(Ling ,E.R 1963),Before adding 90 percent sulpharic acid to a test tube, then added 2 ml of sample and 2 ml of distilled water. Form 2 can be seen because a purple ring that forms between the two layers shows its presence.3. Assessing benzoic acid

Samples were obtained by weighing 1 g of each sample, adding 25 ml of highly pure methanol, and mixing the mixture. After that, Samples heated to 50°C for 30 minutes in water bath. to extract the material. After transferring the entire mixture to a test tube and running it by a vortex mixer for two minutes, samples were filtered through Milli poor. Until the analysis concludes, keep the filter in the fridge. (Ling,E,R1963).

Reagents and chemicals used:

Chemicals and analytical reagents of high purity were used, methanol, sodium hydroxide, ammonium acetate, acetonitrile, distilled water and benzoic acid.

A high-performance liquid chromatography device (SYKAM) of German origin was used, with the following specifications:

(Pump model: S 2100 Quaternary Gradient Pump, Auto sampler model: S 5200, Detector: S 3240 UV/Vis Detector, Column Oven model: S 4115). 20 micro liters of the sample were injected into the column at a concentration of 10 ppm during each experiment, using a separation column type (C18 – ODS = Column) with dimensions (cm * 4.6 mm25) and a flow rate (Flow rate = 1.0 ml / min) and at a wavelength (UV). – 228 nm) and the mobile phase consisted of acetonitrile: ammonium acetate solution in a ratio of (40:60) (a solution of ammonium acetate was prepared by dissolving 0.4 g of it in 1000 ml of highly pure distilled water and adding sodium hydroxide solution until the pH = 4.2).

The benzoic acid concentration was calculated according to the following equation:

$$\text{Con.of benzoic acid} = \frac{\text{The concentration of the standard solution} \times \text{the area of the sample}}{\text{The area of the standard solution}}$$

Table 1: Samples of dairy products selected for testing.

NO.	Type of product	Trade mark	Date of production and validity	Origin
A1	spreadable cheese	Vonk	PR:08/5/2022 EX:07/5/2023	Hungary
A2	Cream cheese	Kala	PR:22/4/2022 EX:19/7/2022	Iran
A3	Cheese	Amal	PR:19/3/2022 EX:19/6/2022	Iran
A4	Cream cheese	Smile	PR:6/4/2022 EX:3/7/2022	Hungary
A5	Thick cream	Nejood	PR:5/5/2022 EX:3/7/2022	Iraq
A6	spreadable cheese	Salim	PR:16/3/2022 EX:15/3/2023	Saudi Arabia
A7	Thick cream	KDD	PR:22/1/2022 EX:21/1/2023	Kwait
A8	Cream cheese	Danube	PR:2/5/2022 EX:1/8/2022	Germany
A9	spreadable cheese	Kiri	PR:11/4/2022 EX:6/2/2022	France
A10	Cream cheese	Kiri	PR:1/5/2022 EX:30/7/2022	France

RESULTS AND DISCUSSION

The results show in table (2) of this study refers the formalin and hydrogen peroxide absence in all samples while benzoic acid present in the sample as a permissible limits. These results were in line with the ranges specified by the usual formula (Egyptian standard 155(1974), Saudi standard 42(1977), and they also agreed with (Belli,P.2013). Preservatives pose germ limiting risk and their various forms, the use of preservatives and significant amounts of commercial fraud affect the consumer's health by raising the risk of cases of vomiting and diarrhea, as well as pain in the abdomen, respiratory cramps, and drowsiness (WHO2000).

The levels of hydrogen peroxide, formalin and benzoic acid content of cheese and milk cream samples were shown in table 2.

Table 2: The amount of hydrogen peroxide, Formalin, and Benzoic acid

Sample	Hydrogen peroxide	Formalin	Benzoic acid g/Kgm
A1	N.D	N.D	12.3
A2	N.D	N.D	9.5
A3	N.D	N.D	12.6
A4	N.D	N.D	5.3
A5	N.D	N.D	16.2
A6	N.D	N.D	7.0
A7	N.D	N.D	9.2
A8	N.D	N.D	18.8
A9	N.D	N.D	13.6
A10	N.D	N.D	6.2

* Results are rate 5 replicates

with an average (6.2) ppm for Kiri cream. Salim cheese samples tested in this study were found to contain benzoic acid 7.0ppm. Also the levels of benzoic acid were 9.2 ppm in KDD cream. While the amount of benzoic acid in Kala cheese were 9.5 ppm. Benzoic acid amount were (12.3,12.6,13.6)ppm in Vonk, Amal, and Kiri cheese respectively. Also the results refers to the amount of benzoic acid in Kiri cream and Danube cream were (16.3,18,8) ppm sequentially.

Numerous studies have been conducted on the determination of benzoic acid and its salts in various processed foodstuffs, including the study of Saad in which they estimated and using the HPLC method some food additives in samples of juices, jams, sauces, canned, dairy products, dried fruits and vegetables (Yen.TandAn2016).

Other studies it was reported that the concentration of benzoate in Iranian dairy products was lower than 30 mg/kg (Z, Esfandiri and others 2015).

(FDO) is the absence used of preservatives in dairy products and in the case of any preservative material, it suspends the license of any product contrary to the conditions (Belli.P and others 2013).

Analysis of sodium benzoate and potassium sorbate in fresh Kashar cheese by HPLC/DAD and found out that the average level of sodium benzoate of the cheese samples

was 68.63 mg/kg. It was also stated that sodium benzoate might occur in fresh cheese at concentrations of up to 50 mg/kg (Gul.O, 2013).

These results are consistent with the Egyptian standard and Saudi standard (Yen.TandAn2016, Z, Esfandiri and others 2015). This is a good indication that these products are free or contain small amount from chemical additives and are suitable for consumption Human.

CONCLUSION

In this research aim evaluate the amount of preservatives including formaline, hydrogen peroxide and benzoic acid in different types of dairy products. Proposed method was HPLC method for determination benzoic acid due to its simplicity, reliability, sensitivity, and rapidness. The results of this investigation showing the absence of formalin and hydrogen peroxide in dairy products such as cheeses and milk cream became evident naturally, while the amount of benzoic acid in some samples that level that a permissible limit of preservatives should be defined for cheese and milk cream

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

The single author contributed in all parts and read and approved the final version.

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