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SELECTED CHEMICAL AND MICROBIOLOGICAL QUALITY ASPECTS FOR CREAM-BASED CAKES SOLD IN EGYPT

By

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ABSTRACT

Thirty five samples (Ten samples of cream cake and twenty five samples of Jatooh) were randomly collected from dairy shops, supermarkets and confectionaries at Cairo governorate, Egypt. Collected samples were subjected to microbiological examination, obtained results proved that, the cream cake samples were contaminated with high numbers of total aerobic plate count, coliforms, total staphylococci*, S. aureus*, yeast and mold with mean values of $40\times10^4\pm 19\times10^4$, $3\times10^2\pm 1\times10^2$, $20\times10^4\pm 10\times10^4$, $35\times10^3\pm 14\times10^3$, $64\times10^3\pm 27\times10^3$ and $44\times10^3\pm 21\times10^3$ CFU/g, respectively. While, in Jatooh samples the counts were $60\times10^4\pm 24\times10^4$ CFU/g, $7\times10^2\pm 4\times10^2$ MPN/g, $8\times10^4\pm 4\times10^4$, $55\times10^3\pm 19\times10^3$, $53\times10^4\pm 27\times10^4$ and $36\times10^4\pm 11\times10^4$ CFU/g, respectively. Also *E. coli* was isolated from only 2 samples of Jatooh (8%), but could not be detected in any cream cake samples. Performed chemical examination aimed to investigate the presence of inhibitory substances by using HPLC in cream cake samples. The results revealed that, the sorbic acid and benzoic acid could not be detected in any of examined cream cake samples. Fatty acids profile of cream cake samples were assessed by using gas chromatography. The results revealed that, the mean value of saturated fatty acids was 80.71%± 1.5%. The predominant saturated fatty acid was Lauric acid (C12:0) in the examined cream cake samples. The mean value of monounsaturated fatty acids (Palmitoleic acid and Oleic acid) and polyunsaturated fatty acids were 15.70%± 2.42% and 6.311%± 0.6%, respectively. Its worthy mentioned that all cream cake samples contained Trans fatty acid (Vaccenic acid) in percentage of 1.17%± 0.05%.

Keywords:

Cream cake, Jatooh, benzoic acid, sorbic acid, saturated fatty acid, Trans fatty acid, *E. coli,* Yeast and Mould.

INTRODUCTION

Cream filled pastries as (Cream cakes and Jatooh) are two of the most popular milk-based bakery products in Egypt, which are enjoyed not just in villages, but also in cities. They are found in different shapes, sizes, and categories and plays a main role in events like birthdays, marriages, and special holidays **(Khan *et al.,* 2022).** Annually, hundred millions of people all over the world get poisoned with these products **(Hussein, 2021).** This may be the result of unsanitary techniques used in the products manufacturing, including strategies for obtaining and the quality of raw materials (Including water sources), packing, handling, and distribution of the final products to the costumers **(Muhammad *et al.,* 2020).**

Food poisoning caused by the consumption of confectionery products has been reported in many countries worldwide. When food conditions change and become unpleasant for the consumer to consume, this is referred to as spoilage. The spoilage of confectionery products includes physical spoilage, chemical spoilage, and microbial spoilage. Microbial contamination of confectionery products is critical due to economic and health-related issues as food poisoning **(Khedmati *et al.,* 2020).**

The aerobic plate count is used as an indicator of bacterial populations in a product **(Odeh and Yamani, 2019),** evaluating the overall quality of dairy products and monitoring the sanitary conditions used throughout the production, collection and handling **(Ahmed *et al.,* 2018).** *Staphylococcus aureus* is one of the major food contaminants worldwide, and its enterotoxins are documented as food poisoning and bioterrorism agents. **(Sundararaj *et al.,* 2019).**

Coliforms, particularly faecal coliforms like *E. coli*, can cause significant poisoning and intestinal illnesses in humans, when present in confectionery products. As a result, from a microbiological perspective, monitoring Coliforms contamination is critical **(Pajohi-alamoti *et al.,* 2016).** Since *E. coli* is a faecal coliform, food contamination particularly with *E. coli* is of major microbiological and health significance **(Jamshidi *et al.,* 2017).** The mould deterioration of bakery products is a significant economical and serious issue for bakeries. The main causes of mould and yeast contamination of confectionery products are known to be

cross contamination, contaminated environments, and used containers for processing, long-term storage, and distribution of products **(Hassanzadazar *et al.,* 2018).**

An important part of monitoring process is related to additives that may be added to products in different stages of production and distribution to increase shelf life, durability, appearance, texture, taste, color, odor, and nutritional value **(Khedmati *et al.,* 2020).** Benzoic acid (BA), sorbic acid (SA) and their sodium and potassium salts (benzoates and sorbates), are commonly used food preservatives as they prevent the growth of bacteria, yeast, and moulds **(Costaa *et al.,* 2018).**

Fats and oils are an essential component of our diet and are frequently implemented in food production to enhance the nutritional value and some other aspects of food quality. It is common practice to convert oils to solid fats via the processes of hydrogenation, esterification, and fractionation. The manufactured solid fats are frequently used in as margarine and breakfast spreads in our breakfast, bakery products, chocolate goods, etc. **(Pehlivanoğlu *et al.,* 2018)**, although they may cause certain health issues because they contain saturated fatty acids (SFAs) and perhaps Trans fatty acids (TFAs). While saturated fatty acids raise the levels of both total cholesterol and low density lipoprotein. Saturated fatty acids could affect cardiovascular disease, coagulation, inflammation and insulin resistances. Additionally, TFAs which are unsaturated fatty acids with at least one methylene carbon-carbon group in aTrans configuration cause diseases like diabetes, cardiovascular disease, obesity, breast cancer, prostate cancer, cancer infertility, and coronary artery disease **(Yolci Omeroglu and Ozdal, 2020).**

The microbial and chemical characteristics of cream-filled pastries must be evaluated and because of all mentioned before, this survey study was aimed to throw light on to what extent some of the dairy based products (Cream cakes and Jatooh) are in acceptance with the Egyptian standards (4037/2005), hygienically safe for the Egyptian consumers by examining some of existing pathogenic bacteria contaminated some of dairy based desserts products in local markets. Furthermore, determine some inhibitory substances such as sorbic and benzoic acid present in cream cakes and determine fatty acids (FAs) composition in Egyptian cream cakes due to there are limited reported studies on investigation of fatty acids profile of this products.

MATERIAL AND METHODS

1- Collection of samples:

Thirty five random samples of dairy based desserts, (10 samples of cream based cakes and 25 samples of Jatooh) were collected from dairy shops, supermarkets and confectionaries in Cairo Government. Samples were Transferred aseptically in ice box to the laboratory with a minimum of delay kept in cooling condition at 4ºC until microbiological examination and chemical examination.

1.1. Microbiological examination:

1.2. Preparation of decimal dilutions of the examined samples according to **(Graham and maturin, 2004).**

1.3. Total Colony Count was applied according to **(ISO, 2012a).**

1.4. Coliforms count (MPN/g) was assessed according to **(Davidson *et al.*, 2004)** with identification of the isolated Coliforms according to **DeVos *et al.*, (2009).**

1.5. Isolation and identification of *E. coli* according to **(APHA, 2004).**

1.6. Total Staphylococci count with identification of the suspected *S. aureus* was determined according to **(ISO, 2012b).**

1.7. Total yeasts and molds count was assessed according to **(ISO, 2012c).**

2- Chemical Examination:

2.1- Detection and determination of sorbic and benzoic acid in cream cake:

By using High-performance liquid chromatography (HPLC) was assessed according to **(ISO, 2012d).**

2.2- Fatty acids profile of extracted fat from cream cake by using thermo GC-Mass DSQ II (according to AOAC, 2002):

2.2.1. Fatty acids extraction according to **(AOAC, 2002).**

2.2.2. Gas Chromatography (GC) for analysis of fatty acid methyl esters (FAMEs) according to **(AOAC, 2002).**

RESULT

Microbiological Results:

Table (1): Statistical analytical results of the determined microbiological parameters in the examined samples of dairy based desserts.

Parameters	Type of Sample	Total No. of Sample	Positive samples		Min.	Max.	Mean±S.E.M.
			NO.	%			
Total Aerobic Count (cfu/ g)	Cream Cake	10	10	100	15×10^3	8×10^5	$40\times10^4\pm 19\times10^4$
	Jatooh	25	25	100	2×10^3	60×10^5	$60\times10^4\pm 24\times10^4$
Coliforms Count (MPN/ g)	Cream Cake	10	10	100	30	9×10^2	$3\times10^2\pm 1\times10^2$
	Jatooh	25	25	100	70	11×10^3	$7\times10^2\pm 4\times10^2$
Total Staphylococcal Count (cfu/ g)	Cream Cake	10	10	100	2×10^2	72×10^4	$20\times10^4\pm 10\times10^4$
	Jatooh	25	23	92	4×10^2	30×10^4	$8\times10^4\pm 4\times10^4$
S. aureus Count (cfu/ g)	Cream Cake	10	4	40	6×10^2	30×10^4	$35\times10^3\pm 14\times10^3$
	Jatooh	25	10	40	1×10^2	80×10^4	$55\times10^3\pm 19\times10^3$
Total Yeast Count (cell/ g)	Cream Cake	10	6	60	2×10^3	3×10^5	$64\times10^3\pm 27\times10^3$
	Jatooh	25	21	84	4×10^3	61×10^5	$53\times10^4\pm 27\times10^4$
Total Mould Count (cell/ g)	Cream Cake	10	10	100	5×10^3	30×10^4	$44\times10^3\pm 21\times10^3$
	Jatooh	25	18	72	13×10^2	20×10^5	$36\times10^4\pm 11\times10^4$

No.: Number Min.: Minimum Max.: Maximum S.E.M.: Standard Error of Mean.

Table (2): Distribution of satisfactory and unsatisfactory dairy dessert samples based on their Coliform counts according to E.S. (cream number 154.2/2005).

Cream cake				Jatooh			
Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory	
No	%	No	%	No	%	No	%
4	40%	6	60%	6	24%	19	76%

According to E.O.S. Number 154/2005: the Coliform count must be less than 10 cells /g.

Table (3): Incidence of *E. coli* isolated from the examined samples of dairy based desserts.

Examined samples	Total number of isolates	Number of positive *E. coli* isolates	%
Cream cake	2	0	0
Jatooh	8	2	8

Table (4): Relationship between coagulase +ve and TNase +ve *S. aureus* isolates.

Examined samples	Number of suspected *S. aureus* isolates	Coagulase +ve		TNase +ve	
		NO.	%	NO.	%
Cream cake	4	3	75	2	50
Jatooh	10	10	100	8	80

According to number of suspected *S. aureus* isolates.

Fatty Acids Profile:

Table (5): Saturated fatty acids profile in the examined samples of cream cake.

Saturated fatty acids	Mean±S.E.M.
Caprlyic acid (C8:0)	1.089±0.084
Capric acid (C10:0)	1.5±0.08
Lauric acid (C12:0)	24.28±2
Myristic acid (C14:0)	9.63±0.817
Palmitic acid (C16:0)	22±1.5
Heptadecanoic acid (C17:0)	0.24±0.03
Stearic acid (C18:0)	21.76±1.7
Arachidic acid (C20:0)	0.21±0.010
Total	80.539±1.5

Table (6): Mono-unsaturated fatty acids profile in the examined samples of cream cake.

Mono-unsaturated Fatty acids	Mean±S.E.M.
Palmitoleic acid (C16:1 w7)	0.57±1.94
Oleic acid (C18:1 w9)	12.03±0.941
Total	15.707±2.42

Table (7): poly-unsaturated fatty acids profile in the examined samples of cream cake.

Poly unsaturated Fatty acids	Mean±S.E.M.
Linoleic acid (C18:2w6)	5.691±0.545
Linolenic acid (C18:3w3)	0.28±0.0432
Arachidonic acid (C20:4 w6)	0.33±0.0494
Total	6.512±0.6

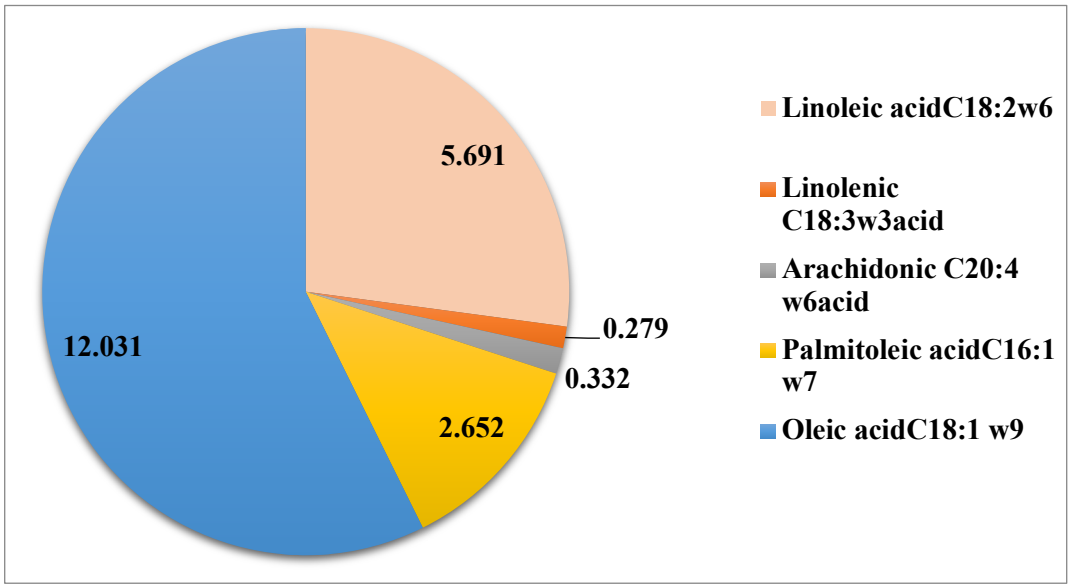

Fig. (1): Mono unsaturated and poly unsaturated fatty acids profile in the examined samples of cream cake.

Table (8): Trans fatty acids profile in the examined samples of cream cake.

Trans Fatty acids	Mean±S.E.M.
Vaccenic acid C18:1 w7	1.17±0.05

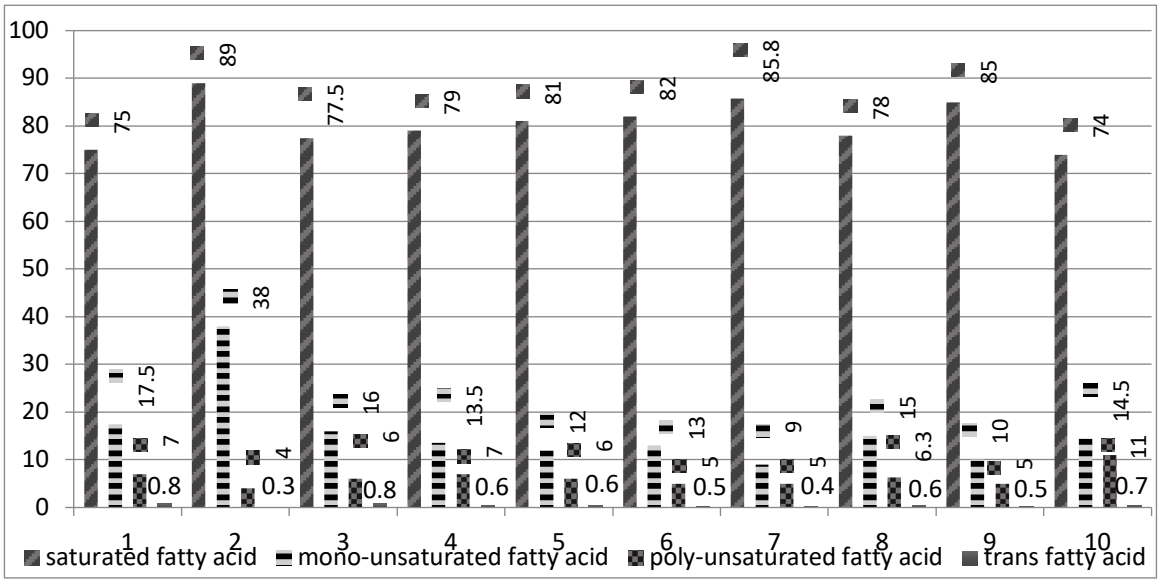

Fig. (2): Fatty acids profile in the examined samples of cream cake.

DISCUSSION

1-Microbiological Examination:

1.1. Total Colony Count (CFU/ g):

The total bacterial count is frequently employed as an indicator for the products microbiological quality, utility, and safety. It could reflect the circumstances in which the product was made, such as the efficiency of the processing and the hygienic state of the equipment and machinery at the processing plants **(Ahmed *et al.,* 2018).**

Results in (Table 1) revealed that, the mean value of aerobic plate count in examined samples of cream cake and Jatooh samples were, $40\times10^4\pm 19\times10^4$ and $60\times10^4\pm 24\times10^4$ CFU /g, respectively .

In the present study, higher results of cream cake and Jatooh were obtained by **(El-Kadi *et al.,* 2018) and (Muhammad *et al.,* 2020).** While, lower result reported by **(Sharifzadeh *et al.,* 2016); (Khan *et al.,* 2022) and (Pajohi-alamoti *et al.,* 2016).** Furthermore, similar results were obtained by **(Hassanzadazar *et al.* 2018); (Odeh and Yamani, 2019) and (Dağ, 2020).**

The high counts of the tested samples are seen to be a warning indicator that indicating use of contaminated raw materials, use of polluted waters, bad personal hygiene, and the use of contaminated equipment **(Saeed *et al.,* 2018).**

1.2. Coliforms count (MPN/ g):

The presence of coliforms in ready-to-eat food is considered as a marker for failure of heat treatment or recontamination following heat treatment. In addition, coliforms can also be found in these foods as a result of inappropriate sanitation procedures **(Dağ, 2020).**

Presented results in (Table 1) evident that all examined samples of cream cake and jatooh samples were contaminated with Coliform microorganisms with a mean count of $3\times10^2\pm 1\times10^2$ MPN/g and $7\times10^2\pm 4\times10^2$ MPN/g, respectively.

It is clear from the obtained results that 90% and 76% of the examined cream cake and Jatooh samples contain high numbers of coliform and disagree with the Egyptian Organization for Standardization **(E.S. 154.2/2005)**, which recommend that Coliform count should be less than 10 cells /g in the product. As shown in (Table 2).

Results reported in our study for cream cake and Jatooh showed lower results than those reported by **(El-Kadi *et al.,* 2018).** Furthermore, lower results were recorded by **(Sharifzadeh**

***et al.,* 2016); (Hassanzadazar *et al.* 2018); (Dağ, 2020) and (Gill *et al.,* 2020).** While, similar results were recorded by **(Odeh and Yamani, 2019).**

Major reasons behind high Coliform contamination in the samples could be due to not using pasteurized cream and inadequate cooling systems. Moreover, coliforms' presence in the samples is more related to not observing personal hygiene in the production and distribution of confectionery sweets **(Pajohi-alamoti *et al.,* 2016).**

1.3. *E. coli:*

Escherichia coli (*E. coli*) is a fecal coliform bacterium which leads to 2000 admissions and 60 deaths across united states based on reports from Centers for Disease Control and Prevention. **(Jamshidi *et al.,* 2017).** *E. coli* strains have an important role in foodborne gastrointestinal diseases, the presence of *E. coli* strains was considered as an indicator of fecal contamination for many years **(Khedmati *et al.,* 2020)**.

The incidence of isolated *E. coli* from examined Jatooh samples was 8%. While the organism could not be isolated from all of the examined cream cake samples (Table 3).

It is clear that cream cake was in accordance with the Egyptian Organization for Standardization (E.S. 4037/2005), as they were free from *E. coli*. While, it concerns the presence of *E. coli* in jatooh samples were in disagreement with this standard Egyptian Organization for Standardization (E.S. 4037/2005) and contained *E. coli* with percentage of 8%. Its presence in the examined Jatooh samples is may related to fecal contamination or lack of hygiene by handlers and it is necessary to observance of standards of hygiene and development of safe food handling techniques and aseptic pastry manufacturing system in some confectioneries **(Sharifzadeh *et al.,* 2016).**

1.4. Staphylococci:

1.4.1. Total Staphylococcal count:

Staphylococcal food poisoning (SFP) is considered to be the second or third most common pathogen causing outbreaks of food poisoning**.(Shiferaw and Yimmam, 2020),** staphylococcal poisoning usually occurs after ingestion of the food contaminated by toxins. About 30 to 50 % of healthy people carry the Staphylococcal bacteria on their skin, throat, and nose **(Khedmati *et al,* 2020).**

Results presented in (Table 1) revealed that Staphylococci was present in 100% and 92% of the examined samples of cream cake and Jatooh, respectively, with a mean count of $20\times10^4\pm 10\times10^4$ and $8\times10^4\pm 4\times10^4$ cfu/g, respectively .

According to the findings of the current study, a number of factors, including the use of contaminated tools and containers, the absence of pasteurized creams in pastries, inadequate cold preservation, the use of contaminated equipment and containers, and poor personal hygiene of workers during the processing, storage, Transfer, and distribution of the products have been identified as the primary causes of contamination with staphylococci **(Hassanzadazar *et al,*. 2018).**

1.4.2. *Staphylococcus aureus* count:

Staphylococci can be divided into two groups, coagulase positive Staphylococcus (CPS) and coagulase negative staphylococci (CNS), according to production of coagulase enzyme, which is capable of coagulating blood plasma. An important characteristic that differentiates *S. aureus* from most staphylococcal species is its ability to produce coagulase, an enzyme that clots blood plasma **(Shiferaw and Yimmam, 2020),** most enterotoxigenic strains are coagulase producers but not all of them are TNase producers**. (Garbaj, 2007)** reported that about 50% of the enterotoxigenic *Staphylococcus aureus* isolates were positive for both coagulase and TNase production, and this was confirmed by **(Hill *et al*., 2012),** who reported in general staphylococci that produce enterotoxins are coagulase and/or thermonuclease positive.

It was obvious that, the incidence of *S. aureus* in the examined samples of cream cake depending on the results of coagulase test were 3 (75%) while depending on the results of TNase test were 2 (50%), respectively. The highest incidence depending on both tests was 10 (90%) in Jatooh samples (Table 4).

The incidence of *S. aureus* in the examined samples of dairy based desserts was 40%, and 40% for cream cake and Jatooh; respectively. With a mean count of $35\times10^3\pm 14\times10^3$ and $55\times10^3\pm 19\times10^3$ cfu/g, respectively (Table 1). The current results for the isolation of *S. aureus* from the examined cream-filled pastries (cream cake and Jatooh) were in accordance with those recorded by **(El-Kadi *et al.,* 2018).** While, lower results were obtained by **(Sundararaj *et al.,* 2019); (Dağ, 2020) and (Muhammad *et al.,* 2020).** Whereas, higher results were recorded by **(Pajohi-alamoti *et al.,* 2016); (Sharifzadeh *et al.,* 2016); (Cho *et al.,* 2019); (Hassanzadazar, *et al.,* 2018); (Khedmati *et al.,* 2020) and (Lee *et al.,* 2021).**

Furthermore, primary sources of such contamination can be workers' purulent pimple of the hands or face and improper handling of pastry materials by the confectionaries staff**.**

(Pajohi-alamoti *et al.,* 2016).

1.5. Yeast and mold count:

Fungi are responsible for the deterioration of raw materials and ready to eat foodstuffs, particularly of bakery products. Although the fungal contamination at pre-baking stages is notorious, it is not considered the most critical issue, once the mycobiota can be destroyed by the heat treatment (Baking). On the contrary, post baking contamination (Air, product handling, and poorly sanitized equipment) seems to be extremely serious to the microbiological stability of cakes **(Morassi *et al.,* 2018).**

1.5.1. Total yeast count:

Contaminated food intake with yeast can lead to measurable signs of liver injury, inflammation, etc. **(Saeed *et al.,* 2018).**

Data depicted in (Table 1) revealed that contaminated yeast could be detected in 6 (60%) and 21 (84%) of cream cake and Jatooh, respectively, with mean values of $64\times10^3\pm 27\times10^3$ and $53\times10^4\pm 27\times10^4$ cfu/g, respectively.

Higher results of cream cake and Jatooh were obtained by **(Khedmati *et al.,* 2020).**While, comparatively lower results were reported by **(Jamshidi *et al.,* 2017); (Odeh and Yamani, 2019) and (Gill *et al.,* 2020).** On the other hand, nearly similar findings were reported by **(Sharifzadeh *et al.,* 2016); (Hassanzadazar *et al.,* 2018); (Saeed *et al.,* 2018) and (Dağ, 2020).**

High levels of yeast contamination may be due to keeping pastry creams for a long time at confectioneries, inappropriate Transport, and contaminated supply conditions **(Pajohi-alamoti *et al.,* 2016).**

1.5.2. Total Mold Count:

Contamination with mold is not only associated with adverse health consequences and lower quality of the products, but also it is of great economic importance in confection **(Jamshidi *et al.,* 2017).**

Regarding the data recorded in (Table 1) Mold was present in 10 (100%) and 18 (72%) of the examined cream cake and Jatooh samples; respectively, with mean values of $44\times10^3\pm 21\times10^3$ and $36\times10^4\pm 11\times10^4$ cfu/g, respectively.

Higher obtaining results of cream cake and Jatooh were recorded by **(Morassi *et al.,* 2018).** While, comparatively lower results were reported by **(Jamshidi *et al.,* 2017); (Odeh and Yamani, 2019) and (Khan *et al.,* 2022).** On the other hand, nearly similar findings were reported by **(Hassanzadazar, *et al.,* 2018); (Saeed *et al.,* 2018) and (Dağ, 2020).**

Finally, the obtained results of examined cream cake and Jatooh, were disagreed with the Egyptian Organization for Standardization **(E.S. 4037/2005)**, which recommended that cakes must be free from Yeast and Mold.

The main cause of fungus in bakery products may be due to high sugar contents which tend to support the growth of the mold better than other microbes, but some other yeast can also attack the products. Also poor handling, time of storage, and conditions of storage could be a source of contamination. **(Saeed *et al.,* 2018).**

2- Chemical examination of the examined cream cake samples:

2.1. Inhibitory substances examination:

Benzoic and sorbic acids are two food additives used to preserve food products by inhibiting growth of yeast and moulds **(Costaa *et al.,* 2018).** So, cream cake samples were examined by HPLC (Hyper Performance Liquid Chromatography) to determine inhibitory substances mainly sorbic acid and benzoic acid.

The results revealed that Sorbic acid and benzoic acid could not be detected in any of examined cream cake samples. Nearly similar results reported by **(Elsayed *et al.,* 2017) and (Öztekin, 2018).** While, higher obtaining results were obtained by **(Costaa *et al.,* 2018) and (Mustafa *et al.,* 2021).**

2.2-Fatty acids profile of the examined cream cake samples:

2.2.1. Saturated fatty acids:

As shown in (Table 5), Fig. (2), the mean value of total saturated fatty acid in the examined cream cake samples were 80.539%±1.5%, with minimum 73.58% and maximum 89.20%. The most abundant saturated fatty acid in all examined cream cake samples was Lauric acid (C12:0) with a mean value of 24.28%±2%, followed by Palmitic acid (C16:0) and Stearic acid (C18:0) with a mean value of 22%±1.5% and 21.76%±1.7%, respectively.

Early studies have consistently shown a link between dietary consumption of saturated fat and an increased risk of coronary heart disease (CHD), as measured by increased levels of total and low density lipoprotein cholesterol (LDL-C). It's indicated that SFA are possibly the most

harmful dietary components since they enhance total and LDL-C cholesterol levels when compared to carbohydrates on an energy equivalent basis **(Naila *et al.,* 2022).** Higher results were reported by **(Albuquerque *et al.* 2017) and (Yolci Omeroglu and Ozdal, 2020).**

2.2.2. Unsaturated fatty acids:

2.2.2.1. Mono- unsaturated fatty acids:

The mean value of total mono-unsaturated fatty acid in the examined cream cake samples were 15.707%±2.42%, and were in the following ranges 6.43% - 17.50%. The most abundant (Predominant) mono-unsaturated fatty acid in all examined cream cake samples was Oleic acid (C18:1 w9) with a mean value of 12.03%±0.941%. (Table 6), Fig. (1).

Nearly similar results were obtained by **(Yolci Omeroglu and Ozdal, 2020).** On the other hand, higher results were achieved by **(Albuquerque *et al.* 2017).**

It has been demonstrated that monounsaturated fatty acids (MUFA) can raise High density lipoprotein cholesterol (HDL-C) levels and lower plasma triglycerides without changing LDL-C levels. Additionally, MUFA have recently been demonstrated to provide some protection against the oxidative damage caused to LDL-C, which is another advantage that has been hypothesised to result from replacing saturated fat with MUFA. **(Pehlivanoğlu *et al.,* 2018).**

2.2.2.2. Poly-unsaturated fatty acids:

Inspection of Table (7) and Fig. (1) revealed that, the mean value of total polyunsaturated fatty acid in the examined cream cake samples were 6.512%±0.6%, and were in the following ranges 3.91% - 11.01%. The most abundant polyunsaturated fatty acid in all examined cream cake samples was Linoleic acid (C18:2w6) with a mean value of 5.691%±0.545%.

Comparatively similar results were obtained by **(Yolci Omeroglu and Ozdal, 2020), (Albuquerque *et al.,* 2017).** While, lower results were reported by **(Naila *et al.,* 2022).**

Linoleic acid demonstrates a significant lowering effect on both total and LDL-C cholesterol. Additionally omega 6 (n-6) PUFA above 10% of total energy intake lowers HDL-C concentrations **(Omar and Salimon, 2013).** Omega 3 (n-3) includes eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) found mainly in oily fish and that explain its lower values in our present study.

2.2.3. Trans fatty acids (TFAs):

Natural TFA (Composed of mainly vaccenic acid, C18:1n11Trans) occur naturally by bio hydrogenation process in ruminant meat and dairy products at trace amounts. On the other hand TFA (Mainly elaidic acid, 18:1n9 Trans) occur in industrially produced partially hydrogenated vegetable oils. Moreover, the deodorization step in the refining of oils leads to the formation of di-trans (C18:2 Trans and C18:3 Trans) and mono-Trans isomers (C18:1trans) of PUFA, while partial hydrogenation of oils results in the production of chiefly mono Trans isomers of the naturally occurring cis-C18:1 **(Yolci Omeroglu and Ozdal, 2020).** In our study, elaidic acid was not dedected in any of cream cake samples analyzed and vaccenic acid (C18:1n11 Trans) showed negligible prevalence for majority of the samples, as shawn in (Table 4).

Trans fats has been showed to increase the risk of coronary heart disease (CHD) in part by increasing the level of low-density lipoprotein (LDL) referred as "bad cholesterol" and decreases the level of high-density lipoprotein (HDL) referred as "good cholesterol" and raising triglycerides (TG) in the bloodstream, thus promoting systemic inflammation. it has a significant higher ratios of Trans fatty acid increase risk of cardio vascular diseases (CVD), coronary artery diseases, blood lipid profile, diabetes, and cancer **(Islam *et al.,* 2019).**

Higher ratios of saturated fatty acids and lower ratios of Trans fatty acid in cream cake indicate that these Cream used in this product produced by other ways than hydrogenations, May by winterizing or interestrification, which have the advantage of lower Trans fatty acids percent, but on the other hand. It has a significant higher ratios of saturated fatty acids which implicated in cardio vascular diseases (CVD) and coronary artery diseases. **(Pehlivanoğlu *et al.,* 2018).**

CONCLUSION

Most of examined samples were not in conformity with the standard specifications of the Egyptian Organization for Standardization (E.S. 4037/2005) and that is considered a very dangerous, because bacteria are significant spoilage microorganisms of food, rendering them unfit for human consumption by retarding their nutritive value and sometimes by producing toxins. Bacterial growth on cakes is a common problem for the cake manufacture. By the searching in the medical references, it was observed that, most of this bacteria had the ability to human and animal pathogenicity or produced toxins. The growth of toxigenic bacteria on cake samples must be considered as a problem of safety for human consumption. So, public awareness about following the strict hygienic control measures should be applied.

Furthermore, it's crucial to increase consumer awareness of the health implications of Trans fatty acids present in cream cake and state efforts to limit their use by restaurants and confectionaries establishments. Also, the national government agencies should aid these efforts by enforcing Egyptian legislation and laws that legislate Trans-fat legal percentage use in Egypt.

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الجوانب الكيميائية والميكروبيولوجية المختارة للكيك (التورت والجاتوهات) المباعة بمصر والمعتمدة علي منتجات الحليب

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المستخلص العربي

أجريت الدراسة على خمسة وثلاثين عينة (عشر عينات من التورت) و (خمسة و عشرين عينة من الجاتوه) جمعت عشوائيا من محلات الألبان و محلات المخبوزات في محافظة القاهرة بجمهورية مصر العربية. فحصت هذه العينات، ميكروبيولوجيا و كيميائيا بهدف الكشف عن حمض السوربيك و حمض البنزويك في عينات التورت مع الإشارة إلى سمات الأحماض الدهنية الخاصه بعينات التورت . وقد اسفر الفحص الميكروبيولوجي عن وجود عدد كلى للبكتيريا، كوليفورم, ستافيلوكوكاى، مقور العنقودي الذهبي, خمائر و عفن بإعداد مختلفة و بمتوسط قيمة $40\times10^4\pm19\times10^4$, $3\times10^2\pm1\times10^2$, $20\times10^4\pm10\times10^4$, $35\times10^3\pm14\times10^3$ مستعمرة بكتيرية / جرام و $64\times10^3\pm27\times10^3$ و $44\times10^3\pm21\times10^3$ خلية/جرام على التوالي في عينات التورت, بينما في عينات الجاتوه كانت $60\times10^4\pm24\times10^4$, $7\times10^2\pm4\times10^2$, $8\times10^4\pm4\times10^4$, $55\times10^3\pm19\times10^3$ مستعمرة بكتيرية/جرام و $53\times10^4\pm27\times10^4$ و $36\times10^4\pm11\times10^4$ خلية/جرام على التوالي. كما تم عزل ميكروب الإيشريشياكولاي من عينات جاتوه التي تم فحصها بنسبة 8٪ ولكن لم يتم الكشف عنها في أي من عينات التورت.

هذا وقد أوضح الفحص الكيميائي عن عدم وجود حمض السوربيك و حمض البنزويك في جميع عينات التورت. كما أوضحت نتائج تحديد سمات الأحماض الدهنية لعشر عينات من التورت عن وجود الاحماض الدهنية المشبعة بمتوسط قدره 80.539±1.5%. في حين كان متوسط الاحماض الدهنية الأحادية الغير مشبعة هو 15.707±2.42% . و لكن كان متوسط الاحماض الدهنية المتعددة الغير مشبعة هو 6.512±0.6. أما الاحماض الدهنية المتحورة فقد تواجدت في العينات بمتوسط قدره 1.17±0.053%.

هذا وقد تم مناقشة الاهمية الصحية والاقتصادية للنتائج التي تم الحصول عليها.