

ASSESSMENT OF THE KNOWLEDGE, ATTITUDES, [AND PRACTICES (KAP) ABOUT CREAM BASED CAKES SAFETY AND QUALITY AMONG DIFFERENT CONSUMERS IN EGYPT

By

Esraa, Owais, Ayah, B. Abd-El Salam* and Ashraf, A. Moawad

Department of food hygiene and control, Faculty of Veterinary Medicine, Cairo University, Egypt.

* Corresponding author's Email: ayah.badawi@vet.cu.edu.eg Egypt.

ABSTRACT

Bakery and pastry products are highly appreciated worldwide. Due to consumer demand; a varied diversity of these products are now extensively served in markets and different food-servicing establishments. Cakes especially cream based ones with different ingredients of topping and filling could be considered nowadays as the most popular and higher sold bakeries in our country or even worldwide. Thus, this study is meant to judge the knowledge, attitude, and practices (KAP) of cake quality and safety awareness among the public Egyptian population in order to assess the gap between consumer needs, expectations and reality. A cross-sectional study was conducted on 1300 participants from different areas in Egypt with different age, gender, education, residence and occupation. A structured questionnaire was designed from twenty-three questions dealing with consumer KAP of cake quality, safety and storage and answers were analyzed statistically. The major part of participants in this survey was females (54%), (72%) was found to be in the age group 21 - 40 years, (61%) were bachelor or equivalent degree of education, (83%) belonged to urban population and (70%) were non-health field occupations. (78.8%) of the responders consume cake on occasion, (92.6%) of them selected to consume cakes for the spongy cake part itself and (58.7%) choose the cream as the most favor type of topping. The majority of responders (84.7%) select their cakes based on taste parameter. It worse to mention that (53%) of participants didn't know the opposing health effect of cream-based cakes on human health, although that (80%) agree with considering cake as a source of food poisoning and (13%) of the of participants had already suffered from cream-based cakes food poisoning. It is also not good to know that, the majority could preserve cake for more than one week (42.9%); others accept the addition of preservatives to cake in order to prolong its shelf life (82%). In conclusion, the suggestion of this study was that, the Egyptian population had adequate knowledge about cake safety and quality

issues, but sometimes apparent knowledge failed to be interpreted into practices especially about storage optimum conditions, therefore it seems necessary to communicate directly with cake consumers from several categories to increase the awareness, improve the attitude and encourage good practices regarding this area.

Keywords:

Cakes, Cream based cakes, Knowledge, Attitude, Practice, Safety, Quality, Storage.

INTRODUCTION

Bakery and confectioneries are highly different and multipurpose. Along with the massive different possible recipes that can be found, it is very easy to adapt them to the presented ingredients, the desired organoleptic characteristics or nutritional properties. A healthy diet should include a range of bakery products, which are widely available in markets. Unsweetened types (Bread, bagels, buns, rolls muffins, and crumpets), sweet types (Cakes, pancakes, biscuits, doughnuts, waffles, and cookies) and filled goods (Fruit and meat pies, sausage rolls, pastries, sandwiches, cream cakes, pizza, and quiche) are the three categories into which bakery products can be divided. Confectioneries had involved in daily food regime for different consumers especially for elderly and children, among these are cookies, biscuits and different types of cakes (**James *et al.*, 2004 and Guiné, 2022**).

Cream-filled confectioneries are milk-based products with high production and consumption rates. Decorated Cream-Based cakes are extensively used as a ceremony or celebration catering in many occasions. Either handcrafted or prepared on a large-scale commercial basis. Different kinds of cakes are high in fat and carbohydrates, making them foods that provide energy as well as excellent providers of protein and minerals. Several components create these products including wheat flour, milk, eggs, cream, shortenings (Margarine), sugar, salt, jelly, fresh fruits, coloring and flavoring agents and leavening agents which also give these products their soft and spongy feel (**Rizk *et al.*, 2015 and Hassan *et al.*, 2018**).

Cake products are one of the greatest popular products in the Egyptian markets particularly products stuffed with cream. From the first peep, it may touch on mind that there is no microbiological significance for these products because of their exposure to high temperatures during backing process. But the reality is that some of these products contain other sensitive ingredients such as cream and chocolate, which are not heated during processing.

These materials are added to the product after baking for filling, topping and decoration purposes. Numerous factors helped to create a risk of cream based cakes as presence of allergen-causing materials in the components of the filling materials such as powdered milk, eggs and sugar. Moreover, fillings ingredients used in final cake product processing after baking such as fresh dairy cream and fresh egg custard may provide an ideal growth medium for bacterial pathogens, which is worsened if the final product is subjected to Time-Temperature combination abuse. Furthermore, in some cake recipes there is a need to add uncooked or raw eggs (e.g. tiramisu, icings and chocolate mousse) or even lightly cooked eggs as in soft meringues; the dangerous of these forms of added eggs are not subjected to any full bactericidal step to control if it was already contaminated with *Salmonella*. (Calvert *et al.*, 2007 and Abd El-Rady *et al.*, 2016). Cream-based cakes like many processed foods, are susceptible to deterioration due to physical, chemical, and microbiological factors. Physical and chemical spoilage doesn't restrict the shelf life of high moisture cream-based cakes, while it is greatly affected by microbiological deterioration caused by bacteria, yeasts and molds. Additionally, a number of cream-based cake items have been accompanying foodborne outbreaks caused by *Salmonella* spp., *Staphylococcus aureus*, *Escherichia coli*, *Listeria monocytogenes*, and *Bacillus cereus*. In the tropical world, food poisoning is a significant gastrointestinal illness. Food borne microbial pathogens were found to be the real cause for 200 different diseases or even more, extending from insignificant abdominal disorders to lethal cancer. The high-risk cases are usually reporting to the very aged, very young, immune-compromised people and healthy people exposed to a very high dose of an organism. The source of pathogen entrance to cakes in these outbreaks included contaminated ingredients, Cross-Contamination during preparation because of inadequate cleaning or poor food preparation practices, contamination by infected food handlers (Poor personal hygiene and bad habits) and poor control of storage times and temperature (James *et al.*, 2004; Calvert *et al.*, 2007; Wiwanitkit, 2015 and Hassan *et al.*, 2018). Baking of cakes is a thermal process controlled by a time-temperature combination targeting destruction of pathogenic, food spoilage microorganisms and inactivation of enzymes. However, the effectiveness of this process is affected by the presence of heat resistant microorganisms. For that, the setting of this process during cake production regulates the cake quality and safety. Additionally, cream based cakes

come with toppings or fillings that can be made without the use of heat, such as cream, chilled custard, frosting, spices, nuts, or fruit. (Ceccaroni *et al.*, 2020). Extension of shelf-life of cream-based cakes has been achieved by various methods including freezing, packaging conditions and materials, thermal processing, bio-conservation, chemical additives as preservatives and others. All these methods are more efficient when appropriate additives are used in manufacturing of cream-based cakes products. Some of them like enzymes, leaven, fats, and antifungal agents contribute to elongate the shelf-life of these products. In the same time, they may positively affect technological properties and shorten duration of the whole process or they may adversely impact the suitable taste (Izabella *et al.*, 2014). From the aforementioned importance of safety and quality attributes of cake products during preparation and storage and their adverse effect on consumer health, especially after the heavy consumption rate of these products in the last periods in Egypt accompanied with the widespread production from different level of brands and pastry shop chains either national or multinational brands or even from local bakery and pastry shops; this cross-sectional survey study was done aiming to evaluate the Egyptian cake customer level of food safety Knowledge, Attitude and Practice (KAP) regarding compliance within population. Therefore, these could help in the development of appropriate disease prevention and public health intervention strategies. Hence, the present survey was designed to assess the cake safety, quality and storage behavior KAP among general population in Egypt.

Subjects and Methods:

The survey questionnaire and data description:

A cross-sectional survey was conducted during the period from October 2021- February 2022 among Egyptian consumers through an online questionnaire designed in Arabic language, "the native language in Egypt", using Google Form. Structured questionnaire was set to gather information on the knowledge, attitudes and practices of public population on cream-based cakes quality and safety for product selection in purchasing and during storage.

The survey instrument included twenty-three questions. The first five questions covered the respondents' sociodemographic characteristics (Age, gender, education, residence, and occupation). The second section was dealing with general consumption data base alongside with some question concerning cake quality and the purchasing selection parameters from the consumer point of view. The second consisted of seven questions covering the KAP points. The third

section included another seven questions about Knowledge, Attitude and Practice of the consumers toward cake safety; these questions specifically dealt with general population knowledge about different types of hazards associates with cake consumption, different fat categories and its health effect. As regard questions about attitudes and practice were aimed to determine the understanding of public population about cake safety and application of this understanding. Final part included 4 questions covered the knowledge, attitude and practice of the consumer for cake product storage conditions, suitability after storage and preservation availability. Questionnaire questions about sociodemographic information were done using (Fahmy *et al.*, 2015) and other questions covering the KAP parameters was guided by (Ahmed *et al.*,2018). A pilot study was agreed by ten researchers to assess the relevancy, reliability, clearance, and adequacy of the questions before their use.

Sampling strategy:

An appropriate sample of adequate participants was requested to participate in this survey through social media (Facebook, Telegram, and WhatsApp). All participants freely participated in the study and for that reason they were excused from written consent. Also, objectives of this study were explained clearly before the beginning of sharing in this survey.

Sample size:

Using a confidence interval of 95%, a standard deviation of 0.5, and a margin of error of 5%, the required sample size was 1300 participants.

Statistical analysis:

The results of the survey study were summarized as percentages (%) for categorical variables. The Statistical Package for Social Science (SPSS) for Windows (Version 26.0, Chicago, IL) was used for analysis of data.

DISCUSSION

One thousand and three hundred (1300) participants responded to this survey questionnaire about cake products. This high number of participants was useful in giving more relevant and confirmed figure needed about cake consumption in Egypt. Fig. (1 to 5) showed respondent's demographic profile and it was seen that percentages of male and female respondents were about 46% and 54%, respectively. Furthermore, maximum number of respondents (72%) was found to be in the age group 21- 40 years. Least number of respondents (2%) belonged to age

group more than 60 years. Concerning the education degree, the majority of participants (61%) were bachelor degree while the minimum number of participants was from high school about (1%), these results were attributed to the selection of online pathway for survey distribution, this new technology in data collection is advantaged in covering more areas and categories of participant with minimum effort and time consumption but it's disadvantage may be the restrictions in participants age and education who can deal with the online technique. It was also seen that majority of the participants belonged to urban population (83%) as compared to rural residents (17.6%), which was favored by authors to cover the more important area representative most national areas. As far as occupation is concerned, there was a major difference seen in number of respondents that turned up; health field workers account for 30% and non-health field occupations make up to a total of 70%. The percentage of participants with food safety knowledge intended to be lowered to be more representative to the most popular consumer knowledge, attitude and practices. Fig. (6 to 12) illustrated the response of the participants to questions related to their KAP about general cake products quality. This group of questions also targeted to evaluate the consumer usual habit and favor about cake and their consumption rate in addition to the cake selection parameters for purchasing. Nowadays, confectioneries are a chief food in many countries worldwide in each day meals, despite the sociocultural variances or nutritional needs. That was matching with responders answer about the cake consumption rate, as the highest percentage (78.8%) used to eat cake in occasions mainly Fig.(6). In spite of different types, flavors, topping and additives added to cakes; (92.6%) of the responders selected to eat cakes for the spongy cake part itself not for the other topping agents Fig.(7). Although, between all different topping agents recently used by different cake brands to attract the consumer and offer different varieties; most of the responders (58.7%) choose the cream as the most favor type among others Fig. (8). by asking the responders about the selection criteria to choose your cake, the majority of answers directed to the taste (84.7%) followed by price (40.3%) Fig. (10), while by asking them directly if they find that there is a correlation between cake quality and its price; the lowest percentage was disagreed with this concept (27%) and at the same time the major participant sector (41%) was confused and don't know the correct choice Fig. (11). For the healthy people and dietary facts interesting people it is well known that cakes are listed with the restricted list due to its high caloric value, sugar and fat content in

In addition to newly emerged gluten sensitivity conditions. For patients suffering from chronic diseases such as diabetes, high blood cholesterol level, digestive disorders, heart diseases and unstable blood pressure it is also well known that cakes should not be on their meal item. But for the common consumer these data may be not clear enough, as cleared from answers on questions 9 & 12 which showed low knowledge level of the participants about the effect of cakes on health from a nutritional point of view, in addition to the gap of knowledge for the diseased people about considering cakes as a restricted item in their diet regime. 94% of the responders answered that they are not suffering from any disease prevents cake consumption which not complementary with high diabetic rate between Egyptians even children Fig. (9). Also, most of participants about (53%) didn't know the adverse health effect of cakes on human health, they divided between (22%) don't know and (31%) denied this fact Fig. (12). To lower the risk of acquiring chronic diseases like diabetes, obesity, cardiovascular disease, and cancer; nutritional reformulation measures that minimize caloric density, salt, added sugar, saturated fats and also trans fats are crucial (**Ramon *et al.*, 2020**). The food safety KAP correlated with cake consumption of all the respondents has been shown in Fig. (13, 14, 15). More than half of the participants believed that, the most common type of hazards could be found in cakes is chemical (56.2%) and physical hazards (54.6%), then biological hazards (35.7%) as in Fig. (13), which reflects poor knowledge between different consumers about food safety, because in fact the incidence of biological hazards in food and unfortunately cakes is the highest among other hazards. Also, in the same aspect the incidence of physical hazards in such type of delicate products is very low as compared to other products with complicated processing techniques. According to the CDC, the topmost five microbial pathogens causing the domestically acquired foodborne illnesses are nor virus, non typhoidal *salmonella*, *Clostridium perfringens*, *Campylobacter* and *Staphylococcus aureus* (**Thomas, 2017**). By asking the participants to examine their knowledge about prevalence of cake as a source of food poisoning, there were high number of correct responses (80%) agreed with this probability which is appreciable even though most of them are non-health field occupation's Fig.(14). Also, by examining the incidence of already happened food poisoning cases among the participants, the percentage also was logic (13%) complying with low reported cases linked with cakes in Egypt Fig. (15). It highlights that local residents of Egypt are

knowledgeable about the facts related to food safety and hygiene, types of hazards, incidence of poisoning from cakes and food poisoning symptoms. Ingredients such as raw flour, dairy products, sugar, cocoa powder, chocolate, nuts, spices, peanut butter, dried yeast, dried coconut, egg and egg products used in the manufacturing of cakes can carry pathogens and result in pre-baking microbial contamination. According to a report delivered by the Macomb County Health Department for the period of the early spring of 2002, a *Salmonella* outbreak caused by *Salmonella* enteritidis related to consumption of cassata cake from Black Forest Cakes and Pastries resulted in 196 ill people, 24 of patients required hospitalization. The epidemiologic analysis could not determine how the bacteria were introduced into the product while improper sanitation, food storage and preparation practices were the most likely causes for its distribution in the facility and the subsequent outbreak of illnesses. A multistate *E. coli* incident connected to cake mix was reported in July 2021 and sickened 16 persons across 12 states. Raw ingredients, like flour and eggs, in cake batter and dough can contain harmful germs leading to harmful illness. *E. coli* infections can be serious, especially for children who are most commonly developing severe illness (CDC,2021). There are various strategies to control pathogenic incidence in cakes; such as pH decrease, addition of natural preservatives, and thermal processing (Pasteurization), while using the Hazard Analysis Critical Control Points (HACCP) system for making filling cream can successfully ensure the safety of cream-based cakes (Abd El-Rady et al., 2016). Questions represented at Fig. (16 to 19) dealt with fat types, effect and sources in cakes. Responders' answers in this part of the survey reflected a great and satisfactory consumer knowledge about types of fat as (72%) of responders knew the difference between saturated and unsaturated fats, and about the dangerous of saturated fatty acids among unsaturated ones, (56%) of the responders stated that saturated fatty acids are more dangerous and have a severe effect on human health Fig. (16, 17). Filling creams, which are often made of fat and sugar, are crucial ingredients in a diversity of confectionery dishes because they provide baked goods their flavor, texture, and stickiness. The sensory and rheological qualities of filling creams are significantly influenced by the fat level, which ranges from 30 to 60%. Basically, the consistency of a filling cream is determined by the solids content of the fat (Abd El-Rady et al., 2016). Even though the saturated fats are not preferable and needed to be substituted with unsaturated fatty acids in our diet in general, that is inapplicable in cakes production

because of their needed functional properties. This fact is clear for our responders as shown in Fig. (18), as (60%) of the responders agree with the importance of saturated fats use in cake manufacture. The WHO advised the industry to lower the energy densities, trans-fats, and saturated fats in their goods in 2004. The Dutch government requested the food industry to lower the levels of saturated fat in food goods in 2014, despite the fact that there had been little progress in this area over the previous ten years. The source of fat used in cake manufacture isn't less in their importance than type of fat. In this aspect there is a great difference in sources for the production on commercial scale and homemade production. The participants were asked for the source of fat they used during homemade cakes processing at home. The response of the participants in this point was shocking, the responders high percentages tend to mix natural and synthetic fats in order to produce cake at home (64.5%) which may be attributed to financial issue and high cost with low availability of natural fat in our markets Fig.(19).Hydrogenated vegetable oils are extensively used in cake manufacture, as they are low in cost compared to other fats, longer shelf life, as well as they add desirable characteristics to cakes. Hydrogenated vegetable oils are known to contain abundance of Tran's fatty acids (TFA). In addition, heat treatments process (Baking) adversely affects the consumer health via formation of undesirable forms of TFA. Recently, FDA released a final determination that partially hydrogenated oils are not (GRAS) as they are the primary dietary source of artificial TFA in processed foods and were related to serious health concerns (**Tânia et al., 2017**). According to **Ramon et al. (2020)**, monoglyceride organogels (Monoglyceride emulsion and sunflower or monoglyceride and palm oil) are viewed as healthier alternatives to Trans- and saturated fats in Europe. Although no reliable information is available or legal requirements either national or international about the final cake product shelf life and storage conditions (Time and temperature), it is commonly known between cake producers to preserve it in refrigerator temperature (4-6°C) since production till purchasing for a maximum period of 3 days. In the final part of this survey the consumer KAP in response to cake spoilage, preservation time and temperature and the tendency to use inhibitory preservatives to prolong the product shelf life and improving its quality were the targets. (94%) of the whole responders considered the cake preservation in refrigerator as a mandatory and it is well known to the majority the effect of cold preservation on cake safety and quality Fig. (20).

The difference between responders was linked to the preservation time not temperature; 42.9%, 35.7% and 12.7% of the responders could store their cake in refrigerator for one week, 3 days and 2 days, respectively with the lowest percentage 1.8% preferred only to save it for 1 day only. Some responders (6.9%) gave no importance to the time of storage; they store their cake till complete consumption regardless the time factor effect Fig. (21). Cream cake is an excellent growth medium for many kinds of microorganisms, as it provides rich nutrient, high moisture content ($a_w \geq 85$) and neutral pH value. So, cream cake is not shelf stable and pose a potential public health risk if subjected to temperature abuse at any stage of production, storage, distribution and marketing, as well as bad production hygienic condition (**Belgin et al., 2009**). The staling rate of cakes is slow because of higher ratios of sugar and shortening in the formulation. Staling rate was found to be low under low temperature storage conditions, this fact explains the importance of cakes storage within cooling temperature, either refrigeration or freezing even though its bad effect on cake texture and sensory parameters (**Nesli et al., 2011**). (**Saranraj, 2012**) indicated that mold spoilage considered as the most important microbial spoilage threaten cake industry; not only from the product physical alteration point of view but also because of its adverse health effect via mycotoxin production. Spoilage is attributed mainly to microbial growth and metabolic activities resulting from microbial growth on available substrates, such as organic acids and volatile compounds. Some acids, such as lactic and succinic acids have been associated with food spoilage and can serve as spoilage indicators for foods such as milk or egg products (**Clarisse et al., 2020**). (**Pereira et al., 1994**) noted that, the problem of Staphylococcus toxin food poisoning in cake is usually related to poor refrigeration preservation before eating; “the cake may be accidentally contaminated by the food handler after processing and inadequately cooled before it was eaten.” The authors concluded that, the main cause of Staphylococci overgrowth is due to a poor refrigeration system. There is no constant legislation about cake products shelf life, even in the Egyptian standards for cake; the storage condition under freezing was mentioned but without restricting the constant period of storage (**ES: 4037/ 2005**). The highest percentage (30.5%) of responders considered 3 days as the accepted shelf life of cake products in markets before purchasing, which resemble the accepted limit to the producers and reflect the consumer common knowledge about cake products market attitudes and practices Fig. (22). The detection of spoilage markers in combination with sensory analysis

would offer an attractive quality control approach for food dessert manufacturers, who need objective criteria for setting the expiry date of their products and to anticipate potential claims from customers through accelerated shelf-life testing (**Clarisse et al., 2020**). Cakes in all forms and categories are considered as high cost and price product, so product loss due to spoilage is of economic importance and also incidence of food illness. For those reasons beside the good hygienic practices and high-quality raw materials use in cake production, the addition of legally accepted chemical preservatives to improve final product safety and quality is accepted lately. Final question in this survey aimed to cover the consumer knowledge about the chemical preservatives use as additive in cake and determine their acceptability. Data illustrated in Fig. (23) showed the high consumer satisfaction about addition of preservatives to cake to prolong its shelf life and guarantee 82% safe food. In general, cakes are kept using chemical acid preservatives, which are only appropriate for items with low pH (pH 5.5). Using commonly known chemical preservatives is low-cost and effective, but will affect the final product taste especially with storage and adversely affect consumers' health. Nowadays, more consumers tend to use different food products containing natural, organic, and healthy additives especially in the preservation target. Natural food preservatives like nisin, flavonoids can be a response to current health concerns. However, they significantly raise food sector production costs (**Wang, 2022**). The use of essential oils as natural additives for preserving food goods and extending their shelf lives while also adding flavor has drawn increased attention in the same way. According to a study conducted by (**Thanaa in 2018**), adding lemon and orange oils to cakes improved their texture, organoleptic quality, and shelf life.

CONCLUSION

In conclusion, the results of this study shed light on the fact that cake consumers in Egypt are not well acquainted with sufficient information about adverse health effect of cake consumption, or the sources and forms of food poisoning linked to cake consumption and saturated fat replacement emergency. In addition to bad habits related to cake products storage conditions and product selection criteria, mishandling of food is a direct threat to consumer health. This calls for the appropriate authorities to start a food safety culture programme that emphasizes

all food safety guidelines. The link between good handling practice, hygienic production environment, raw materials quality, adequate processing technique and the final product safety and quality is still not covered enough by consumer attitude and practices for cake consumption and preparation. Stating optimum cake storage conditions (Time and temperature) and the type of legally added food preservatives with their permissible levels should be listed in the Egyptian Standards for cakes.

REFERENCES

- Abd El-Rady, M. F.; Nagwa, M. H.; Nessrien, M. Y.; Abd El-Razik, M. M. and Fahmy, H. A. (2016):** Implementation of Hazard Analysis Critical Control Points (HACCP) Principles in Production of Filling Cream. J. Agric. Sci., Ain Shams Univ., Cairo, 24 (1), 207-218, 2016.
- Ahmed, M. K.; Khadiga, A. I.; Farah, A. A. and Hasnaa, A. A. (2018):** Assessment of the Knowledge, Attitude and Practice about food Safety among Saudi Population in Taif. Biomed J. Sci and Tech Res, MS.ID.001629.
- Belgin, S.; Ozgur, C.; Gokhan I. and Sebnem, P. (2009):** Microbiological Examination of Meatball, Cream Cake and Turkish delight (Lokum). Journal of Animal and Veterinary Advances, 8 (10): 2049-2054.
- Calvert, N.; Murphy, L.; Smith, A. and Copeland, D. (2007):** A hotel-based outbreak of *Salmonella enterica subsp. Enterica serovar Enteritidis* (*Salmonella* Enteritidis) in the United Kingdom, 2006. European communicable disease bulletin 12, 222.
- CDC; Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Foodborne, Waterborne, and Environmental Diseases (DFWED) (2021):** *E. coli* Illness Linked to Cake Batter: Harlee's Story. Page last reviewed: November 26, 2021.
- Ceccaroni, D.; Alfeo, V.; Bravi, E.; Sileoni, V.; Perretti, G.; Marconi, O. (2020):** Effect of the time and temperature of germination on the phenolic compounds of *Triticum aestivum*, L. and *Panicum miliaceum*, L. LWT 2020, 127, 109396.
- Clarisse, T.; Sophie, J.; Anne, T.; Marie-Bernadette, M.; Noël, G.; Olivier, G.; Valérie, B.; Michel, G. and Florence, B. (2020):** Identification of the bacteria and their metabolic activities associated with the microbial spoilage of custard cream desserts. Food Microbiology 86 (2020) 103317.
- Egyptian standard (4037/ 2005):** Cake specification, Egyptian organization for standardization and quality control, ministry of industry, Cairo, Egypt.

- Fahmy, S. I.; Nofal, L. M.; Shehata, S. F.; El Kady, H. M. and Ibrahim, H. K. (2015):** Updating indicators for scaling the socioeconomic level of families for health research. Journal of the Egyptian Public Health Association, 90 (1), 1-7.
- Guiné, R.P.F. (2022):** Textural Properties of Bakery Products: A Review of Instrumental and Sensory Evaluation Studies. Appl. Sci. 2022,12, 8628.
- Hassan, Z. H; Taami, B.; Abbasi, Z. and Aminzare, M. (2018):** Microbial contamination of cream filled pastries supplied in confectioneries of Zanjan, Iran. J Nutrition Fasting and Health. 2018; 6 (1):30-34.
- Izabella, K. K.; Justyna, R. K. and Lucjan, K. (2014):** Factors influencing quality and shelf life of baking products. Journal on Processing and Energy in Agriculture 18 (2014) 1.
- James, P. S.; Daphne, P. D.; Wassim, E. and John, K. (2004):** Shelf Life and Safety Concerns of Bakery Products - A Review. Critical Reviews in Food Science and Nutrition 44 (1):19-55
- Nesli, S.; Rieks, B.; Christie, D.; William, F. and Jozef, L. K. (2011):** Improvement of Shelf Life Stability of Cakes. Journal of Food Quality 34 (2011) 151-162.
- Pereira, M. L.; Do Carmo, L. S.; Dos Santos, E.J. and Bergdoll, M. S. (1994):** Staphylococcal food poisoning from cream-filled cake in a metropolitan area of south-eastern Brazil. Rev Saude Publica, 1994; 28:406 - 9.
- Ramon, E.; Eulàlia, V.; Ana María, R.; Rosa, C.; Sara, C. and Xavier, A. (2020):** Reformulation of Pastry Products to Improve Effects on Health. Nutrients Journal, 2020, 12, 1709.
- Rizk, J. R. S.; Hemat, E.; Mohamed, G. and Bedier, S. H. (2015):** Quality Characteristics of Sponge Cake and Biscuit Prepared Using Composite Flour. Arab Universities Journal of Agricultural Sciences 23 (2).
- Saranraj, P. (2012):** Microbial Spoilage of Bakery Products and Its Control by Preservatives. International Journal of Pharmaceutical and Biological Archives 2012; 3 (1):38 - 48.
- Tânia, G.A.; Joana, S.; Mafalda, A.S.; Beatriz, P.P.O. and Helena, S.C. (2017):** Multivariate characterization of salt and fat content, and the fatty acid profile of pastry and bakery products, J. The Royal Society of Chemistry, Food Funct, 8, 4170-4178.
- Thanaa, A. M.A. (2018):**Effect of Lemon and Orange Oils on shelf life of Cake. Middle East Journal of Applied Sciences, Volume: 08, Issue: 04, Pages: 1364-1374.
- Thomas, B. (2017):** Foodborne pathogens. AIMS Microbiol. 2017; 3(3): 529 -563.
- Wang, L. I. (2022):** Quality characteristics of sponge cakes made of rice flour under different preservation conditions. Food Sci. Technol, Campinas, 42, e02922, 2022.

Wiwanitkit, V. (2015): Food poisoning due to cake intake: A case study, *Annals of Tropical Medicine and Public Health*, 8 (6), 307.

RESULTS

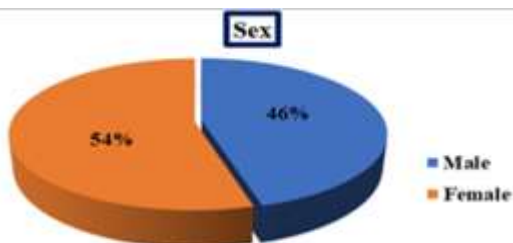


Figure 1: Sex distribution among study group.

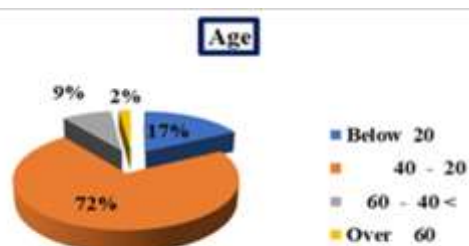


Figure 2: Age distribution among study group.

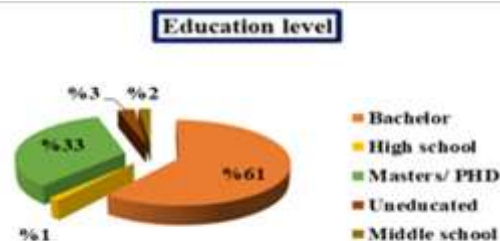


Figure 3: Education degree among study group.

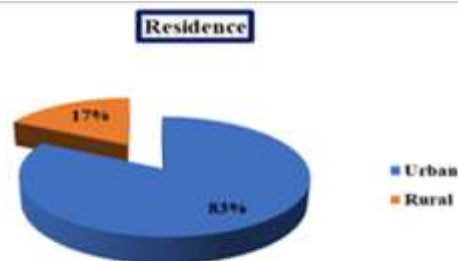


Figure 4: Residence distribution among study group.

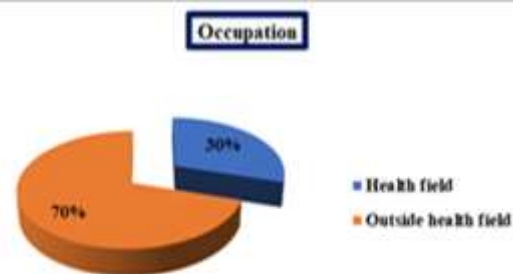


Figure 5: Occupation distribution among study group.

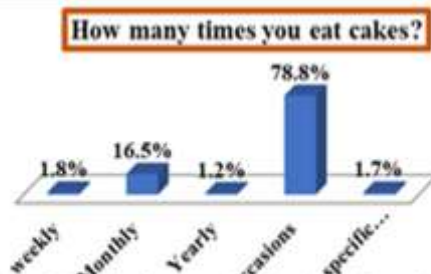


Figure 6: Distribution among study group of practice about cake consumption rate.

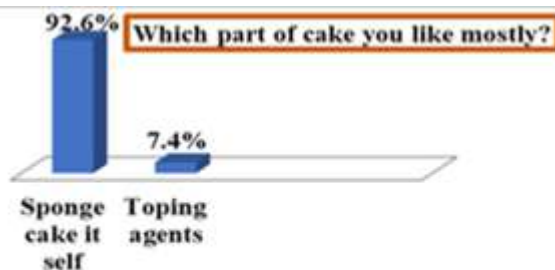


Figure 7: Distribution among study group of practice about favorite type or part of

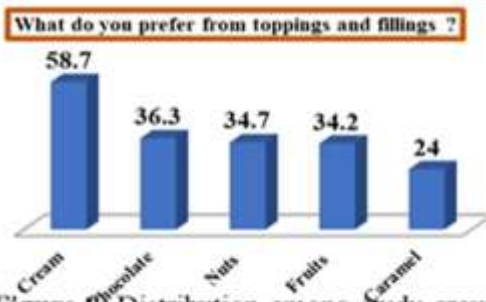


Figure 8: Distribution among study group practice about favorite type of cake

Do you have any disease prevent you from eating cake

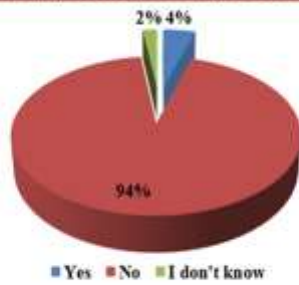


Figure 9: Distribution among study group Knowledge about health effect of cake consumption on chronically diseased consumers.

How do you evaluate the cake quality ?

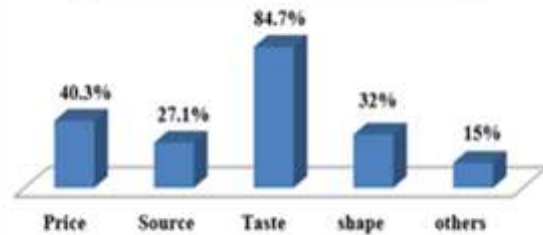


Figure 10: Distribution among study group practice and attitude about factors contributing to cake quality.

Note: The responders in this question gave the option to select mmore than one

Do you think that cake price is related to its quality?

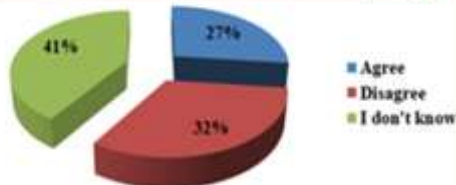


Figure 11: Distribution among study group attitude about conjugating cake quality with its price.

Do you think that cake consumption may affect your health?

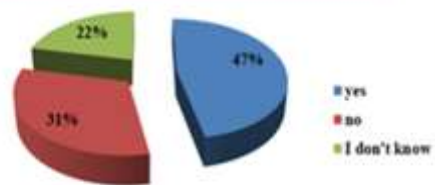


Figure 12: Distribution among study group Knowledge about cake consumption adverse health effect.

Which type of hazards you suspect in cakes?

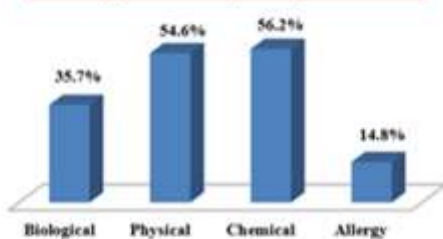


Figure 13: Distribution among study group Knowledge about types of food safety hazards.

Note: The responders in this question gavd the option to select mmore than one choice.

Does eating contaminated cakes may lead to food poisoning?

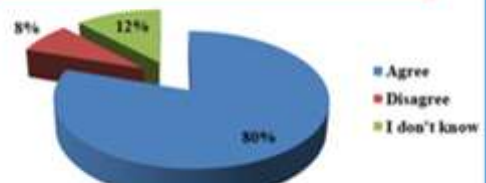


Figure 14: Distribution among study group attitude about prevalence of food poisoning through cakes.

Did you ever have food poisoning from cakes?

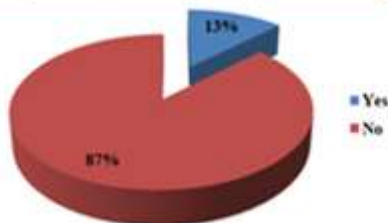


Figure 15: Distribution among study group practice about incidence of food poisoning through cakes.

Do you Know the difference between saturated and unsaturated fats?

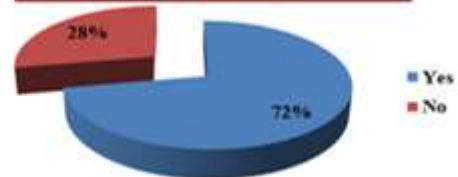


Figure 16: Distribution among study group knowledge about types of fats used in food processing.

Which type of fat is more dangerous (saturated or unsaturated)?

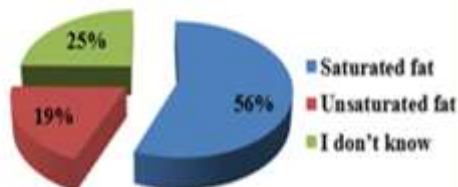


Figure 17: Distribution among study group knowledge about adverse health effect of saturated fat among unsaturated.

Does Cream based cakes should contain high amount of saturated fats?

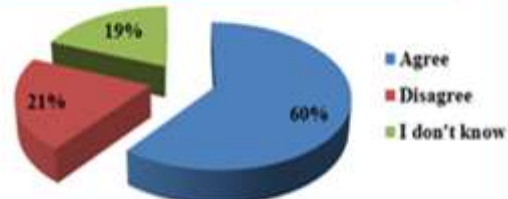


Figure 18: Distribution among study group attitude about the importance and amount of saturated fat added in cakes for good quality.

What is the source of fat do you use during cake preparation at home?



Figure 19: Distribution among study group practices in the type of fat used in cake processing on home scale.

Do you think that cakes should be preserved in refrigerator all the time?

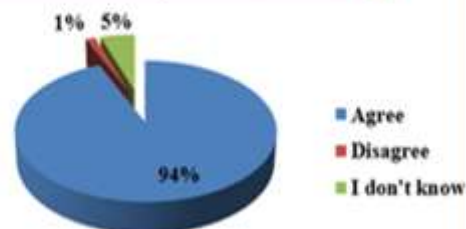


Figure 20: Distribution among study group attitude about cold storage of cake importance.

How long do you preserve you cake for consumption?



Figure 21: Distribution among study group practice for cake storage period at home after purchasing.

What is the shelf life of cake?



Figure 22: Distribution among study group knowledge about cake spoilage incidence, signs and shelf life period.

Do you accept the addition of preservatives to cakes to prolong its shelf life?

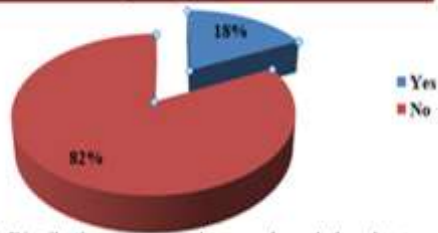


Figure 23: Distribution among study group knowledge about chemical preservatives purpose and its side effect.

