

Microbiological evaluation of artisanal mayonnaise supplied in snack bars in the city of Itapetinga – BA



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ABSTRACT

Artisanal mayonnaise has gained popularity among consumers looking to enhance the flavor of food products. However, the production environment of these mayonnaise can become the main factor of contamination when there is no proper control of good manufacturing practices. Therefore, the objective of this study was to evaluate the microbiota present in artisanal mayonnaise marketed in different locations in the city of Itapetinga-BA, as well as to compare it with the limits acceptable by the legislation for microorganisms such as Salmonella, total and fecal coliforms, molds, and yeasts. The study was developed through the collection of samples in a sterile container from three snack bars located in the municipality of Itapetinga-Bahia, whose criterion was that their production takes place in an artisanal way, being identified, and coded in A, B and C. The results showed that the mayonnaise served as a side dish in snack bars were contaminated in the two repetitions performed. which can leave customers of these establishments susceptible to food outbreaks. This result points to a serious problem of non-compliance with good manufacturing practices. Therefore, it is suggested that new studies covering more establishments be carried out, that inspection actions be strengthened, that the handlers of these foods participate more frequently in training as part of the implementation of good manufacturing practices and that these establishments make the necessary adjustments to eliminate the risks of outbreaks due to microbiological contamination of sauces such as mayonnaise.

Keywords: Good handling practices, DTA, Food Hygiene, Food services.



1 INTRODUCTION

According to Anvisa's Collegiate Board Resolution (RDC) No. 276, of September 22, 2005, mayonnaise is a stable emulsion, oil in water, prepared from vegetable oil, water and eggs, and other ingredients may be added as long as they do not decharacterize the product, which must be acidified. The additions of different ingredients bring prominence to artisanal mayonnaise. These have gained popularity among consumers looking to enhance the flavor of food products such as snacks. However, the production of these mayonnaise may involve different hygiene and processing conditions than commercial mayonnaise, which may result in microbiological contamination of these products. Therefore, understanding the microbiota in artisanal mayonnaise is crucial to ensure consumption safety and guide proper production practices.

Regarding the production of homemade mayonnaise, it can be said that the environment becomes more favorable to the multiplication of microorganisms if the storage and preparation conditions are not adequate. Poor handler hygiene and improper storage conditions can contaminate mayonnaise and cause foodborne illness (DTAs). For this reason, it is essential to fill the existing knowledge gaps on the contamination of this product, in order to find ways to improve preparation, storage and consumption practices. This includes investigating the presence of microorganisms in artisanal mayonnaise, as they are more susceptible to poor hygiene and processing conditions compared to the same product of industrial origin (FELINTO et al., 2021).

It is worth mentioning that the investigation of this microbiota is essential to identify the type of contamination and develop strategies to control the growth of microorganisms in this food, thus contributing to the reduction of DTAs and improvement of public health (ELIAS, 2014).

Among the microorganisms that cause ATDs, *Salmonella*, total and fecal coliforms, as well as molds and yeasts stand out. Regarding *Salmonella*, studies describe it as a pathogenic bacterium widely associated with outbreaks of foodborne illnesses such as salmonellosis. This disease causes symptoms such as diarrhea, fever, nausea, vomiting, and abdominal pain. In more severe cases, salmonellosis can lead to hospitalization and even death, especially in people with compromised immune systems, children, and the elderly (SILVA, 2023).

On the other hand, total and fecal coliforms are described as indicators of hygienic-sanitary quality of food, suggesting contamination of fecal origin. They are a group of bacteria that includes both harmless and pathogenic species. However, its presence may indicate flaws in good manufacturing practices and a higher risk of pathogenicity (ELIAS, 2014). Finally, molds and yeasts are described as food spoilers, they are the main causes of sensory changes such as taste, odor, and texture (SILVA, 2023).

With regard to the control of mayonnaise contamination, the Brazilian legislation establishes sanitary guidelines for its production and commercialization. According to the National Health



Surveillance Agency (ANVISA), Resolution RDC No. 724, of July 1, 2022, determines the microbiological standards for food, defining the acceptable limits for the presence of pathogens and contamination indicators, such as *Salmonella* and fecal coliforms, respectively. In addition, there are other resolutions that provide for good manufacturing practices to ensure food safety.

Despite the existence of specific legislation, there is still a need for further studies to investigate the presence and diversity of microorganisms in artisanal mayonnaise so that the production, storage and distribution of this product are in accordance with current regulations and that there are public policies for stricter control throughout the production chain (NASCIMENTO et al., 2023).

For this reason, this study aimed to evaluate mayonnaise produced in an artisanal way and distributed in the snack bars of the city of Itapetinga-BA, seeking to identify the presence of *Salmonella*, total and fecal coliforms, and molds and yeasts. Non-compliance involving good manufacturing practices in these types of establishments incurs risks of food outbreaks due to microbial contamination.

2 METHODOLOGY

Samples of 100g of mayonnaise were collected in a sterile container from three snack bars located in the municipality of Itapetinga-Bahia, whose criterion was its production in an artisanal way. Two replications were made seven days apart from one collection to the other, with proper identification and coding of the samples in A, B and C, which were transported in an isothermal box with ice to the Food Microbiology Laboratory - UESB - Itapetinga, where they were stored under refrigeration until the moment of analysis.

The microbiological analyses carried out were the same as those established by Normative Instruction (IN) No. 161, of July 1, 2022, which presents the list of microbiological standards and acceptable limits in food, which also converges with Collegiate Board Resolution (RDC) No. 724, of July 1, 2022. These guidelines recommend the analysis of *Salmonella* detection in 25 grams of sample, the count of *Enterobacteriaceae per gram of sample*, as well as the quantification of molds and yeasts per gram of sample. The results of the analyses were interpreted in relation to the limits established by the legislation for sauces such as mayonnaise.

Thus, the analyses for the presence of total coliforms, thermotolerant coliforms, *Salmonella sp*, molds, and yeasts were carried out according to Silva et al. (2017).

3 RESULTS AND DISCUSSION

The results of the microbiological analyses carried out on artisanal mayonnaise produced and offered as a side sauce in snack bars in the city of Itapetinga-BA are presented in Table 1.



Table 1 - Quantification of microorganisms from the analyzed samples and the limits of the legislation.

Samples	<i>Salmonella</i>	Total coliforms at 35°C (NMP/g)	Total coliforms at 45°C (NMP/g)		Molds and Yeasts (CFU/g)	
			R1	R2	R1	R2
	R1 and R2	R1 and R2	R1	R2	R1	R2
The	Present	150	>1,100	<3.00 a.m.	190	Absent
B	Present	1.100	>1,100	<3.00 a.m.	133,3	41,5
C	Present	>1,100	>1,100	<3.0	Absent	Absent
Legislation	Absent	<102 years	<102 years			

According to the table above, it can be seen that all samples tested positive for *Salmonella*. According to the Resolution of the Collegiate Board No. 12/2001 of the National Health Surveillance Agency (Anvisa), the presence of *Salmonella* is not allowed in food, characterizing the analyzed samples as unfit for consumption. This is different from the results obtained by Matsushima (2020) and Araújo et al. (2016), who did not find the presence of *Salmonella sp.* in homemade mayonnaise and pequi mayonnaise served in the city of Rio Verde-GO, respectively.

Salmonella is one of the main pathogens responsible for DTAs, they are widely distributed in nature, having as their main reservoir the intestinal tract of humans and animals in which birds in general, domestic and wild mammals stand out. One of the most common manifestations of *Salmonella* is salmonellosis, DTA transmitted by the consumption of raw or undercooked eggs, where some signs and symptoms can be observed such as gastroenteritis, diarrhea, fever, nausea, vomiting and abdominal pain (CARVALHO et. al., 2016).

The contamination may originate from the eggs used to prepare mayonnaise, as they have already been associated with several food outbreaks, as reported by Carvalho et. al., (2016). To avoid contamination of products with eggs, it is necessary to limit the use of it within the expiration date described on the packaging, which already binds the proper origin of this raw material, which according to Brazilian legislation must present a Federal Inspection Seal (SIF), indicating compliance and that the product is fit for consumption. The commercialization of eggs is regulated by Decree No. 9,013, of March 29, 2017, of the Regulation of Industrial and Sanitary Inspection of Products of Animal Origin (RIISPOA) which presents the due quality requirements, when an establishment uses eggs without the proper certification, assumes the risk of causing serious diseases such as salmonellosis in its customers and be held responsible for it. In addition, the storage conditions under proper refrigeration must be taken into account until the time of use, to safeguard its original quality characteristics.

It is also necessary to ensure that eggs and raw egg-based foods, such as mayonnaise, are prepared, transported, and stored properly. One strategy to avoid contamination of raw egg mayonnaise



is acidification, already provided for in the legislation by RDC No. 276/2005. Therefore, vinegar, lemon juice or acidulants can be added to the preparation of mayonnaise to consequently reduce the risks of *Salmonella contamination* (KEERTHIRATHNE et al., 2016).

Regarding the presence of total coliforms, quantities above the limit acceptable by the legislation were perceived, which is a maximum of 102 MPN/g, whose contamination ranged from 150 to 1,100 MPN/g in the two replicates evaluated for the different establishments, indicating serious failures in good manufacturing practices. Some of the bacteria in the total coliform group are able to ferment lactose and produce acid and gas at 35°C, while thermotolerant bacteria can ferment lactose and produce acid and gas at 45°C. The presence of total coliforms indicates possible fecal contamination, while the presence of fecal coliforms is a more specific indication of such contamination (THILINI PIUSHANI et al., 2016).

Regarding contamination by molds and yeasts, sample "A" showed 190 CFU/g in the first replication and absence in the second replication; sample "B" showed 133.3 CFU/g and 41.5 CFU/g, respectively; and sample "C" did not show contamination by molds and yeasts. A specimen may test positive for total coliforms and *Salmonella*, and negative results for other microorganisms. This is explained by the fact that total coliforms encompass a broader group of bacteria (SUSANA et al., 2015).

As the legislation does not establish a specific limit for molds and yeasts, their presence does not indicate compliance and that it may be fit for consumption, On the contrary, molds and yeasts are spoilage microorganisms and therefore may indicate that the product is already in a deterioration phase, its quality is compromised, that is, it should not be consumed (SILVA, 2023).

The quality of the raw material, the proper handling when preparing the sauce, the proper conservation, the hygiene of the materials, environment and handlers, are essential for the microbiological quality of the product. Therefore, it is essential to apply Good Handling Practices to avoid contamination in the product and consequently reduce the risks of foodborne diseases (DTAs) (FELINTO et al., 2012).

4 CONCLUSION

In view of the study developed, it was possible to perceive that the artisanal mayonnaise sold in different places in the city of Itapetinga-BA presented contamination by both indicator microorganisms such as coliforms, as well as spoilers such as molds, and pathogens such as *salmonella*. In other words, the failures indicated by the contamination point to a serious problem of non-compliance with good manufacturing practices, which may be extended to an even greater number of similar establishments in the city of Itapetinga-BA. Therefore, it is suggested that new studies covering more establishments be carried out, in order to provide data that strengthen sanitary



inspection actions in the city, with a view to ensuring the safety and quality of sauces and other foods prepared and served for immediate consumption. In addition, food handlers in these types of establishments should participate more frequently in training as part of the implementation of good manufacturing practices, as well as the establishments should make the necessary improvements and adjustments to eliminate the risks of outbreaks due to microbial contamination. In this way, there will be safety and microbiological quality for food products prepared and served, such as mayonnaise-type sauces, in the municipality of Itapetinga-BA.



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