Scienxt Journal of Biotechnology and Life Sciences
Year-2023 || Volume-1 || Issue-2 || July-Dec || pp. 23-32

Survey on food safety and hygenie in bakeries of prayagraj and the microbial load of selected baked food products

[*1]Sonal Keserwan, [2]Janne Claryn Benjamin
[1, 2]Department of Industrial Microbiology,
Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj,
Uttar Pradesh, India

**Corresponding Author: Sonal Keserwan,*
Email: sonalkeserwani38@gmail.com

Abstract:

Bakery Industry is one of the major food industries in India. It has played a significant role in the economic development of the country. The two most important bakery products biscuits and breads account about 81% of the World Bakery products. The study aims to get proper data from different sectors of Bakery Industry, which included questions regarding the surrounding, cleaning of the Bakery Premises. Data collection also included information from the food handlers, and a feedback was taken from customers in respective of Flavour, Taste, Texture and quality of food products.

For evaluation of the level of contaminants under microbiological aspects, Total Plate count was performed for observing the growth of bacterial and fungal colonies and on the basis of comparison of the Total plate count with the standards given by FSSAI for bakery products, quality of food products is analysed.

Keyword:

Total Plate count, Bakery, FSSAI, Contaminants, Microbiological safety

1. Introduction:

Baked products have been around us for thousands of years. The art of baking was developed early during The Roman Empire. Due to fame and desire that the art of baking received around 300BC baking was introduced as an occupation and respectable profession for Roman. The oncoming demand vigorously continued for baked products and the first bakers association was established in 168 BC in Rome.

Bakery industry is one of the major food industries in India. It has played a significant role in the economic development of the country. The most two important bakery products are biscuits and bread which accounts about 81% of the whole bakery products. Microbiological food safety is concerned for the production of safer products and mainly ensured by preventive approaches. It's primary goal are to minimize the risks of foodborne pathogens and their toxins, reduce the incidence of human disease as well as facilitating domestic and international trade.(Fadaly and Gayar 2004)

Microbiological risk is managed by Government standards and regulations on district level of food borne hazards that should not exceed. The current level of intolerable risk of community is willing to accept is a political decision by risk managers and commonly termed as" The Appropriate Level of Protection" (ALOP) (Gorris 2005) .The total plate count is widely used as an indication of the microbiological quality of food unless they are known to large no. of bacteria as a natural consequences of their preparation. (Adams and Moss 2005).

Pastries include cakes and baked products filled with cream, sauces and syrups. They can be spoiled by microorganism coming with ingredients that are added after baking such as icing, nuts, tapping and cream. Most products because of low water activity (aw) allows only molds to grow. However, some materials used as filling may have high water activity (aw) which allows for bacterial growth (Ray 2006). The management of microbial food safety has evolved from mainly recycling on product testing to process control approach as the implementation of good manufacturing practice (GMP) and the Hazard Analysis Critical Control Point (HACCP) (EFSA 2007).

In cake and biscuits different types of bacterial colonies were observed and the population increased proportionately with the increase in storage duration. Microbiological safety is an increasing public health concern worldwide. It is estimated that each year in US that there are approximately 76 million foodborne illness (Easa 2010).

Staphylococcus, E.coli, Bacillus species, Aspergillus, Penicillum are the most common genera of bacteria and molds generally isolated from the bakery product. These molds have been known to produce toxins which are both acutely and chronically toxic to humans and animals. Freshly baked products are sterile and does not contain viable microorganism but soon become contaminated upon exposure to air and surface. Contamination occurs after baking process, during the production steps such as cooling, slicing (unhygienic handling), transport and packing as well as storage. Within this production and storage chain, bakery products can be contaminated with moulds, yeasts and occasionally by bacteria such as rope -causing heat resistant endospore forming bacteria (Earle and Putt 1984).

In view of the present study entitled "Survey on food safety and hygiene in bakeries of Prayagraj and microbial load of selected baked food products" was conducted with following objectives:

1. To evaluate the food safety and hygiene conditions in bakeries of Prayagraj on the basis of question.
2. To determine the microbial load of selected baked food products.

2. Materials and methods:

PLACE OF WORK: The project was done in the Undergraduate Laboratory, Department of Industrial Microbiology, JIBB SHUATS, Prayagraj.

PREPARATION OF QUESTIONNAIRE FOR THE SURVEY: The questionnaire was prepared to gather some information based on the basis of

- Types of Bakery products were produced.
- Types of raw materials used for production purpose.
- Cleaning and Hygiene measures followed.
- Interview of Food Handlers asking about their personal hygiene and cleanliness or if they were or was ever suffered from any type of infection or disease.

An interview was conducted where 5 food handlers from all respective bakeries was interviewed. According to Data given by them, if response is equal to 5 according to point scale then the conclusion was made that term of field was good, if the response between 3 and 5 then the conclusion can be made that it is average, if the response is equal to or below 3 then it will be considered to below average

A feedback was taken from 5 customers of all the respective bakeries, according to data given by them, if the response given by them was equal to 5 according to point scale then the conclusion can be made that term of field was good, if the response was between 3 and 5 then the conclusion was made that it will be average, if the response is equal to or below 3 then it will be considered to below average.

2.1. Survey site:

El'Chico Bakery, Paradise Bakery, Holiday Bakery, Ruot, O Bakers, Kamdhenu Bakery, Hunt's bakers.

3. Observation:

3.1. Microbial load of different products from different bakeries of prayagraj:

The microbial limit test is designed to perform the qualitative and quantitative estimation of viable microorganisms present in the sample. The microbial load count are carried out aseptic condition to avoid accidental microbial contamination of the preparation of food. As all the food products are consumed by Human. According to food safety and Indian Standard Act (2006), the no. of fungal colonies obtained on culture plate should not exceed $4*10^3$cfu/g. The experiment conducted by us to analyse the quality of pastry of different bakeries, the fungal count was ranging from $0.5*10^3$-$4*10^4$cfu/g and the bacterial count was ranging from $0.5*10^3$-$6.5*10^4$cfu/g. So as we compare the results obtained from the experiment with FSSAI Standard. All the samples from different bakeries were not exceeding standards given by FSSAI. So here we conclude that all the bakeries were serving good quality of pastries.

- Table showing the total plate count of pastries from Bakeries with comparison with FSSAI Standards.

S.No.	BAKERY	FUNGAL COUNT 10^3cfu/g 104cfu/g						BACTERIAL COUNT 10^3cfu/g 10^4cfu/g						FSSAI STANDARD	
		P1	P2	M1	P1	P2	M2	P1	P2	M3	P1	P2	M4	BC	FC
1	A	1	0	0.5	1	0	0.5	2	0	1	0	1	0.5	4000	5000
2	B	2	0	1	2	1	1.5	3	2	1.5	1	2	1.5	4000	5000

3	C	2	5	3.5	2	3	3	4	4	3	4	2	3	4000	5000
4	D	3	2	2.5	2	1	1	7	1	4	2	2	2	4000	5000
5	E	1	2	1.5	3	3	3	5	8	6.5	2	3	2.5	4000	5000
6	F	7	1	4	2	2	4	8	1	4.5	2	3	2.5	4000	5000

BC: Bacterialcount, FC: Fungal Count, P1: Plate 1, P2: Plate 2, M: Mean

Table Source: FSSAI Standard acceptable range for pastry, Indian food safety and standard act 2006, (412-413).

- Table showing the total plate count of cookies from Bakeries with comparison with FSSAI Standards.

S.no	Bakery	Fungal Count 10^3cfu/g			10^4cfu/g			Bacterial Count 10^3cfu/g			10^4cfu/g			FSSAI Standard	
		P1	P2	M1	P1	P2	M2	P1	P2	M3	P1	P2	M4	BC	FC
1	A	2	0	1	1	0	0.5	0	2	1	1	0	0.5	4000	5000
2	B	2	2	2	3	2	2.5	3	2	1.5	0	3	1.5	4000	5000
3	C	4	3	3.5	3	0	1.5	2	1	1.5	2	3	2.5	4000	5000
4	D	6	2	4	5	1	3	7	1	4	4	6	3	4000	5000
5	E	3	2	2.5	4	2	3	4	0	2	2	2	1	4000	5000
6	F	5	5	4.5	2	3	2.5	8	1	4.5	1	5	3	4000	5000

BC: Bacterial Count, FC: Fungal Count, P1: Plate1, P2: Plate 2, M: Mean

Table Source: FSSAI Standards acceptable range for cookies, Indian Food Safety and Standards Act 2006 (418-420).

According to FSSAI Act 2006, the no. of fungal colonies obtained on a culture plate should not exceed to $5*10^3$cfu/g, the bacterial colonies obtained on plate should not exceed $4*10^3$cfu/g. The experiment conducted by us to analyse the quality of baked cookies of different bakeries, the fungal count ranged from $0.5 *10^3$cfu/g – $4*10^4$cfu/g, and bacterial count ranged from $0.5*10^3$ cfu/g -$4.5 *10^4$ cfu/g. As we compare the result obtained by us in the experiment with FSSAI standard Act 2006, the microbial count of each sample we analysed was not exceeding

the microbial count as per the FSSAI standard, it was concluded that all the bakeries were serving good quality of cookies.

3.2. Evaluation of data collected from consumers:

- Table showing the percentage of customer's response with comparison study of sensory evaluation of bakery products in New Delhi.

As the sensory evaluation of baked product from different bakeries of Prayagraj this table was created to compare among with respective bakeries on the basis of colour, texture flavour of the product. The results were compared to the study conducted by Kumar and Srivastava (2016) where comparison of bakeries with standards (10) as per Maric. Aleksander *et.al* the improvement of product quality in the bakery industry, International *Journal of Quality Research UDK-378.014.3(497.11)*

S.no	Bakery	Colour	Texture	Flavour	Cleanliness	Problem Faced	Overall Acceptibilty
1	A	9.95	9.95	9.95	9.95	0	8.29
2	B	9.95	9.95	8.15	9.0	1.65	7.93
3	C	8.3	8	8.1	4.95	6.6	7.63
4	D	8.3	8.3	8.1	8.3	6.6	8
5	E	8.1	8.3	8.3	8.1	3.3	7.1
6	F	6.6	4.9	6.6	6.6	10	6.94

Table Source: Improvement of Product Quality in Bakery Industry, International *Journal of Quality Research, (Table -15.1) (324-325)*

3. 3. Evaluation of data collected from food handlers:

- Table showing food handler response for the fulfillment of bakery hygiene method.

A total of 30 participants participated each 05 from various bakeries. The table is created on the basis of Questionnaire designed for food handlers (Questionnaire 2) and the response was observed on the basis of parameters.

S.No.	Bakery	Total Participants	Washing of hands	Food Consumption	Use of Mask	Use of Gloves	Use of Hairnet

				near work place			
1	A	05	05	00	05	05	05
2	B	05	05	00	05	05	05
3	C	05	05	00	03	05	02
4	D	05	05	01	00	04	00
5	E	05	05	00	00	04	01
6	F	05	04	02	03	02	00

- Table showing percentage of foodhandler's response with comparison among all the respective bakeries.

Hygenie is the most important and dominant part to reduce contamination, here the percentage of the response collected by the staff people of the bakery was performed. The response category depends on handwashing practices, food consumption near work place, use of masks, gloves and hairnets while working in the bakery .The present study was made on comparison taking a standard of (20) take from the assessment of Hygenie food handler practises and microbiological quality of baked food products (3-5), *Journal of Food processing and Technology, DOI:10.41722189.100056)*

S.no.	Bakery	Handwashing	Food consumption	Using mask	Using gloves	Using Hairnet	Overall acceptability	Level of Evaluation
1	A	19.93	0	19.9	19.9	19.9	15.9	Good
2	B	19.93	0	19.9	19.9	19.9	15.9	Good
3	C	19.93	0	16.6	19.9	16.6	14.6	Good
4	D	19.93	13.3	0	16.6	0	12.3	Average
5	E	19.93	0	0	16.6	16.5	13.6	Good
6	F	16.3	9.9	16.6	14.5	0	11.52	average

Table Source: Health and Hygenie practices and safety measures of selected bakery, South Nigeria 9(5) (220-221).

3.4. Evaluation of data collected from bakeries:

As for the data collected from the different bakeries of prayagraj indicating the rate of cleanliness of the bakery premises and the number of times and the process of the baked products being screened before marketizing and the responses are being compared with HACCP guidelines given under FSSAI standards .It was found that Bakery A was the good amongst all the other bakeries as it used RO- treated water for the cleaning purposes and production purpose ,after every 2 days they use to clean their premises and were using good quality of raw products for the production purposes ,the number of times the products were screened before marketizing and were providing the better climate control for the food storage.

4. Summary and conclusion:

The present study entitled "Survey on food safety and hygiene of bakeries of Prayagraj and their microbial load of selected baked products" were carried out for the conclusion that bakery industries are developing industry in terms of the quality of several bakery products. The percentage of hygenie practices followed by people involving the production of the respective bakeries. For quality analysis the level of contamination microbiological evaluation of the sample was performed.

In view of the following conclusion was made:

- For quality assurance, all the bakeries were producing good quality of baked products.
- According to the feedback of Consumers bakery A and Bakery B were superior in all aspects having a high rate of acceptability.
- According to the responses collected from the foodhandlers in accordance to their personal hygiene and the order of following all the measures taken during production bakery A was the surperior among all.
- According to the data collected from the owner of the bakeries included the cleaning schedule, sanitation facilities of the staff, screening of the products bakery A was the superior among all.

As per the observations it is concluded that bakery A ie. El'Chico is the best bakery of Prayagraj.

5. Reference:

(1) Khanom A, Shammi T , MD (2016): Determination of microbiological quality of packed and unpacked bread .*Stamford journal of microbiology 6(1) :24-29*

(2) Maric A, Mastilovic (2009) : Contribution to the improvement of products quality in bakery industry, *International journal of quality research UDK-378.014.3.(497.11)*

(3) Afolabi Q, Aluko O, Olawande (2015): Study of safety of bread for human consumption in an urban community in Southwestern Nigeria 9(5) 272-277.

(4) El- Fadaly H, Kadi S (2016): Microbiological examination for chocolate cake samples.

(5) Simonati CN, Moldovan, Moise G (2009) : Microbiological quality of confectionary products .*National Journal of Food Processing and Technology 9(8) :320-331*