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ASSESSMENT OF BAKE PRODUCTS AT DEHRADUN

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Abstract

In present study, local manufactured food products such as bread, pastry, bakery biscuits and one company product parle-G Biscuit were selected for microbial count and characterized the isolated contaminant on the basis of biochemical tests. In Local bread contained 2.86×10^4 bacterial cells per gm, bakery biscuits find average 2.96×10^3 bacterial cells per gm and in pastry, and average 2.73×10^3 bacterial cells per gm were present. But parle-G Biscuit did not contain any microorganism. Further, isolated contaminant were characterized by biochemical tests and observed that isolated strains were Bacillus spp., E. coil and Klebsiella spp.

Keywords: *Bacillus Spp.*; *E. Coil*; *Klebsiella Spp*; Food.

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1. Introduction

Microorganisms are responsible for spoilage as well as food borne infection. The food spoilage is a metabolic process that causes foods to be undesirable or unacceptable for human consumption due to changes in sensory characteristics (Sahu and Bala, 2017). Spoiled foods may be safe to eat if they may not cause illness because there are no pathogens or toxins present but changes in texture, smell, taste, or appearance cause them to be rejected (Smith *et al.,* 2004; Doyle, 2007; Edward, 2007; Montville and Matthews, 2008). These pathogenic microorganisms came from contaminated equipment, post processing or miss handling by workers. Adesetan *et al.* (2013) reported that 66.7% of the kitchen equipments were contaminated with *S. aureus*, 14.1% with *B. subtilis*, 7.7% with *B. cereus* and 11.5% had no bacterial growth. Strict hygienic practice should be observed when handling these equipments to guard against food poisoning. Saranraj *et al.* (2011) reported that many industrially produced baked goods emerge from the baking process with a surface that is essentially sterile but post bake handling can quickly lead to fungal, microbial surface contamination as a result of exposure to airborne contaminants as well as equipment contact.

Rumes *et al.* (2013) suggested that rope spoilage is a bread disease which consists in bacterial decomposition of the bread crumb. Spoilage organisms are heat-resistant spores of bacteria

Bacillus subtilis, *B. licheniformis* and *B. pumilus* which survive the baking process. Ijah *et al.* (2014) reported that microorganisms were isolated from bread were *Bacillus, Staphylococcus, Micrococcus, Aspergillus, Penicillium, Rhizopus*, and *Mucor*. Unachukwu *et al.* (2015) selected 30 bread samples and observed that spoilage of bread were strictly fungal organisms which include *Rhizopus* spp, *Aspergillus* spp, *Mucor* spp, *Penicillium* spp, and *Fusarium* spp.

Chauhan *et al.* (2015) reported that improper personal hygiene can facilitate the transmission of the pathogenic bacteria found in environment and on people's hands via food to humans. 323 outbreaks of food poisoning caused by bacteria in Britain between 1969 and 1972 and contaminated with Salmonella (Seiler, 2000). Present literature suggested that various types of microorganisms were responsible for spoilage so aim of present study was counting and isolation of microorganisms from local manufactured food products such as bread, pastry, bakery biscuits at Dehradun and one company product Parle-G were selected for microbial analysis.

2. Materials and Methods

Collection of samples: In present study, local manufactured food products such as bread, pastry, bakery biscuits and one company product parle-G were selected for microbial analysis.

Isolation of micro-organisms from food samples: Micro-organisms were isolated by serial dilution methods on different agar medium such as Nutrient Agar Medium, Eosin Methylene Blue Agar (EMB), and Bacillus Differentiation Agar Medium.

Characterization of isolated microorganisms: Isolated strains were characterized according to Bergey's manual of determinative bacteriology (Holt *et al.*, 1994).

3. Results and Discussion

In the present study microbial count or load were determined by SPC (Standard Plate Count) as per the guidance of BIS. In Local bread, average 2.86×10^4 bacterial cells per gm were present in three samples and it ranged from 2.5×10^3 to 3.0×10^3 (Table 1). In bakery biscuits, average 2.96×10^3 bacterial cells per gm were present in three samples and it ranged from 2.6×10^3 to 3.3×10^3 (Table 2). In pastry, average 2.73×10^3 bacterial cells per gm were present in three samples and it ranged from 1.2×10^3 to 3.3×10^3 (Table 3). Similarly, Shahbaz *et al.* (2013) reported that 24.7% chicken sandwiched burgers and 12.28% butter cream pastry samples were classed as unsatisfactory due to high aerobic plate count, high coliform count and presence of the fungal contaminants. Adebayo *et al.* (2014) evaluated microbial count in four fermented and unfermented food samples and observed that during storage, the bacteria counts were observed to range from Klebsiella aerogenes, Lactobacillus plantarum, Leuconostoc sp., Micrococcus varians, Proteus mirabilis, Streptococcus faecalis, Staphylococcus epidermidis, Aspergillus niger, Aspergillus flavus, Cladosporium herbarum, Geotrichum candidum, Mucor mucedo, Neurospora sitophilia and Penicillium *sp.* bacteria and fungi that were recovered from the food samples during storage.

Further, these isolated strains were identified by morphological as well as biochemical tests. The isolated culture strains of bakery biscuits were observing their colour as white pigmented

colony, non-motile, rod shape. On the Bread culture strains were also observing their colour as whitish, dry, flat surface, spore forming colonies, rod shape. On the pastry culture strains were also observing color as greyshish white, rod shape, raised colony, moist, smooth, translucent disc and non motile are appeared on the NAM culture plate. Further, these isolated strains were chracterized by biochemical tests and obseved that in all local made products three pathogens i.e. *Bacillus* spp.*, E. coil* and *Klebsiella* spp. were present (Table 4-7). In Parle-G Biscuit samples did not contain any bacterial count. Similarly, El-Hadedy and El-Nour (2012) isolated the *Escherichia coli* from food and characterized on the basis of biochemical tests such as catalase (+), Indole test (+), MR test (+), VP (-), Urease test (-), Citrate utilization test (-) and strains showed fermentation in various sugars such as Glucose (+), Lactose (+), mannitol (+), sucrose (+). Similarly, Alves *et al.* (2006) characterized *Klebsiella pneumoniae* on the basis of various biochemical tests such as H_2S (-ve), Indole (-ve), citrate utilization (25% positive), MR (25% positive), VP(25% positive), Urease (25% positive). Seenivasan et al. (2012) observed that *Bacillus subtilis* showed negative result in various biochemical tests such as Indole test, MR, VP, Citrate utilization, Nitrate reduction tests. All the results suggested that local bake product such as bread, pastry, bakery biscuits contained microorganisms and assume that these contamination may be due contaminated utensil, miss handling by workers, during storage. Company product parle-G Biscuit did not contain any microorganism which showed that company product is better than local products.

Table 1: Bacterial count in bread samples

S.NO	SAMPLE	BACTERIAL COUNT			
		PLATE 1	PLATE 2	PLATE 3	MEAN
1.	BS_1	3×10^4	2.9×10^4	3×10^4	2.9×10^4
2.	BS_2	3×10^2	3×10^4	2.5×10^3	2.8×10^3
3.	BS_3	2.9×10^4	3×10^4	3×10^3	2.9×10^3

Note: BS_1, BS_2, BS_3 are three bread samples.

Table 2: Bacterial count in bakery biscuits

S.NO	SAMPLE	BACTERIAL COUNT			
		PLATE 1	PLATE 2	PLATE 3	MEAN
1.	BSS_1	3×10^4	2.9×10^4	2×10^3	2.6×10^3
2.	BSS_2	4×10^2	2.6×10^6	3.5×10^1	3.3×10^3
3.	BSS_3	2×10^1	3×10^5	4×10^3	3.0×10^3

Note: BSS_1, BSS_2, BSS_3 are three bakery biscuit samples.

Table 3: Bacterial count in pastry samples

S.NO.	SAMPLE	BACTERIAL COUNT			
		PLATE 1	PLATE 2	PLATE 3	MEAN
1.	PS_1	1.2×10^3	5×10^2	2×10^1	2.7×10^2
2.	PS_2	2.8×10^3	3.4×10^3	1×10^4	2.4×10^3
3.	PS_3	3.2×10^2	2.5×10^4	3.8×10^5	3.1×10^3

Note: PS_1, PS_2, PS_3 are three pastry samples.

Table 4: Morphological characteristics of pathogenic bacteria isolated from bakery products

S.NO.	Name of microgranisms	Colony Morphology	Colour	Shape	Media
1.	*Klebsiella pneumonia*	Slimy, transculent raised growth	Blue, Purple	Round	EMB
2.	*Esherichia coil*	Moist glistening	Green metallic	Round	EMB
3.	*Bacillus subtilis*	Dull, wrinkled	Creamish	Rod	NAM

Table 5: Biochemical characterization of *Klebsiella spp.*

S.NO.	Name of biochemical test	KP1	KP2	KP3	KP4	Final results (%age)
1.	MR	+	-	-	+	75% (+ve)
2.	VP	-	-	+	-	75% (-ve)
3.	Indole	+	-	+	-	50% (-ve)
4.	H_2S	-	+	-	-	75% (-ve)
5	Citrate	+	-	-	+	50% (+ve)
6.	Nitrate	+	-	+	+	75% (+ve)

Table 6: Biochemical characterization of *Escherichia coil*

S. No	Name of biochemical test	EC1	EC2	EC3	EC4	Final results
1.	MR	+	+	+	+	100% (+ve)
2.	VP	-	-	+	-	75% (-ve)
3.	Indole	+	+	+	+	100% (+ve)
4.	NO_3 redu.	+	+	-	+	75% (+ve)
5.	Citrate	-	+	-	-	75% (-ve)
6.	Urease	-	-	+	-	75% (-ve)
7.	Gelatin	-	-	-	+	75% (-ve)
8.	H_2S	+	-	-	-	75% (-ve)

Table 7: Biochemical characterization of *Bacillus spp*

S.NO.	Name of biochemical test	BS1	BS2	BS3	BS4	Final results
1.	Indole	-	+	-	-	75% (-ve)
2.	TSI	-	-	+	-	75% (-ve)
3.	MR	-	+	-	-	75% (-ve)
4.	VP	+	-	-	+	50% (+ve)
5.	H_2S	+	-	+	-	50% (+ve)
6.	Nitrate	-	+	-	+	50% (+ve)

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