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Original Article

Proximate Composition and Selected Physicochemical Parameters of Cake Prepared with Preservatives

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Abstract *- A cake is a baked confection made from flour, sugar and other ingredients. Due to some of the ingredients present in cake, it is susceptible to alteration and degradation. The study aimed to determine the pH, Free Fatty Acid values and proximate composition of cake prepared with preservatives. Cakes were prepared and stored for 14 days. Sample A was prepared without preservatives, while calcium propionate and sorbic acid were used to prepare Samples B and C, respectively. pH, Free Fatty Acid (FFA) values and proximate analysis were determined for days one, seven and fourteen after preparation using standard methods. The result showed that the pH value of the samples decreased while the free fatty acid values increased in all the samples as the storage period increased, except for the FFA of sample C for day 7. The results of the proximate composition showed that the crude protein and carbohydrate content increased after 7 days but decreased after 14 days of storage, except in Sample C, where an increase was evident. The results of total microbial load indicated no mould growth in Samples B and C, there was the presence of bacteria in all samples through the 14-day storage period, and there was no yeast count in Samples A and B immediately after production. The sensory evaluation result showed that Samples A and B were more acceptable in colour, aroma and taste than Sample C. In conclusion, although cake samples prepared with calcium propionate and sorbic acid had good antimicrobial effects, they had relatively bad taste and aroma.*

Keywords *- Cake, Preservative, Calcium propionate, Sorbic acid, Proximate.*

1. Introduction

Cake is a flour dessert typically prepared with flour, sugar, and other ingredients (Shaikh *et al.,* 2016). Cakes have evolved from their earliest beginnings, which were bread modifications, to a wide variety of sweets that can be simple or complicated and that have characteristics in common with pastries, meringues, custards, and pies. The most frequent cake ingredients are flour, sugar, eggs, butter, oil and margarine. Many people bake and consume cakes, frequently served as celebratory food at ceremonial events like weddings, anniversaries, and birthdays (Li& Walker, 1996). Annongu*et al* (2008) researched the nutritive content of the cake, and the findings demonstrate that it includes beneficial nutrients such as soluble carbohydrates, protein, fat and mineral matter.

Due to the nature of ingredients present in cake, some liquid preparations are susceptible to microbial contamination; such preparations are protected by preservatives, which avoids degradation and alteration of the quality of the product. Hence, a preservative is a natural or synthetic chemical added to various food products to prevent microbial contamination (Shaikh *et al.,* 2016). Preservatives improve food's aroma, taste, and/or appearance while maintaining its good properties.

Additionally, they serve as additives in food, cosmetics, and pharmaceutical items. Antioxidants, sodium Benzoate (NaB), calcium propionate, and sorbate are a few examples of preservatives (Al-Ani *et al.,* 2019). Calcium propionate is a reliable and safe food additive with fewer side effects, widely used in preserving various food products. Both humans and animals can digest and absorb it as a precursor for the synthesis of glucose. In addition, calcium propionate provides essential minerals such as calcium to mammals (Zhang *et al.,* 2020). Calcium propionate is commonly used in bread as an antimicrobial agent. Sorbate, otherwise known as sorbic acid, is an effective inhibitor of most molds, yeasts, and some bacteria.

Sorbic acid can be added directly to food products because it is only weakly soluble in water. It is frequently employed in preserving foods with a pH of 6.5 or lower, where bacterial, fungal, and yeast control is crucial for safe and economical food storage. The usage of sorbic acid in food is usually regarded as safe. (Jung*et al.,* 2002). The efficiency of sorbic acid can be impacted by environmental parameters such as pH, water activity, temperature, atmosphere, microbial load, microbial flora, and specific food components (Jung *et al.,* 2002). In the baking industry, various substances are used as cake preparation

preservatives. Chemicals used as additives preserve food content and also have the potential to damage consumers; thus, there is a need to investigate how certain preservatives affect the nutritional content of produced cakes.

2. Materials and Method

2.1. Sample Collection

Cake ingredients such as flour, butter, eggs, baking powder, vanilla flavor and preservative powder (calcium propionate and sorbic acid) were purchased from Mile 1 market, Port Harcourt, Rivers State.

2.2. Sample Preparation

Three batches of cake of 15 cupcakes each were made. The first batch was prepared without preservatives, the second batch was prepared with calcium propionate and the third batch was prepared with sorbic acid and were labelled Sample A, Sample B and Sample C, respectively. The samples were sealed in air-tight bags and labelled accordingly in sets of 3, making 5 sets per sample; each sample was labelled week 0, week 1, and week 2; therefore, shelf-life was observed for 14 days.

2.3. Cake Preparation

For each sample, 250g of all-purpose flour, 250g of butter, 175g of sugar, 5 eggs, 1 tablespoon of baking powder, 1 tablespoon of vanilla flavor and calcium propionate for Sample B and sorbic acid for Sample C. The oven was preheated for 15 minutes at 150ºC. The flour, baking powder and preservative (none for Sample A, calcium propionate for Sample B and sorbic Acid for Sample C were mixed together in a wide bowl and set aside.

In a separate bowl, the butter was creamed until it became light, fluffy and white. Sugar was added, and the creaming continued until it went from grainy to fluffy again. The eggs were added one after the other as the creaming continued, and the vanilla flavor was added. Gradually, the flour mixture was added, one cup at a time. It was mixed until well incorporated. Two spoons of the batter were added to the baking pans, a total of 45 cupcake pans, 15 per sample. It was baked in a preheated oven for 30 minutes.

Proximate analysis was determined using the modified method of AOAC (2012).

2.4. Moisture Content Determination

Two grams of the dry sample were weighed into a moisture can, and the sample was oven-dried for 1 hour at 150ºC. It was cooled in a desiccator to cool for 15 minutes. The final weight was taken, and the process was repeated for all samples.

$$\% \text{ moisture} = \frac{(W2 - W3)}{(W2 - W1)} \times \frac{100}{1}$$

W1 = Weight of the empty moisture can; W2 = weight of sample before drying; W3 = Weight of sample after drying.

2.5. Ash Content Determination

Two grams of the sample were weighed into the crucible. The crucible containing two grams of the sample was placed in a muffle furnace and ashed at 550°C for 1 hour; it was allowed to cool in the desiccator for 15 minutes. This process was repeated for all cake samples.

$$\% \text{ Ash} = \frac{W2}{W1} \times \frac{100}{1}$$

W1 = Weight of sample; W2 = weight of ash.

2.6. Fat Content Determination

Fat bottles and thimbles were washed and dried in the oven at 105°C for 30 minutes and were cooled in the desiccator for 15 minutes. One gram (1g) of the sample was weighed, poured into the thimble, and put into the fat bottle. 40 ml of hexane was measured into the fat bottle containing the sample. The fat bottles were sent to the orbital shaker and allowed to shake for 3 hours. The fat bottles containing the oil and hexane were sent into the air oven at 105ºC for 1 hour to evaporate the hexane and extract the oil. This process was repeated for all samples.

$$\% \text{ Fat} = \frac{W2}{W1} \times \frac{100}{1}$$

W2 = Weight of extract, W1 = weight of sample.

2.7. Crude Fibre Determination

Into a beaker, 25ml of 1.25% H_2SO_4,0.5g was added and allowed to boil gently for 5 minutes; it was filtered and properly rinsed with hot deionized water. The sample was scrapped with a spatula into the beaker, 25ml of 1.25% NaOH was added, allowed to boil for 5 minutes, and filtered; the residue was later washed with hot deionized water. The residue was then oven-dried for 1 hour at 105ºC. After drying, the filter paper containing the sample was placed in the crucible and put in the muffle furnace for 1 hour at 550ºC. The ash was removed from the furnace and weighed. The process was repeated for all samples.

a) Crude Fibre (g) = Weight of residue - Actual Ash

b) $\% \text{ Crude Fibre} = \frac{\text{Crude Fibre}}{\text{Sample Weight}} \times \frac{100}{1}$

2.8. Crude Protein Determination

Digestion flasks were washed and dried in the oven for 30 minutes at 105ºC. 0.3g of $CuSO_4$ and 3g of Na_2SO_4 were added to the digestion flask. 0.5g of sample was weighed and added. 12ml of conc. H_2SO_4 was added. The digestion unit containing the digestion flask was mounted into the fume cupboard for digestion at 460ºC for 1 hour. After digestion, it was transferred into a measuring cylinder, and distilled water was added to measure up to 100ml. 20 ml of the sample was transferred into the distillation unit. 10ml of boric acid was added and distilled for 5 minutes. The distilled sample was titrated against 0.1m of HCl until a pink

colour was observed. Titre values were recorded. The process was repeated for all cake samples.

$$\% \text{ Crude Protein} = \frac{\text{Sample titre–blank titre x N of acid x 1.4}}{\text{Weight of sample (in 10ml)}}$$

2.9. Carbohydrate Determination

Carbohydrate analysis was done by getting the difference between the summation of the values of crude fibre, crude fat and moisture content of the sample, (100 – (% moisture + % ash + % Fat + % protein + % crude fibre)).

2.10. pH Determination

Five grams of sample was weighed into 50ml of water. It was allowed to stand for 30 minutes at room temperature. The solution was filtered, and pH was determined using a pH meter. This process was repeated for all samples.

2.11. Free Fatty Acid (FFA) Determination

Five grams of sample was weighed into an empty beaker. 50ml of neutralized Ethanol was added to extract the free fatty acid. The samples in the beaker were filtered using only the liquids. 4 drops of phenolphthalein indicator were added into the conical flask, and the filtrate was titrated against 0.1M NaOH; the colour changed from clear amber to cloudy amber and finally to light purple. The titre values were recorded. This process was repeated for all samples.

3. Total Microbial Load Determination

3.1. Total Bacterial Count Determination

Twenty-eight grams of Nutrient agar was weighed and dissolved into 100ml of distilled water in a sterile conical flask, put in an autoclave at 121°C for 15mins, and allowed to cool at 40oC before pouring into the plate to solidify. 15g of peptone water was added to 25g of sample weighed and dissolved into 225m/l of sterile prepared peptone water. 1 ml was pipetted from the first tube of diluents into the second tube until the diluents provided well-separated colonies. 0.1ml was aseptically pipetted and inoculated with a flame on each of the media with the help of a sterile L-shaped glass rod. It was incubated for 24 – 48 hours. Colonies on Nutrient Agar plates were counted using colony counters, and values were recorded. This process was repeated for all samples.

3.2. Total Yeast Count Determination

Potato Dextrose Agar was used for the cultivation of yeast. Twenty-nine grams per litre (29g/L) was weighed and dissolved into a sterile conical flask. It was mixed to dissolve completely before being sterilized at 121°C for 15mins using an autoclave and was allowed to cool to 40°C before being dispensed into sterile petridishes to solidify. Values of yeast growth were recorded, and the procedure was repeated for all samples.

3.2.1. Sensory Evaluation Test

Immediately after cake preparation, a sensory evaluation test was conducted on 28 persons (panellists) to examine the colour, texture, aroma and taste of three cake samples. Values were obtained and recorded. A five-score chart was provided for evaluation – 5 for excellent, 4 for very good, 3 for good, 2 for fair and 1 for poor.

3.2.2. Statistical Analysis

All data were presented as mean ± standard deviation. Data were analyzed with one-way analysis of variance (ANOVA) using the SPSS version 20.0. Results were compared among groups with Scheffe's post hoc test and considered significant at a 95% confidence level ($p< 0.05$).

4. Result

Table 1. pH, free fatty acid and proximate composition of cake prepared with some preservatives immediately after production

Sample	Moisture	Ash	Fat	Crude	Crude Fibre	Carbohydrate	pH	Free Fatty
A	20.50 ± 0.29	1.86 ± 0.08^{bc}	19.79 ± 0.01^{bd}	8.09 ± 0.35^{b}	1.97 + 0.04^{bc}	47.81 ± 0.57^{bd}	7.27 ± 0.07^{bd}	0.22 ± 0.00^{ad}
B	20.92 ± 0.97^{c}	2.41 ± 0.04^{*ad}	23.76 ± 0.00^{*ad}	6.90 ± 0.00^{*a}	3.12 ± 0.21^{*ad}	42.90 ± 1.23^{*a}	6.68 ± 0.17^{*ad}	0.42 ± 0.02^{ad}
C	21.57 ±	1.93 ± 0.11^{bc}	26.05 ± 0.05^{*bc}	7.11 + 0.00^{a}	1.77 ± 0.13^{bc}	41.58 ± 1.21^{*ac}	5.28 ± 0.52^{*bc}	0.92 + 0.03^{*bc}

Key Sample A – Cake prepared with no preservative, Sample B – Cake prepared with Calcium Propionate Sample C – Cake prepared with Sorbic Acid

Values are mean ± STD, n= 3. Values with * showed a significant difference at 0.05 level when comparing Sample A with other samples, Values with a,b showed a significant difference at 0.05 level when comparing Sample B with other Samples and Values with cd showed a significant difference at 0.05 level when comparing Sample C with other samples.

Table 2. pH, free fatty acid and proximate composition of cake prepared with some preservatives 7 days after production

Sample	Moisture	Ash	Fat	Crude Protein	Crude fibre	Carbohydrate	pH	Free Fatty Acid
A	19.25 ± 0.39^{bd-}	0.34 ± 0.16^{bd-}	21.14 ± 0.06^{bd-}	9.48 ± 0.01^{bd-}	2.01 + 0.01^{b}	47.86 ± 0.35^{ad}	5.51 ± 0.01^{bd-}	0.24 ± 0.05^{bd}
B	20.99 ± 0.24^{*ac}	1.63 ± 0.13^{*ad}	20.59 ± 0.01^{*ad}	8.04 ± 0.00^{*ac}	2.51 ± 0.33^{ao}	46.24 ± 0.65^{ad}	5.83 ± 0.01^{*ad}	0.59 ± 0.00^{*ad}
C	21.48 ± 0.17^{*ac}	3.43 ± 0.04^{*bc}	22.98 ± 0.06^{*bc}	7.23 ± 0.05^{*ac}	2.27 ± 0.14^{ac}	43.41 ± 1.41^{*bc}	4.92 ± 0.01^{*bc}	0.48 + 0.02^{ac}

Key Sample A – Cake prepared with no preservative, Sample B – Cake prepared with Calcium Propionate, Sample C – Cake prepared with Sorbic Acid

Values are mean ± STD, n= 3. Values with * showed a significant difference at 0.05 level when comparing Sample A with other samples, Values with a,b showed a significant difference at 0.05 level when comparing Sample B with other samples and Values with cd showed a significant difference at 0.05 level when comparing Sample C with other samples.

Table 3. pH, free fatty acid and proximate composition of cake prepared with some preservatives 14 days after production

Sample	Moisture	Ash	Fat	Crude Protein	Crude fibre	Carbohydrate	pH	Free Fatty Acid
A	$21.69 \pm 0.03^{bd-}$	$1.64 \pm 0.00^{bc-}$	19.70 ± 0.50^{bd}	7.87 ± 0.00^{ad}	2.00 ± 0.01	47.02 ± 0.36^{bc}	$4.64 \pm 0.03^{bc-}$	$2.16 \pm 0.01^{bd-}$
B	$23.28 \pm 0.04^{*ado}$	$2.20 \pm 0.10^{*ad}$	$21.91 \pm 0.59^{*ad}$	7.90 ± 1.72^{ad}	2.10 ± 0.21	$42.63 \pm 0.86^{*ad}$	$5.45 \pm 0.03^{*ad}$	$1.10 \pm 0.50^{*ac}$
C	$19.32 \pm 0.03^{*bcQ}$	1.84 ± 0.00^{bc}	$25.60 \pm 0.20^{*bc}$	$9.60 \pm 0.00^{*bcQ}$	1.90 ± 0.10	$44.28 \pm 2.60^{*ac}$	4.53 ± 0.02^{bc}	$1.36 + 0.05^{*ac}$

Key Sample A – Cake prepared with no preservative, Sample B – Cake prepared with Calcium Propionate, Sample C – Cake prepared with Sorbic Acid

Values are mean ± STD, n= 3. Values with * showed a significant difference at 0.05 level when comparing Sample A with other samples, Values with a, b showed a significant difference at 0.05 level when comparing Sample B with other samples and Values with cd showed a significant difference at 0.05 level when comparing Sample C with other samples.

Table 4. Total bacterial, mould and yeast count of cakes prepared with some preservatives during 14 days of storage

Total Microbial Load	Sample	Day 1	Day 7	Day 14
Total Bacterial Count (Cfu/g)	A	1.8×10^2	1.5×10^3	4.0×10^3
	B	3.0×10^2	4.5×10^3	3.9×10^4
	C	3.0×10^4	3.8×10^4	2.0×10^5
Total Mould Count (Cfu/g)	A	NG	NG	2.5×10^2
	B	NG	NG	NG
	C	NG	NG	NG
Total Yeast Count (Cfu/g)	A	NG	2.0×10^2	1.0×10^2
	B	NG	3.5×10^2	3.1×10^3
	C	1.0×10^2	1.0×10^2	1.9×10^3

Keys: Sample A – Cake prepared with no preservative
Sample B – Cake prepared with Calcium Propionate
Sample C – Cake prepared with Sorbic Acid
NG – No Growth
Cfu - Colonies forming unit

Table 5. Sensory results obtained from 28 panellists on cake samples prepared with some preservative obtained immediately after production

	Colour Test			Texture Test			Aroma test			Taste Test		
	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C
Excellent	16	7	12	11	7	3	13	4	4	17	1	2
Very Good	9	12	4	11	11	12	9	13	4	6	4	4
Good	3	7	10	3	10	10	6	7	8	4	11	10
Fair	0	2	1	1	0	3	0	4	8	0	9	6
Poor	0	0	0	0	0	0	0	0	4	1	3	6

Key Sample A – Cake prepared with no preservative
Sample B – Cake prepared with Calcium Propionate
Sample C – Cake prepared with Sorbic Acid

5. Discussion

Cakes are foods that children and adults widely consume. Table 1 shows the proximate composition and selected physicochemical parameters of cake samples evaluated immediately after production. It reveals that the samples' moisture content, ash, fat and free fatty acid content increased in Samples B and C when compared with Sample A, while a decrease was observed in the pH, crude protein and carbohydrate content of the samples during the first day of preservation.

The amount of moisture in a food material affects its acceptance, packaging, and shelf life. Moisture is an environmental factor that encourages microbial development and deterioration. Moisture content increased in Samples B and C when compared to Sample A, and the highest value was observed in Sample C. The increase in moisture content could be due to the water-conserving nature of the preservatives. The increased moisture detected in the cake samples made with preservatives may adversely

affect the cake's storage durability by promoting mould formation and accelerating moisture-dependent biochemical processes (Onimawo and Akubor, 2012). High moisture content increases the susceptibility of a food product to microbial and enzymatic spoilage (Akubor and Eze, 2012).

Ash refers to the total mineral content of a food item, which is the inorganic residue left over after all organic matter has been completely oxidized. Food's mineral content aids in the metabolism of macronutrients to release energy. Ash content significantly increased in Sample B and showed no significant difference in Sample C when compared to Sample A. This result is in agreement with that of Ikpeme*et et al.* (2010), who reported that there was an increase in the ash content of food substances prepared with preservatives.

Fats are the most calorically rich food group, providing about 9cal/kg of energy on average. The fat content significantly increased in Sample B and C when compared to Sample A. Increase in fat content indicates that the preservatives increased the energy density of the cake (Roberta *et al.,* 2019).

Protein is an essential macronutrient and useful component in food compositionsProtein is needed to develop blood cells, protect, form, rebuild, maintain and grow tissue, skin, hair, tissue and essential organs (Rahman *et al.,* 2020). Crude protein content was significantly reduced in Sample B and showed no significant difference in Sample C when compared to Sample A. The decrease in protein content in Samples B and C is in tandem with the findings of Rahman *et al.* (2020), who reported that coconut cake treated with preservatives recorded a decrease in protein content and that low protein can lead to diminished intelligence or mental retardation.

Crude fiber is widely known for preserving bulk, promoting motility, and enhancing peristalsis by extending the surface of the food in the intestines(Meyer, 2004). The fibre content significantly increased in Sample B and decreased in Sample C compared to Sample A. The increased fibre value observed in Sample B has several health benefits, as it will aid digestion in the colon and reduce constipation.

Carbohydrate is an essential macronutrient that provides energy for nutrition and is readily fermented by microorganisms to produce carbon dioxide. The carbohydrate content was significantly reduced in Samples B and C when compared to Sample A.

pH measures the acidity and alkalinity nature of any substance. pH values less than 7 are acidic, and pH values greater than 7 are alkalinic (Membe*et al.,* 2001). The decrease in pH values of Samples B and C could be attributed to the chemical composition of the preservatives, and the result obtained in this study is in consonance with the findings of Membe*et al* (2001), who reported a decrease in the pH of sponge cakes when added with Rubus powder.

Free fatty acids are produced by the hydrolysis of oils and fats. The free fatty acid value obtained in this study showed an increase in Samples B and C when compared to Sample A.

Table 2 shows the proximate composition and selected physicochemical parameters of cake samples prepared with some preservatives after seven days of production.

The moisture, ash, crude fibre and free fatty acid content significantly increased in Sample B and C when compared to Sample A. High ash content suggests that they are rich in organic matter, which is convertible to oxides and water on heating (Akubor and Ishiwu, 2013). The increased crude fibre content of Samples B and C makes the cake an ingredient with more physiological benefits (Hafize *et al.,* 2019).

Fat, crude protein and carbohydrate content significantly reduced in Sample B and significantly increased in Sample C when compared to Sample A. pH value significantly increased in Sample B and significantly reduced in Sample C when compared to Sample A.

Table 3 shows the proximate composition and selected physicochemical parameters of cake samples prepared with some preservatives after fourteen days of production.

Moisture, ash, fats and crude protein increased in Sample B and C when compared to Sample A. The increase in ash content of Samples B and C recorded in this study is in comparison with the findings of Uzor-Peters *et al.* (2008), who reported reduced levels of ash contents in baking products stored with preservatives.

Crude fibre content slightly increased in Sample B but decreased in Sample A. Carbohydrate and free fatty acid content significantly reduced in samples B and C compared to Sample A. pH values significantly increased in Sample B but decreased in Sample C.

The pH, FFA and proximate composition of cake samples prepared with some preservatives were analyzed and compared immediately after production, 7 days and 14 days after production. The result shows that the moisture content of the cake samples preserved with sorbic acid decreased as the storage time increased, while the samples preserved with calcium propionate recorded an increase in moisture content as the storage days increased. A decrease in the moisture sample of a sample prevents microbial growth and spoilage; thus, sorbic acid is a good preservative for inhibiting microbial growth and enhancing the shell life of cake samples. This finding is in consonance with the result of (Jung *et al.,* 2002), who reported that sorbic acid promotes the shelf-life of food samples.

The result also reveals that the ash content of the samples decreased during the 7 days of storage except in the samples preserved with sorbic acid, where an increase in ash content was observed during the 7 days of storage. The ash

content of the samples increased during the 14 days of storage except for the samples treated with sorbic acid, where an increase was evident when compared with the 7 days of storage. The increase in ash content recorded in this study agrees with the findings of El-Owni and Hamid (2008), who reported increasing ash content during the storage period. However, the result contradicts the findings of Peter *et al.* (2010), who recorded a decrease in the ash content of baked samples as the storage period increased.

The protein content increased in samples A and B during the 7 days of storage, while a decrease in protein content was observed in group C treated with sorbic acid. Protein degradation as a result of storage time may be the cause of the observed decrease in protein content, and this result is in agreement with the findings of Hayaloglu *et al.* (2005), who reported that the protein content of fruits decreased as the storage period increased.

The result also shows that the samples' pH values decreased while the samples' free fatty acid values increased as the storage period increased. A decrease in the pH value of the samples could be a result of the decrease in the production of lactic acid by the action of lactic acid bacteria (Hayaloglu *et al.,* 2005). An increase in free fatty acid might result from lipid oxidation as a result of lipid oxidation as a result of exposure to air, moisture or heat, indicating that the cake is becoming stale or getting rancid (Mahesar*et al*.,2014).

The total microbial load of cake samples was determined immediately after production, 7 days after production and 14 days after production, as seen in Table 4, and the following was observed.

The result shows that the total bacterial count of the samples increased in the samples produced in the preservatives during the 7 days of treatment but decreased during the 14 days compared to the 7 days of storage. Bacterial contamination in cakes may result in decreased quality, resulting in economic losses and the possibility of causing public health hazards. The increase in the bacterial count observed in the samples produced during the 7 days could be attributed to hygienic measures during handling (Shaltout *et al.,* 2017).

The result of Total Mould Count revealed no mould growth in Sample B and C for the 14 days of storage; Sample A had no growth after 7 days but had mould after 14 days of storage.

The result of the Total Yeast Count revealed no yeast growth in Samples A and B immediately after production, but it increased after 7 days but decreased after 14 days. Sample C had a low amount of yeast count immediately after production and after 7 days but increased during 14 days of storage.

A sensory evaluation test was done by 28 panellists, as shown in Table 5, and the result revealed that colour, texture, aroma and taste were more acceptable in Sample A compared to Sample B and C; Sample C was generally least acceptable in aroma and taste.

6. Conclusion

Preservatives have been used for many years to enhance the shelf life of baked products such as cakes and have played an important role in reducing serious nutritional deficiencies. They help to ensure the availability of wholesome, appetizing and affordable foods that meet customers' demands. The results obtained in this study indicate that cake is a good source of carbohydrates, protein, fat, and other nutrients and that the preservatives help to prevent the loss of nutrients during the storage period but cause an increase in the acidity of the cake. The antimicrobial effects of calcium propionate and sorbic acid were evident, as there was no physical mould growth after 14 days. From the result, it can be concluded that cakes prepared with calcium propionate and sorbic acids can stay for 14 days without losing their essential nutrients. However, other preservatives with less acidic effects might seem more suitable and safer for consumer's health.

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