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Impact of Preservatives in pH of Yoghurt Produced from Soya Beans Milk in Sokoto Metropolis

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ABSTRACT
Soya beans are potential food material that contains all essential amino acids, used primarily for soya milk production. Soya milk is used as a substitute for cow milk and human milk over the years; it has been developed into a food for infant and individuals suffering from various forms of malnutrition and food allergies. This study aimed to determine the impact of preservatives on pH of yoghurt produced from soya beans milk. Sample were analyzed using Illinois method, pH of the samples and organoleptic tests (texture, taste, aroma, mouth feel) were measured to determined shelf- stability of samples stored in the Refrigerator and samples stored at room temperature. Result of pH analysis shows Samples (4.9±0.1) stored in the refrigerator with potassium metabisulphate preservatives gives better quality compared to samples (3.0±0.1) on sodium benzoate preservative. Difference between the mean obtained from the ANOVA were ascertained using Ducans multiple range, Potassium metabisulphate at lower temperature gives better organoleptic properties than sodium benzoate preservative. Conclusively the inhibitive ability of potassium metabisulphatee at lower temperature is higher than that of sodium benzoate preservatives.
Keywords: Soya Beans; pH; Preservatives; Yoghurt; Concentration;

INTRODUCTION

Soya bean (Glycine maxima), the primary material for soya milk production has been identified to be one of the most important legumes of the tropics with high protein content. It is potentials Food materials that contain all essential amino acids that are very important for the proper development of the body, indeed soya beans, has a higher content of lysine in comparison to other plant proteins (Ade-omowaye *et al.*, 2004). Soya beans when processed they give soya beans milk which can be converted to yoghurts which is valuable protein supplement or substitute for adult and infants feeding (Delia and Herbert, 1986).

Soya milk is lactose-free and can be consumed by the lactose- intolerant people as a substitute to milk (Okafor, 1990). Preservatives are added to improve yoghurt consistency. These are generally additives, which prolong the life span of foods and drinks by preventing micrognim to prevent the food onto which it is added from fermentation and spoilage without causing any harmful effect to the person who consumed the food. The use of chemicals preservatives enhanced food quality, reduced waste and enhances consumer acceptability (Friezer, 1989). These chemical preservatives are classified into three main types: Anti-microbial (such as Benzoic acid, propionates, Di-methyl pyrocirbonates), antioxidant (such as Ascorbic acid, Butylated hydroxyl anisole), and antibiotic (such as Oxy tetracycline, Ninsin and lacto Peroxidase). Other miscellaneous preservatives are classified into three main types: anti microbial (such as ascorbic acid, butylated hydroxyl anisole) and antibiotic (such as Oxytetracyclineninsin and lacto peroxidase) other miscellaneous preservatives are vinegar, Sorbet, silica, gel, boric acid, boras formaldehyde, thiabendazole (Friezer, 1989). Ascorbic acid and its derivatives are added to milk and yoghurt to inhibit the rancidity and spoilage rate of the yoghurt. Likewise ninsin is used in preserving yoghurt, as it prevent the Growth of vegetable bacterial cells and end pores that are responsible for gas formation by *Clostridium spp* which may cause the cause the yoghurts package to expand or burst. A culture of lactoperioxiodase is also used to

prevent yoghurt because it damages the inner membrane of bacteria. Most preservatives are readily available since they can be synthesized in the laboratories (Friezer, 1989).

Soya milk is of considerable interest to nutritionist as possible substitute for cow milk and human milk. Over the year, it has been developed into a food for infant suffering from various forms of malnutrition and for individual with food allergies and diseases associated with cow milk diet and also to reduced expensive and encourage small scale producer.

MATERIALS AND METHODS

Soya beans sample was bought from Sokoto Central Market and identified at the Department of Biological Sciences Sokoto State University, Sokoto. Soya beans was prepared by soaking 4g of clean washed soya beans grains in boiled deionized water for 24hrs at interval of 8hrs. The soya beans was dehulled and washed with water, grinded to give slurry. The milk was extracted by sieving and filtration (Iwe, 2003). Six litters of prepared soya milk was warm in water bath at 35-38^{o}C for 20min, 0.10% of gelatine was dissolve in 3ml of deionised water and added to the samples under constant rapid stirring. Stabilizer was allowed to incorporate properly; soya milk was pasteurized at 85^{o}C for 30minutes in a water bath. The milk was then kept to cooled in the refrigerator at 40^{o}C for 1hour, 120ml (2%) of yoghurts culture was inoculated into 5880ml of the prepared milk, the mixture 6000ml was incubated at 45^{o}c until the pH of 4.0 - 4.3 was reached. The incubated yoghurt was then kept in the refrigerator at 40^{o}c for 24 hours. Seven thousand grams of sugar were dissolved into 6000ml of the yoghurts sample with five grams of vanilla flavour were shaked properly until the mixture dissolved completely.

One gram of each, sodium benzoate and potassium metabisulphate (preservatives) was dissolved in 3ml of deionise water and shaked thoroughly inside the beaker, the 3ml of the solution was added to 1500ml of the prepared yoghurts. The yoghurt was package into sample bottles, in which each bottle was been, label for easy identification.

The yoghurts samples were stored at room temperature for 13days and refrigerated for 13days, pH of samples in each group's (Refrigerated and room temperature) were determine using pH meter at the interval of 2days. Results in this study were reported as mean of four replicate analyses. One-way analysis of variance (ANOVA) was used to determine difference between the mean scores. Difference between the mean obtained from the ANOVA were ascertained using Ducans multiple range. Significance was set at $p<0.05$.

RESULT

Result of pH in samples stored in the refrigerator with different preservatives is presented in Figure 1.0. The pH of soya milk yoghurt stored in the refrigerator at 60^{o}C of four respective samples, SSMY, PSMY, SPSMY, and USMY showed different mean concentration (3.0±0.1 to 4.9±0.1). PSMY was highest at 1st and 2ndday (5.1 ±0.1) at the13thday, pH was least (4.9±0.1). The pH of the soya milk yoghurts stored at refrigerator decreases within the storage time (days). pH of untreated samples at day 0 and 1of PSMY was different compared to SSMY. Soya milk yoghurt with the two Preservatives had the pH between from (4.0±0.1to 4.9±0.1) in the Acidic range.

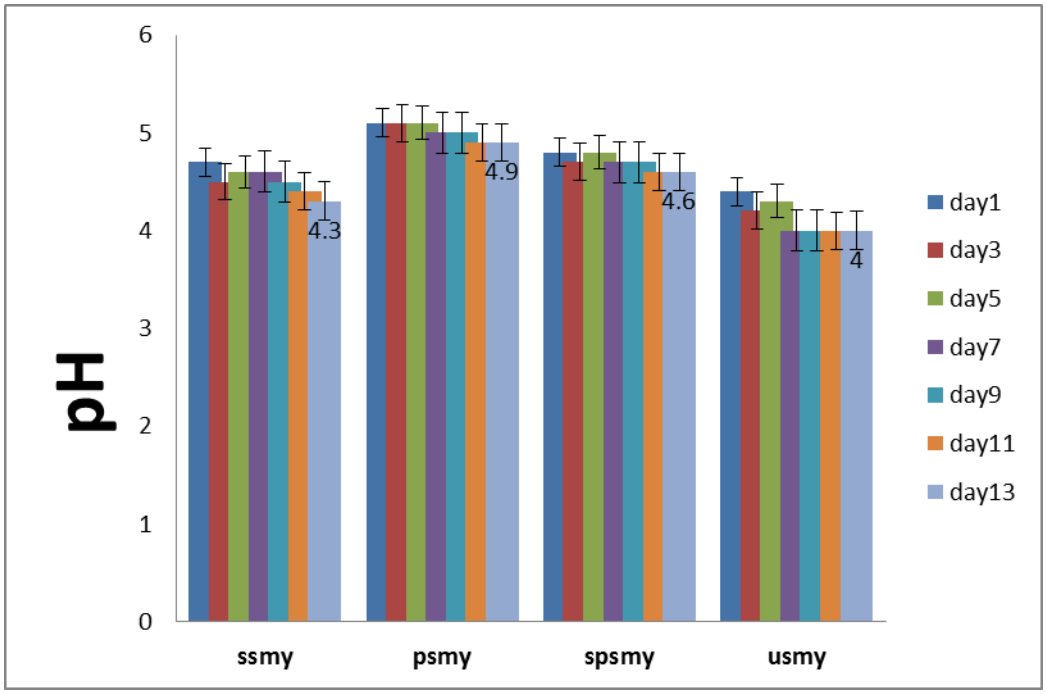

Figure 1.0: pH in samples stored in the refrigerator with different preservatives at 60^{O}C.
Key:-
SSMY= sodium benzoate soya milk yoghurt.
USMY= untreated soya milk yoghurt.
SPSMY=sodium benzoate + potassium metabisulphate soya milk yoghurt.
PSMY= potassium metabisulphate soya milk yoghurt.

Result of pH in samples stored at room temperature with different preservatives is presented in Figure 2.0. Soya milk yoghurt stored at room temperature in 4different samples of SSMY, PSMY, SPSMY, and USMY indicated mean concentration in pH between (3.0±0.1 to 3.7±0.1). PSMY for 5th and 8thday recorded highest pH value (3.0±0.1 to 3.8±0.1).

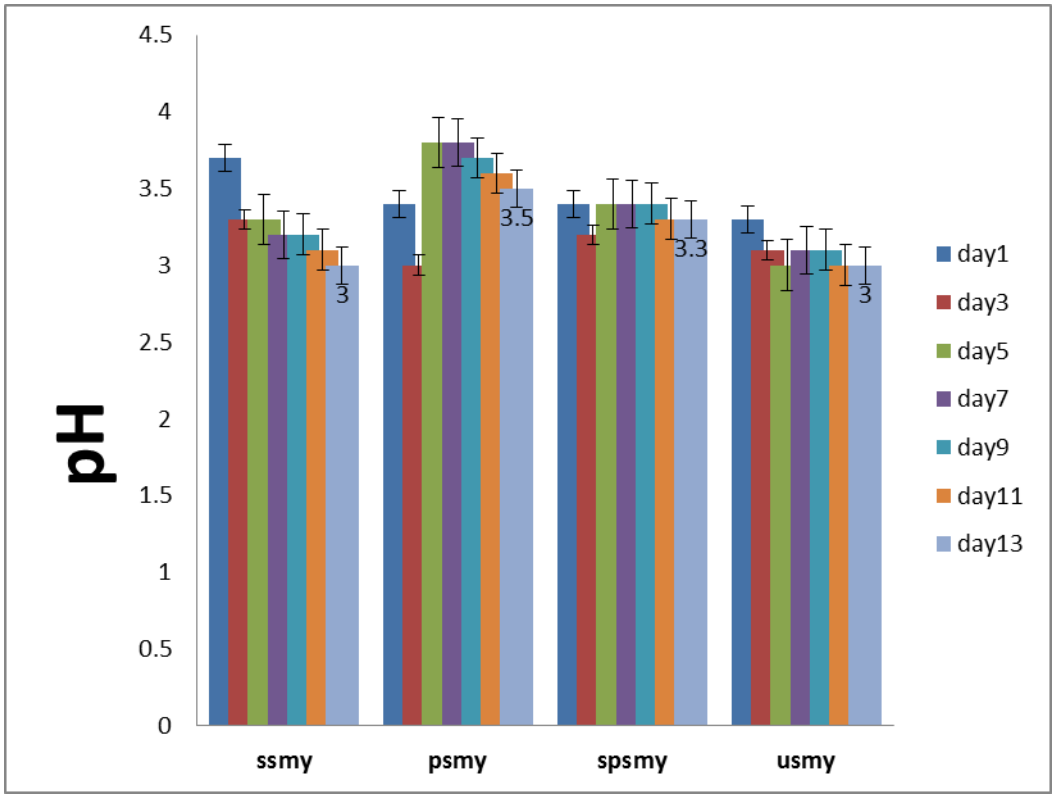

Figure 2.0 present the pH of soya milk yoghurts stored at room temperature.
Key:-
SSMY= sodium benzoate soya milk yoghurt.
USMY= untreated soya milk yoghurt.
SPSMY=sodium benzoate + potassium metabisulphate soya milk yoghurt.
PSMY= potassium metabisulphate soya milk yoghurt.

DISCUSSION

Within the first 13days and thereafter the study observed that samples stored in refrigerator with different concentration of pH preserved with potassium metabisulphate had better color, odor and taste. This study is different with the findings of Akpan in 2007 who reported average quality of organoleptic properties in his study sample preserve with potassium metabisulphate. This difference observed in the present study could be an influence of temperature factor and storage time compared to samples on other preservatives groups used in this study.

Even though the pH in samples preserved with sodium benzoate stored in the refrigerator at different concentration fall within the normal range as required by the standard organization of Nigeria, the study observed good qualities of organoleptic properties within the first 13days. This Study is different with the findings of Akpan in 2007 who reported best pH in sodium benzoate preservatives in soya milk yoghurt at different temperature.

Study also observed samples preserved with combination of potassium metabisulphate and sodium benzoate stored in the refrigerator at different concentration of pH have their organoleptic properties maintained within the first 13days. The study observed that samples on potassium metabisulphate groups are better than sample on combination of preservative because of the difference in pH.

Study observed samples stored at room temperature immediately changed their qualities. Bio-deterioration of the milk was influenced by factors like pH, temperature and microbial load. The significance differences

observed in the pH of the products indicate that soya beans milk owes it acidity or pH to the actions of certain microorganisms (Ibrahim *et al.*, 2016).

These may be as results of rapid growth of bacterial at room temperature on the shelf storage; the room temperature makes the oxidation favorable for their replication and growth. In a broad sense, the preserved yoghurt should be stored at a low temperature in order to increase its life span.

However several adverse health effects are associated with the uncontrolled use of chemical food preservatives when used alone as a preservative, sodium benzoate rarely causes side effects, even when consumed in large doses of up to 50g, reports from Oregon State University in 2015. In certain individuals, nausea and vomiting may occur. In rare cases, sodium benzoate can irritate existing stomach ulcers and cause mild hyperventilation, possibly leading to dizziness and light headedness, according to (Hazardous Substances Data Bank of the National Library of Medicine, 2015).

The samples kept on refrigeration storage with potassium metabisulphate preservative, best preserved the yoghurt. This is as a result of anti-microbial activity of potassium metabisulphate which results in low temperature that inhibits the growth of bacteria. However, on shelf storage, the room temperature makes the oxidation favorable for their replication and growth. In a broad sense, the preserved yoghurt should be stored at a low temperature in order to increase its life span.

CONCLUSION

Potassium metabisulphate preservatives gives the optimum pH on both shelf and refrigeration storage within 13days, indicating the inhibitive ability of potassium metabisulphate is higher than that of sodium benzoate.

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