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Full Length Research Paper

Cyper-coconut yoghurt: preparation, compositional and organoleptic qualities

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In this study the possibility of using various plant milk sources in the making of yoghurt was investigated in a completely randomized design model. Yoghurts were made using Cow milk (T_1), Coconut milk (T_2) , Tigernut milk (T_3), 50% Tigernut milk + 50% Coconut milk (T_4) 50% Tigernut + 50% Soybean milk (T_5) and 50% Tigernut + 50% Cow milk (T_6). The various yoghurt samples were analyzed for chemical composition and sensory qualities were tested. The sensory quality was determined using a nine point hedonic scale. It was observed that the samples of yoghurt from Tigernut milk (T3) and 50% Tigernut +50% Soybean milk (T5) were higher in crude protein and total solids while the titrable acidity was. 0.5 in Tigernut milk yoghurt (T3). The overall sensory score was 5.0 for all types of yoghurts included in this study. The yoghurt made from 50% Tigernut milk + 50% Cow milk yoghurt (T6) had similar sensory qualities compared to yoghurt from other sources. The higher chemical composition, cost per kg of each yoghurt samples and sensory scores of yoghurt prepared from Tigernut milk and Coconut milk sources as well as their potential therapeutic effects may well be encouraging for the Nigerian dairy industry.

KEY WORDS: Plant milk sources, sensory scores, chemical composition.

INTRODUCTION

Yoghurt can be defined as semi fermented often flavored milk food. It is known and consumed in almost all parts of the world. It is traditionally known by adding common strains of *Lactobacillus* and *Streptococcus* bacteria strains to raw milk. Yoghurt can be used to prevent/control diarrhea due to ite therapeutic effect (Kosikowski 1982).. It is capable of modulating the inflammatory response produced by carcinogen. It reduces the inflammatory response through an increase in apoptosis. Proteins in yoghurt are more digestible (Jacobson, 1978, Guarner, 2001) than for raw milk. Yoghurt was found to improve iron status by improving the absorption of iron from other foods (Branca and Ross, 2001). Yoghurt was recognized as being more protective against heart disease due to reduction in non-existence of saturated fat acids. It is noteworthy to mention that there are different types of yoghurt. The variations may be due to the use of live and active culture for inoculation, the use of plain (natural) and or fruit flavor and the use of milk from different species of animal and plants hence, the variation factor allows for the utilization of Tigernut and coconut milk sources.

Tigernut is a cosmopolitan perennial crop found all over the world. The nut was found to be rich in myristic acid, oleic acid, linoleic acid (Eteshola and Oraedu, 1996). The protein, fat and sucrose contents were put at 8%, 25.50% and 17.4 % respectively. The nut is also rich in mineral and oil contents. The oil was implicated as Lauric acid. The nut was equal valued for the high starch dietary fibre and carbohydrate (mono, di and polysaccharides). Tigernuts are regarded as digestive tonic and also helps in the treatment of indigestion, colic diarrhea, dysentery and excessive thirst (Martinez (2003). The nut was found in preventing heart attacks,

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thrombosis and activates blood circulation; it also helps in preventing cancer due to high content of soluble glucose. It was reported that tigernut helps in reducing the risk of colon cancer. Additionally, the nut is suitable for diabetic persons and also helps in loosing weight (Martinez, 2003).

Coconut milk is a complete protein food when taken in its natural form (Ukwuoma and Mauanya, 2003) and it helps in fighting heart disease while the protein and energy contents in soymilk are highly digestible. The qualities of these plant protein sources stimulated their inclusion in the preparation of yoghurt in this study so as to provide protein rich product at affordable price in place of animal protein which is scarce and expensive. Hence, the thrust of this study was to evaluate the nutritional qualities of yoghurt prepared from different plant milk sources (Coconut, Tigernut and Soybean).

MATERIALS AND METHODS

Tigernut, Soybeans and Coconut were bought from a local market in Ilorin metropolis, Kwara State Ilorin, Nigeria, while cow milk was bought from Fulani settlement within Ilorin, Nigeria

Preparation of Coconut milk

The coconut was broken by using a small club while the meaty part was removed using a blunt knife. The brown skin of the meaty part was removed with a sharp knife and the meaty part without the brown skin was grated using a grater. The grated coconut meaty part was kept in a bowl while some warm distilled water was added and left for some few minutes to extract the oil, aromatic compounds and the milk.

Preparation of Tigernut milk

The method of Belewu and Abodunrin (2007) was used. Briefly, the nut was properly picked to remove the stone, infected nut and other debris. It was later washed and rinsed in distilled water while 6 litres of distilled water was added to 1kg of the nut. The total content was later blended several times with a blender. The milled tigernut meaty part was filtered to separate the milk from the insoluble chaff.

Preparation of Starter culture

The starter culture was purchased from a local super-market in Ilorin, Nigeria and prepared according to the methods of Belewu (2006) and the manufacturer instructions.

Experimental Treatments

Various yoghurt samples were prepared by combining one or two of the different milk source(s) together. The experimental treatments are as shown below:

$T_{1 =}$ Sole cow milk yoghurt
$T_{2 =}$ Sole Coconut milk yoghurt
$T_{3 =}$ Sole Tigernut milk yoghurt
$T_{4 =}$ 50% Tigernut milk + 50% Coconut milk yoghurt
$T_{5 =}$ 50% Tigernut milk + 50% Soybean milk yoghurt
$T_{6=}$ 50% Tigernut milk + 50% Cow milk.

Preparation of Various Yoghurts

The method of Belewu *et al*. (2005) was used. Briefly, the various milk samples mixture as shown in the experimental treatments was heated separately to a temperature of between 85 and 95°C for between 15 and 30 minutes. It was later cooled rapidly to a temperature of 45°C . Each of the treatments was inoculated with 2% of the starter culture (*Streptococcus thermophillus* and *Lactobacillus bulgaricus)* at a ratio of 1:1. The whole content of each treatment was incubated between 43 and 45°C for 8-12 hours without the addition of sugar for the formation of the curd. The yoghurt is ready for consumption or it could be refrigerated.

Parameters evaluated

The sensory score

A thirty member trained panelists were used to evaluate the various sensory parameters (colour, flavor, texture, overall acceptability) and the scores were based on a 9 points hedonic scale.

Analyses

Chemical composition of the various yoghurt samples was done by using the method of A.O.A.C. (1990). Data collected on the sensory score were analyzed using analysis of variance of a completely randomized design model. Duncan (1955) was used to compare the means.

RESULTS AND DISCUSSION

The results of the chemical composition of the different yoghurt samples are shown in tables 1, 2, and 3. The total solids content was higher for T_2 than for T_3 and T_5. contrarily, T_2 has the lowest crude protein while T_3 had the highest which was similar to T_5. The results agreed with the report of Belewu *et al*. (2005). High crude protein of T_3 and T_5 could probably be due to high crude protein of Tigernut. High total solids content of T_2 and T_3 could be due probably to high content of the nutrients (CP and Fat) in the treatments. Tigernut milk was reflected by notably increase in the protein content of the yoghurt sample. This was confirmed by Eka and Ohaba (1972) who found similar protein increase in tigernut.

Table 1: Chemical composition of the various milk sources

Composition (%)	Tigernut milk	Soymilk	Coconut milk	Cow milk
Protein	4.10	4.50	2.81	3.11
Total Solids	9.30	8.32	32.12	12.43
Calcium	0.17	0.105	0.113	0.131
pH	6.5	6.1	6.2	6.3
Titrable acidity	0.19	0.17	0.15	0.13

Table 2: Chemical composition of the different yoghurt samples

Parameters(%)	T_1	T_2	T_3	T_4	T_5	T_6	±SEM
Total solids	13.90^{b}	18.50^{a}	17.12^{a}	12.10^{b}	10.37^{c}	11.40^{c}	1.35*
Crude Protein	4.65^{b}	3.25^{c}	6.50^{a}	4.50^{b}	6.32^{a}	5.17^{a}	0.55*
Titrable Acidity	1.06^{a}	0.18^{e}	0.50^{c}	0.32^{d}	0.70^{b}	0.81^{b}	0.48*
pH	4.50	6.11	6.10	6.32	6.58	6.35	0.08 ns
Fat	2.50^{c}	9.50^{a}	9.70^{a}	8.50^{a}	6.30^{b}	5.10^{b}	0.67*

Table 3: Sensory Scores and Cost of different yoghurt samples

Parameters	T_1	T_2	T_3	T_4	T_5	T_6
Taste	3.17a	2.50b	3.00a	3.80a	3.28a	2.50b
Flavour	1.67b	2.20a	2.43a	2.50a	2.75a	2.34a
Texture	2.26a	2.00a	2.00a	1.60b	2.17a	2.00a
Colour	1.40b	1.50b	1.80b	2.14a	2.80a	3.00a
Overall acceptability	3.80b	1.50c	3.50b	3.60b	2.17b	5.00a
Cost /kg (#)	235.00	120.00	115.00	113.50	116.00	160.00

The pH values of all the samples fell within the value reported by Murti *et al.* (1992) and Belewu and Abodunrin (2007) who used Tigernut for the preparation of Kunnu. It was noted from this study that the lowest flavor was in T_1which still remained unclear. The Lactic acid content ranges between 0.18 and 1.06 and the values of T_1, T_5 and T_6 agreed with the previous results reported by Tamime and Robinson (1985).The fat content of the yoghurt samples followed a trend of $T_1>T_2>T_3$.

The sensory scores revealed various significant differences in all the parameters evaluated. The highest taste, flavor, colour and overall acceptability were recorded for T_4 but with the least texture. The study also showed that all the yoghurt samples made from Tigernut milk had the best values in all the sensory scores compared to other yoghurt made from other sources. The superior ($p<0.05$) overall acceptability of the tigernut based yoghurt was in line with the report of Tigernut and Health (2005) who found that Tigernut drink was largely acceptable. Additionally, the cost per kg of yoghurt samples showed that yoghurt made from Tigernut milk was found to be economical compared to other sources.

CONCLUSION AND IMPLICATIONS

The best performance of Tigernut milk based yoghurt could be due probably to the richness of the nut in most of the nutrient contents (crude protein, total solids, fat mineral contents as well as amino-acids). Oleic acid was the dominant fatty acids in Tigernut oil which is better for consumers. It was also noted that it was economical to produce yoghurt from Tigernut milk on large scale.

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