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Sensory Property, Physicochemical and Bacteriological Examination of Home-made and Commercial Yoghurt Produced and Marketed in Port Harcourt Metropolis, Nigeria

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ABSTRACT: Bacterial contamination of yoghurt cannot be overemphasized due to it physicochemical and sensory properties that might encouraged the growth of pathogenic bacteria. This study was done to determine the sensory property, physicochemical and Bacteriological examination of yoghurt made at home for home consumption and the one made and sold in Port Harcourt metropolis by the use of general microbiological techniques. Results gotten showed that sample B (Sweetened Home-made) had the best sensory properties when assessed as 47.6%; 52.5%;47.5%;27.5%;50% 32.5% for overall acceptability, most preferred, appearance/colour, aroma, flavor and texture/viscosity respectively. Proximate composition, mineral and vitamin content revealed that sample F had the best moisture content (87.33%); sample A had the highest ash content (1.73%); sample B had the highest crude protein and carbohydrate content (6.02%; 21.36); Sample C had the highest fat content (2.27%). The result of the iron (Fe) content of the different yoghurt samples revealed that sample C had more iron content (0.777mg/100g). The sodium content was high in sample A (44.875 mg/100g) and least in sample F (1.15 mg/100g). Sample B (216.963 mg/100g) had the highest calcium content while sample B (0.0047 U.I/100g) had the highest vitamin C content as compared to vitamin A content having the highest amount in sample A (0.097 mg/100g). The total heterotrophic bacterial counts ranged from $2.20\pm0.63x10^4$ to $4.65\pm2.19x10^4$CFU/ml for sample E and A respectively. The Total lactobacillus count ranged from $2.34\pm1.94x10^2$ to $12.28\pm8.76x10^2$CFU/ml for sample A and F respectively. There was no significant difference ($p\geq0.05$) in the total heterotrophic bacterial and lactobacillus counts between the different milk samples analyzed. Forty-four (44) bacterial isolates were identified in this study belonging to the following genera; *Bacillus* spp, *Staphylococcus* spp. and *Lactobacillus* spp. *Bacillus* had the highest occurrence in sample B, C, D and F (11.36%) with least occurrence in sample A and F (6.36%). *Staphylococcus* had the highest occurrence in sample C (9.09) with least occurrence in sample E (2.27%). *Lactobacillus* has the highest abundance in sample D (6.82%). This study has revealed high bacterial load, proximate, mineral and vitamin content which might allow bacteria to thrive. There is need to advocate for proper storage of the yogurt to prevent bacterial contamination.

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Yoghurt is most common among the dairy products consumed around the world, and its sensory attributes, have a large effect on consumer acceptability (Saint-Eve *et al*., 2006). It is believed that yoghurt has valuable therapeutic properties and helps in curing gastrointestinal disorders (Bhattarai and Das, 2016). Whole or skimmed milk is used for making Yoghurt or dahi which is very popular and nutritious dish in Bangladesh (Agu *et al.*, 2014).Yoghurt, is produced when milk or milk products coagulates, causing the lactic acid contained in it to coagulate, via the action of bacterial enzymes lactase provided by the bacteria

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Streptococcus thermophilus, *Lactobacillus bulgaricus* breaks down the sugar compound glucose and galactose that the lactose is composed of, under anaerobic conditions (Yabaya and Idris, 2015). While it is beneficial to include yoghurts as an important diet in our daily consumption, it is also important to ensure that it is safe and healthy for human consumption. Unsafe food can pose significant threats to the human population. As a matter of fact, microbial contamination and food-borne bacterial diseases constitute a large and growing public health concern (World Health Organization, 2018; Valero *et al.*, 2015). Undesirable bacteria that can cause spoilage of dairy products include Gram-negative psychrotrophs, coliforms, lactic acid bacteria, yeasts, and moulds. For this reason, increased emphasis should be placed on the bacteriological examination of dairy products (World Health Organization, 2018; Valero *et al.*, 2015). Igbabul *et al.* (2014) conducted a related study on physicochemical, microbiological and sensory evaluation of yoghurt sold in Makurdi metropolis. The proximate composition, microbiological and sensory properties of five (5) different commercial yoghurt sold in Makurdi metropolis were analysed. The result of the proximate composition indicated that, the fat, Crude fibre, moisture and carbohydrate contents of the yoghurt samples differs significantly ($p<0.05$). However, there was no significance difference ($p>0.05$) between the protein content of different yoghurt, and also between the ash content of different yoghurt yoghurt. The result showed that, the total solids content, total solids non-fat content and viscosity of all the samples differed significantly ($p<0.05$). Hence this research was done to examine the sensory characteristics, physiochemical and bacteriological examination of yoghurt made at home for home consumption and the one made and sold in Port Harcourt metropolis, Nigeria.

MATERIAL AND METHOD

Description of study Area: The study was carried out within Port Harcourt metropolis, Rivers State, Nigeria where the samples were processed.

Sample Collection: Yoghurt samples (Home-made and commercial) were produced and purchased from Port Harcourt under aseptic conditions. The samples were labelled properly, put into an ice-chest and transported to the Department of Microbiology Laboratory Rivers State University for bacteriological analyses.

Sensory Evaluation: The yoghurt samples were evaluated for their sensory characteristics (Appearance/colour, aroma, flavour, most preferred, texture/viscosity and overall acceptability by panelists who comprised of microbiology undergraduate students and staff members of the Department of Microbiology, Rivers State, Nigeria. A test form (questionnaire) comprising the six sensory attributes such as Appearance/colour, aroma, flavour, most preferred, texture/viscosity and overall acceptability was given to each of the assessors. The results were recorded accordingly. Using nine-point hedonic scale ranging from excellent or extremely like (score = 9) to extremely dislike (score=0).

Determination of Moisture Content: The oven drying method of AOAC (2000) was adopted. Petri dish was dried in an oven for 30 minutes, then put into a desiccator to cool using a pair of tongs. Cooled empty dish was weighed and the weight was recorded as W1. Two grams (2g) of the test samples were weighed into the dish and the dish was reweighed and recorded as W2. The sample was dried in an oven set at 100^0C until constant weight was recorded. The dish and its dried content were weighed and the reading recorded as W3. The moisture content was calculated using the formula: % Moisture= (W2-W3)/(W2-W1) X 100 Where; W1 = weight of empty dish, W2 = weight of dish + sample before drying, W3 = weight of dish + sample after drying.

Determination of Ash Content: The dry ashing method of AOAC (2000) was used. A crucible was dried in an oven and cooled in a desiccator. The crucible was weighed and recorded as W1. 5g yoghurt sample was weighed and recorded as W2. The sample was pre-ashed on a hot metal plate in a fume cupboard. The pre-ashed sample was put into a muffle furnace at 600 °C for complete ashing of the sample and kept in a desiccator to cool after which it was weighed and recorded as W3. The ash content was calculated using the formula: % Ash Content= (W3-W1)/(W2-W1) X 100 Where; W1 = weight of empty crucible, W2 = weight of crucible+ weight of sample before ashing, W3 = weight of crucible+ weight of sample after ashing.

Crude Protein Determination: Crude protein was determined by the method described by AOAC (2000). 2g was weighed and transferred into a flask. Concentrated H_2SO_4 (25ml) and half tablet (catalyst) was added into the flask. The flask was placed in the digestion compartment with heater on till it turned colourless and allowed to cool. Distilled water (200ml), 75ml of 5% NaOH and glass beads were all added. 50ml of 4% boric acid and 3 drops of screened methyl red were dispensed into a 250ml conical flask. The neutralized sample was transferred to the Laboratory distillation compartment, with heater on

and the conical flask with boric acid and the indicator was placed on the ammonia outlet. The ammonia was allowed to distil into the boric acid beaker until 250ml mark. The mixture was titrated with 0.1 N HCl to light reddish colour. The titre value was recorded and used to calculate the percentage nitrogen content and the protein content with expressions below; % Nitrogen= (0.00014 X Titre X 50) / (Wt. of sample taken) X 100 The % crude protein was determined by multiplying the calculated nitrogen content of the sample by a conversion factor. % protein = %N x 6.2.

Determination of Fat: Crude fat was determined using the solvent extraction method described by AOAC (2000). 2g of the sample was weighed into the thimble and covered with cotton wool. The empty flask was weighed and then transferred to the thimble and the sample into the soxhlet extractor. 150ml of hexane was added and mounted on the extraction unit. The sample was allowed to extract for 3 hours. The thimble was removed and the solvent recovered was transferred to the extraction flask then to the oven to evaporate residual solvent at 105^0C for 30min. This was allowed to cool (Desiccator) then weighed and recorded. Weight of fat= (wt of flask + fat) – (wt of empty flask)

$$\%fat = \frac{weight\ of\ fat}{sample\ weiht} x100$$

Determination of Carbohydrate Content: Total carbohydrate content of each sample was determined by nitrogen free extractives and carbohydrate difference. This was done by subtracting the total percentage values of moisture, ash, protein, fat, crude fiber obtained from 100 %, thus: % Carbohydrate = 100% - (% moisture + % ash + % protein + % fat + % crude fibre).

Determination of Mineral Content: Mineral analysis was carried out using dry digestion method. The method described by AOAC (2000). 1g of sample was weighed into a previously washed and dried porcelain crucible and ignited at 550^0C for 2 hours in a muffle furnace (Model SXL). 5ml of concentrated HCL was added to the ash in the crucible and diluted with 20ml of de-ionised water**.**

The content of the crucible was heated on a hot plate until it boiled down to half its volume (about 10ml) then allowed to cool, it was filtered into a 100ml volumetric flask using whatman no. 1 filter paper and made up to volume using de-ionized water**.** Elemental assay was done using Atomic Absorption spectrophotometer (Buck Scientific 210VP)**.** It was put on the Acetylene gas then on the main switch**,** put on the lamp of the element to be analyzed in the lamp position**,** turned on the air-acetylene knob. Switched on the fuel supply and ignited the flame**. T**he equipment was zeroed using the blank, ran the standard for each metal**, a**spirated the sample digest**,** Calculated the content of the element using the formula

$$\text{Metal } \% = \frac{\text{Conc. (ppm) x solution volumes}}{10^4 \text{x sample weiht}} * 100$$

$$\text{Metal (mg/100g sample)} = \text{metal } (\%) * 1000$$

Bacteria Enumeration and Preservation: One milliliter (1ml) of the yoghurt samples were aseptically dispensed into a beaker containing 9ml of the diluent and stirred to dislodge the bacteria into the medium (Cheesebrough 2005) A serial tenfold dilution was carried out from dilutions 10^{-1} to 10^{-6}. Aliquot (0.1ml) from appropriate dilutions (10^{-2} and 10^{-1}) was spread plated in duplicates onto Nutrient Agar and De Man Rogosa and Sharpe agar (MRS). The plates were incubated at 37^oC for 24 hours. Representative discreet colonies from the two-agar used were purified by sub-culturing on freshly prepared sterile nutrient agar plates and incubated at 37^oC for 24hours to obtain pure culture (Taylor, 2008). The pure cultures were stored McCartney bottles at -4^oC in the freezer for further analyses.

Isolation and Identification of the Bacterial Isolates: The bacterial isolates were isolated presumptively based on their colonial/morphological characteristics such as the size, margin, surface, color, elevation, texture and transparency and identified through conducting series of biochemical tests such as Oxidase, Catalase, Coagulase, Citrate Utilization, Methyl red, Indole, Voges Proskauer and sugar fermentation tests to confirm the identity of the test bacteria (Cheesbrough, 2005).

Data Analysis: Statistical analysis was carried out on the data obtained using ANOVA and descriptive analysis. This was done using a computer-based Programme-SPSS version 25. Data were represented in tables and chats.

RESULTS AND DISCUSSION

The result of the overall acceptability of the different yoghurt samples showed that sample B (47.5%) had the overall acceptability followed closely by D and E (22.6%) yoghurt samples while sample F (0%) had no acceptability. Sample B (52.5%) was the most preferred yoghurt sample while samples E and F (5%) were the least accepted yoghurt samples.

Table 1: Sensory Assessment of the Yoghurt Samples

Sample	Overall Acceptability N (%)	Overall Most Preferred N (%)	Overall Appearance /Colour N (%)	Overall Aroma N (%)	Overall Flavour N (%)	Overall Texture/ Viscosity N (%)
A	1(2.5)	2(5.0)	7(17.5)	5(12.5)	1(2.5)	2(5.0)
B	19(47.5)	21(52.5)	15(37.5)	11(27.5)	16(40.0)	13(32.5)
C	2(5.0)	1(2.5)	8(20.0)	7(17.5)	6(15.0)	8(20.0)
D	9(22.5)	6(15.0)	8(20.0)	7(17.5)	7(17.5)	8(20.0)
E	9(22.5)	10(25.0)	1(2.5)	6(15.0)	8(20.0)	8(20.0)
F	0(0.00)	0(0.00)	1(2.5)	4(10)	2(5.0)	1(2.5)
Total	**40**	**40**	**40**	**40**	**40**	**40**

***KEY**: A-unsweetened Home Made; B-sweetened Home Made; C-unsweetened commercially made 1(FP); D-Sweetened commercially made 1(FP); E-sweetened commercially made 2(Az); F-unsweetened commercially made 2(Az)*

Table 2: Proximate Composition of the Yoghurt

Sample	Moisture Content (%)	Ash (%)	Crude Protein (%)	Fat (%)	Carbohydrate (%)
A	78.52±0.01^{a}	1.74±0.01^{a}	4.64±0.07^{a}	0.18±0.01^{a}	14.85±0.07^{a}
B	71.26±0.01^{b}	1.25±0.01^{b}	6.029±0.03^{a}	0.12±0.01^{b}	21.36±0.01^{b}
C	87.08±0.01^{c}	0.55±0.01^{c}	2.64±0.01^{b}	2.27±0.01^{c}	7.55±0.01^{c}
D	82.71±0.02^{d}	0.78±0.01^{d}	2.14±0.02^{c}	2.18±0.01^{d}	12.25±0.01^{d}
E	86.93±0.02^{e}	0.78±0.01^{e}	2.27±0.01^{d}	1.48±0.01^{e}	8.54±0.02^{e}
F	87.33±0.03^{f}	0.48±0.01^{f}	2.47±0.01$_{e}$	1.65±0.01^{f}	8.12±0.01^{f}

***KEY**: A-unsweetened Home Made; B-sweetened Home Made; C-unsweetened commercially made 1(FP); D-Sweetened commercially made 1(FP); E-sweetened commercially made 2(Az); F-unsweetened commercially made 2(Az) *Means with same superscript across the column shows a difference ($p \leq 0.005$)*

Table 3: Mineral/Vitamin Content of the Yoghurt

Sample	Fe (mg/100g)	Na (mg/100g)	Ca (mg/100g)	Vit C (U.I/100g)	Vit A (mg/100
A	0.220	44.875	203.037	0.00097	0.097
B	0.387	11.625	216.963	0.0047	0.077
C	0.777	31.54	118.86	0.0019	0.50
D	0.428	34.14	119.86	0.0018	0.50
E	0.1	1.15	0.2	0.2	0.00
F	0.1	1.15	0.2	0.2	0.00

***KEY**: A-unsweetened Home Made; B-sweetened Home Made; C-unsweetened commercially made 1(FP); D-Sweetened commercially made 1(FP); E-sweetened commercially made 2(Az); F-unsweetened commercially made 2(Az)*

The result of the overall appearance/colour revealed that sample B (47.5%) had the highest while sample E and F (2.5%) had the least overall acceptance in appearance/colour. Sample B (27.5%) also had the overall aroma while sample B (27.5%) had the least aroma. The sensory assessment of the flavour indicated that sample B (40%) had the best flavour while sample F (2.5%) had the least acceptable flavor. The overall texture and viscosity of sample B (32.5%) was also high compared to others while sample F (2.5%) had the least overall texture and viscosity as all shown in table 1. The result of the moisture content of the different yoghurt samples revealed that sample F had the highest moisture content of (87.33%) and sample B having the least moisture content of (71.26%). the ash content was high in sample A (1.73%) and least in sample F (0.49). Sample B (6.02%) had the highest crude protein compared to others while sample C (2.27%) had the highest fat content as compared to carbohydrate content having the highest amount in sample B (21.36%) while sample C (7.50%) had the least carbohydrate content as showed in table 2. The result of the iron (Fe) content of the different yoghurt samples revealed that sample C had more iron content (0.777mg/100g). The sodium content was high in sample A (44.875 mg/100g) and least in sample F (1.15 mg/100g). Sample B (216.963 mg/100g) had the highest calcium content compared to others while sample B (0.0047 U. I/100g) had the highest vitamin C content as compared to vitamin A content having the highest amount in sample A (0.097 mg/100g) while sample F and E (0 mg/100g) had the least vitamin A content as showed in table 3. Microbial population of the yoghurt samples is presented in Table 4. The total heterotrophic bacterial counts ranged from $2.20\pm0.63x10^{4}$ to $4.65\pm2.19x10^{4}$CFU/ml for sample E and A respectively. The The Total lactobacillus count ranged from $2.34\pm1.94x10^{2}$ to $12.28\pm8.76x10^{2}$CFU/ml for sample A and F respectively. There was no significant difference ($p \geq 0.05$) in the total heterotrophic bacterial and lactobacillus counts between the different yoghurt samples. A total of forty-four (44) bacterial isolates were obtanied from the different yoghurt samples. *Bacillus* had the highest occurrence in sample B, C, D and F (11.36%) while having the least occurrence in

sample A and F (6.36%). *Staphylococcus* had the highest occurrence in sample C (9.09) and with least occurrence in sample E (2.27%). *Lactobacillus* has the highest abundance in sample D (6.82%) and C (4.55%) had the least relative abundance as revealed in Fig.1

Table 4: Microbial Population of the Yoghurt Samples

Sample type	THB $\times 10^4$	TLC $\times 10^2$
A	4.65±2.19[a]	2.34±1.94[a]
B	3.21±1.08[a]	3.13±1.94[a]
C	3.67±1.72[a]	3.55±1.86[a]
D	3.32±1.93[a]	2.44±0.11[a]
E	2.20±0.63[a]	6.05±1.42[a]
F	2.27±0.69[a]	12.28±8.76[a]

KEY*: A-unsweetened Home Made; B-sweetened Home Made; C-unsweetened commercially made 1(FP); D-Sweetened commercially made 1(FP); E-sweetened commercially made 2(Az); F-unsweetened commercially made 2(Az) *Mean with the same superscript along the columns is not significantly different (p≥0.05)*

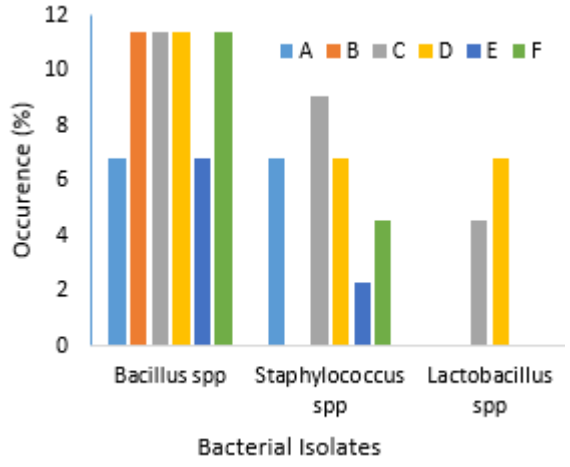

Fig. 1: The Relative abundance of the bacterial isolates from the different Yoghurt samples

Yogurt is among the most common dairy products consumed around the world, and its sensory attributes have a large effect on consumer acceptability (Saint-Eve *et al*., 2006). Drinkable yogurt, categorized as stirred yogurt with a low viscosity, is a growing area of interest based on its convenience, portability, and ability to deliver all of the health and nutritional benefits of stirred or set yogurt (Eder, 2003). The low viscosity is obtained through high agitation, which breaks the coagulum after the fermentation period, before the product is bottled and refrigerated (Thompson *et al*., 2007). Sensory evaluation of the yoghurts produced indicated that there were significant differences (P<05) in the acceptability ratings for overall acceptability, most preferred, appearance/colour, flavor, aroma and viscosity/texture. The sensory properties such the overall acceptability, most preferred, appearance/colour, flavor, aroma and viscosity/texture of the different yoghurt were assessed. The assessors were a significant source of variation for all sensory properties analyzed. This could be caused by the scaling differences among the panelists or assessors, which is typically seen in descriptive analysis and this agrees with the work of Atunes *et al*. (2005). Replication by sample and panelist by sample interactions were not significant sources of variation for any of the attributes, indicating that the panelists were consistent in their evaluations (Ares *et al*., 2009). The finding on aroma in this study agrees with that of Akoma (2000) who similarly reported non-significant differences in the aroma of yoghurts produced from cow milk, tiger nut milk, coconut milk, and their composites. The sweetened home-made yoghurt was the most preferred yoghurt in terms of appearance, aroma, flavor, colour, viscosity/texture, the most preferred and had the overall acceptability. Akoma *et al*. (2000) had a somewhat different finding. The authors reported that yoghurt produced from tiger nut milk alone had higher appearance and taste acceptability over yoghurt produced from cow milk. The finding on appearance and acceptability in this study is similar to that of Sanful (2009) who reported that yoghurt produced from composite milk composed of equal proportions of tiger nut milk and cow milk had higher appearance acceptability over yoghurts produced from cow milk alone. The high appearance and acceptability of the sweetened home-made yoghurt was probably due to its colour which resulted from colour synergy between cow milk and other components used in the milk. The acceptance of the colour of the yoghurt could have been as result of visual appeal to the panelists or assessors (Sanful, 2009). On the other hand, the overall acceptability finding in the present study agrees with that of Akoma *et al*. (2000) who reported that panelists generally preferred yoghurt produced from tiger nut milk alone to those produced from cow milk and other milks which is demonstrated in this study. All samples had high moisture content above 81.0% which might be due the water used or the storage condition of the yoghurt and this could affect the texture and mouth feel (Osundahunsi *et al*., 2007). The crude protein was found to be higher in commercial yoghurt than in other yoghurt samples. The higher value in crude protein may be due to fortification of the yoghurt with amino acids as well as method of extraction and pre-extraction treatments, this is in agreement of the work of Igbabul *et al*. (2014). The ash contents were found to be very low in all the samples which may be due to fortification of yoghurt with mineral element that is to say it is a reflection of the mineral content of the milk

samples which is needed for bone development, teeth formation and body functions (Osundahunsi *et al*., 2007).

The fat contents of the commercially produced yoghurt were higher than those of the homemade yoghurt. The fat contents of the various yoghurt products were lower than the 1.88 – 4.00% fat content range reported by Olugbuyiro and Oseh (2011) for some market yoghurts in Nigeria, but were within the fat content range of 5.1 - 9.7% reported by Ajibade *et al*. (2015) for yoghurt produced from cow milk. The fat contents of the various preferred were within the FAO standard as reported by Omola *et al*. (2014). In the FAO standard, yoghurts with 0.5 – 10% fat content are said to be good while yoghurts with fat content of 3.0% are said to be the best. In terms of fat content, yoghurts can be placed into three categories. Yoghurts with less than 0.5% fat content are to be labelled 'non-fat yoghurt', those with fat content of 0.5 - 3.25% are to be labelled 'yoghurt' while those with fat contents above 3.25% are termed 'high fat yoghurts' (USDA, 2001 as cited by Olugbuyiro and Oseh, (2011). Fat plays an important role in improving the consistency of yoghurt and also provide twice as much energy as same quantity of carbohydrate and protein (Ehirim and Onyeneke, 2013). The carbohydrate content of the samples showed that milk could serve as source of energy for the body and the low carbohydrate value is attributed to the process of fermentation which converts carbohydrate basically lactose to lactic acid. This makes yoghurt an ideal food for lactose intolerance individuals (Ehirim and Ndimantang, 2004). The values obtained in this study for crude protein, fat, moisture content, ash and carbohydrate fall within the range obtained by Osundahunsi *et al*. (2007). The mineral composition of the yoghurt samples among which are Na, Ca and Fe, where higher in the commercially produced yoghurt and considerably low in the home-made yoghurt probably because of the fortification of yoghurt with minerals from the preservatives (Uzuegbu *et al*., 2001). The composition of vitamins in the yoghurt samples revealed that the highest vitamin A content was observed in the commercially produced samples (Uzuegbu *et al*., 2001). The total heterotrophic bacterial counts were high in sample A (unsweetened Home Made) $4.65\pm2.19x10^4$ CFU/ml for sample and low in sample E (sweetened commercially made 2(Az) $2.20\pm0.63x10^4$ while total lactobacillus count was high in sample F (unsweetened commercially made 2(Az) $12.28\pm8.76x10^2$ CFU/ml. Generally, the total heterotrophic bacteria and *Lactobacillus* count were low in the yoghurt samples studied were lower than those reported by Wakil *et al*. (2014) for starter-developed fermented milk. Bristone *et al*. (2015) reported a $6.0 \times 10^5 – 7.1 \times 10^5$cfu/ml range for total bacterial count for yoghurts produced from cow milk. The lower microbial counts observed in this study from the yoghurt samples was probably due to proper handling and maintenance of good sanitary standards at all stages of the yoghurt production process, differences in fermentation time, and type of starter used. The total bacterial, and Lactobacillus of the yoghurts produced in this study were within acceptable safety limits ($< 10^5$ and < 10 CFU/ml for total bacterial, and *Lactobacillus* count) specified by the International Commission on Microbiological Specifications for Foods (ICMSF) (1986). There was no significant difference ($p \leq 0.05$) in the total heterotrophic bacteria, and lactobacillus counts obtained from the various sites studied. In this study, several bacterial species were identified using morphological, biochemical and molecular means. The bacterial isolates from this study were species from the genus *Staphylococcus, Bacillus* and *Lactobacillus.* The presence of these variety of bacteria in the yoghurt shows that yoghurt is a reservoir of bacterial diversity. The presence *Staphylococcus* spp may indicate the poor sanitary and handling during the production and distribution of the yoghurt. It might probably be as a result of the prevalence of the genus on parts of the human body such as hands, nose, skin and clothing (Prescott *et al*., 2004). Possibility of introduction of the organism into food during processing, handling and packaging through the human handler cannot be overruled. Coagulase positive *Staphylococcus aureus* is responsible for food poisoning as a result of food intoxication (Ahmed *et al*., 2009). Enterotoxin production by *S. aureus* is promoted by the presence of starch and protein in the yoghurt samples (Prescott *et al*., 2004). As pH of the yoghurt drink reduces or decreases, the condition becomes favorable for *Staphylococcus* to thrive. The occurrence of *Bacillus* spp in the yoghurt sampled might be due to the nutritional profile of the yoghurt which is favorable for the growth of most spoilage bacteria as well as the storage condition of the yoghurt after production (Omola *et al*., 2014) This is in agreement with the report of Oyeleke (2009) that bacterial contaminants were predominantly *Bacillus* spp with 70% frequency of occurrence. The presence of *Bacillus* might be as a result of post pasteurization contamination or the presence of resistant or spore former types of *Bacillus* and this agrees with the work of Khan *et al*. (2008). The presence of *Lactobacillus* which is a lactic acid bacterium and they are predominant in yoghurt/milk fermentations. *Lactobacillus* spp is desirable when isolates are the correct specie applied as starter cultures (Moreira *et al*., 2001). *Lactobacillus*

bulgaricus is a probiotic that should be consumed life with the fermented food for health benefits to accrue. However, viable strains of these were not found in most of the yoghurt samples. Similar reports were shown by Oyeleke (2009).

Conclusion: This work demonstrated a high bacterial load from the yoghurt and the increased presence of the sensory, vitamin and proximate composition of the yoghurt might encourage the proliferation of these organisms such as *Lactobacillus*, *Bacillus* and *Staphylococcus* in the yoghurt which might be introduced into the yoghurt during handling and processing.

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