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Antibacterial Potentials of Lactic Acid Bacteria (LAB) Isolated from Cow Milk against Some Selected Food Spoilage Bacteria

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Abstract:
Lactic acid bacteria (LAB) are Gram positive, acid tolerant, generally non-spore forming, catalase negative, indole negative and rod or cocci in structure. LAB produce lactic acid as a major product of fermentative metabolism. This study was designed to determine the antibacterial activity of Lactic acid bacteria (LAB) against some selected food putrefaction bacteria. LAB were obtained from cow milk sold in Eke, Oye and Ogbete markets in Enugu, Enugu State and were transported to the Laboratory for isolation, characterization and identification using standard microbiological methods. The selected food spoilage bacteria were isolated from spoilt rice and cabbage and were identified in line with Clinical and Laboratory Standards Institute (CLSI) techniques. The organisms isolated include Staphylococcus aureus, Escherichia coli and Pseudomonas aeruginosa. The antibacterial potential was done using agar well diffusion method in line with the CLSI protocol. The antibacterial assay carried out showed variant zones of inhibition ranging from 1 mm to 30 mm. LAB isolates from cow milk had highest zones of inhibition of 25 mm against E.coli, 30 mm against Staphylococcus aureusand 27 mm against Pseudomonas aeruginosa. From our study results, LAB isolated from cow milk possess antibacterial activity which could be harnessed for new drug development. Thus, the use of lactic acid bacteria in food preservation will be of immense benefits and also as a starter cultures in the production of so many fermented dairy products. They are as well known to possess Generally Regarded as Safe (GRAS) status with World Health Organization (WHO) and Joint Food and Agriculture Organization (FAO) approval. Lactic acid bacteria may therefore be considered as an alternative to the commonly used preservatives in response to consumers' demand for natural and less-processed products.

Keywords: *Bacteriocin, peptide, milk, antibacterial, preservatives*

1. Introduction

Foods play enormous roles in the survival of every living organisms. Right from the existence of humanity when man began to cultivate crops for food, food spoilage has been one of the greatest challenges facing him till date because foods get contaminated by food spoilage microbes on daily basis and at different level of production processes. Food spoilage is the change in the pH, colour, texture, taste and odour of food as a result of the presence of some microbes, whose activities make the food unsafe for consumption. Food preservation is simply any activity or technique applied to purposefully extend the shelf-life of food or food products. While Mohammed *et al*., (2013) define biopreservation to be an act of extending the storage life and enhanced safety of foods using the natural microflora and their antimicrobial products. Currently, almost all the food products have one or two preservatives. Generally, the main purpose of food preservation is to preserve or maintain the natural characteristics of food and to increase the shelf life of food, and also to inhibit the natural ageing and discoloration during food preparation and storage.

According to Pehrsson*et al.,* (2000), cow milk is a pale liquid gotten from the mammary glands of cow. He further explained that cow milk is one of the major sources of nutrition for infants mammals before they can digest other types of food given to them. Other nutrients found in the cow milk include protein and lactose. Moreover, Lactic acid bacteria (LAB) are naturally found in milk including cow milk because it contains all the necessary nutrients they need to thrive (Delavenne*et al.,* 2012; Wouters*et al.,* 2002). Lactic acid bacteria (LAB) are Gram positive, acid tolerant, generally non-spore forming, catalase negative, devoid of cytochrome and non-respiring rod or cocci that produce lactic acid as a major product of fermentative metabolism, and most interestingly, they are recorded to have Generally Regarded as Safe (GRAS) status and are mostly approved by Joint Food and Agriculture Organisation (FAO) and World Health Organisation (WHO) for use (Holzapfel*et al*., 2001).

It was suggested in Soomro*et al.,* (2002) that the use of LAB could make it possible for human to successfully preserve certain foods without causing any harm to the food or the consumer; as they also help maintain the original chemical composition of food. According to Jay (1996), the concept of microbial interference and the antagonism displayed by one microorganism against the other has been known since the last century. LAB produce compounds (e.gbacteriocins, organic acids, carbon dioxide, hydrogen peroxide etc) that are highly antimicrobials, these have been proven to possess antibacterial effects against dangerous food spoilage fungi (e.g*PenicilliumexpansumFusariumgraminearum, Botrytis cinerea*) and bacteria such as *Salmonella, Helicobacter, Shigella, Staphylococcus aureus, Escherichia coli, Enterococcus* and *Bacillus* species, including *Listeria monocytogenes*and *Clostridium botulinum* (Ulusoy*et al*., 2007; Delves-Broughton (1990), these pathogens majorly cause food spoilage and their activities lead to food poisoning and food intoxication. The protective lactic acid bacteria ferments, Satomi (2016) can also inhibit the growth of histamine-producing bacteria, including non-halophilic lactic acid bacteria (LAB), such as *Oenococcusoeni, Lactobacillus hilgardii, Lb. buchneri*, *Staphylococci* and some *Enterobacteriaceae*, such as *Morganellamorganii, Enterobacter, Hafnia, Raoultella*, that are known to cause scombrotoxin fish poisoning (SFP) which is usually associated with scombroid fish, cheese, meat products etc.

Lactic acid bacteria are usually found as microflora of some food products, thus referred to probiotics, having enormous health benefits on the consumers; and they are known to produce special protein compounds called bacteriocins with high bactericidal and bacteriostatic properties which has made them attractive natural preservatives (Cotter *et al.,* 2005). They are found in abundance and majorly isolated from milk and other fermented foods (Mohammed *et al*., 2013). Lactic acid bacteria are also known to produce mannitol and exopolysaccharide which are have abundant applications in the food industries.

According to Ray (1992), bacteriocin from LAB are considered ideal as bio-preservative because of they are product of GRAS organisms and have been found to be non-toxic to human health nor active against eukaryotic cells; they are easily degraded by proteolytic enzymes in the digestive systems. Ray also added that they are easily broken by digestive proteases, having little influence on the gut microbiota, maintains the nutritional composition of food products, effective even at low concentration, tolerant to heat and pH and active under refrigerated storage. Benefits of bacteriocins synthesised by lactic acid bacteria (LAB) include preservation of food at any temperature, reduce the risk for transmission of food borne pathogens through the food chain, improve the economic losses due to food spoilage, discourage the use of chemical preservatives and they stand to satisfy consumers and industrial demand (Naidu, 2000).

Antimicrobial peptides synthesized by LAB (e,gnisin) is not only approved for use as food preservative but also has become a promising potential for wide range of clinical applications, next-generation antibiotics targeting the multiple-drug resistant pathogens and also a promising alternative in treatment of cancer (Rodney *et al.,* 2014).

It was recorded inAnand and Sati 2013) that several chemical preservatives cause different kinds of illnesses and fatal diseases including ulcer, asthma, allergies, palpitations, urticarial etc when consumed most especially in higher concentration.This is why there is higher demand of safer methods of preserving foods without or less addition of these chemical preservatives and the use of lactic acid bacteria (LAB) or their products could become the promising alternative.

This study was aimed at determining the antimicrobial potentials of Lactic acid bacteria (LAB) isolated from cow milk on some selected food spoilage bacteria, isolating, identifying and characterising some Lactic acid bacteria species from cow milk. Also to isolate and identify some food spoilage bacteria from spoilt foods and to determine the antimicrobial potentials of lactic acid bacteria (LAB) against some selected food spoilage bacteria

2. Materials and Methods

2.1. Sample Collection

A total of 15 (5 each) samples were purchased from different cow milk sellers (Fulani women) in three different markets of Enugu metropolis, these major markets are Eke market, Oye market and Ogbete market. Samples were collected using sterile containers and immediately placed in a container filled with ice. They were brought to the laboratory and refrigerated at 4°C for one week.

2.2. Sample Analysis

2.2.1. Sensory Property of Milk

Using the method of Ranganna (2008), the sensory qualities of the cow milk samples were determined by confirming the colour, aroma, text and taste.

2.2.2.p^{H} Determination

The pH of the milk sample was determined by dispensing 20ml of the milk sample into a conical flask and pH was taken using a pH meter model PHS-3C (precise pH meter) after it was first calibrated using buffer 4, 7 and 10; and then pH of the samples were measured.

2.3. Isolation of Lactic Acid Bacteria

Using the method of Omemu*et al*., (2007), 1 mL of milk from each sample was homogenised with 9 mL of tryptone water. The stock solution obtained (10^{-1}) was used for serial dilutions up to 10^{-8} by incorporating 1mL into 9 mL of the diluent. A quantity of 1 mL was taken from each dilution of the sample into sterile petri dishes to be analysed. Isolation of *Streptococcus species* was done using Blood based agar and MRS media (Biokar) for *lactobacilli* and were both incubated for

24 hours at the temperature of 35°C. All strains were randomly picked from plates for macroscopic examination and the developed colonies were counted using a colony counter. The selected colonies were purified by repeated streaking on the appropriate agar media in petri dishes and later sub cultured in bijou bottles to achieve pure cultures. The pure isolates of lactic acid bacteria were preserved in a refrigerator at 4°C for further analysis.

2.4. Characterisation of Lactic Acid Bacteria

The Lactic acid Bacteria (LAB) were characterized based on Colonial morphology, cell morphology (Mohammed *et al*., 2013) and biochemical tests (Oyeleke and Manga, 2008).

2.5. Identification of Lactic Acid Bacteria

The isolated LAB were first enriched using nutrient broth medium and both incubated for 24 hours at 35°C. Phenotypic identification of lactic acid bacteria strains was based on cell and colony morphology, Gram stain, biochemical tests and colony morphology. The surface of the colonies were seen from the side and while the edge of the colony were seen from the above (Mohammed *et al*., 2013; Oyeleke and Manga, 2008).

2.6. Morphological Observation of Lactic Acid Bacteria Cells (Gram Staining)

The glass slides used to carryout Gram staining were thoroughly sterilized using 70% alcohol. Samples were taken aseptically using sterilised wireloop and smeared on a slide and heat fixed on the Bunsen burner for about four to five times and air-dried after which the Gram staining reagents were applied according to Yulvizar&Mazhitov (2018) and allowed for air-dry. The prepared LAB isolates were later observed under the microscope using x40 and x100 objective lens. Gram-positive bacteria appeared purple while Gram-negative bacteria appeared pink/redish colour.

2.7. Preparation of a Cell Free Culture Supernatant

Using the method of Timothy and Sharma (2014), all the purely isolated LAB strains were propagated in nutrient broth for 72 hours at 35^{o}C in bijou bottles. Cell free solutions were obtained by centrifuging the broth culture at 3000 revolution per minute (rpm) for 15 minutes and the supernatant decanted into a new eppendorf (centrifuge) tube followed by another centrifugation until a pure supernatant was gotten.

2.8. Indicator Organisms

The indicator organisms (*Pseudomonas aeruginosa and Escherichia coli* were isolated from spoilt cabbage while *Staphylococcus aureus* was isolated from spoilt rice) using selective media for each organism. They were maintained in nutrient broth and refrigerated at 4^{0}C for analysis.

2.8.1. Detection of Antagonistic Property of LAB

The agar well diffusion method, in line with Babatunde*et al*., (2014) was used to determine the antibacterial activities of the isolates. Broth culture of each indicator organisms were spread on already prepared agar plates. Holes were bore in the agar using sterile cork borer. Sterile syringes were used to introduce appropriate quantity of the cell free supernatant and were incubated at 35^{0}C. The plates (18 in number) were then checked for possible clear zones of inhibition after 24 hours and 48 hours and measured in millimetres.

2.9. Biochemical Tests

2.9.1. Catalase Test

In line with the method recorded in Karen Reiner (2010), the organisms were aseptically picked with the use of sterile wire loop and smeared on clean glass slides and then colonies were diluted with a drop of distilled water. Then 2-3 drops of 3% hydrogen peroxide were dropped on diluted colonies containing organisms. Production of bubbles indicated positive while absent of bubbles indicated negative result.

2.9.2. IndoleTest

The test organism was inoculated into a broth that contained tryptophan and incubated at 35^{0}C for 48 hours. Then 2ml of the broth suspension was transferred to sterile test tube under aseptic conditions. About 0.5ml of Kovac's reagent was added to the broth. The mixture was shaken vigorously to ensure a thorough mixing and later observed for colour reaction. A pink-coloured ring round the interface between the broth suspension and the reagent which rose to the surface is an indicative of positive results and when no colour change is an indicative of negative results (www.vetbact.org).

2.9.3. Urease Test

Urea Agar based medium was prepared, slanted, inoculated with isolates and incubated at 35^{0}C and then examined after 24 hours. The ability of the organisms to produce urease which in turn breakdown the urea incorporated in the medium thus liberating ammonia which in turn increases the pH of the medium to alkalinity was carefully observed. The change of agar from yellow to red or pink indicated positive result while no colour indicated negative result (www.vetbact.org).

2.9.4. Sugar Fermentation Test

The sugar fermentation was done using modified method of SagarAryal (2020). 2 grams of lactose sugar was weighed into a beaker and dissolved in 200ml of distilled water, the sugar solution was autoclaved for 15 minutes at 121°c and allowed to cool to 30°c. Then 10 ml of the sugar solution was measured into sterilized test tubes and the organisms were aseptically inoculated into the solution using inoculation loop. Test tubes were properly covered using foil and masking tape to create a total anaerobic environment. The test tubes were incubated at 35^0C and checked for colour change after 24 hours. Change in colour from red to yellow indicated positive result while red indicated negative; that is, the organism cannot ferment the sugar.

2.9.5. Oxidase Test

Two drops of a diluted solution of the oxidase reagent (tetramethyl-p-phenalene-diaminedihydrochloride) was used to wet a piece of filter paper, after that LAB isolate was smeared on the wet piece of filter paper. Positive test was indicated by the presence of intense purple colour by the cells in the smear within 30 seconds while failure of the development of an intense purple colour within 30 seconds indicated a negative test (www.vetbact.org).

2.9.6. Effect of NaCl Concentrations on Growth of Isolates

The isolates of (*Lactobacilli* and *Streptococci*) species were inoculated in bijou bottles using MRS and Blood based agar respectively both having different concentrations of NaCl (2.0% and 6.5%) and incubated at 35°C. The culture bottles were observed for the presence or absence of growth after 24 and 48hours and for three weeks (Yavuzdurmaz, 2007).

2.10. Isolation of Indicator Organisms

The indicator organisms were *Escherichia coli, Pseudomonas aeruginosa and Staphylococcus aureus.* The first two indicator organisms were isolated from spoilt cabbage and spoilt rice respectively using serial dilution method of Omemu*et al*., (2007). The cabbage was cut and blended using a blender and was soaked in 300ml of distilled water for about 24 hours and aseptically stored at room temperature. From the 10^5 dilution 1ml was taken and spread on Eosine Methylene Blue (EMB) agar for *E.coli* isolation, 1ml was also spread on cetrimide agar containing 2% of glycerol for *Pseudomonas aeruginosa*isolation.

The spoilt rice was soaked in 100ml of distilled water and kept at room temperature. After 24hours 1ml was taken from the 10^5 dilution and spread on Manito salt agar for *Staphylococcus aureus* isolation. All the plates were incubated for 24hrs at 35^0C. Colony from each plate was sub-cultured into nutrient broth and later used for susceptibility testing after 24hours.

3. Results and Discussions

3.1. Results

Table 1 and 2 shows Morphological and Biochemical Characteristics of lactic acid bacteria isolates from cow milk.

Isolates	Colonial Morphology	Microscopic Characterization	Gram Reaction
Lab 1	Circular, light yellow, opaque, convex, glittering	Coccobacilli, singly, Gram positive	+
Lab 2	Circular, white, rough and fuzzy	Gram positive, coccobacilli, singly	+
Lab 3	Circular, white, irregular, mucoid, opaque	Gram positive, coccus shape, singly	+
Strep 1	Partial hemolysis, greenish zones and around it	Cocci appearing in short (diplococcic) chains, Gram positive	+
Strep 2	Creamy white, Complete hemolysis, larger clear zones and transparency	Cocci appearing in short (diplococcic) chains, Gram positive	+
Strep 3	Transparent and no hemolysis	Cocci appearing in short (diplococcic) chains, Gram positive	+

Table 1: Morphological Characterization of Isolates from Cow Milk
Key: (+): Positive Reaction (−):Negative Reaction

Concentrations:

10^7 –A5: Lab 1 S.A – 10^5: Strep 1
10^4 – B2: Lab 2 S.B – 10^4: Strep 2
10^4 – C2: Lab 3 S.C – 10^5: Strep 3

Isolates	Catalase Test	Indole test	Urease test	Oxidase test	Lactose Fermentation test
Lab 1	-	-	+	-	+
Lab 2	-	-	+	-	+
Lab 3	-	-	+	-	+
Strep 1	-	-	+	+	+
Strep 2	-	-	+	+	+
Strep 3	-	-	+	+	+

Table 2: Biochemical Test Results of Lactic Acid Bacteria (LAB) Isolated from Cow Milk
Key: (+): Positive Reaction (–): Negative Reaction

Isolates	Escherichia Coli	Staphylococcus Aureus	Pseudomonas Aeruginosa
Lab 1	25 mm	28 mm	27 mm
Lab 2	1 mm	30 mm	22 mm
Lab 3	4 mm	28 mm	20 mm
Strep 1	23 mm	28 mm	27 mm
Strep 2	9 mm	29 mm	17 mm
Strep 3	8 mm	27 mm	12 mm

Table 3: Inhibition Zones Diameter of LAB Isolated Against Food Spoilage Organisms
Key:Mm = Millimeter

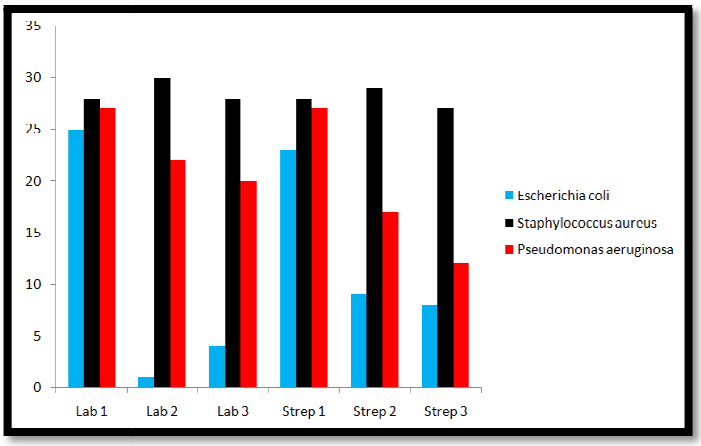

Figure 1: Inhibition Zones for Antibacterial Activity of LAB Isolates against Escherichia Coli, Staphylococcus Aureus and Pseudomonas Aeruginosa Represented in Bar Chat

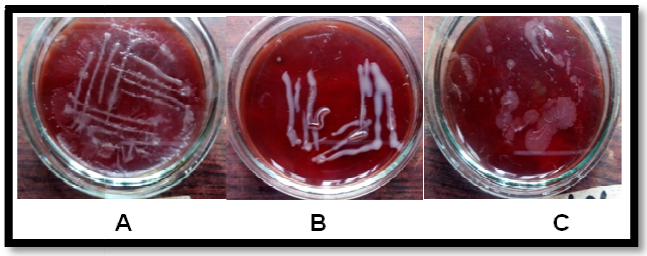

Figure 2:Colony Morphology and Appearance of Streptococci Colony Isolates from Cow Milk Labelled as a, B and C

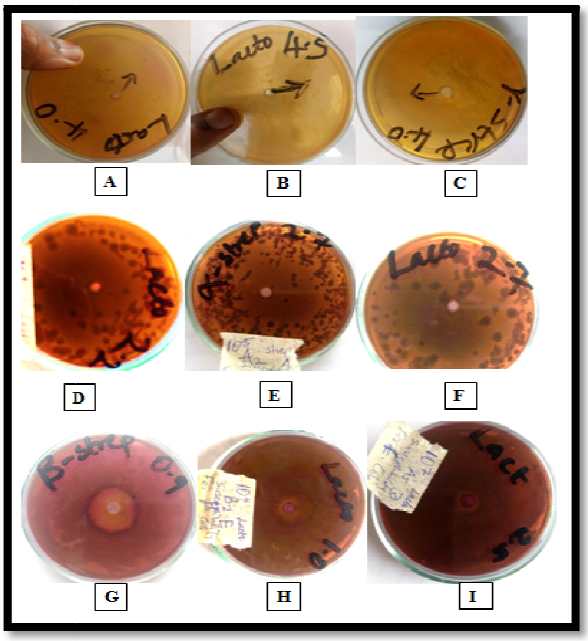

Figure 3: Plates Showing Zones of Inhibition Caused by LAB Isolates from Cow Milk Against Staphylococcus Aureus, Pseudomonas Auriginosa and EschericaColi Respectively,The Plates Are Labelled from A to I Respectively

3.2. Discussion of Findings

All the milk samples obtained were observed to be fresh; the colour and taste were also confirmed to meet the standard of consumption.

Table 1 shows morphological characterization of isolates from cow milk. A total of eleven colonies were randomly picked from the various samples for streaking after serial dilution. They were picked based on distinct colonial characteristics. A total of six isolates were later identified using morphological, physiological and biochemical characteristics.

From findings, Lab1 colonies were observed to be Circular, light yellow, opaque, convex, glittering and the cell morphology appeared under the microscope as coccobacilli, singly, Gram positive. Lab2 colonies appeared Circular, white, rough and fuzzy with cell morphology of Gram positive, coccobacilli, singly. While Lab3 colonies were observed to be circular, white, irregular, mucoid, opaque and having the cell morphology as Gram positive, coccus shape, singly. Strep1colonies were found to possess partial hemolysis, greenish zones around. Strep2 colonies were found to be creamy white, complete hemolysis, larger clear zones and opaque while Strep3 colonies were transparent and did not show any hemolysis at all. However, all the isolates of *Streptococci* under the microscope appeared as cocci in short chains and Gram positive. These reports agreed with the work of (Messaoudi*et al*., 2013; Aesen*et al.,* 2000; (O'sullivan*et al.,* 2002).

Table 2 shows biochemical test results of lactic acid bacteria (LAB) isolates from cow milk. In correlation with the work of Aesen*et al.,* (2000); O'sullivan*et al.,* (2002) *lactobacillus* and *streptococcus species* were catalase negative, indole negative, can ferment lactose, urease positive, resistant to NaCl and lacking oxidase except *Streptococci* isolates. These findings also agree with Alipin and Safitri (2016) and Mora&Arioli (2014).The LAB isolates were subjected to 2% and 6.5% of NaCl and it was observed for three weeks that Lab3 grew better on 2% of NaCl than when it was cultured on 6.5% of NaCl but Lab1 showed better growth when on 6.5% of NaCl than when cultured in 2% of NaCl while Lab2 displayed equal level of growth on the both concentration of NaCl. Strep2 grew well even on 6.5% of NaCl while Strep1and Strep3 grew less on 6.5% concentration of NaCl but grew well at 2%. The resistance of these LAB isolates to NaCl shows they can survive bile salt and can be considered good candidates of probiotics. These results correlate with result of (Menconi*et al.,* 2014). All the lactic acid bacteria isolates were also seen to produce gas when cultured in broth media, this confirms their ability to produce carbon dioxide (CO_2) as an end-product of glucose fermentation, this correlates with works of (Messaoudi*et al*., 2013) which is one of the good characteristics of lactic acid bacteria considering to be used as bio-preservatives.

From the results obtained in comparing the two lactic acid bacteria in cow milk, it was observed that the species of *Lactobacillus* in all samples has higher dominance (70%) compared to the strains of Streptococcus (30%). This finding is in line with the report of Bennani*et al.,* (2017).

Indicator organisms used to confirm the antibacterial potentials of LAB isolates against food spoilage bacteria were isolated from spoilt rice and cabbage. The colonies of these organisms were carefully observed and reported thus: *E.coli* colonies were small, smooth, high and green metallic sheen. *Pseudomonas aeruginosa*colonies were large, flat, fluorescent and greenish in colour while *Staphylococcus aureus*colonies appeared to be circular, bright yellow, opaque, convex elevation and entire margin. These reports agree with the work of Brook *et al.,* (2004).

Table 3 shows inhibition zones of LAB isolates against food spoilage organisms. All the species of LAB isolates displayed various zones of inhibition towards food spoilage bacteria. From the species of *Lactobacillus*, Lab1 displayed the highest zone of inhibition (25 mm) against *E.coli*followed by Lab3 (4 mm) while Lab2 displayed the lowest zone of

inhibition (1 mm) against *E.coli.* On the other hand, from the isolates of *Streptococci,* Strep1 displayed inhibition of 23 mm against *E.coli,* Strep 2 displayed 9 mm while Strep 3 displayed the least zone of inhibition of 8 mm against *E.coli*.
In figure 2 which is the Colony morphology and appearance of *Streptococci* colony isolates from cow milk. (A) Shows Strep1 on blood based agar having Partial hemolysis, greenish zones and around it. (B) Shows Strep2 on blood based agar having Creamy white, complete hemolysis, larger clear zones and opaque. (C) Shows Strep3 on blood based agar with Transparency and no hemolysis on the media

While in figure 3 which includePlates showing zones of inhibition caused by LAB isolates from cow milk against *Staphylococcus aureus, Pseudomonas auriginosa* and *Escherica coli*. (A) shows inhibition caused by Lab1 against *Staphylococcus aureus* on manitol salt agar, (B) shows inhibition caused by Lab2 against *Staphylococcus aureus* on manitol salt agar, (C) shows inhibition caused by Strep 3 against *Staphylococcus aureus* on manitol salt agar, (D) shows inhibition caused by Lab2 against *Pseudomonas auriginosa* on cetrimide agar,(E) shows inhibition caused by Strep1 against *Pseudomonas auriginosa* on cetrimide agar, (F) shows inhibition caused by Lab1 against *Pseudomonas auriginosa* on cetrimide agar, (G) shows inhibition caused by Strep2 against *Eschericia coli* on EMB agar, (H) shows inhibition caused by Lab2 against *Eschericia coli* on EMB agar, (I) shows inhibition caused by Lab1 against *Eschericia coli* on EMB agar

In the case of *Staphylococcus aureus,* Lab2 have the highest zone of inhibition (30 mm), while Lab1 and Lab3 had similar inhibition of (28 mm) against *Staphylococcus aureus.* On the other hand, Strep2 showed the highest zone of inhibition (29 mm) against *Staphylococcus aureus,* followed by Strep1 (28 mm); Strep3 have (27 mm) zone of inhibition against *Staphylococcus aureus.* While in the case of *Pseudomonas auriginosa,* from the isolates of*lactobacilli*, Lab1 showed higher zone of inhibition (27 mm), followed by Lab2 having (22 mm), while Lab3 showed (20 mm) zone of inhibition against *Pseudomonas aeruginosa.* In the same vein, Strep1 displayed the highest zone of inhibition (27 mm) against *Pseudomonas aeruginosa* followed by Strep2 having (17 mm) while Strep3 displayed just (12 mm) zone of inhibition against *Pseudomonas aeruginosa.* It is of no doubt that LAB isolates showed higher inhibition zones against *Staphylococcus aureus* because lactic acid bacteria and their products are known to be more active against closely related organisms, this agrees with the work of Ramirez *et al.*, (2013).

4. Conclusion

Lactic acid bacteria (LAB) have really shown to be promising alternatives to chemical preservatives/antibiotics and to improve food processing and preservation methods adding to the fact that they are probiotic bacteria with Generally Recognized as Safe (GRAS) status as compared to so many food additives. The need of bio-preservatives has been on high demand because of so many ailments associated with chemical additives and the uses of LAB potentially serve the purpose. The use of LAB will not only extend the shelf life of food or improve/maintain food quality but also offer so many health benefits to the consumers, as well improving their immunity against pathogens and prevention of pathogen colonization on the epithelia cells and their use can also reduce the case of disease outbreaks associated with food. Aside food industry, some LAB compounds have also gained the interest of other industries such as pharmaceutical industry as they are known to produce bacteriocins that can be alternatives to so many antibiotics of which some human pathogens are now resistant to.

Bacterial species isolated from cow milk can be used as starter cultures for the manufacture of fermented dairy products, which initiate a rapid acidification of the raw material. These can contribute to microbial safety or offer one or more organoleptic, technological, nutritional or health benefits.

The results of this research showed six (6) strains of lactic acid bacteria (LAB) isolated from cow milk can play an important role in food preservation and the development of organoleptic characteristics.

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