Greener Journal of Medical Sciences
Vol. 9(1), pp. 12-16, 2019
ISSN: 2276-7797

DOI Link: http://doi.org/10.15580/GJMS.2019.1.091518138
http://gjournals.org/GJMS

Evaluation of Bacterial and Microflora Contaminants in Palm Wine Containers and Their Effects in the Gastrointestinal System of Man

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ARTICLE INFO

Article No.: *091518138*
Type: *Research*
DOI: *10.15580/GJMS.2019.1.091518138*

Submitted: *15/09/2018*
Accepted: *19/09/2018*
Published: *31/05/2019*

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Keywords: *Palm wine, bacterial contaminants, GIT, Agar, Micro flora, Palm wine container*

ABSTRACT

The occasional outbreak of food poisons and drinks has necessitated the search for possible causes hence the Evaluation of bacteria and Micro flora contaminants in Palm wine containers or gouges was embarked upon.

Twenty four (24) Palm wine containers were collected from palm wine tappers. Swab samples were collected from the containers and cultured in Blood agar, Nutrient agar, Saboureid agar and Mackonkey agar. They were left to incubate for 24 to 48 hrs.

Several methods were used to identify various bacteria and micro flora contaminants and their colonies were counted.

The most commonly found contaminants were the yeast species particularly *S. cerevisiae,* candida species, pichia species, followed by lactic acid bacteria and acetic acid bacteria. Other bacteria present were Aerobic mesophilies, Acetobacter species and staphylococcus mirabilis. These bacterial contaminants and commensals could be concluded to be responsible for food poisons and unspecific gastrointestinal tract disturbances.

INTRODUCTION

Microorganisms are generally regarded as living forms that are microscopic in size (Cruishank, 1973) and relatively simple, usually unicellular in structure. The diameter of the smallest body that can be resolved and seen clearly with the naked eye is about 100mm.

Bacteria are microscopic unicellular organisms which can be classified into the following type of cell; The ovoid or spheroid called coccus, the rod or cylindrical bacillus, the curved vibro, the spiral shaped spirillium and coil shaped spirochaetes. The coccus (plural cocci) size 0.5-1.0um in diameter. Cocci generally have one axis approximately equal to any other axis. Sometimes the cell is thickened (giving rise to a kidney shaped cell) or distorted in some way as to depart from the spherical shape example in streptococci.

Barri in 1836 helped to establish that microorganisms could cause diseases when using a heat sterilized pin, he transmitted a disease from the silk worm infected with a fungus to a healthy silkworm. Commensals constitute the normal flora of the healthy body. (Oguwike et al, 2018). They live on the skin and on the mucous membrane of the upper respiratory tract, the intestine, female genitals and they obtain nourishment from the secretions and food residues. This normal flora are also observed to exist as contaminants on palm wine bottles, palm wine containers and glass cups for drinking palm wine. Since normally they do not invade the tissues, they are generally harmless, though under certain conditions usually when the body defences are impaired, they may invade the tissues and cause diseases, thus acting as opportunistic pathogens, while the true pathogens are adapted to overcoming the normal defenses of the body and establish their growth in the tissues, producing poisonous substances or toxins often causing damage to the tissues and thus the manifestations of disease.

Palm wine is an alcoholic beverage produced by natural fermentation of sap of various palms, which include *Elias guinensis, Rapha regalis, R. sudania, R. vinifera* and *R. hookeri* (Obire 2005). Palm wine is a cloudy, whitish beverage with a sweet alcoholic taste and a very short shelf life of only 1 day. (Joshi et al, 2017).

The sap is extracted and collected by a tapper. Typically, the sap is collected from the cut flower of the palm tree (Akinrotoye et al, 2014). A container is fastened to the flower stump to collect the sap. The white liquid that initially collects tends to be very sweet and non-alcoholic before it is fermented. Our enthusiasm in this research is to evaluate the bacteria and micro flora contaminants on palm wine containers and their effects in the gut system of man. Palm wines are produced in the south eastern part of Nigeria, Southern Ghana, Gabon, Congo and Zaire (Ayogu 1999). The wine is stored in a calabash container popularly called ‘udu’ in Igbo (Eastern part of Nigeria). Most times the tappers do not keep the containers hygienic thus giving chance for microflora and bacteria contaminants to multiply in the containers of the wine and when people drink this wine, it gets to the gut system and give rise to different gut system ailments.

MATERIALS AND METHODS

Experimental design:

Twenty four (24) palm wine empty containers were borrowed from Palm wine tappers for the research analysis for one week. Swab sticks were used to pick swab samples from the mouth and inside the empty palm wine containers.

The swab samples were cultured in blood agar medium, sabouroid agar medium and nutrient agar medium by method of culturing technique as described by Baker and Silverton, 1985.

The sample were allowed to stay in the incubator for 24-48hrs before reading out and examining the isolated organisms. Also Bacterial colony counts were done as described by Baker, 1985.

Detection of Organisms in Palm wine Containers:

- Yeast cells of saccharomyces cerevisiae were identified by plating the sample in sabouroid agar.
- Aerobic Mesophilic Bacteria: Samples were further diluted in sterile tap water and volume of 0.1ml of appropriate dilutions were spread-plated in duplicates on pre-dried surfaces of plate counts agar (PC: merk) colonies were counted after incubation at 30 to 32^0cfor 48-72hrs.
- Staphylococci: To identify staphylococcus aureus, appropriate dilutions were spread-plated in duplicate plates of manitol salt agar (Oxford) and incubated at 30-32^0c for 48-72hrs. Ten colonies from countable plates were picked and slide and tube coagulase test were done (Baker and Silverton, 1985).

RESULTS

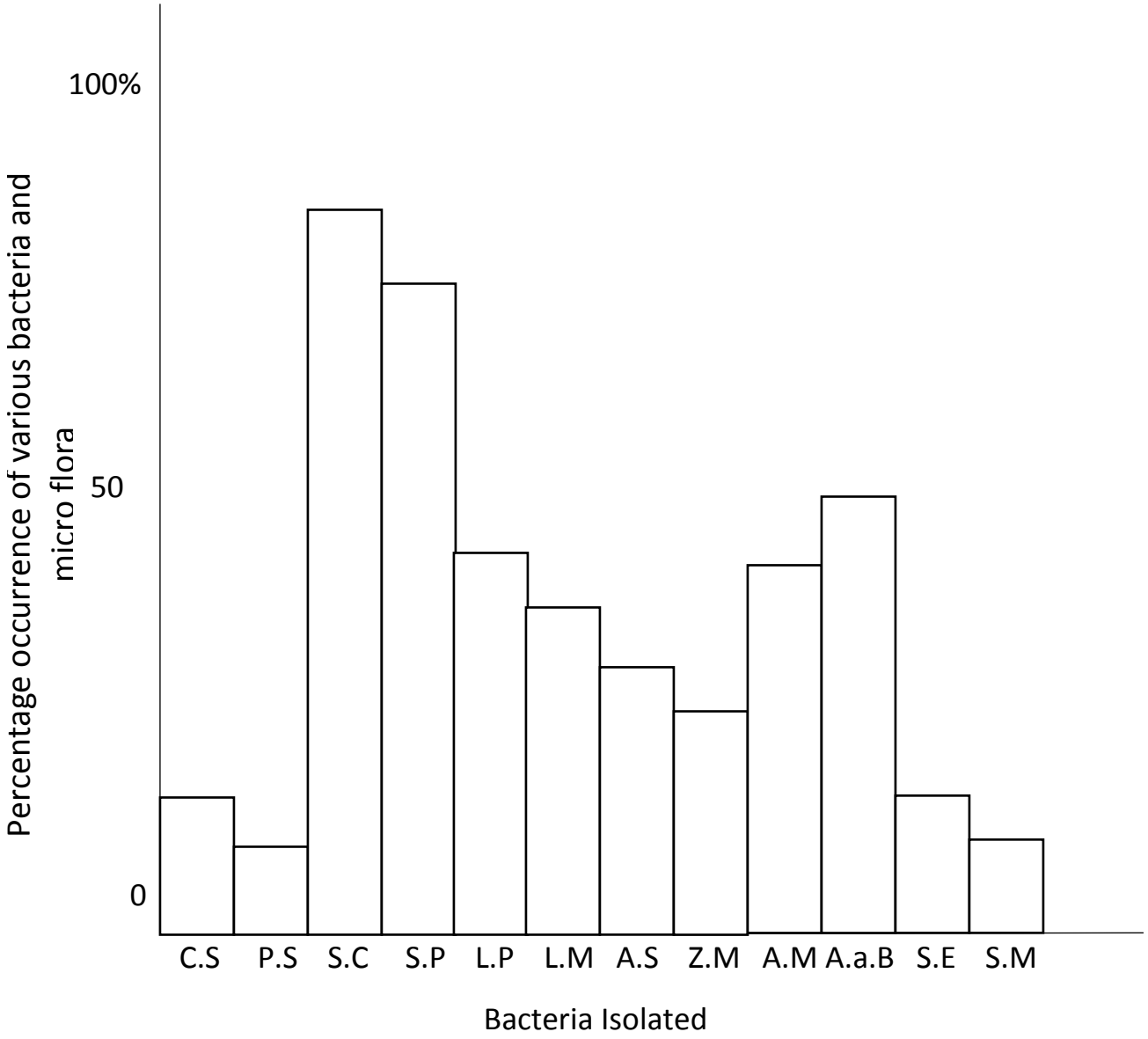

Figure 1: Various micro flora and bacteria isolated from empty palm wine containers and their percentage occurrence

Key:

C.S= Candida specie, P.S= Pichia Species, S.C= Saccharomyces cerevisiae, S.P= Schizosaccharomyces pombe, S.E=Staphyloccocus epidimidis, L.M= Leuconostoc mesenteroides, L.P= Lactobacillus plantarum, A.S= Acetobacter specie, S.M= Staphyloccocus mirabilis, Z.M= Zymononas mobilis, A.M= Aerobic mesophiles, A.a.B= Acetic acid bacteria.

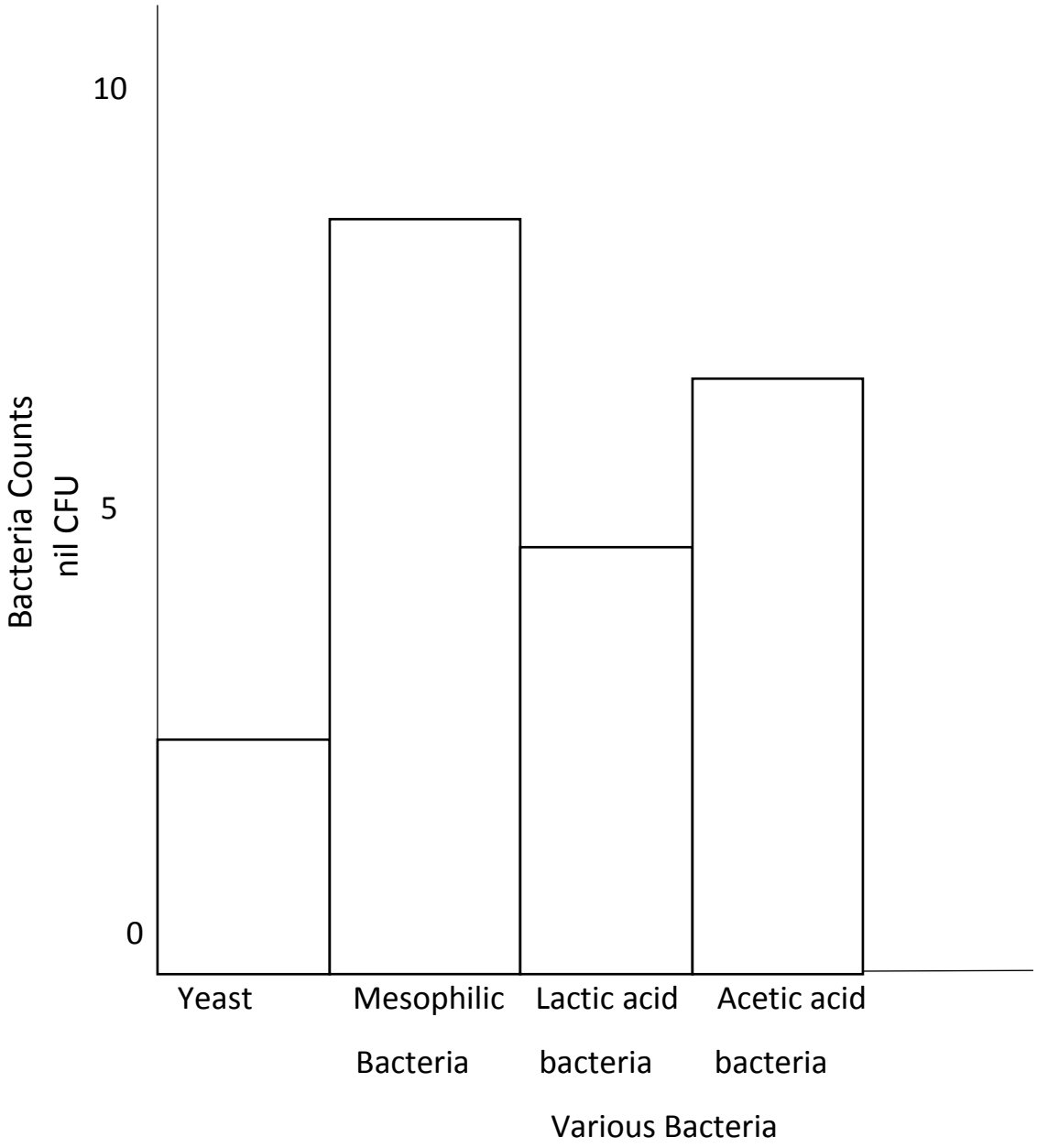

Figure 2: Various bacteria colony counts present in palm wine empty containers.

DISCUSSIONS

The extent of bacteria and micro flora contaminants in Palm wine containers have been evaluated. The cleaning of palm wine containers is simplified by rinsing in tap water immediately after use. Contaminated material however must always be properly washed with a suitable detergent (Baker et al, 1985), then rinsed in tap water. The result obtained from this research study is in agreement with the work of Joshi et al, 2017. The microorganisms isolated from the culture tests carried out with the swab samples indicated the presence of mainly yeast such as saccharomyces cerevisiae, schizosaccaromyces pombe, contaminants such as candida species, pichia species, staphylococcus mirabilis, staphylococcus epidermidis, and lactic acid bacteria such as lactobacillus plantarum, leuconostoc mesenteroides, Acetobacter species, *Zymononas mobilis*, Aerobic mesophiles and acetic acid bacteria. The microorganism are reported to originate from the palm tree, the gourd (container) used for sap collection and fermentation (Joshi et al, 2017) or the tapping equipment.

Palm sap has some microflora such as saccharomyces cerevisiae which is used in the production of acceptable wines from tropical fruits (Aina and Soetan, 1986).

The result of the study in fig 1 shows that yeasts such as saccharomyces cerevisiae and schizosaccharomyces pombe are the highest

contaminants found in palm wine containers or gourge. This is followed by lactic acid bacteria and acetic acid bacteria,others are candida species and pichia species. Mesophilic bacteria has the highest bacterial count isolated in the palm wine container (Fig 2). This was followed by acetic acid bacteria and lactic acid bacteria.

Many commensals or non-pathogenic microbes are transmissible from person to person (Cruishank et al, 1973) or derived from the environment they are present often in numbers on the skin in the upper respiratory tract, the intestine and the lower genito urinary tract and as such, they constitute the normal bacterial flora of the body and may play some part in the body's defences against invading pathogenic microbes.

The effects of this micro flora and bacteria contaminants is that sometimes when they get into the gastrointestinal system of man they can initiate infection if they gain access to such places. Some diseases they can cause are diarrhea, unspecific stomach disturbances, vomiting and stomach aches. These commensals and contaminants can initiate infection in the gut system when they are able to overcome the host defence system.

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Cite this Article: Oguwike FN; Igwedibia CP; Anudu MN (2019). Evaluation of Bacterial and Microflora Contaminants in Palm Wine Containers and Their Effects in the Gastrointestinal System of Man**.** Greener Journal of Medical Sciences, 9(1): 12-16, http://doi.org/10.15580/GJMS.2019.1.091518138**.**