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Microbiological Potentials of Some Food Sold In Sa'adatu Rimi College of Education Kumbotso Kano Nigeria

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***Abstract*-**Pathogenic bacteria from the hands of food handlers and the food were isolated to determine the contamination potential of enterobacteriacea in some common food consumed at different selling points in Sa'adatu Rimi College of Education Kano State. 50 food samples were collected from the area under study which include, rice and beans, Boiled moringer leafs, boiled maize, roasted meat, salted groundnut, boiled cassava, Danwake and Gurasa among others. It shows that *Staphylococcus aureaus* and Escherichia coli are the predominant species found in all the samples analyzed. Proper personal hygiene and other source of contamination need to be taken care in order to prevent contamination of food among food sellers.

Keywords; Isolation, Characterization, Bacteria, Pathogen, Food, Handler

I. INTRODUCTION

Bacteria that cause diseases are called pathogenic bacteria and are capable of causing diseases in human, or plant. Bacteria food poisoning are the most common type of food poisoning and it is as a result of the presence of pathogenic bacteria or poisonous substances produce by them in food due to unhygienic behavior and inappropriate handling practices by human. Some bacteria are host specific; others cause trouble in a number of host, depending on the condition. Food borne illness is an ever present threat which can be prevented with proper care and handling of food product. It is estimated that between 24 and 81 million cases of food borne diarrhea diseases occur each year in Nigeria which cost between 5 and 17 billion Naira in the medical care and lost in productivity. Bacterial food poisoning is the most common type of food poisoning and it is caused as a result of the presence of harmful bacteria or poisoning substance produced by them in food [1].

An outbreak of food poisoning may be cause by microbes which appear to be quite different from those involves in food spoilage. Harmful Bacteria (pathogens) find their way into food in a number of ways. However most food poisoning occurs as wholesome in spite of the fact that it is heavily infectious, microorganism causing food poisoning are resulted due to unhygienic behaviour and in appropriate handling practice during processing and packaging [2].

Pathogens can be carried and passed to other by individuals who themselves are not ill. Such carriers may have recently suffered an attack of food poisoning and still be harbouring the organism in their body. In some cases carriers of food poisoning act as reservoir host over a period of many years having themselves acquire immunity to organism concerned e.g *salmonella typhi, bacillus cereus*. Most often they are unaware of their role as a reservoir of infection [3]. High risk food that are likely to be infected with pathogens are foods intended to be eaten without cooking example include; meat , rice, fish, eggs, poultry, milk etc some bacteria produce toxin called endotoxin while others produce exotoxin. The major types of pathogenic Bacteria associated with food includes; *Salmonella Clostridium Pafringens, Staphylococcus aureus, Listeria spp, Monocytogens spp, and Escherichia coli* [4].

Generally contaminated food may smell and taste delicious even though contaminated and could be capable of causing food borne illness which may either be food intoxication or infection [4]. Food intoxication occurs when bacteria multiply in food and produce toxin outside their cell (exotoxin) which poisons the person consuming food. The most common food borne intoxication is cause by *staphylococcus aureus*, the problem may arise from eating the food containing the toxin [5]. The incubation period is normally short and the toxin produce irritation of the stomach and vomiting occur followed by abdominal pain and diarrhoea within 4 – 24 hours. Exotoxin are less easily destroyed by heat then the bacteria itself [5].

II. MATERIALS AND METHODS

II.I SAMPLING SITE

Ten restaurants used for the study were all located within the school compound, five were located at the eastern side of the school and the other five were situated by side at the western end of the school market. The type of food sold includes: Rice and Beans, Fish, Boiled Meat, Danwake, Salat and Cabbage. Gurasa, wainar flour etc.

II.II STERILIZATION

All the materials and glass wires were sterilized in line with aseptic techniques. All glass wares used in carrying out this work were sterilized in auto clave at 121^0C for 15 minutes at 15 pounds pressure. Materials such as ware loop are sterilized by flaming using direct heat.

II.III MACROSCOPIC EXAMINATION

Gram stained slides were observed under microscope using x 100 objective lens with a drop of oil immersion. Bacterial shapes and Gram reaction were observed and recorded for each slide. Each slide was also labelled as the sample number.

II.IV BIOCHEMICAL TEST FOR CHARACTERIZATION OF BACTERIA

II.IV.I CITRATE UTILIZATION TEST

Simmon's Citrate Agar was prepared in slants in bijou bottles as recommended by the manufacturer. Using a straight wire, the media will first be streak with the test organism and then stabbed to the butt of the bottle. This will then be incubated at 37^0C for 24-48 hours. A blue color formation indicated a positive result while no color change was recorded as negative result [6].

II.IV.II METHYL RED TEST

These were carried out according to the method described by [7]. Five milliliter of MR-VP broth will be inoculated with the test organism and incubated' at 37^0C for 2-3 days. Five drops of methyl red indicator will be added to each tube, Red color development indicated positive (alkaline) test.

II.IV.III VOGES PROSKAUER (V-P) TEST

According to the method described by [8] five milliliter of MR-VP broth were inoculated with the test organism and incubated at 37^0C for 48 to 72 hours. 5 drops of 40% potassium hydroxide will be added followed by l5 drops of 5% naphthanol in ethanol; the tubes will be shake and the caps were loosened. The tubes will be placed in a sloppy position. Development of a red color starting from the liquid-air interface within one hour indicates a V-P positive test.

II.IV.IV INDOLE TEST

The test organism were inoculated into 5ml sterile peptone water and incubated at 37^0C for 24-48 hours, after the incubation 3-8 drops of Kovac indole reagent were added to each of the test tube containing the broth culture and shake gently. A positive reaction will be the development of a red colored ring at the reaction layer above the broth within 1 minute.

II.IV.V OXIDASE TEST

To a piece of filter paper, a few drops of the dilute (l%) solution of oxidase reagent (tetramethyl-phenylenediamine-dihydrochloride) which will be prepared by standard procedure were added. A bit of growth from the nutrient agar slant will be obtain using sterilized platinum (but not Nichrome) wire loop and smeared on the wet piece of paper. Development of an intense purple color by the cells within 30 seconds indicates a positive oxidase test [8].

II.IV.VI UREASE UTILIZATION TEST

The isolates were heavily inoculated in to bijou bottles containing 3ml each of sterile urea broth (supplemented with urea supplement). They will be incubated at 37^0C for 24-72 hours. Development of a bright pink or red color indicates a positive urea reaction [8].

II.IV.VII COAGULASE TEST

The test was conducted by placing a drop of normal saline on a clean glass slide. A small portion of the isolate will be emulsified in the drop of normal saline and a drop of plasma will be added to the suspension and the complex will rocked gently. On observation, coagulase positive isolate show agglutination within ten (10) seconds [6].

II.IV.VIII CATALASE TEST

A measure of 2-3ml of 3% hydrogen peroxide were poured into a test tube. A sterile glass rod will be used to remove several colonies of the test organism and immersed in the hydrogen peroxide solution. Bubbling of gas indicated a positive test [6].

II.IV.IX TEST IN TRIPLE SUGAR IRON (TSI) AGAR

TSI agar were prepared by standard method. With a sterile needle, an isolate will be obtain from the subculture and streak on the surface of the slant, and the butt will stabbed 2 to 3 times. The caps of the tubes will be loosened and the tubes were incubated for 24 h at 37^0C. The butt becoming yellow indicates glucose fermentation. If no other sugar is fermented, the slant would be red while the butt is yellow. If in addition to glucose, lactose or sucrose or both are fermented, both the butt and the slant would be yellow (A/A reaction) [6]. If TSI is inoculated with a culture that appears as a non-lactose fermenter

but gives an A/A reaction, the chances are that the culture is a sucrose fermenter. If none of the 3 sugars in TSI (glucose, lactose and sucrose) is fermented, the inoculated culture would grow using the peptone present in the medium but no yellow coloration of the butt or the slant would occur [6].

III. RESULT AND DISCUSSION

The result indicated that *S. aureus* and *E. coli* are the common microbes found in the hand of food handles more especially the hand of the girls which may be due to unhygienic behavior of food handling as shown in table below.

Table 1: Isolation and Identification of Bacterial Pathogens

Sample no	**Media used**	**Morphological/cultural characters**	**Biochemical Test**		**Organism**
			Catalase	Indole	
Res/001/H	N.A	Milky colour confluence formation	+	-	S. aureus
Res/002/H	N.A	Milky colour in shape	-	+	E. coli
Res/003/H	N.A	Milky colour shining irregular shape	-	+	E. coli
Res/004/H	N.A	Milky colour confluence formation	+	+	S.aureus & E. coli
Res/005/H	N.A	Milky colour circular in shape with irregular formation	+	-	S. aureus
Res/001/YL	N.A	Shiny colour with confluence formation	+	-	S. aureus
Res/002/YL	N.A	Milky colour confluence formation-	+	-	S. aureus
Res/003/YL	N.A	Milky shiny colour circular in shape	+	-	S. aureus
Res/004/YL	N.A	Whitish colour confluence formation	-	+	E. coli
Res/005/YL	N.A	Milky shiny and circular growth	+	+	S. aureus
Res/001/CL	N.A.	Milky colour Round in shape irregular formation	-	+	*E.coli*
Res/002/CL	N.A.	Milky colour confluence formation	-	+	*E.coli*
Res/003/CL	N.A.	Milky & shining colour circular in shape	+	+	*S. aureus & E.coli*
Res/004/CL	N.A.	Whitish in colour confluence	+	-	*S. aureus*
Res/005/CL	N.A.	Milky in colour circular in shape	+	-	*S. aureus*
Res/001/M	N.A.	Milky colour confluence formation	+	-	*S. aureus*
Res/002/M	N.A.	Whitish in confluence formation	+	-	*S. aureus*
Res/003/M	N.A.	Milky colour circular in shape	+	-	*S. aureus*
Res/004/M	N.A.	Milky colour round in shape	-	+	*E.coli Negative*
Res/005/M	N.A.	Milky shiny and circular growth	-	-	*E.coli & S. aureus*
Res/006/M	N.A.	Confluence formation milky colour	+	+	*E.coli*
Hawkers					
Res/001/ZL	N.A.	Milky colour circular in shape	+	-	*E.coli*
Res/002/ZL	N.A	Milky colour circular in shape cluster	+	-	*S. aureus*
Res/003/ZL	N.A	Whitish in colour confluence formation	+	-	*S. aureus*
Res/004/ZL	N.A	Milky colour circular in shape	+	+	*S. aureus*
Res/005/ZL	N.A	Milky colour round in shape	+	+	*S. aureus*
Res/006/ZL	N.A	Milky colour confluence formation	-	+	*S. aureus & E.coli*
	N.A	Milky colour, shiny circular in shape	+	-	*S. aureus*
Res/001/MZ	N.A	Milky colour circular in shape	+	-	*E.coli*
Res/002/MZ	N.A	Milky colour circular in shape	+	-	*S. aureus*
Res/003/MZ	N.A	Milky colour confluence growth	+	-	*S aureus*

Keys: Res =Restaurant, H=Code for sampling Site, YL=Code for sampling Site
CL=Code for sampling Site, M=Code for sampling Site, HK=Hawkers
ZL=Code for sample Zogale, MZ=Code for sample Maize, G=Code for sample Groundnut
F =Code for sample Fura da Nono, R=Code for sample Cassava N.A=Nutrient agar
-S=No reaction (Negative result), + =Reaction (positive result)

Biochemical tests carried out for all samples analysed revealed only *S. aureus* and *E.coli* and also *S. aureus* in all the restaurants. Restaurant CL revealed a mixture of *S. aureus* and *E.coli* for while samples from suya spot (M) revealed

mixture of *S. aureus* and *E.coli* except sample 005 which revealed nil. But for hawkers ZL revealed *E.coli* but for sample 005 and 006 revealed a mixture of *S. aureus* and *E.coli*

Hawkers of boiled maize samples show *S aureus* except sample 001 which revealed E.coli while Hawkers of salted groundnut (G) samples revealed a mixture of *S. aureus* and *E.coli* whereas sample 003 and 005 revealed only *Staphylococcus aureus,* but for sample 002 revealed both *Staphylococcus E.coli* while sample 004 revealed only *E.coli.* However, hawkers of fura da nono sample revealed only *Staphylococcus aureus* 001, 004 & 005 while sample 003 revealed *E.coli* Hawkers of boiled cassava (R) samples for revealed only *Staphylococcus aureus* except sample 003 which revealed both *Staphylococcus aureus* and *E.coli*

IV. CONCLUSION

From the finding it was observed that most organisms isolated were *S.aureus* and *E.coli* and belong to enterobactereacea and are pathogenic which can cause abdominal discomfort that may lead to diarrhea which is highly life threatening. Poor personal hygiene especially from the hands of food handlers are the main reason of isolation these organisms which are the normal floral of the skin and mucus membrane of the nose and *E.coli* (a normal flora of the large intestine of human being) These organisms may turn to be opportunities and can cause food borne infection. Although S. *aureus* colonies on the sample were found to be more than that of *E.coli.*

V. RECOMMENDATIONS

Personal hygiene is of greatest importance at time especially when handling food, food storage, handling and preparation must to be carried out in proper and hygienic way. Therefore, the following process shall be undertaken by all those involved in food preparation and distribution

- Washing of hands before touching food.
- Covering mouth and the nose when coughing and sneezing.
- Keeping nails short and clean always.
- Wearing protective clothing when preparing food.
- The water used in the preparation of food must be from purified source or boiled before used.
- Keep kitchen clean always, floor and working surface should be washed after using them.
- All utensils that have been used during preparation and eating should wash immediately after used.
- Food shall be covered and protect from flies which can carried vast number of Bacteria on the hair in cyst.

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