MICROBIOLOGICAL SURVEILLANCE OF FOOD AND BEVERAGE SERVICES IN TERTIARY CARE HOSPITALS

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ABSTRACT

The aim of this study was to check the bacterial presence in the food which is served in the hospital for the staff and patients. It was seen that the most of the bacterial species which was present in food are from Gram –ve enteriobacteriacae. It was seen that the most of the food items were free from pathogenic bacteria.In the food microbiology we detect the only foodborne pathogens, in the uncooked food many oforganism are present but we need to detect only food borne Gram Negative pathogens e.g.GramNegative bacteria have more ability to cause disease in those patients which surviving from lowimmune response and Gram-Negative organism have ability toacquire resistant against multiple antibiotics.These organisms have different mechanism including Effluxpump,modification in antibiotic targets, increase regulations of target protein. In the hospital some time patients get thisGram-Negative pathogen by contamination food and water. Patient get the infection by this sourcemore easily because a viable organism is present in the food and patient consume this food which haveviable pathogens and patient get infection. Pathogens is *Vibrio cholerae, Escherichia coli 0157:H7,Shigella, Salmonella, Campylobacter*. These all organism are Gram Negative, and cause the foodborneillness. *Vibrio cholerae* cause cholerain the patient, cholerais an acute diarrheal disease. Whenpatient consume food, which have this organism it forms the profuse, painless, watery diarrhea andvomiting, they may lead to hypovolemic shock and death in less than 2 hours.*Escherichia coli0157:H7* can produce the deadly toxin after the consumption. The main source of this organism is rawmilk, unpasteurized juice and raw sandwich. *Shigella* cause the infection in the Digestive system and their toxin survive the gastric acidity better than another organism. *Salmonella* is cause the Gastroenteritis, food poisoning, Enteric fever and septicemia. Gastroenteritis and food poisoning areoccurred when human ingestion the contaminated food. *Campylobacter* caused the disease in humandigestivesystem whenhumaningestionthecontaminatedfood.Thisispresentintherawandundercooked food, untreated water and raw milk. If the hospital kitchen is prepared the unhygienic food and not follow the precaution during prepare food and serving the food to patient this type oforganism is spoil the food easily and patient get infection and surfing the more complication. The organism is more dangerous in case when human have low immune response (during illness).

INTRODUCTION

Microbiologyisthesciencewhichstudyoftheoccurrenceandsignificanceofbacteria,fungi,protozoaandalgaeand Foodmicrobiologyissciencewhichstudyofthoseorganismwhichcontaminate the food and cause the spoilage of food, pathogens that may cause disease especially iffood is improperly cooked and store. Government authorities, Hospitals and food companies usemicrobiological analysis to monitor the state of

contamination at all times and analyze its trends so asto detect emerging risks. Raw food and cooked food are carry some organism but these organisms arenot cause any infection in the human body but if food carry those organisms which are cause theinfection in human body its dangerous. These organisms are mainly belonging to the Gram-negativeclass. Microbiological analysis is also an essential tool for carrying out tests in accordance with themicrobiological criteria established for each food type, as well as being essential for evaluating theactions of different management strategies based on the Hazard Analysis. Microbiological analysis offoods is based on the detection of microorganisms by culturing, visual,biochemical,immunological,or genetic means, either before preparation of (raw food) and after preparation of food (cooked food).Traditional culture methods for detecting microorganisms in food are based on the food sample into anutrientmedium in which themicroorganisms can multiply, thus providing visual confirmation oftheir growth.

Bactriaaremainlypresenteverywhereontheearthandbacteriacontributemorethan90%toinfectthe human body. Bacteria are most common cause is food poisoning. Food poisoning occur when theperson eats the contaminate food and this contamination are occur due to the bacterial flora. Gramnegative organisms are cause the food poisoning. In this Gram-negative series of bacteria, the bacteriaare *Vibrio cholerae, Escherichia coli 0157:H7, Shigella, Salmonella, Campylobacter*. *Vibrio cholerae*are live in contaminated water and food. When the healthy person is ingestion this contaminated food,the bacteria will goinside thebody reached to gastrointestinal tract and cause the cholera. Thisorganism is mostly present in the fish, seafood such as prawns and tuna. The symptoms of cholera arediarrhea, vomiting and nausea. *Escherichia coli 0157:H7. (E. coli)* is Gram negative organism andcause the infection in digestive system. *E. coli* is the normal flora of the human and animals. Most ofthe time it is not cause the any infection in the body but if *E. coli* strain 0157:H7 are interduce to bodyitleadstothefoodpoisoning.

MATERIAL AND METHODS

METHOD

A study was conducted from 1st January, 2021 to 30th April 2021 in the hospital to check the all food borne pathogens (bacteria, virus, fungi and parasites). During this study the samples was collectfrom the hospital's kitchen and perform the manual method in the laboratory. In the manual method we are done the test on culture media and for the identification of organism done the biochemical test as manual method**.**

SAMPLERECEIVED

Following list of samples, we are collect from the hospital's kitchen side in the sterile container and chose the all precaution to prevent the foreign contamination-

- FOOD
- RAWMILK
- DAHI
- CHANNADAL
- PANEERSABJI
- RAWCHEESE
- GAZARMATAR
- WHITECHNNADAL
- BOILEDRICE
- PICKLES
- RAWSANDWICH
- SALAD
- TEA
- JUICE
- PATIENTFEED(PAPTAMENPOWDER)
- NATURALFEED

SAMPLE PROCESSING

- **MacConkey Agar-** Suspend 49.53 grams of dehydrated medium in 1000 ml purified/distilledwater. Heat to boiling to dissolve the medium completely. Sterilize by autoclaving at 15 lbs,pressure (121°C) for 15 minutes i.e. validated cycle. AVOID OVERHEATING. Cool to 45-50°C. Mix well before pouring into sterile Petri plates. The surface of the medium should bedrywheninoculated.

- **Blood agar**-suspend 28.00 grams of nutrient agar medium in 1000 ml purified/distilled water.Heat to boiling to dissolve the medium completely.Sterilize by autoclaving at 15 lbs, pressure(121°C) for 15 minutes. AVOID OVERHEATING. Cool to 45-50°C and add sheep or humanblood (40 ml in 1000 ml of nutrient agar) and mix well, pouring into sterile Petri plates. Thesurface ofthemediumshouldbe drywheninoculated.

- **xylose-Lysine Deoxycholate Agar (XLD Agar)-** Suspend 56.68 grams in 1000 ml distilledwater. Heat with frequentagitation until the medium boils. DO NOT AUTOCLAVE OROVERHEAT. Transfer immediately to a water bath at 50°C. After cooling, pour into sterilePetri plates. It is advisable not to prepare large volumes that will require prolonged heating,therebyproducingprecipitate.

- **Selenite Broth (Selenite F Broth) (Twin Pack)**-Suspend 4.0 grams of Part B in 1000 mldistilledwater. Add19.0gramsofPartA. Mixwell.Warmtodissolvethemediumcompletely.

Distribute in sterile test tubes. Sterilize in a boiling water bath or free flowing steam for 10minutes. DO NOT AUTOCLAVE. Excessive heating is detrimental. Discard the preparedmedium if large amount of selenite is reduced (indicated by red precipitate at the bottom oftube/bottle).

CATALASE TEST - This test was used to check the production of enzyme catalase. For this test a clean microscopic slide was taken. A drop of 3% H2O2 was taken on the microscopic slide aseptically. A loopful of bacterial culture was taken and mix ed with 3% H2O2 solution on the slide and the presence of the bubble production observed.

OXIDASE TEST- Log phase culture of isolated strains was touched on the surface of oxidase disc and observed for coloure change.

STARCH HYDROLYSIS- Starch agar plates were streaked with isolated strain incubated for 24 h. The plate were flooded with Iodine solution for 30 sec and observed for coloure change.

SUGAR FERMENTATION TEST- Triticale soy broth was prepared and added in sterile test tube . Now Durham tube added in test tube inoculate strain in each test tube. Incubate the tube for 24 h at 37°c and observed for colure change

RESULTS

S.NO	SAMPLE	BACTERIA	STERILE	RESULT
1	Paneer sabji	NO	YES	No bacteriapresent
2	Chana daal	NO	YES	No bacteriapresent
3	Boiledrice	NO	YES	Nobacteriapresent
4	Salad	GPC	NO	Staphylococcusspp.
5	Sandwich	GPC	NO	Staphylococcusspp.
6	Tea	NO	YES	No bacteriapresent
7	Juice	NO	YES	No bacteriapresent
8	Drinking water	GNB	NO	E.coli
9	Milk	GNB	NO	Salmonella
10	Rawpaneer	GNB	NO	E.coli
11	Utensils[beforeuse]	NO	YES	No bacteriapresent
12	Pickle	NO	YES	No bacteriapresent
13	Liquidsoap	GNB	NO	Salmonella,Proteus
14	Dahi	GNB	NO	Lactobacillusspp
15	Ketchup	GNB	NO	E.coli
16	Kitchenairsample	GNB/GPC	NO	Mixedgrowth

BIOCHEMICAL CHARACTERIZATION

Catalase test

All the isolate were catalase negative as no libration of effervescence of o2 around the bacteria colonies were seen on addition of hydrogen peroxide (h2o2).

Oxidase test -

All the isolated were oxidase negative as no change in color was noticed on oxidase disc after spot inoculation on it .

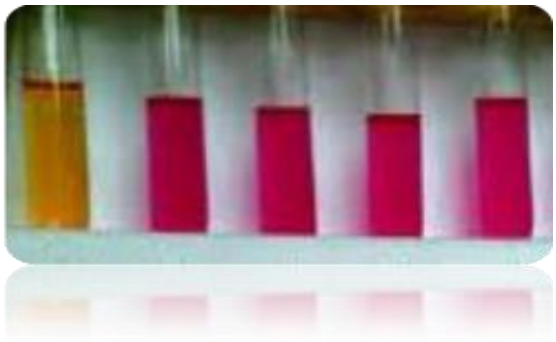
Starch hydrolysis

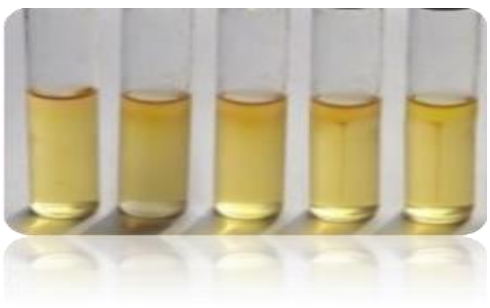
No clear zone was shown by the isolate and addition of iodine solution. Hence the isolate were unable to produce amylase .

Sugar fermentation test

The isolates produced yellow color in broth and indicated that they utilized glucose ,lactose and sucrose and produced acid .

Figure 1-CITRATE TEST





DISCUSSION

In this study sixteen different samples were taken from the kitchen area of the hospital in whichnine samples were showing the bacterial contamination. Out of nine samples six were gramnegative, two were gram positive and one were showing the mixed growth. This indicates thatthere are very high chances of food poisoning in the hospital and can affect the patients veryeasily due to their weak immune system. As we already know that if we keep salad for morethantwo hours there are very high chances of bacterial growth which is the most common reason of acute food poisoning and can show its symptoms within two to four hours of food intake.

CONCLUSION

After this study it has been concluded that the Hospital administration should properly moniterthe survillence testingof food andbeveragesin thehospital, because there are very highchances of food contamination either due to patients or due to unhygienic way of preparing thefood. Patients who are having weak immune system can easily get infected instead of treatment, which can be life threatening in some patients who are going under chemotherapy or transplantation.

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