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STUDIES ON THE PRESENCE OF BACTERIAL CONTAMINANTS ON STREET VENDED FOODS

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ABSTRACT

This study was carried out to examine the bacteriological associated risk factors of street vended foods. Twenty bacterial cultures were isolated from different street foods. On the basis of biochemical characterization found that 8 cultures belong to Bacillus spices and 12 cultures fit into streptococcus species. The study specifies that the possibility of street foods contamination was very high. Therefore, concerned bodies should provide health education to street food vendors to develop their hygienic circumstances during the preparation, handling storing and serving of foods.

Key words: Street foods, hygiene, biochemical , bacteriological, streptococcuss.

INTRODUCTION

The economic situation of the country, social difficulties and urbanization, among other factor, encourage the growth of the informal sector of the economy, including the sale of street food. Street food is defined by the Food and Agricultural Organization **[1]** as ready to eat food items and beverages prepared or sold by the vendors particularly in streets and other similar public places **[2,3]**

It can be found anywhere there is a heavy flow of individuals, as their marketing performance relies solely on place and promotion of word – of- mouth **[4].** Familiarity, taste, cheap costand comfort are some of the attractive variables that make street food common as a source of food. They may also play an important role in the supply of nutrients, providing consumers with an opportunity to fulfill their everyday dietry demands **[4].**

In addition, most food manufacturers lack good food handling procatices, exposing foods to harmful conditions such as cross-contamination, dangerougs stoirage and poor conditions of time-temperature **[5]**. Street-sold foods or street foods are those foods and beverages that, without further processing or planning, are prepared and sold bt the vendors on the street and in the other public places for immediate consumption or for later consumption **[6].**

Street sold food is vulnerable to contamination since it is sold in the open and sometimes not protected. In addition, they also operate from locations such ass bus stations, industrial areas, schools, market places, streets because street vendors tend to carry their goods to their customers. These places typically do not meet standard for food and safety **[7,8]**.

From a health stand point, the selling of food on the streets is very controversial. Microbial contamination is the main health risk associated with street foods.

By performing various studies in Brazil, the presence of the food brone pathogens and highest counts of microorganisms in the different area of street food items in country **[9,10,11,12].**

The current study was designed to evaluate the quality of common street foods.

METHODOLOGY

Sample collection:

Street food samples were collected in sterilized collection bags from different region of street food vendors and bring to the laboratory for the isolation of desired species **[13, 14]**.

Isolation of bacteria:

The samples were weighed to 1 gram and then serially diluted in 0.85% NaCl solution. Further the diluted samples from 10^{-8}, 10^{-9}, 10^{-10} test tubes were spread on sterilized nutrient agar plates and then incubated at 37oC for 24 hours **[15]**.

Pure culture preparation:

The colonies were shortlisted on the basis of their different morphological parameters and then streked on sterilized utrint agar plates by using continous quadrant streaking method. Further the plates were then incubated at 37oC for 24 hours **[14,15]**.

Strain identification:

The identification of the isolates were carried by performing various staining as well biochemical tests which were followed by the Bergy's manual **[16]**.

Antagonistic effects of the isolates:

The pure isolates were screened for the antagonistic effects against the gram positive and gram negative bacteria **[17]**.

Growth curve study:

The isolates were inoculated in sterilized nutrient broth media and then the OD were taken at constant time interval for the analysis of the growth of isolates **[18]**.

RESULTS & DISCUSSIONS

Isolation of Bacteria from collected food samples:

The food sample was collected from the local vendors was used for isolation of the bacteria. The sample was serially diluted prior to use for the inoculation purpose. The sample was serially diluted and the diluted sample was used for isolation.

Figure 1: Serial Dilution of the food sample

Serial dilution is a simple yet efficient technique to determine the number of cells or organisms in a concentrated sample. Serial dilution helped to obtain diversified colonies on the Nutrient Agar Media plate.

The isolation of bacteria was done through serial diluted sample of 10^{-10}dilution. The sample was inoculated on the NAM media plate by spread plate method and the plate was incubated for 24hours at 37°C. After incubation the plate showed the colonies of bacteria on them.

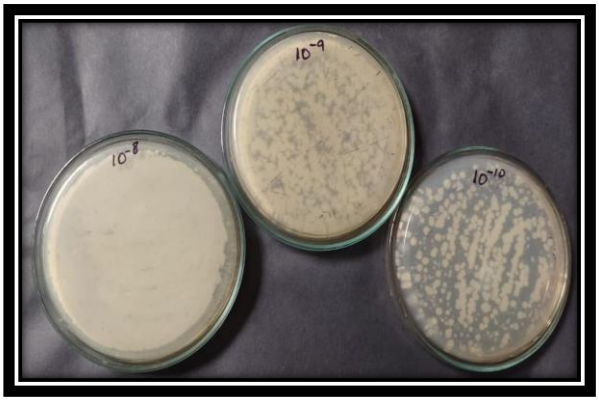

Figure 2: Spreading plate showing the colonies of bacteria

Pure culture preparation:

The cultures were selected on the basis of morphological parameters from mixed culture plates obtained after serial dilution and spreading.

The pure culture of bacteria was obtained by streak plate method. A single colony was picked from the spreading plate and a continuous quadrant pattern was drawn on the fresh nutrient agar media plate. The plate was then incubated for 24hours at 37°C. After incubation it showed the bacterial growth on the drawn pattern.

Figure 3: Streaking plate of few pure cultures on NAM.

After the growth of culture, the broths were prepared and then biochemical analysis was done for the identification of the isolated strains.

Identification of pure cultures by staining and biochemical tests:

Staining of the cultures:

The bacterial pure cultures were stained through Gram's and endospores staining procedure in order to study the shape and genus.

Table 2: Results of Gram's staining and endospore's staining

S no.	Cultures name	Gram's Staining	Endospore's Staining
1	S1C1	Bacillus, positive	Positive
2	S1C2	Streptococcus, negative	Positive
3	S1C3	Streptococcus, positive	Negative
4	S1C4	Streptococcus, positive	Negative
5	S1C5	Bacillus, negative	Positive
6	S1C6	Streptococcus, positive	Negative
7	S2C1	Bacillus, negative	Positive
8	S2C2	Bacillus, negative	Positive
9	S2C3	Streptococcus, negative	Negative
10	S2C4	Bacillus, negative	Positive
11	S2C5	Bacillus, negative	Negative
12	S3C1	Streptococcus, positive	Negative
13	S3C2	Streptococcus, negative	Positive
14	S3C3	Streptococcus, negative	Negative
15	S3C4	Bacillus, positive	Negative
16	S3C5	Bacillus, positive	Negative
17	S4C1	Streptococcus, positive	Positive
18	S4C2	Streptococcus, positive	Positive
19	S4C3	Streptococcus, positive	Negative
20	S4C4	Streptococcus, positive	Positive

Biochemical analysis of the cultures:

Table3: Identification of pure cultures by catalase, urease, indole, mannitol, VP, glucose fermentation tests.

Cultures name	Catalase test	Urease test	Indole test
S1C1	Positive	Positive	Positive
S1C2	Positive	Negative	Negative
S1C3	Negative	Negative	Negative
S1C4	Negative	Positive	Positive
S1C5	Positive	Positive	Positive
S1C6	Negative	Negative	Negative
S2C1	Negative	Positive	Positive
S2C2	Positive	Positive	Negative
S2C3	Positive	Negative	Negative
S2C4	Negative	Negative	Positive
S2C5	Positive	Positive	Positive
S3C1	Negative	Positive	Negative
S3C2	Positive	Negative	Positive
S3C3	Negative	Positive	Negative
S3C4	Positive	Positive	Positive
S3C5	Positive	Negative	Positive
S4C1	Negative	Positive	Negative
S4C2	Positive	Negative	Positive
S4C3	Negative	Positive	Negative
S4C4	Negative	Positive	Positive

Cultures name	MR test	VP test	Glucose fermentation test
S1C1	Positive	Positive	Positive
S1C2	Negative	Negative	Positive
S1C3	Positive	Negative	Negative
S1C4	Negative	Positive	Negative
S1C5	Positive	Positive	Positive
S1C6	Positive	Negative	Positive
S2C1	Negative	Positive	Negative
S2C2	Negative	Negative	Positive
S2C3	Positive	Negative	Negative
S2C4	Negative	Negative	Negative
S2C5	Negative	Positive	Negative
S3C1	Positive	Positive	Positive
S3C2	Positive	Negative	Negative
S3C3	Negative	Positive	Positive
S3C4	Positive	Negative	Negative
S3C5	Negative	Positive	Negative
S4C1	Negative	Negative	Positive
S4C2	Positive	Positive	Positive
S4C3	Negative	Positive	Negative
S4C4	Positive	Positive	Positive

Table4: Identification of pure cultures by sucrose fermentation, lactose fermentation, glycerol fermentation, casein hydrolysis and NaCl growth tests.

Cultures name	Sucrose fermentation test	Lactose fermentation test	Glycerol fermentation test
S1C1	Negative	Negative	Negative
S1C2	Positive	Positive	Positive
S1C3	Negative	Negative	Positive
S1C4	Negative	Negative	Negative
S1C5	Positive	Positive	Negative
S1C6	Positive	Positive	Positive
S2C1	Negative	Negative	Positive
S2C2	Positive	Negative	Negative
S2C3	Negative	Negative	Positive
S2C4	Positive	Positive	Negative
S2C5	Negative	Positive	Positive
S3C1	Positive	Negative	Negative
S3C2	Negative	Positive	Negative
S3C3	Negative	Positive	Positive
S3C4	Positive	Negative	Negative
S3C5	Positive	Positive	Negative
S4C1	Negative	Negative	Positive
S4C2	Positive	Positive	Positive
S4C3	Negative	Negative	Negative
S4C4	Positive	Negative	Positive

Cultures name	Casein hydrolysis test	NaCl growth test	Mannitol test
S1C1	Positive	Positive	Positive
S1C2	Negative	Positive	Negative
S1C3	Negative	Positive	Negative
S1C4	Positive	Positive	Positive
S1C5	Positive	Negative	Positive
S1C6	Negative	Negative	Negative
S2C1	Positive	Positive	Positive
S2C2	Positive	Positive	Negative
S2C3	Positive	Negative	Positive
S2C4	Positive	Positive	Negative
S2C5	Negative	Positive	Negative
S3C1	Positive	Negative	Positive
S3C2	Positive	Positive	Positive
S3C3	Positive	Positive	Negative
S3C4	Positive	Negative	Negative
S3C5	Negative	Negative	Positive
S4C1	Negative	Positive	Positive
S4C2	Positive	Positive	Negative
S4C3	Positive	Negative	Positive
S4C4	Negative	Positive	Negative

After the morphological identification the bacteria was undertaken for the biochemical testing. Different biochemical test were performed for the isolated bacteria and their result were used for its characterization. Few tests were explained below:

Indole test: Bacterial species showed negative result because after addition of kovac's reagent a brown colored ring was formed. This means these bacteria are not able to produce trypto-phanase enzyme and vice versa.

Catalase test: The result for the Catalase test was determined by the appearance of bubbles after the addition of H_2O_2 on the slant after the period of incubation. The bacterial species showed positive result for Catalase test as there was bubble formation on the bacterial slant after addition of H_2O_2. This indicates that the bacteria are able to produce the catalase enzyme.

Catalase is an enzyme, which is produced by microorganisms that live in oxygenated environments to neutralize toxic forms of oxygen metabolites; H_2O_2. The catalase enzyme neutralizes the bactericidal effects of hydrogen peroxide and protects them.

Anaerobes generally lack the catalase enzyme. Catalase-positive bacteria include strict aerobes as well as facultative anaerobes. They all have the ability to respire using oxygen as a terminal electron acceptor.

CONCLUSION

Four samples were collected from different locations of Gomtinagar, Lucknow.

Further the bacterial cultures were isolated from these samples by serial dilution and spread plate method. Where twenty bacterial cultures were selected from the mixed culture plates and then pure cultures were prepared by streak plate method.

These cultures were termed as S1C1, S1C2… so on. These pure cultures were identified by staining method and biochemical tests. On the basis of tests it was concluded that eight cultures belong to *Bacillus* species and twelve to *Streptococcus* species. The results of this study clearly demonstrated that, the street-vended foods in Gominagar, Lucknow were contaminated with different pathogenic bacteria. The existence of these bacteria in foods and poor knowledge of food vendors towards food borne disease were the associated risk factors to contamination of street foods.

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