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EXAMINATION OF MEAT SAMPLES FOR THE PRESENCE OF MICROBES IN SLAUGHTER HOUSES OF HYDERABAD, TELANGANA, INDIA

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ABSTRACT Twenty areas were short listed out of which four area samples of meat from Hyderabad, Telangana, India, were analysed by microbiological quality; isolation and confirmation of Staphylococcus, Enterobacter, Pseudomonas, Klebseilla, Streptococcus, Escherichia coli, Clostridium, Bacillus, Salmonella, Shigella and Proteus by selective plating, microscopic examination and biochemical characterization. The microbiological quality of the meat was assessed. Six genera were isolated, characterized and identified; namely, ***Staphylococcus, Proteus, Bacillus, Escherichia coli, Pseudomonas and Streptococcus***. The most prevalent microorganism observed was Staphylococcus which is due to poor hygiene of the meat handlers, resulting in meat contamination. The result revealed that the hygiene conditions of meat from the slaughterhouses used in this study were below acceptable standards for human consumption.

KEYWORDS : Meat contamination, Slaughterhouses, Microbiological quality, Isolation.

1. INTRODUCTION

According to the oxford dictionary (2007) slaughterhouse which is also called as abatoir is a facility where animals are killed and processed into meat for food. The animals which are commonly slaughtered include sheep, cow, pig, goat, horse and fowls which mostly include chickens including ducks, turkeys, quails and pigeons. Water from abatoirs have numerous bacteria which might be a cause of various diseases and such water is many times is being introduced into nearby water bodies like streams, ponds and rivers which are used by people in nearby neighbourhood for various domestic purposes like cooking, washing and bathing (Adeyemo, 2003). Waste disposed and by-product management in food processing industry pose problems in the area of environmental protection and sustainability (Russ and Pittroff, 2004). It is as a result of this pollution that environrnental pollution and related diseases (especially zoonotic diseases) are caused and transferred (Salami, 1998). Furthermore, the consumption of meat containing various pathogens has shown to be problematic (Jay, 2005; William and Dennis, 2008). Food borne pathogens are the leading cause of illness and death in developing countries costing billions of dollars in medical care and social costs (Fratamico et al., 2005). Changes in eating habits, mass catering complex and lengthy food supply procedures with increased international movement and poor hygiene practices are major contributing factors (Hedberg et al., 1992). The pathogens present in this meat are not only responsible for food borne diseases but also are the major causes of meat spoilage.

2. MATERIALS AND METHODS

1. Description of the study area and sampling

Hyderabad is one of the metropolitan cities in southern India, located in the Central Telangana state and spread over an area of 260° Km^2. The city lies in the deccan plateau and rises to an average height of 536 m above the sea level. The city lies at 17.366°N latitude and 78.476°E longitude. The area under study has been divided into 20 areas in and around four sides of Osmania University. A distance of approximately 5Kms is maintain between the areas. Out of the 20 areas shortlisted 4 areas (Nampally, Tarnaka, secunderabad, Dilsukhnagar) were visited for collection of samples of soil, water, plank, knife, hand and meat.

2. Collection of samples

By following certain aseptical methods samples of soil, water, plank, knife, hand and meat were collected in presterilised containers.

3. Cultivation and Enumeration

Two different methods were employed for cultivation i.e.., spread plate method and impregnation method. Serial dilutions of soil, water and macerated meat were made using sterile normal saline as the diluent. Aliquots(0.1ml) from fourth (10^{-4}) to eighth (10^{-8}) of each sample was aseptically transferred onto nutrient agar plate and spread with a sterile glass rod. A control plate was also maintained to know about proper sterilisation. The so inoculated plates were incubated at 37°C for 48 hours which is followed by observation of colonies i.e.., counting and recording the observations in various samples. For meat, hand, knife and plank sample direct impregnation was performed onto the nutrient agar plates followed by incubation at 37°C for 48 hours, then the plates were observed.

4. Isolation, Characterisation and Identification

Pure cultures of bacteria were isolated by streaking discrete colonies of different morphological types, which were observed on the nutrient agar plates onto fresh nutrient agar plates. These cultures were further subculture in nutrient broth and incubated at 37^0c for 48 hours which acted as stock culture for further biochemical tests. The following standard characterization tests like biochemical and staining were performed. The pure cultures of bacterial isolates were identified on the basis of their cultural, morphological and biochemical tests in accordance with methods described by K. R. Aneja(2003) and with reference to Holt(1977). Biochemical tests like sugar fermentation, coagulase test, urease test, catalase test, oxidase test, indole production test and citrate utilization test were performed following the standard protocols given by K. R. Aneja (2003).

3. RESULT AND DISCUSSION

The abattoirs in Hyderabad (Nampally, Tarnaka, Secunderabad, Dilsukhnagar) were examined for the presence of pathogenic bacteria from slaughtered animals i.e., from meat and beef and also in the environment (butchering tables, knifes, hands of the butcher, soil and water). The microbial load was found to be higher in Tarnaka when compared to other 3 areas. Pure isolates of Staphylococcus and Pseudomonas were obtained from the abattoirs out of suspected species of Enterobacter, Staphylococcus, Pseudomonas, Klebseilla, Streptococcus, and Escherichia coli, Clostridium, Bacillus, Salmonella, Shigella and Proteus. Table1 given below shows the results of various biochemical tests used for identifying these bacteria. Out of four areas Dilsukhnagar is the only area showing the presence of Pseudomonas.

Table 1: summary of biochemical test used in identifying bacterial pure cultures obtained

S. No	Shape	Gram Stain	Indole test	MR Test	VP Reaction	Citrate	Urease	Catalase	Oxidase	Glucose	Lactose	Sucrose	Suspected bacteria
1	R	_	+	-	+	+	-	+	-	AG	AG	AG	Enterobacter sp
2	C	+	-	+	+/-	-	-	+	+	A	AG	A	Staphylococcus sp
3	R	_	-	-	+/-	+	+	+	-	AG	AG	AG	Klebseilla sp
4	C	+	-	+	+/-	-	-	+	+	A	NONE	A	Streptococccus sp
5	R	_	+	+	-	-	-	+	-	AG	AG	A	Escherichia coli
6	R	+	-			-	-	-	-	AG	NONE		Clostridium sp
7	R	+	-	-	+/-	-	-	+	+	A	NONE	A	Bacillus sp
8	R	_	-	+	-	+	-	+	-	AG	NONE	A	Salmonella sp
9	R	_	-	+	-	-	-	+	-	AG	NONE	A	Shigella sp
10	R	_	+	+	-	+	+	+	-	AG	NONE	AG	Proteus sp
11	R	_	-	-	-	-	+	+	+	NONE	NONE	NONE	Pseudomonas sp

Interpretation: (+) Positive test, (-) Negative test, (R) Rod-shaped, (C) Cocci-shaped, (A) Acid, (G) Gas

Food poisoning caused by staphylococcus species is one of the most common causes of foodborne illness due to the widespread occurrence of staphylococcus aureus and the ability of many strains to produce enterotoxins (Jay, 2005). The presence of S. aureus in food and other food handlers and in this case animal butchers that may be hosting the pathogen and releasing it the meat through skin lesions containing S. aureus, or releasing the pathogen into the meat either by sneezing or by coughing (Jay, 2005). S. aureus produces some exotoxins which can convert local host tissue into nutrients and this might also be a reason for wide spread of S. aureus in various areas. The pathogenicity of S. aureus is a complex process involving a diverse array of extracellular and cell wall components that are coordinately expressed during different stages of infection. The coordinated expression of diverse virulence factors in response to environmental cues during infections hints at the existence of global regulators in which a single regulatory determinant controls the expression of many unlinked target genes. These regulators help bacteria to adapt to a hostile environment by producing factors enabling the bacteria to survive and subsequently to cause infection at the appropriate time. It has been reported that species of Pseudomonas and Bacillus can cause surface slime; aerobic meat spoilage (Williams and Dennis, 2008). Furthermore, species of Clostridium has been seen to cause souring of meat (Williams and Dennis, 2008). Putrefaction which is an anaerobic decomposition of protein with the production of foul-smelling compounds such as H_2S can be caused by species of Clostridium, Pseudomonas and Proteus (Williams and Dennis, 2008).

4. CONCLUSION

Meat is one of the good source of protein which is required for body building and repair of worn out tissues, so adequate care should be taken to avoid the contamination and spoilage by microorganisms. The handlers at the slaughter houses should be acquainted with aseptic technique of handling to reduce the microbial load and enable the meat for safe human consumption. Even after taking the required precautions if there is any traces of microbial cells left, in the betterment of the consumer it is advised to cook meat properly for preventing food borne diseases.

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