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RESEARCH ARTICLE

MICROBIAL ASSESSMENT OF MEAT SOLD IN AROUND THE HYDERABAD CITY.

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Abstract

Food borne pathogens are major causes for the food borne illness in the developing countries due to changing the food habits. The main objective of the present study is to investigate the microbial quality of meat sold in retail shops in around the Hyderabad city and to determining their susceptibility to different antimicrobial agents. A total of 120 samples were collected from the 15 retail shops and are processed and analyzed for potential food borne pathogens using standard methods. Antibiotic susceptibility test was performed by using disk diffusion method. Out of 120 samples 8(6.67%), 39(32.5%) and 46(38.33%) were positive for *Salmonella* spp., *E. coli* and *Staphylococcus aureus* respectively. Antimicrobial susceptibility testing for *E. coli* showed resistant to Ampicillin, Nalidixic acid, Gentamicin, but sensitive to remaining all the antibiotics tested. Among the *S. aureus* isolates 90% were resistant to Nitrofurantoin, 80% to Ampicillin, 68% to Norfloxacin, 60% to Cefpodoxime, 38% to streptomycin, and 20% to Kanamycin but all (98%) of the isolates were sensitive to Co-trimoxazole. Whereas, isolates of *Salmonella* spp. shown resistant to Ampicillin (86%), Gentamycin (92%), Tetracycline (78%) and 60% to Cefpodoxime but 44% (17) isolates were sensitive to all the antibiotics tested. Present study concluded that the meat from retail meat shops is important sources of bacteria of public health significance i.e. *Salmonella*, *E.coli* and *Staphylococci* in Hyderabad city. Presence of this pathogenic microorganisms indicating there is a need to screening of meat from the retail shops to monitor hygienic conditions.

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Introduction:-

Microbial food safety and food-borne infections are important public health concern worldwide. There have been a number of food-borne illnesses resulting from the ingestion of contaminated foods such as chicken meats. Most of the pathogens that play a role in food borne diseases have a zoonotic origin [Busani *et al* ,2006]. According to reports of the World Health Organization (WHO, 2003) and the Centers for Disease Control and Prevention (CDC, 2000) every year a large number of people are affected by diseases due to contaminated food consumption. Although, these pathogens usually cause mild to moderate self-limiting gastroenteritis, invasive diseases and complications resulting in more severe cases (Zhao *et al.*, 2001). Numerous epidemiological reports have implicated foods of animal origin as the major vehicles associated with illnesses caused by food-borne pathogens (Peterson *et al.*, 1998). Contaminated raw or undercooked poultry and red meats are particularly important in transmitting these food-borne pathogens (Zhao *et al.*, 2001).

In developing countries potential cause for food borne illnesses are poverty, inadequate sanitary conditions, and poor general hygiene (Siddiqui *et al.*, 2006). Raw meat is available in open-air local retail shops without appropriate temperature control and this is purchased by households. Although, it is difficult to prove a direct role of drug resistance

in bacteria contaminating food items with increased clinical cases of resistant infections, the presence of such bacteria in food items could play a role in the spread of antimicrobial resistance amongst food-borne pathogens (Farzana *et al.*, 2009). Thus, adequate information should be gathered to develop an effective strategy to reduce the outbreak of food borne illnesses and resistance burden in the community. This study therefore aimed at investigating the microbial quality of meat available in common retail shops in Hyderabad city to determine susceptibility pattern of bacterial isolates.

Materials and methods:-

This study involved randomly selected 15 butcher shops in Hyderabad city. Samples were collected from meat cutting knife, Scalding tank, and Dressing Table, Platform, Personnel, water and meat samples. For collection of swab samples, sterile cotton swabs (3 cm long and 1 cm in diameter) moistened with 1 percent peptone water was used. Swabs were rubbed on sites continuously for 30 seconds (Morris and Wells, 1970). The samples were collected in sterile container and immediately transported using ice box to the laboratory for bacteriological analysis.

Screw cap tubes containing swabs were shaken on Vortex mixer for 30 seconds for uniform distribution of microorganisms. Tenfold serial dilutions upto 10^{-8} dilution of all the samples were done using sterile normal saline solution. A 25gm sample of the meat was homogenized in 225 ml of buffered peptone water using homogenizer. Then the sample was made into 10 fold serial dilutions and was incubated for 24hrs at 37°C . All media and antibiotic discs were purchased from Himedia. For isolation and identification of pathogenic organisms a loopful of sample from homogenate inoculate onto Nutrient agar plates and incubated at 37°C for 48 hours. Isolation of specific pathogenic organism's specific Media is used. For isolation of *S. aureus*, *E. coli* and *Salmonella* spp. a loop full colonies from Nutrient agar plates were inoculated on Manitol salt agar (MSA), Macconkey agar, EMB agar and XLD agar plates and the plates were incubated at 37°C for 48 hours. Formation of golden yellow colonies on MSA which were identified as *S. aureus*. Then the gram-negative organisms including *Salmonella* and *E. coli* were identified by using biochemical reactions. For confirmation of thermo tolerant *E. coli*; suspected isolates were incubated at 44°C water bath for 48 hours in nutrient broth and they were tested for growth at 44°C and checked for indole production. Isolates which demonstrated growth at 44°C with indole production were confirmed as thermo tolerant. Antimicrobial susceptibility testing for *Salmonella*, *E. coli* and *S. aureus* was performed using the disk diffusion method and results were interpreted using the performance standards for antimicrobial disk susceptibility tests (CLSI, 2010). The antibiotics used were Ampicillin (10 μg), Streptomycin (10 μg), Tetracycline (30 μg), Ciprofloxacin (5 μg), Norfloxacin (10 μg), Gentamicin (10 μg), Kanamycin (30 μg), Cefpodoxime (10 μg), Nitrofurantoin (300 μg) and Co-trimoxazole (25 μg).

Results and discussion:-

Food borne illnesses caused by non- typhoid *Salmonella*, *S. aureus* and *E. coli* represents a major public health problem worldwide. These pathogens are transmitted mainly through consumption of contaminated food and water and the presence of these organisms in meat animals and in raw meat products has relevant public health implications (Sousa, 2008) From the present study it was observed that almost all the samples from the retail meat shops had pathogenic microorganisms which are contributing incidence of food borne illness. In this study, pathogenic organisms are isolated in the majority of samples collected from retail meat shops, which indicates the presence of unhygienic food processing. Moreover, the identification of thermo-tolerant *E. coli* showed the presence of recent fecal contamination (Collee and Mackie, 1999). These findings are in accordance with the findings of Gibbons *et al* (2006).

A total of 120 samples from 15 butcher shops were collected and analyzed for various food borne pathogens. Among 120 samples 8(6.67%) were positive for *Salmonella* spp., 39(32.5%) were positive for *E. coli*, whereas 46(38.33%) samples were positive for *Staphylococcus aureus* (Table 1). Earlier Lin *et al.* (2009) and Kumar *et al.* (2010) were reported *Staphylococcal* contamination from various sources of slaughter process which are similar to the results of present study.

In the present study Dressing table (6), water (7) and meat (8) were the sources from which high numbers of *E. coli* isolates were obtained. The results are indicative of hygienic conditions of major sources from where *E. coli* contamination in meat food chain takes place. Morar *et al.* (2008) Studied critical control points (CCP) in poultry slaughterhouse and found that knife, water, table and poultry meat as main source of *E. coli*. In present study also similar observations were seen. *Salmonella* spp. was isolated from different sources during the slaughter process and the low *salmonella* isolation percentage may be due to low level of fecal and water contamination (Valerie *et al.*, 2009).

Out of the 39 *E. coli* isolates 28 (72%) were thermo-tolerant. Antimicrobial susceptibility testing for *E. coli* showed resistant to Ampicillin, Nalidixic acid, Gentamicin, but sensitive to remaining all the antibiotics tested. A total of 46 *S. aureus* isolates were tested for ten antibacterial agents which showed 90% were resistant to Nitrofurantoin, 80% to Ampicillin, 68% to Norfloxacin, 60% to Cefpodoxime, 38% to streptomycin, and 20% to Kanamycin but all (98%) of the isolates were sensitive to Co-trimoxazole. However, out of the 46 isolates of *S. aureus* 10(20%) were sensitive to all the antibiotics tested. Total of 39 isolates of *Salmonella* spp. were tested for ten antibiotic discs which showed resistant to Ampicillin (86%), Gentamycin (92%), Tetracycline (78%) and 60% isolated to Cefpodoxime but 44% (17) isolates were sensitive to all the antibiotics tested. These findings are in accordance with the findings of Haimanot Tasew *et al.* (2010).

Fig 1. Showing antibiotic sensitivity test of *S. aureus*. with different antibiotic discs



Fig 2. Showing antibiotic sensitivity test of *E.coli* with different antibiotic discs.

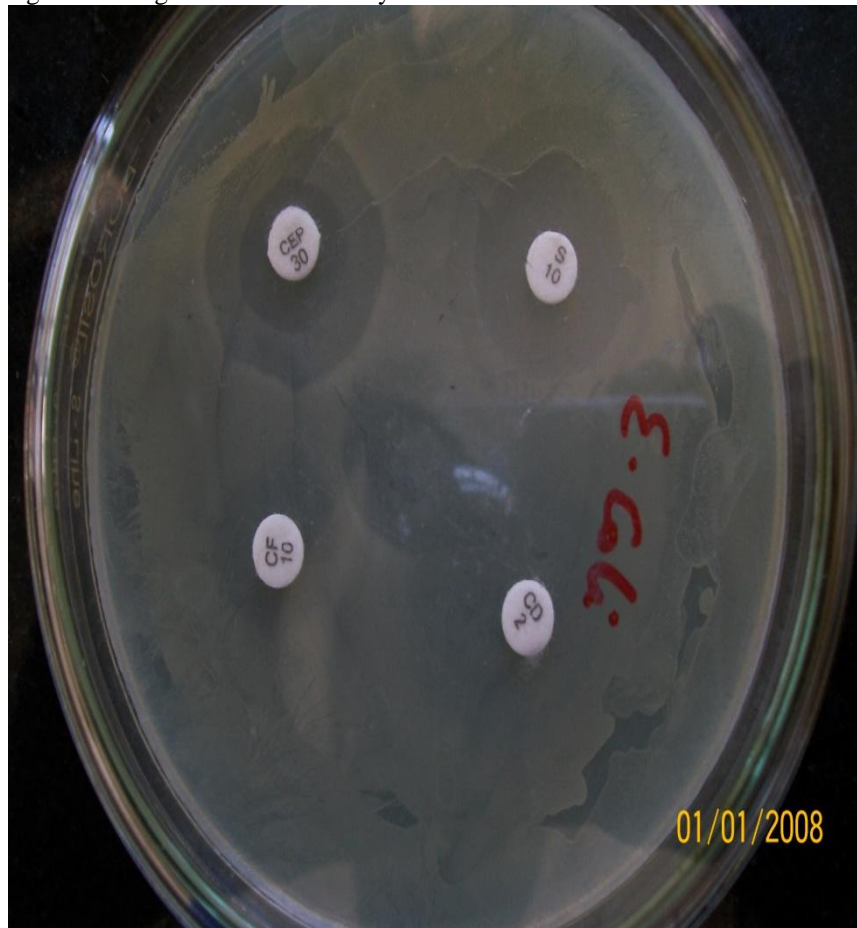


Fig 3. Showing antibiotic sensitivity test of *Salmonella* spp. with different antibiotic discs.



Table 1. Isolation of *Salmonella* spp., *E. coli* and *S.aureus* from different sources of retail meat shops

S. No.	Source	No. of sample tested	No. of isolates			Percentage positive		
			<i>Salmonella</i> spp	<i>E.coli</i>	<i>S.aureus</i>	<i>Salmonella</i> spp.	<i>E.coli</i>	<i>S.aureus</i>
1	Knife	15	0	4	6	0.00	26.67	40.02
2	Scalding tank	15	1	4	5	6.67	26.67	33.33
3	Defeatherer	15	0	5	4	0.00	33.33	26.67
4	Dressing Table	15	3	6	8	20	40.02	53.36
5	Platform	15	0	3	7	0.00	20	46.67
6	Personnel	15	0	02	1	0.00	13.33	6.67
7	Water	15	1	7	8	6.67	46.67	53.36
8	meat	15	3	8	7	20	53.36	46.69
Total		120	8	39	46	6.67	32.5	38.33

Conclusion:-

Present study concluded that the meat from retail meat shops is important sources of bacteria of public health significance i.e. *Salmonella*, *E.coli* and *Staphylococci* in Hyderabad city. Presence of this pathogenic microorganisms indicating there is a need to screening of meat from the retail shops to monitor hygienic conditions (Muleta, and Ashenafi, 2001) Thus, it requires strong controlling system of the personal hygiene and educating food handlers about the basic ideas of processing and producing a safe food. In conclusion, the presence of food pathogens and indicator organisms such as thermo-tolerant *E. coli* in most of the retail shops meat samples shows poor food handling and processing practices. Therefore, meat handlers and sellers should be educated on the adverse effects of lack of proper personal, environmental hygiene and sanitation. In addition, consumers should avoid eating raw and inadequately cooked food.

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