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Phenotypic and genotypic characterization of some toxigenic bacteria isolated from meat and meat products

A Thesis presented by

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7. SUMMARY

Toxigenic bacterial species have been linked to major outbreaks of food poisoning, illness and death all over the world. So, the present study was conducted to throw light over these bacterial species with special reference to *E. coli*, Salmonellae; coagulase positive *S. aureus* and *B. cereus* strains in 250 random samples of fresh meat and meat products viz: Beef burger, kofta; minced meat and sausage (50 for each), were collected from different shops at Kaliobia Governorate.

The results of Food-borne pathogens isolation revealed that, 77 out of 250 samples were positive for isolation (30.8%), where 24 (31.2%) were single pure cultures and 53 (68.8%) were mixed cultures. Moreover, 129 (51.6%) isolates of foodborne pathogens were recovered from 250 samples, where *S. aureus* were the most isolated (41/16.4%) followed by *E. coli* (25 /10.0%); *B. cereus* (21/8.4%); *Enterobacter cloacae* (14/5.6%); *Citrobacter freundii* and *Kl. pneumoniae* (9/3.6% for each); *Proteus vulgaris* (7/2.8%) and Salmonellae (3/1.2%).

The results of *E. coli* isolation cleared that, 25 *E. coli* strains were isolated from minced meat samples (7/14%) followed by kofta (6/12.0%); sausage (5/10.0%); fresh meat (4/8.0%) and beef burger samples (3/6.0%). The serological examination of 25 isolated *E. coli* strains appeared that, seven isolates were typed as O55:H7 (two from each samples of kofta, minced meat and one from each samples fresh meat, beef burger, sausage) ; three O₁₁₁:H₄ (one from each samples of fresh meat, kofta, and minced meat); five O₁₂₅:H₁₈ (two from minced meat; one from each samples of fresh meat; kofta and sausage) ; three O126:H7(one from each samples of kofta; minced meat and sausage) ; two O128:H27 (one from each samples of fresh meat and beef burger); two O142:H2 (one from each samples of beef burger and sausage) beside three

O158:H2 (one from each samples of kofta; minced meat and sausage samples). Moreover, the results of antibiotic sensitivity tests for isolated *E. coli* showed that, they were highly resistant for methicillin followed by oxytetracycline; amoxicillin; ampicillin; streptomycin and erythromycin. But, they were highly sensitive to meropenem followed by norfloxacin; gentamycin; ciprofloxacin and florphenicol.

Meanwhile, the results of *S. aureus* isolation appeared that, 41 strains were isolated mostly from kofta samples (12 / 24.0%) followed by minced meat (9/ 18.0%), sausage, fresh meat (8/16.0% for each) and beef burger samples (4/8.0%). Moreover, the results of antibiotic sensitivity tests for isolated *S. aureus* revealed that, the isolated *S. aureus* were highly resistant for methicillin followed by ampicillin; oxytetracycline; amoxicillin; cefotaxime; streptomycin; doxycycline and erythromycin. Meanwhile, they were highly sensitive to norfloxacin followed by gentamycin; ciprofloxacin and meropenem.

Moreover, the results of *B. cereus* isolation showed that, 21 strains were isolated mostly from kofta (7/14.0%) followed by sausage (6/12.0%); minced meat (4/8.0%); beef burger (3/6.0%) and fresh meat samples (1/2.0%). The results of antibiotic sensitivity tests for isolated *B. cereus* revealed that, they were highly resistant for ampicillin; methicillin followed by oxytetracycline; amoxicillin; erythromycin and cefotaxime. Meanwhile, they were highly sensitive to gentamycin; norfloxacin followed by ciprofloxacin; meropenem and florphenicol.

The PCR results for *E. coli* strains showed that, *stx2* virulence gene was detected in one strain and *vt2e* virulence gene was detected in two out of 6 studied strains, but *stx1* virulence gene was failed to be detected in all studied strains. Meanwhile, PCR results for *S. aureus* strains showed that, enterotoxin *seb* virulence gene was detected in one strain and enterotoxin *sed* virulence gene was detected in 4 out of 5 studied

strains, but enterotoxins *sea*; *sec* and *see* virulence genes were failed to be detected in all studied strains. In addition, the results for *B. cereus* strains cleared that, *nhe*; *cytK* and *ces* enterotoxigenic virulence genes were detected in all three studied strains.

Finally, the results proved that, the isolated *E. coli*; *S. aureus* and *B. cereus* strains are enterotoxigenic ones with multiple antibiotic resistances and they are meat-borne pathogens of public health importance.