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Methicillin Resistant Staphylococcus aureus in Ready to Eat Meat Products

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By

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7- Summary

Contamination of ready to eat (RTE) meat products with *Staphylococci* mainly enterotoxigenic *S. aureus* and MRSA strains constitutes serious problems for consumer's health, therefore, the present study was carried out on 120 random samples of RTE beef products of beef kofta, beef burger, beef shawerma, and beef luncheon (30 of each), collected from different restaurants and street vendors at Benha city, Qalubiya Governorate, for detection the prevalence of *Staphylococci* with special reference to *S. aureus* and MRSA beside the phenotypic characterization of the isolated *S. aureus* strains and genotypic detection of staphylococcal enterotoxins genes and *mecA* virulence gene in them.

I- Bacteriological examinations

The results of bacteriological examination of examined RTE beef products (beef kofta, beef burger, beef shawerma, and beef luncheon) samples revealed that, the mean value of *Staphylococci* and *S. aureus* counts were $3.42x10^3$, 5.2x10 CFU\g for beef kofta with incidences of 73.3, 56.6%, respectively; $2.81x10^3$, 3.2x10 CFU\g for beef burger with incidence of 63.3, 43.3%, respectively; $1.53x10^3$, 2.6x10 CFU\g for beef shawerma with incidence of 50, 36.6%, respectively; and $0.20x10^3$, 1.9x10 CFU\g for beef luncheon samples with incidence of 83.3, 66.6%, respectively; it is worth mentioning that the total incidence of *Staphylococci* and *S. aureus* in examined samples were 67.5, and 50.8%, respectively.

II- In-Vitro antimicrobial resistance examination

The in-vitro anti-microbial susceptibility tests for the isolated *S. aureus* strains revealed that, the isolated *S. aureus* were highly resistant for Methicillin (70.5%) and Oxacillin (70.5%), followed by Nalidixic acid (60.6%); Cefotaxime (55.7%); Ampicillin (50.8%) and Amoxicillin (59.0%). Meanwhile, they were highly sensitive to Norfloxacin (95.1%), followed by Lomefloxacin (88.5%), Gentamycin (77.0%), and Ciprofloxacin (78.6%).

III- Polymerase Chain Reaction detection of some *S. aureus* enterotoxins and MRSA *mecA* genes

Polymerase Chain Reaction (PCR) detection of *S. aureus* enterotoxin producing strains revealed detection of one isolate carrying *SeA* gene, and other carrying *SeB* gene, and one carried both *SeA* and *SeD* genes. Moreover, the PCR results cleared that, the *mecA* gene was detected in two out of eight studied *S. aureus* isolates (25.0%) giving product of 533bp. The two positive strains were isolated from kofta and luncheon samples.

The achieved results in the current study allow concluding that ready to eat beef products were generally may be contaminated with *Staphylococci* especially *S. aureus* due to many causes mainly bad hygiene and post cooking contamination. Furthermore, the examined beef kofta was the most contaminated samples followed by burger, shawerma and luncheon samples; in addition, detection of multi-drug resistant *S. aureus*, entero-toxigenic isolates, and MRSA strains declared the poor hygienic conditions and mishandling occurred during production and serving processes, and possesses them as products of public health hazards.

Finally, the present study proved that meat products are considered of public health hazard due to presence of *Staphylococci* mainly enterotoxigenic *S. aureus* and MRSA strains; this may be referred to mishandling and the negligence of hygienic aspects either at production levels where most workers did not have medical certificates or selling of meat with expired dates. Moreover, the hygienic measures are suggested for obtaining meat and meat products with controlled bacterial pathogens to be fit for human consumption.