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Probable Hazards of Some Meat Products.

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❖ 7. SUMMARY

- A total of 120 random samples of meat products that were collected from different supermarkets and shops in Benha City (kalubia governorate) . The collected samples were differentiated into two groups of famous(well known) and Non famous(unknown) trade names samples in which each group represented by samples of minced meat, beef burger, sausage and luncheon (15 of each).
- The collected samples were subjected to bacteriological and chemical examination for determination of the hazards which are associated with the consumption of such products according to presence of some pathogenic bacteria (*B.cereus* and *S.aureus*), heavy metals residues (as lead and cadmium) and residual nitrite levels.
- The obtained results indicated that *B.cereus* were isolated from the examined samples of famous & Non famous trade names meat products with an incidences of 13.3%& 26.7%(with a mean values of $5.26\times10^{2}\pm 0.81\times10^{2}$ &$9.95\times10^{2}\pm 2.04\times10^{2}$ (cfu/g)) from minced meat, 33.3% & 53.3% (with a mean values of $2.19\times10^{3}\pm 0.43\times10^{3}$&$4.21\times10^{3}\pm 0.59\times10^{3}$(cfu/g)) from beef burger, 46.7% &60% (with a mean values of $8.47\times10^{3}\pm 1.79\times10^{3}$&$1.83\times10^{4}\pm 0.36\times10^{4}$ (cfu/g)) from sausage and 26.7% & 33.3% (with a mean values of $1.09\times10^{3}\pm 0.25\times10^{3}$ & $2.62\times10^{3}\pm 0.41\times10^{3}$ (cfu/g))from luncheon. Generally with inattentive to the type of the product, *B.cereus* could be isolated at percentage of 30% from samples of famous trade names and 43.3% from samples of Non famous trade names. The differences associated with the examined samples of meat products were highly significant($p<0.01$) as a result of brand or product type.

- Also, the mean values of Staphylococci counts /g in minced meat, beef burger, sausage and luncheon from the examined famous& Non famous trade names samples were $1.21\times10^3\pm 0.18\times10^3$, $5.14\times10^3\pm 0.76\times10^3$,$1.86\times10^4\pm 0.31\times10^4$ and $2.57\times10^3\pm 0.42\times10^3$ (cfu/g) & $2.63\times10^3\pm 0.35\times10^3$, $8.32\times10^3\pm 1.61\times10^3$,$3.75\times10^4\pm 0.82\times10^4$ and $6.96\times10^3\pm 1.07\times10^3$ (cfu/g), respectively. Moreover, *S.aureus* were isolated from the examined samples of famous trade names minced meat, beef burger, sausage and luncheon with an incidence of 20% (with a mean value of($7.12\times10^2\pm 1.15\times10^2$ cfu/g), 46.7% (with a mean value of $3.96\times10^3\pm 0.63\times10^3$), 53.3%(with a mean value of$9.35\times10^3\pm2.10\times 10^3$ cfu/g) *and* 33.3% (with a mean value of$1.48\times10^3\pm 0.31\times10^3$ cfu/g).
- Furthermore, *S.aureus* were isolated from the examined samples of Non famous trade names minced meat, beef burger, sausage and luncheon with an incidence of 33.3% (with a mean value of $1.53\times10^3\pm 0.28\times10^2$ cfu/g), 66.7% (with a mean value of $5.77\times10^3\pm 0.92\times10^3$ cfu/g) 80% (with a mean value of $2.69\times10^4\pm 0.56\times10^4$ cfu/g) and 46.7% (with a mean value of $4.05\times10^3\pm 0.79\times10^3$ cfu/g).
- In general, 38.3% (23samples) of the examined famous trade names samples and 56.7% (34- samples) of the examined Non famous trade names samples were unaccepted based on their contamination with *Staph.aureus* according to ES.
- Moreover, the antimicrobial susceptibility test was applied on 16 isolated *B.cereus* and *Staphylococcus aureus* strains and the results revealed that *B.cereus* strains were susceptible to , Amikacin, Gentamicin, Doxycycline and Ciprofloxacin ; while *Staphylococcus aureus* strains were mostly susceptible to Oxacillin, Amikacin and Ampicillin.The results also

revealed that all the examined strains of *B.cereus* were resistant to Kanamycin (100%) and Sulphamethoxazol (93.7%), while all the examined *Staphylococcus aureus* isolates were resistant to Nalidixic acid & Kanamycin (100%) , Cephalothin (87.5% and Penicillin (81.3%).

- The multiplex PCR technique was used for detection of the toxin producing genes of *B.cereus* and *Staphylococcus aureus*. In which the occurrence of enterotoxin genes (*hbl*C and *cyt*K genes) of *B.cereus* was determined in 16 isolated strains (4 from each meat product), the results indicated that out of the examined selected 16 *B.cereus* isolates 11 strains (68.75%)were contain *both hbl*C &*cyt*K genes. Meanwhile, 4strains(25%) were positive to only *cytK* gene and only one strain (6.25%)was carry *hblC* gene.
- Also, 16 obtained isolates of *S.aureus* were examined for the presence of enterotoxins with specific primers for SEA, SEB, SEC and SED genes and the results revealed that 6 strains (37.5%) were toxin producing and the most detected enterotoxin gene in the examined strains was SEA was detected in 2 isolates (12.5%),while each of SEB, SEC and SED was detected in only 1 isolate (6.25%) and also SEA&SEC were present in only one isolate. Although , 10 strains were negative for the 4 examined enterotoxin producing genes.
- In addition, heavy metals investigation of the examined meat products samples for detection of Lead and Cadmium levels revealed that the average of lead levels (mg/kg) in the examined samples of famous & Non famous trade names minced meat, beef burger, sausage and luncheon were 0.06 ± 0.01 & 0.08 ± 0.01 ; 0.11 ± 0.01 & 0.14 ± 0.01 ; 0.16 ± 0.01 & 0.22 ± 0.01 and 0.23 ± 0.01 &0.27 ± 0.01 , respectivelly. Also, the

detectable samples above the permicible limit stipulted by EOS were 5 samples (8.3%) and 12 samples (20%) from all of the examined famous and Non famous trade names meat products.

- Meanwhile, the mean values of Cadmium levels (mg/kg) in the examined famous & Non famous trade names meat products samples were 0.03 ± 0.01 & 0.06 ± 0.01for minced meat samples ; 0.07 ± 0.01 & 0.10 ± 0.01 for beef burger samples ; 0.12 ± 0.01 & 0.14 ± 0.01 for sausage and 0.15 ± 0.01 & 0.19 ± 0.01 for luncheon. Moreover 6.7% &15% of the examined famous & Non famous trade names meat products were above the permissible limits stipulated by EOS.
- Concerning to the mean values of nitrite levels (ppm) in the examined famous trade names and Non famous trade names meat products samples were 62.07 ± 2.51 & 81.73 ± 3.12 for the examined luncheon samples ; 27.59 ± 1.65 & 63.25 ± 2.66 for the examined sausage samples and 39.81 ± 2.24 & 76.46 ± 2.80 for the examined beef burger samples. Meanwhile , nitrite was not detected in all of the examined minced meat samples either famous or Non famous trade names meat products samples. Depending on the MPL of nitrite levels stipulated by EOS all of the examined samples of famous trade names meat products were accepted except only one luncheon sample (1.7%) was unaccepted , meanwhile 9 samples (15%) of the examined Non famous trade names meat products were unaccepted (represented by 4-luncheon, 3- burger and 2-sausage samples).
- Finally, the risk of consumption of such meat products , the public health hazards of the isolated microorganisms also the dangers of heavy metals residues and high nitrite levels , and also the possible sources of contamination were discussed. In addition to some recommendations of

the needed hygienic measures which were suggested to avoid the contaminations of such foods to improve their quality and safety for sake of consumers.