



Monitoring of some food poisoning microorganisms in dairy and egg based desserts

Thesis

presented by

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SUMMARY

In the present study, a total of 250 random samples of dairy and egg-based desserts were collected from different confectionary, dairy shops and retailers in Assiut city, Egypt. The samples were represented as rice pudding (rice with milk), pudding (Mehalabia), ice cream, cream caramel and cream cakes (Gâteau). The samples were examined for the presence of some food poisoning microorganisms including *Staph. aureus*, *B. cereus*, *Sal. typhimurium* and *E. coli* O157:H7. Staphylococcal enterotoxins were also detected by Reverse Passive Latex Agglutination technique "RPLA". Detection of *ces* gene which mediates production of cereulide, the emetic toxin of *B. cereus*, was also performed. Moreover, *in vitro* and *in vivo* studies to determine the antimicrobial effects of the cinnamon and ginger essential oils against isolated bacteria were done.

Part - I: Microbiological examination of the dairy and egg-based dessert samples

1- Incidence and count of *Staph. aureus*:

Staph. aureus was existed in 26%, 20%, 28%, 20% and 36% with a mean of 5.6×10^5 , 1×10^5 , 1.3×10^3 , 3.7×10^3 and 5.5×10^4 cfu/g in rice pudding, pudding, ice cream, cream caramel and cream cakes samples, respectively. The classical enterotoxin type A was found in 2 pudding samples, type C was found in 1 rice pudding and 1 cream cake samples and 1 pudding sample had both types A & D.

2- Incidence and count of *B. cereus*:

B. cereus could be detected in 40%, 22%, 6%, 16% and 12% with a mean of 1.9×10^4 , 1.1×10^3 , 6.6×10 , 1.8×10^3 and 2.8×10^4 in rice pudding, pudding, ice cream, cream caramel and cream cakes samples, respectively. The *ces* gene was existed in 2 rice pudding samples, 1 ice cream sample, 1 cream caramel sample and 2 cream cake samples.

3- Incidence of *Salmonella* spp.:

Salmonella spp. could be detected in 10%, 6%, 12%, and 10% in rice pudding, pudding, ice cream and cream cake samples. No *Salmonella* spp. could be detected in the examined cream caramel samples. The detected *Salmonella* serotypes were *Sal. typhimurium* (6 samples), *Sal. enteritidis* (4 samples), *Sal. tsevie* (3 samples), *Sal. Haifa* (1 samples), *Sal. infantis* (2 samples), *Sal. Virchow* (1 samples), *Sal. malade* (1 samples) and *Sal. tamale* (1 samples).

4- Incidence of *E. coli* O157:H7:

E. coli was found in 10%, 16%, 14%, 6% and 6% of rice pudding, pudding, ice cream, cream caramel and cream cakes samples, respectively. *E. coli* O157:H7 could be detected in 4% of pudding, 2% of ice cream and 2% of cream caramel samples. *E. coli* O157:H7 could not be detected in the examined rice pudding and cream cake samples.

Part-II: Experimental part

1- In vitro study

In this part, broth dilution method was adopted to determine the minimum inhibitory (MIC) and minimum lethal (MLC) concentrations of cinnamon and ginger essential oils on isolated *Staph. aureus*, *B. cereus*, *Sal. typhimurium* and *E.*

coli O157:H7. The MIC and MLC for the cinnamon essential oil against *Staph. aureus*, *B. cereus*, *Sal. typhimurium* and *E. coli* O157:H7 were 0.25% and 0.5%, 0.5% and 1%, 0.125% and 0.25%, and 0.25 and 0.5%, respectively. The MIC and MLC for ginger essential oil against *Staph. aureus* were 1% and 2% and against *B. cereus*, *Sal. Typhimurium* and *E. coli* O157:H7 were 2% and 4%.

2- In vivo study

In this part, the effect of 2 MIC, 1 MIC and 0.5 MIC of cinnamon essential oil was examined on the survival of *Staph. aureus*, *B. cereus*, *Sal. typhimurium* and *E. coli* O157:H7 that isolated from the current work after inoculation in prepared rice pudding. In which, the count of inoculated bacteria was evaluated after 0 h, 24 h, 48 h, 72 h and 96 h for each concentration after inoculation. The observable results revealed that 2 MIC of cinnamon essential oil could inhibit the survival of all inoculated bacteria in a shorter time than 1 MIC concentration. The concentration of 0.5 MIC was seen to gradually reduce the survival of all inoculated bacteria from 24 to 96 h.