Detection of food poisoning bacteria in some semi-cooked chicken meat products marketed at Qaliubiya governorate

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ARTICLE INFO

ABSTRACT

Ninety random samples of semi cooked chicken meat products represented by strip; pane and nuggets (30 of each) were collected from different supermarkets at Qaliubiya governorate for bacteriological examination. The mean values of Aerobic plate count, Enterobacteriaceae count and Staphylococcus count were $4.9 \times 10^4 \pm 1.2 \times 10^4$, $3.1 \times 10^2 \pm 8.2 \times 10^2$ and $1.5 \times 10^2 \pm 7.1 \times 10^2$ cfu/g for chicken strips; $8.4 \times 10^4 \pm 3.3 \times 10^4$, $8.9 \times 10^2 \pm 5.6 \times 10^2$ and $4.5 \times 10^3$ cfu/g for chicken pane; and $7.46 \times 10^4 \pm 1.7 \times 10^4$, $1.2 \times 10^2 \pm 2.1 \times 10$ and $7.2 \times 10^3 \pm 2.3 \times 10^3$ cfu/g for chicken nuggets. Moreover, the incidence of *S. enteritidis* was 6.6% for chicken strips and not detected in pane and nuggets. *Staph. aureus* incidence was 20%, 26.6% and 26.6% for chicken strips, pane and nuggets for total examined samples by using conventional culture method. For more confirmation, identification of *Staph. aureus* from 5 random samples by Vitek 2 compact system was applied. Results recorded was identical to that of culture method with accuracy 100% for examined chicken products samples and showed that the Vitek 2 system is a suitable tool for rapid and direct identification of gram positive cocci as an ideal detection system should include high specificity and sensitivity; fast response time; capability for mass production; simplification of sample preparation steps; minimal perturbation of sample; and providing continuous data analysis as that obtained by the Vitek 2 compact system.

1. INTRODUCTION

In recent years, chicken meat products are considered one of the most products which attract the consumers because they represent quick, easily prepared meat meals with high health benefits and good flavor. Bacterial contamination is possible at any stage of production. Also, chicken meat products consider a favorable environments for the survival and transmission of microorganisms in the human food chain especially *Staph. aureus* and *Salmonella* (Olimpia et al., 2006).

Staphylococcal food poisoning is of major concern in public health programs worldwide. As *Staph. aureus* is a leading cause of gastroenteritis resulting from consumption of products in which enterotoxigenic Staphylococci have grown and produced enterotoxins (Bhatia and Zahoor, 2007). *Salmonella* cause illness by means of infection, as it multiplies in the intestine, colonizes and subsequently invades the intestinal tissues, producing an enterotoxin and causing inflammatory reaction and diarrhea (ICMSF, 2006).

Aim of this study is through the light on role of *Salmonella* and *Staph. aureus* as food poisoning microorganisms in semi cooked chicken meat products.

2. MATERIAL AND METHODS

2.1. Collection of samples:

Ninety random samples of semi cooked chicken meat products represented by chicken strips, pane and nuggets (30 of each) were collected from different supermarkets at Qaliubiya governorate. The collected samples were kept in a separate sterile plastic bag and preserved in an insulated ice box then transferred directly to the laboratory.

2.2. Preparation of samples according to (APHA, 2001).

2.3. Determination of Aerobic plate count (ICMSF, 1996).

2.4 Determination of total Enterobacteriaceae count (ISO, 2004).

2.5. Determination of Staphylococcal count (FDA, 2001).

2.6 Isolation and identification of *Salmonella* (ISO, 2002)

2.7 Isolation and identification of *Staph. aureus* (ICMSF, 1996), and using of confirmatory identification of *Staph. aureus* by using Vitek 2 compact system technique (Pincus, 2006).

3. RESULTS

It is evident from the result recorded in table 1 that the mean value of APC were $4.9 \times 10^4 \pm 1.2 \times 10^4$ cfu/g for strips.
It is evident from the result recorded in table [1] that the APC in chicken pane showed more contaminated rather than other products. This high bacterial count may be attributed to difference of ingredients and steps in their formulation and preparation also, the hygienic status of raw materials and worker’s hands.

Nearly similar results were obtained by Younes (2014) and Abdallah (2018). Furthermore, this results disagreed with those of Arab (2010); Edris (2015) and Shaltout et al. (2018) who recorded higher counts but Sobieh (2014) and Raphael (2014) were obtained lower results. The variation of this result is due to the difference in hygienic measures management during different processing stages.

Table 2 recorded the Enterobacteriaceae count that nearly similar to results were obtained by Younes (2014) and Shakran (2014) and lower than that obtained by Nawar (2007), Edris (2018) and Shaltout et al. (2018).

Presence of considerable numbers of Enterobacteriaceae with high results in pane samples of semi cooked products indicates inadequate processing and/or post processing contamination, most probably workers, dirty instrument, surfaces or from raw food before processing Total Enterobacteriaceae can be applied to monitor the hygienic level during handling, preparation, storage condition of chicken products.

The obtained results in table 3 revealed that pane and nuggets samples showed more contamination rather than strips that may indicate improper hygiene practices during processing, transportation and storage. These results came in agreement with Ali (2011); Edris (2015) and Shaltout et al. (2018) and lower than that obtained by Amin (2015) and Arab (2010) but higher than that obtained by Shakran (2014) and El-Kholy (2019). Pane and nuggets samples showed more contamination with Staphylococcus, most of outbreaks result of contamination of food from food handlers; Staphylococcus can be carried on hands, nasal passage or throat, and production of heat stable toxin in food is the major public health threat; So sanitary food handling and proper cooking and refrigerating should prevent Staphylococcus food poisoning (FSIS, 2003).

Tables 4 revealed that the incidence of Staph. aureus in examined samples. These results came in accordance with those obtained by Atia (2017) and El-Kholy (2018). Arab (2010) of pane; while, these results were disagreed with Abou-El Roos (2010); Amin (2015), and Shaltout et al., (2018) with higher incidence. Also, it was disagreed with Shaltout et al. (2002), Olimpia (2006) and Edris (2015) who isolated Staph. aureus with lower incidence. But Shanab (2014) failed to detect Staph. aureus in examined samples.

The presence of Staph. aureus in heat treated food may be due to its contamination from food handlers, inadequate cleaned equipment or post processing contamination.

Also, the prevalence of Salmonella in examined samples of chicken strips was 6.6% of all examined samples and negative results were recorded in chicken pane and nuggets.88 samples out of 90 samples were accepted as they free from Salmonella isolates according to EOS (2005).Moreover, the isolated serotype of Salmonella was S.entritides. The presence of Salmonella indicates faulty slaughter techniques, lack of hygiene and sanitary measures. S. entretidis was isolated from heat treated semi cooked chicken strips by Shaltout et al., (2018) and Sharaf (2018) and failed to isolated from chicken pane by Arab

Low incidence rate may be due to the fact that Salmonella kill at 72°C to 83°C. So cooking thoroughly is effective route to avoid food poisoning.

Table 5 showed the using of confirmatory identification to 5 isolates of Staph. aureus from examined samples by using Vitek 2 compact system. The results appear 100% accuracy and were rapid and accurate method for identification. This result came in accordance with Spanue et al.(2003) and Millesia et al.,(2017). Also, Khalaf – Fatma (2019) said that vitez 2 compact systems showed accurate and rapid method for bacterial identification, she identified Staph. aureus from chicken pane with ratio (50%).

| Table 5 Identification of Staph. aureus by using recent biochemical technique (Vitek2 compact system) |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Biochemical Details            | AMY | PIPLC | dYTL | ADH1 | BGA | AGLU |
| 2 | 14 | - | 5 | - | 8 | 9 |
| 13 | APPA | - | 14 | CDEX | - | 15 | AQa |
| 20 | LeUA | 23 | - | - | 24 | BGER |
| 28 | Ala | - | - | 30 | dSOR | 31 | URE |
| 38 | dRib | 39 | dLAT | 42 | LAC | - | 44 |
| 57 | dRF | 58 | O129R | 59 | SAL | 60 | SAc |

5. CONCLUSION

The presence of some food poisoning bacteria as S. enteritis and Staph. aureus that considered objectionable, not only as they render the product of inferior quality and unfit for consumption but also, is considered a reliable index of using of contaminated ingredients and improper handling during production, storage and distribution. So strict hygienic measures must be applied in all stages of production specially during cold storage and handling.

Vitek 2 compact system is a good, rapid and accurate method for identification of food poisoning bacteria.

6. REFERENCES

22. Olimpia, P.;Giuseppe,B.; Marlena, A.; Maria, A. and


