

BACTERIAL QUALITY OF READY TO EAT MEALS IN AIR CATERING

BY

N.A. YASSIEN* AND H.A. EL-ESSAWY**

Dept. of Food Hygiene, Faculty of Vet. Med.
Cairo University, Giza, Egypt.

(Received: 16.12. 1989).

INTRODUCTION

Food produced from animal sources needs special care because of its great role played in transmission of the food borne infections. Eggs and meat meal are considered as a main reservoir for a variety of zoonotic diseases rather than there are different diseases transmitted from man to man through the contamination of different types of foods during preparation, distribution and storage of meals.

Catering is one of the food serving establishments supplying the aircrafts with the different types of meals. Eggs and meat are considered as the main constituents of such meals given to passengers, therefore its contamination with food poisoning organisms constitutes a public health hazard to consumers particularly passengers and crew (Kunstler & Ahlert, 1980; WHO, 1983; Dawarakanth & Murthy, 1984 and Hassan, 1986).

Prepared meals in air catering plants should be therefore subjected to strict hygienic measures to ensure the food safety. This required the used of sound food materials, clean and sterile equipment, clean and hygienic stores as well as good health of the food preparing employees to produce meals of good keeping quality and free from hazard to human health (Gork, 1985).

*Bacterial Quality of Ready to EAT meals in AIR....***MATERIALS AND METHODS****1. Sample collection:**

Forty samples, 20 each of dish one & dish two were collected from a large catering plant in Cairo. The 1st dish contained poached eggs, potato, grilled tomato and Scalope of veal grilled, while the 2nd one contained french omelette with vegetables & grilled chicken Fig. (1).

2. Experimental:

Samples were prepared according to the technique recommended by ICMSF (1978) as follows:

10 gm of the sample were weighed into a sterile polyethylene bag, then 90 ml of ringer solution were added and the bag was placed into the stomacher (Lab. Blender 400). The machine was operated for one minute. The bag was then shaken vigorously before the following techniques were applied:

1. Aerobic plate count: This was carried out by the drop plate method recommended by ICMSF (1978).
2. Total Enterobacteriaceae count. The drop plate method recommended by Gork (1976) was applied using crystal violet bile glucose agar.
3. Enumeration of Staphylococci using Baird-parker medium as well as isolation and biochemical identification of isolates according to Finegold and Martin, 1982.
4. Most probable number of coliforms. The Technique recommended by ICMSF, 1978 was applied.
5. Detection of Salmonellae: The recommended method by Harvey & Price (1981) was applied.

RESULTS

Table (1): Bacterial quality of ready to eat meals in air catering

| | A.P.C. | | Enterobacteriaceae count | | Coliforms MPN | | Staphylococci count | |
|------------------|-----------------|-----------------|--------------------------|-----------------|-----------------|------------------|---------------------|-----------------|
| | A | B | A | B | A | B | A | B |
| Minimum | 2×10^2 | 2×10^2 | 2×10^2 | 2×10^2 | 3 | 3 | 10 | 10 |
| Maximum | 10^5 | 8×10^5 | 10^4 | 2×10^5 | 9×10^3 | 11×10^4 | 10^5 | 4×10^5 |
| Mean | 3×10^4 | 6×10^5 | 6×10^3 | 5×10^4 | 6×10^2 | 9×10^3 | 10^4 | 7×10^4 |
| S.E. \bar{M} . | 8×10^3 | 2×10^5 | 2×10^3 | 10^4 | 4×10^2 | 6×10^3 | 6×10^3 | 3×10^4 |
| \pm | | | | | | | | |

Table (2): Incidence of isolated coliforms from examined samples

| Isolats | No. of samples | % |
|-------------------------|----------------|------|
| Enterobacter cloacae | 5 | 12.5 |
| Klebsiella aerogenes | 4 | 10.0 |
| Providencia spp. | 4 | 10.0 |
| Klebsiella oxytoca | 3 | 7.5 |
| Citrobacter freundii | 3 | 7.5 |
| Enterobacter aerogenes | 2 | 5.0 |
| Klebsiella edwardsii V. | 2 | 5.0 |

N.A. Yassien and H.A. El-Essawy.

Table (3): Incidence of isolated staphylococci from examined samples.

| Isolats | No. of samples | % |
|--------------------|----------------|-----|
| Staph. aureus | 3 | 7.5 |
| Staph. epidermidis | 12 | 30 |
| Micrococci | 10 | 25 |

DISCUSSION

The results reported here-in indicated that the mean aerobic count was 3×10^4 and 6×10^5 of dish A and B respectively, while enterobacteriaceae, the mean count was 6×10^3 and 5×10^4 in examined samples of dish A and B. Comparatively higher counts were reported by Hassan (1986).

It is evident from Table (1) that the mean MPN of Coliforms were 6×10^2 and 9×10^3 /gm for each dish A and B respectively. The comparatively higher counts reported by El-Daly (1986) may be attributed to insanitary conditions of handling, while lower counts revealed in this work may be due to the advanced techniques of hygiene in cleaning and disinfection of food contact surfaces.

The importance of coliforms in food serving establishment is due to the fact that their presence in meals is frequently a reliable indication of faulty methods of preparation, handling and plant mangement. Moreover, such contaminated meals may suffer from undesirable changes rendering them of inferior quality or even unfit for human consumption thus causing economic losses. In addition contamination of such meals with the pathogenic serotypes of E.coli may

Bacterial Quality of Ready to EAT meals in AIR....

constitute a public health hazard to consumers (Libby, 1975 and Miskimin et al. 1976).

Results presented in Table (2) show that *Enterobacter cloacae*, *Klebsiella aerogenes*, *Providencia* spp., *Klebsiella oxytoca*, *Citrobacter freundii*, *Enterobacter aerogenes* and *Klebsiella edwardsii* could be isolated from 12.5%, 10%, 10%, 7.5%, 7.5%, 5% and 5% of the examined samples respectively.

The isolated microorganisms seems to be implicated in food-illness. *K. aerogenes* was implicated in urinary tract infections (Abd-El-Aziz, 1973). *Providencia* spp. are not highly pathogenic but they have been incriminated in sporadic cases of human diarrhoea and in urinary tract infections (Bailey and Scott, 1974). Certain members of *Citrobacter freundii* have been found among intestinal, urinary and other pyogenic infections (Krieg & Holt, 1984).

From the aforementioned results it is evident that the mean count of staphylococci were 10^4 and 7×10^4 in examined samples of dish A and B respectively. Higher count were recorded by Guerin et al., 1980; WHO, 1983 and Dawarkanth and Murthy, 1984.

Results given in Table (3) revealed that *Staph. aureus*, *Staph. epidermidis* and *Micrococci* were present in 7.5%, 30% and 25% of examined samples. Only biochemical identification was applied for isolated organisms. It is worth mentioning that the first organism could be detected in dishes containing French omelette. Nearly similar incidence were reported by Mathes and Hanschke, (1977) and El-Said, (1985).

The most important concern in airline catering is the food safety and wholesomeness. To maintain the physical and chemical characteristics of the products i.e. food quality assurance, it is important to follow the suggestive measures.

Laboratory controls in air catering establishment are absolutely necessary in order to define early the risk areas in the production process by containing control of the various steps of production.

Raw meat and poultry should be obtained from safe sources, officially inspected and approved. Frozen meat and poultry should be properly transported to thawing room where temperature should not exceed 10°C.

Cross contamination during processing of meat specially if the production lines for the preparation of air catering meals particularly of cold dishes should be avoided.

Heating process has to be carried out so thoroughly that the core temperature of meat reaches at least 80°C for a minimum of 3 minutes.

Proper cleaning of hands should be made. Manually operated hand washing facilities should be avoided. Disposal gloves should be introduced.

The maintenance of an effective cold storage chain is of at most importance. The refrigeration temperature of around 4°C should be always maintained.

Basic measures to safeguard acceptable personal hygiene should be recommended as periodic check up, proper sanitary facilities, proper work clothes and efficient hygiene training and checks.

In large catering plant, there should be a clean up crew with a foreman for daily inspection of the equipment and processing areas, at the start of the day's operation to ensure that an adequate cleaning and sanitary job has been fulfilled.

Bacterial Quality of Ready to EAT meals in AIR....

Educational programmes should be imposed for processors and handlers to improve the quality of the products and to ensure a maximum of safety to passengers.

SUMMARY

Bacteriological investigations of forty samples, 20 each of dish A and dish B obtained from a large catering palnt in Cairo were conducted.

Aerobic plate count, Total enterobacteriaceae count, Staphylococci count and MPN of Coliforms as well as presence of salmonella organisms were investigated.

Salmonella organisms could not be detected. The public health significance of isolated microorganisms as well as suggestive measures for production, handling and storage of meals in air catering premises were discussed.

REFERENCES

1. Abdel-Aziz, A. (1973): Medical microbiology, Faculty of Medicine, Cairo University. Sherif Press, Cairo.
2. Bailey, W.R. and Scott, E.G. (1974): Diagnostic microbiology, A text book for the isolation and identification of pathogenic microorganisms, 4th Ed. The C.V. Mosby Comp., Saint Louis.
3. Dawarakanth, C.T. and Murthy, V.S. (1984): Biochemical activity of staphyococci isolated during bacteriological survey of catering establishments. J. Food Sci. and Technol. 21, 1.

N.A. Yassien and H.A. El-Essawy.

- 4 . El-Daly, E. (1986): Prevalence of E.coli in a food serving establishment Zagazic Vet. J., 13, 90.
- 5 . El-Said, M. (1985): Food poisoning organisms in milk and some dairy products in Zagazig. Ph. D. Thesis. Fac. Vet. Med. Zagazig Univ.
- 6 . Finegold, S.M. and Martin, W.J. (1982): Baily and Scotts Diagnostic Microbiology. 6th Ed. C.V. Mosby, Co. St. Louis. Toronto. London.
- 7 . Gork, F.P. (1976): Uber die versachen von qualita-tsmangeln bei tiefgeforenen Fertiggerichtan auf fleisch basis in der fluggastverpflegung Doktor-Ingenieur-Dissertation TU Berlin.
- 8 . Gork, F.P. (1985): Personal hygiene, abasic requirment for hygiene production. LSG safe food in airline catering Feb. 13/14th 1985, Frankfurt, Germany.
- 9 . Guerin, M.; Luquet, F.; Goussault, B. and Billaux, F. (1980): Food borne intoxications in mass catering, 4 years survey. Proceeding of World Congress of Food borne infections and intoxications, Berlin (West), 29.6-3.7. 1980 Pub. by Inst. of Vet. Med. Berlin (West), Germany.
10. Harvey, R.W. and Price, T.H. (1981): Comparision of selenite F., Muller Kauffmann tetrathionate and Rappaport's medium for salmonella isolation from chicken giblets and after pre-enrichment in buffered peptone water. J. Hyg. Cam., 87, 219.
11. Hassan, A. (1986): Microbiological quality of ready to eat meat meals in air catering. M.V.Sc. Fac. of Vet. Med. Cairo University.
12. International Committee of Microbiological Specification for Foods (1978): Microorganisms in Foods I Univ. of Toronto, Press, Toronto and Buffalo, Canada.

Bacterial Quality of Ready to EAT meals in AIR....

13. Krieg, N.R. and Holt, J.G. (1984): Manual of systematic bacteriology Vol. I Williams and Wilkins. Baltimore, U.S.A.
14. Kunstler, M. and Ahlert, B. (1980): Air borne microorganisms in kitchen for mass catering. Proceeding of World Congress of Food borne infections and intoxications, Berlin (West) 29.6-2.7. 1980 Pub. by Inst. of Vet. Med., Berlin (West).
15. Libby, J.A. (1975): meat hygiene 4th Ed. LEN and Febiger, Philadelphia.
16. Mathes, S. and Hanschke, J. (1977): Experimentelle Unter-Suchungen Zur Ubertragung Von Bakterien Uber das Huhnerel Berl. munch Tierarztl Wshr. 90, 200-203 (Cited after Mayes and Takeballi, 1983).
17. Mayes, F.J. and Takeballi, M.A. (1983): Microbial contamination of the hen's eggs. Areview J. Food Protect. 46, 12, 1092-1098.
18. Miskimin, D.; Berkowitz, K.; Solbery, M.; Riha, W.F., Franke, J.; Buchanan, R. and O'leary, V. (1976): Relationships between indicator organisms and specific pathogens in potentially hazardous food. J. Food Sci., 41, 1001.
19. WHO (1983): Mass catering W.H.O. Regional office for Europe, Copenhagen. W.H.O. Regional publications, Europe, Series No. 15.