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QUALITY EVALUATION OF READY TO EAT POULTRY IN ASSIUT CITY

(With 2 Tables)

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تقييم الحالة الصحية للدواجن المعدة للإستهلاك في مدينة أسيوط

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تعتبر لحوم الدواجن مصدراً هاماً للبروتين الحيواني في مصر وذلك لسد حاجة المستهلك منه وحيث أنها عرضة للتلوث بالميكروبات المختلفة أثناء ذبحها وتجهيزها مما يؤدى إلى فسادها أو إلى حالات التسمم الغذائي لذا فقد أجرى البحث على ثلاثين عينة من الدواجن المعدة للإستهلاك الآدمي جمعت عشوائياً من مطاعم مدينة أسيوط لتحديد حالتها الصحية ومدى تلوثها بالميكروبات الممرضة . بين الفحص الميكروبيولوجي للعينات أن العدد الكلي للميكروبات بتراوح مابين ٢×١٠^{٣} إلى ١٩×٩٠ ميكروب في الجرام أما العدد الكلي للميكروبات المعوية ، المكور العنقودى الذهبى وكذا الميكروبات السبحية المعوية فكان يتراوح مابين (١ إلى ١٠^{٣} ، ١٠ إلى ٥×١٠^{٢} ، ١٠^{٢} إلى ٧×١٠^{٣} بمتوسطات ١٠^{٣} ، ١٠^{٢} ، ٣٦ر٣×١٠^{٢} ميكروب في الجرام على التوالى . تم عزل ميكروبات الايشاريشياكولاى ، العنقودى الذهبى ، الاستربت فيكاليس ، الكلوستريديم بيرفيرنجز واليرسينيا انتيروكولوتيكا حيث كان ١٠٪ ، ٢٠٪ ، ١٦ر٦٧٪ ، ١٠٪ ، ٦ر٦٧٪ من العينات التى تم فحصها موجبة لهذه الميكروبات على التوالى . كما دلت النتائج على عدم وجود ميكروبى الكامبيلوباكتر جيوجيناى والسالمونيلا في جميع العينات التى تم فحصها ولقد تم مناقشة النتائج وأهمية الميكروبات التى تم عزلها للحفاظ على صحة المستهلك .

SUMMARY

Thirty random samples of ready to eat poultry were collected under sterile conditions from different food service establishments and restaurants in Assiut City where they were assayed for their microbial quality. The mean values of aerobic plate count, enterobacteriaceae count, staphylococci count and enterococci count were $7.1x10^4$, 10^2, 10^2 and $3.26x10^2$ colony forming funit (CFU)/gm respectively. Out of 30 examined poultry samples 10%, 20%, 16.67%, 10% and 6.67% were positive for E.coli, Staph aureus, Strept. faecalis, Clostridium perfringens and Yersinia enterocolitica respectively. Salmonellae and Campylobacter failed to be detected in the examined samples. Significance of the isolated organisms as well as suggestive hygienic measures for handling, preparation and storage of ready to eat poultry were discussed.

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INTRODUCTION

Eviscerated, ready to cook poulry carcases often contain small numbers of pathogens such as Salmonella, Staphylococcus aureus, Clostridium perfringens, Campylobacter fetus susp. jejuni, and Yersinia enterocolitica. these organisms enter processing plants with live poultry and are spread to carcase surfaces during processing. However, the presence of pathogens in ready to cook carcases can lead to health hazards if the product is mishandled in a plant, food service establishment, or in the home (BRYAN and MCKINLEY, 1974 and BRYAN, 1980).

The microbiology of cooked meats and poultry begins with the raw materials and the cooking process. When red meats and poultry are cooked and subsequently refrigerated to deter spoilage, the bacteria on the raw tissues are greatly reduced leaving only sporeformers and, occasionally, small numbers of thermodurics, notably the enterococci, micrococci, and some lactobacilli (JOHNSTON and TOMPKIN, 1984).

Proper cooking destroys most vegetative cells, including pathogens such as Salmonella, Yersinia, campylobacter, and Staph. aureus. However, cooked poultry must reach an internal temperature of at least 71°C and the surviving bacteria are primarily sporeformers. Furthermore, the aerobic plate counts of immediately post-cook usually are low, but recontamination may occur through contact with hands, and contaminated equipment. Therefore presence of pathogens such as Samonella, Campylobacter, Yersinia and Staph. aureus on a fully cooked perishable product indicates a lack sanitary processing practices in post-cook operations (NATIONAL ACADEMY OF SCIENCES, 1985).

Cooked poultry products may become a hazard when raw or cooked products are mish and led. Subsequent handling of carcases in food service establishment or in homes can spread microorganisms including pathogens that may be associated with the carcase to the cooked product or to other foods through contact with knives, tables, cutting boards, and cleaning cloths (NATIONAL ACADEMY OF SCIENCES, 1985).

Poultry was responsible for foodborne disease outbreaks in which a vehicle was ascertained. salmonellosis accounted for 19% of these outbreaks, staphylococcal intoxication for 16%, C. perfringens enteritis for 10%, other foodborne disease of known etiology for 2% and disease of unknown etiology for 53% (BRYAN and MCKINLEY, 1974; BRYAN, 1980; NATIONAL ACADEMY OF SCIENCES, 1985).

As there is a scarce information regarding the microbiological quality of ready to eat poultry, therefore this study was initiated to evaluate the sanitary condition of rady to eat poultry in Assiut City.

MATERIALS and METHODS

Thirty random samples of ready to eat poultry were colleced under sterile conditions from different food service establishments and restaurants in Assiut City.

A 25 gm portions of each sample were blanded with 225 ml of 0.1% sterile peptone water in waring blender at high speed for one minute, from which ten fold

serial dilutions were prepared. The bacteriological examinations of the prepared samples were carried out according to the procedures outlined by APHA (1972) ICMSF (1978) and SPECK (1984).

Standard plate count agar and Violet red bile glucose agar were for the aerobic plate count (APC) and total enterobacteriaceae count as described by ICMSF (1978). Baird-Parker medium was used for counting coagulase positive Staph aureus which was confirmed by testing for coagulase (BAIRD-PARKER, 1962). Moreover, Eneterococcus selective differential medium (E.S.D.) developed by EFTHYMIOU and JOSEPH (1974) was used for enumeration of enteroocci.

Campylobacters were isolated by direct and enrichment culture methods. Each sample was plated onto blood agar base supplemented with 5% human defibrinated blood, vancomycin 5 mg/liter, trimethoprium 2.5 mg/liter and polymxin B 1.250 IU/liter (Rogol et al., 1985). These samples were also inoculated into ROSEF (1981) liquid enrichment medium supplemented with vancomycin 10 mg/liter, trimethoprium 5 mg/liter and polymxin 2500 IU/liter. Both media were incubated at 42°C for 48 h under microaerophilic condition in anaerobic jar without catalyst using Campylobacter generating kits (Oxoid). All the seeded plates were examined after 24 h of incubation for small, flat, grey or mucoid colonies which when examined by Gram stain showed characteristic Gram-negative spiral or S-shaped organisms. All enrichment media were subcultured on solid selective plates as described before. Biochemical characteristics of Campylobacter isolates were tested according to the recommended methods described by PARK et al. (1984).

Isolation of Salmonella spp. and other enteric pathogens was done by direct plating of the samples on Salmonella shigella (SS) agar plates. Also, the samples were secondarily plated onto SS agar plates after incubation in selenite cystine broth at 37°C for 24 h. The agar plates were incubated at 37°C for 24 h. The standard methods outlined by BAILEY and SCOTT (1974) and CRUICKSHANK et al. (1975) was followed for identification of the isolated organisms.

For isolation of Y. enterocolitica the technique recommended by SPECK (1984) was followed using Cefsulodin-irgasan-novobiocin (CIN) agar plates (SCHIEMANN, 1979). Whereas, isolation of C. perfringens was carried out according to the procedures described by BEERNES et al. (1980).

All suspected colonies were isolated in pure culture for further identification according to BAIEY and SCOTT (1974) and CRUICKSHANK et al. (1975).

RESULTS

Results concerning the microbiological quality of ready to eat poultry are recorded in Tables (1) and (2).

Table (1): Summarized results of viable counts/gm ready to eat poultry.

Item	Minimum	Maximum	Mean
Aerobic plate count	$2x10^2$	$19x10^5$	$7.1x10^4$
Enterobacteriaceae	41	$1x10^3$	10^2
Staph. aureus	10	$5x10^2$	10
Enterococci	$1x10^2$	$7x10^3$	$3.26x10^2$

Table (2): Incidence of isolated organisms from examined ready to eat poultry.

Organisms	No of samples Positive	No tested	Percent positive
E.coli	3/30		10
Staph. aureus	6/30		20
Strept. faecalis.	5/30		16.67
C. perfringens.	3/30		10
Y. enterocolitica.	2/30		6.67
C. jejuni.	0/30		0
Salmonella.	0/30		0

DISCUSSION

Microorganisms on freshly processed carcases are located primarily on the surface, normally at a level of 10^3 to 10^4 per cm^2. They constitute a variety of species including psychrotrophic bacteria and originate from various sources such as the incoming bird (feet, feathers, intestinal tract), water, ice, and air, and are spread from carcases to caracases by processing equipment, utensils, and line processing (NATIONAL ACADEMY OF SCIENCES, 1985).

Although several studies have reported on the microbiological condition of further-processed poultry products (BRYAN et al., 1968a; MERCURI et al., 1970; ZOTTOLOA and BUSTA, 1971; ROBACH et al., 1980), few published reports are available that characterize the effect of individual processing practices on the microbial flora of these products (BRYAN et al., 1968b; DENTON and GARONER, 1982).

The summarized results given in Table (1) showed that the APC as well as counts of enterobacteriaceae, staphylococci and enterococci of ready to eat poultry samples varied from $2x10^2$ to $19x10^5$, 41 to $1x10^3$, 10 to $5x10^2$ and $1x10^2$ to $7x10^3$ with a mean values of $7.1x10^4$, 10^2 and $3.26x10^2$ cfu/gm respectively.

Microbiological criteria involving aerobic plate counts and indicator organisms have limited application for eviscerated ready to cook poultry carceases. In a cooked porduct the guideline should include the APC (to evaluate general condition along the

processing line), Staph. aureus (to identify lack of hygienic practices and potential temperature abuse), Salmonella (post-heat cross-contamination), and coliforms (post-heat contamination). However. information in reports by ICMSF (1974 and 1980) and SPECK (1984) should provide useful guidelines in evaluating the microbiological condition of further-processed poultry.

Table (2) revealed that out of 30 examined ready to eat poultry samples E.coli, Staph. aureus and Strept. faecalis were detected in 10%, 20% and 16.67% of the examined samples respectively.

Contamination of cooked poultry with Staph. aureus usually occurs through handling by humans. If such product is left without refringeration for several hours or cools slowly in refrigeration specially when stored in containers in thick layers growth of Staph. aureus and enterotoxin formation may occur. However, growth of Staph. aureus in a cooked product is favoured by lack of competitive bacteria, which are destroyed by heat (BRYAN, 1980).

C. perfringens were present in 3 of 30 examined ready to eat poultry samples. Low levels of C. perfringens are common on raw poultry but when poultry is cooked some of C. perfringens spores survive. As the temperature of the hot cooked product reaches 50°C during holding at room temperature or during storage in a refrigerator specially when the product is stored in thick layers, spore germination and multiplication of vegetative cells begin. If there is enough time during warm holding or slow colling, cells may reach numbers that can cause illness. However, if such foods are consumed without adequate reheating to kill vegetative cells, illness may occur (NATIONAL ACADEMY OF SCIENCES, 1985).

Campylobacter jejuni failed to be detected in the examined samples whereas Y. enterocolitica were recovered from 6.67% of ready to eat poultry samples as presented in Table (2).

Much of what has been said about Salmonella on raw poultry is applicable to C. jejuni and Y. enterocolitica becaus these organisms also are frequently present on raw poultry products. Poultry associated outbreaks of Campylobacter infection have been reported in recent years and prevention depends on through cooking and proper storage of cooked products (CUNNINGHAM, 1982).

Salmonellae failed to be recovered from the examined samples. SILLIKER (1982) revealed that small numbers of Salmonella may often present on raw poultry while Salmonella on cooked poultry result either from inadequate cooking or from recontamination of adequately cooked poultry by contact with contaminated hands, equipment, and utensils.

However, inadequate cooking of poultry resulting in survival of pathogens as Salmonella, C. jejuni, Staph. aureus, Y. enterocolitica and C. perfringens as stated by BRYAN and MCKINLEY (1974) and BRYAN (1980). Therefore the presence of E.coli,

Staph. aureus, Strept. faecalis. C. perfringens and Y. enterocolitica in the examined ready to eat poultry indicate inadequate cooking of poultry or may be due to post-cook contamination. The occurrence of such pathogens can lead to health hazard.

Extensive and continuous efforts should be made to educate the food service industry and public about the contamination potential associated with the handling of poultry in food service establishments and in homes. Control of this problem include thawing, cooking, hot holding, handling after cooking, chilling, and reheating (NATIONAL ACADEMY OF SCIENCES, 1985).

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