

Department of Food Control,  
Fac. of Vet. Med., Moshtohor Zagazig Univ, Benha Branch  
Head of the Department Prof. Dr. A.M. Edris

## CONTAMINATION OF SHAWERMA WITH PATHOGENIC YEASTS (With 3 Tables)

By

**F. A. SHALTOU and A.M. EDRIS**

(Received at 13/2/1999)

تلوث الشاورمه بالخمائر الممرضة

فهيم عزيز الدين شلتوت ، أبوبكر مصطفى إدريس

اجريت هذه الدراسة على عدد ٧٥ عينة شاورمة قبل الطهى وبعد الطهى قبل اضافة السلطات وبعد الطهى بعد اضافة السلطات بواقع ٢٥ عينة من كل نوع. وجد أن ٢١ (٨٤%) وصفر و ١٧ (٦٨%) من عينات الشاورمة الطازجة والشاورمة المطهية قبل اضافة السلطات والشاورمة المطهية بعد اضافة السلطات على الترتيب ملوثة بالخمائر وكان متوسط العدد الكلى للخمائر كالاتى:  $5.3 \times 10^4$  و  $3.6 \times 10^3$  وصفر و  $10^3$  جرام على الترتيب. وتم عزل الخمائر الممرضة الآتية:

*Cryptococcus neoformans*, *Cryptococcus albidus*, *Trichosporon cutaneum*, *Trichosporon capitatum*, *Candida albicans*, *Candida tropicalis*, *Canida kefyer* and *Torulopsis galberata*.

وتم مناقشة الاهمية الصحية للخمائر المعزولة وتأثيرها على الصحة العامة.

### SUMMARY

A total 75 samples of raw, cooked shawerma before and after addition of salad (25 of each) were examined of or contamination of pathogenic yeasts. The incidence of yeast contaminated samples was 21 (84%), zero, and 17 (68%), while the mean value of total yeast count/ gram showerma was  $5.3 \times 10^4$ , zero and  $3.6 \times 10^3$  for raw, cooked shawerma before addition of salad and cooked shawerma after addition of salad samples, respectively. The pathogenic yeasts isolated were *Cryptococcus neoformans*, *Cryptococcus albidus*, *Trichosporon cutaneum*, *Trichosporon capitatum*, *Candida albicans*, *Candida tropicalis*, *Candida*

keyfer and *Torulopsis galberata*. The public health significance of the isolated yeasts was discussed.

*Key Words: Contamination, Shawerma, Pathogenic Yeasts*

## INTRODUCTION

Shawerma is prepared from marinated sliced beef, mutton or chicken (Soaked in vinegars, salt and spices for 12 hours). The salted sliced beef, mutton or chicken are mounted on a skewer about one meter long to form frustum with small parts of fat in between. The frustum shaped mass is held vertically in an open heater and rotates on the skewer with the source of heat from one direction. Thin slices of cooked meat are sliced from outer surface of shawerma and are served in sandwich with green salad and/ or special dressing of Tahena, Sour cream and yoghurt (Ayaz *et al.* 1985; Refaie and Moustafa, 1990 and Ibrahim, 1996). Yeasts are widely distributed in nature. They thrive on plant leaves and flowers, as well as on the skin, hide and feathers and also in alimentary tract of herbivorous animals. Some yeasts are associated with insects and many are part of normal digestive tract microflora of human. Soil is an important reservoir in which yeasts can survive unfavourable periods and then can be disseminated to foods. These natural habits are also important vehicles for carrying yeasts into food processing facilities. Shawerma is widely distributed as a ready-to-eat meat product, so its contamination with pathogenic yeasts is very dangerous. It is probable that human carriers are important in transferring yeasts from contaminated materials to sound food, Knives, work surfaces, cutting board, worker's hands and aprons can become directly contaminated with yeasts (Dillon *et al.*, 1991). So the present investigation was planned out to study the recontamination of raw and cooked shawerma samples with pathogenic yeasts.

## MATERIAL and METHODS

A total of 75 samples of raw, cooked shawerma before and after addition of salad (25 of each) were collected from Cairo and Kalyobia governorates and transported directly to the laboratory without undue delay. Total yeast count was carried out according to the method recommended by APHA (1976).

Isolation and identification of yeast isolates was planned according to Lodder (1970), Vanderwalt and Karrow (1984), Barnett et al. (1983), Van der Walt and Karrow (1988), Kreger Van Rij (1987), Smith and Yarrow (1988) and Totok and King (1991).

## REUSLTS

**Table 1:** Incidence of shawerma samples contaminated with yeasts.

Kind of Samples	No. of examined samples	No of +ve samples	%
Raw shawerma	25	21	84
Cooked shawerma before addition of salad	25	-	-
Cooked shawerma after addition of salad	25	17	68

**Table 2:** Total yeast count / gram.

Samples	Min.	Max.	Mean $\pm$ S.E.
Raw shawerma	66	$7.1 \times 10^5$	$5.3 \times 10^4 \pm 1.2 \times 10^4$
Cooked shawerma before addition of salad	-	-	-
Cooked shawerma after addition of salad	42	$5.8 \times 10^4$	$3.6 \times 10^3 \pm 0.5 \times 10^3$

**Table 3:** Incidence of pathogenic yeasts isolated from shawerma samples.

Isolated yeasts	Raw		Cooked after salad	
	No.	%	No.	%
<i>Candida albicans</i>	8	32	5	20
<i>Candida parapsilosis</i>	7	28	4	16
<i>Candida tropicalis</i>	10	40	7	28
<i>Candida kefyer</i>	6	24	3	12
<i>Cryptococcus neoformans</i>	5	20	2	8
<i>Cryptococcus albidus</i>	8	32	3	12
<i>Torulopsis galberata</i>	3	12	-	-
<i>Trichosporon cutaneum</i>	9	36	6	24
<i>Trichosporon capitatum</i>	7	28	5	20

## DISCUSSION

Determination of yeast contamination of processed food is an essential part of any quality assurance or quality control program in the food industry. Th data recorded in Table (1) revealed that 21 (84%),

Zero and 17 (68%) samples of raw, cooked shawerma before and after addition of salad, respectively. The results indicate that raw samples highly contaminated with yeasts where as cooking eliminated the contamination completely, but again the samples recontaminated after addition of salad. These results agree with those reported by Frazier and Westhoff (1978) who stated that yeasts were killed at 50 - 58°C for 10 - 15 minutes.

The results recorded in Table (2) showed that the mean value of total yeast count/gram of raw, cooked shawerma before and after addition of salad was  $5.3 \times 10^4 \pm 1.2 \times 10^4$ , Zero and  $3.6 \times 10^3 \pm 0.5 \times 10^3$ , respectively. These results are in agreement with those reported by Dowdell and Board (1968) mentioned that the total yeast count / gram of fresh sausage was  $5-10 \times 10^5$ , El-Khatieb and Abdel Rahman (1989) who stated that the total yeast count / gram of frozen ground beef was  $10^2 - 4 \times 10^5$  /gram and Nychas *et al.* (1991) who revealed that the mean value of total yeast count was  $4 \times 10^4$  / gram minced beef.

El Khatieb (1982) stated that the mean value of total yeast count was  $6.2 \times 10^4$ /gram fresh Sausage and Al Aboudie and Ayob (1987) mentioned that the total fungal count / gram of beef, mutton and poultry meat was less than 100 colonies / gram, *Candida* and *Rhodoturulula* species could be isolated.

The data recorded in Table (3) revealed that *Candida albicans*, *Candida parapsilosis*, *Candida tropicalis*, *Candida kefyer*, *Cryptococcus neoformas*, *Cryptococcus albidus*, *Torulopsis galberata*, *Trichosporon cutaneum* and *Trichosporon capitatum* could be isolated from raw Shawerma and cooked shawerma after addition of salad but failed to be detected from cooked shawerma before addition of salad, this may be due to heat treatment. These results may be in agreement with those reported by Kadish (1931) who stated that *Candida albicans* was destroyed at about 60°C for 10 minutes.

Buick *et al.* (1977), Dillon and Board (1991) and Dillon *et al.* (1991) could isolated *Candida parapsilosis* and *Candida tropicalis* from beef and poultry sausage. Burmeister and Hartman (1966), Deak and Beuchat (1987), Torok and King (1991) and Babic *et al.* (1992) isolated *Candida intermedia*, *Candida sake*, *Candida parapsilosis*, *Candida tropicalis*, *Cryptococcus albidus* from corn, salads and carrots. *Candida albicans* causes infections of the skin and mucous membrane and *Candida parapsilosis* causes endocarditis in human being and also

infect nails. *Cryptococcus neoformans* is a pathogenic for human causing meningitis and subcutaneous or deep granuloma. *Torulopsis glabrata* is commensals on the skin and causes peritonitis and urinary tract infections. *Trichosporon capitatum* causes "white piedra" in which masses of yeasts grow on the outer surfaces of axillary and other hair which is kept permanently moist (Jacquet and Teherani, 1976; Davenport, 1981 and Kazanas, 1986).

To obtain a final product of good quality the raw materials used in shawerma, its preparation, handling, knives, surfaces must be kept in a good sanitary condition, efficient heat treatment and sanitary certificate to food handlers. Salads must be prepared under hygienic conditions. Care should be taken to clean and sanitize kitchen equipments such as cutting boards and slicers to avoid contamination. Avoid using the same equipment for both raw and cooked shawerma.

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