

الميكروبات المعدية فى منتجات اللحوم

على لطفى ، سعد نصر ، حسين يوسف ، حسنى عبد اللطيف
يحيى حفناوى ، عبد الخالق الطماوى* ، رأفت جبران

تم فحص ٧٥ عينة من منتجات اللحوم وتشمل ٢٥ عينة لحم مفرى ، ٢٥ عينة سجق ،
٢٥ عينة بسطرمة عن مدى تواجد الميكروبات المعوية الضارة .

وقد أمكن عزل الميكروبات الآتية : الميكروب العصى القولونى ، شيجيلا ، بروتيس
سالمونيللا ، كليسيلا ، ستروباكتر ، أنتيروباكتر ، سيراتيا ، بروفيد نسيا من عينات اللحم
المفرى المصنع والعصى القولونى ، كليسيلا ، ستروباكتر ، بروتيس ، سيراتيا بروفيد نسيا
من عينات السجق ، الميكروب العصى القولونى ، كليسيلا ، بروتيس ، أنتيروباكتر ،
سيراتيا من عينات البسترمة بنسب مختلفة .

وقد تم تصنيف الميكروب العصى القولونى من عينات اللحم المفرى
١٢٧/ب_٨ ، ١١١/ب_٤ ، ٨٦/ب_٧ ، ١١٤/ب_{٩٠} ، ٨٦/ب_{١٢} ، ١٢٧/ب_{١٢} ، ١٢٧/ب_٨ ، ٥٥/ب_٥ .
ولعينات السجق : ٥٥/ب_٥ .

بسم الله الرحمن الرحيم
الحمد لله رب العالمين
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ENTEROBACTERIACEAE IN MEAT PRODUCTS IN UPPER EGYPT
(With 9 Tables)

By
A. LOTFI; S. NASR; H. YOUSSEF; H. ABD EL-RAHMAN; Y. HEFNAWY
A. EL-TIMMAWY and R. GOBRAN
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SUMMARY

A total of 75 random samples of meat products including (25 manufactured raw meat, 25 Sausage and 25 Basterma samples) were collected from Sohag and Assiut Cities markets and examined bacteriologically for Enterobacteriaceae.

The mean value of total Enterobacteriaceae count/gm in the samples of manufactured raw minced meat, sausage and bosterma were 9.1×10^5 and 3.2×10^5 respectively. Salmonella typhi and salmonella typhimurium could be isolated only from manufactured raw minced meat.

Members of enterobacteriaceae could detected in the examined meat products. Various serotypes of enterobacteriaceae, the enteropathogenic Esch. Coli (EPEC) strains could be isolated from manufactured minced meat and Sausage.

INTRODUCTION

Determination of any or all members of the family Enterobacteriaceae as indicators of food sanitary quality has received the attention of more and more food scientists. Moreover, the total Enterobacteriaceae count is simple, rapid and capable of indicating both enteric contamination and organisms of public health hazard (THATCHER and CLARK, 1968). Raw minced meat is a good medium for the rapid growth of microorganisms. Several researchers (ROUSHDY, 1971; FOSTER, *et al.* 1977; KLEE BERGER, 1979; TEUFEL, *et al.* 1982 and YOUSSEF, *et al.* 1984) could be isolating members of family Enterobacteriaceae from manufactured raw minced meat.

The value of sausage as a food article has led many investigators (LOTFI and YOUSSEF, 1966; SURKIEWICZ, *et al.* 1972 and EL-KHATIEB, 1982) to conduct research work.

With respect of Basterma, the curing effect of meat is of high nutritive value and bacterial examination is necessary to detect the hygienic condition of production, storage and handling process.

Various Investigators (HESS, 1976; FEHLHABER, 1981 and SADEK, 1982) succeeding in detecting members of Enterobacteriaceae in cured meat. The main purpose of this investigation is to study the hygienic condition of meat products which marketed in Sohag and Assiut Cities, therefore this work was planned to secure the following:

- 1) Enumeration of total Enterobacteriaceae, total coliforms.
- 2) Isolation and identification of Enterobacteriaceae.

A. LOTFI, et al.**MATERIAL and METHODS****Collection and preparation of samples:**

75 random samples of meatproducts including (25 samples of manufactured raw minced meat, 25 Sausage and 25 Basterma) were collected from markets of Sohag and Assiut Cities, the samples were collected in retail package and dispatched to the laboratory with a minimum of delay.

Preparation of samples:

10 gm of each sample were homogenized under sterile condition for 2 minutes in 90 ml of 0.1% sterile peptone water using a Waring blender (3000 r.p.m), several dilutions of the homogenate up to 10 were prepared from the original dilution (A.P.H.A. 1972).

1) Enumeration of Enterobacteriaceae:

Was carried out according to MERCURI and COX, 1979.

2) Isolation and identification of typical E.coli:

Was carried out according to (EDWARDS and EWING, 1972). E.coli were identified biochemically and serologically according to BUCHNAN and BIBBONS, 1974. Isolation and identification of Enterobacteriaceae was carried out according to EDWARDS and EWINGS, 1972 and BAILY and SCOTT, 1974.

RESULTS

Results are recorded in tables 1-9.

DISCUSSION**Total Enterobacteriaceae count:**

All examined samples were contaminated with Enterobacteriaceae organisms. The statistical analytical results and frequency distribution were recorded in tables (1&2).

The obtained results pointed that the meat products contained high Enterobacteriaceae count, and this may be attributed to contamination of flesh used for manufacture of such products, (EL-MOSSALAMI, 1958 and KLEEBERGER, et al. 1980). Mincing machine, grinders, equipments and knives consider a source of infection and contamination of the meat during processing (FRAZIER, 1967 and BRYAN, 1975). Moreover addition of spices to meat lead to marked increase in bacterial population (FRAZIER, 1967; HEFNAWY, 1980 and HEFNAWY and YOUSSEF, 1984). Besides unsatisfactory hygienic measures during preparations, handling and distributions may play a role in the contamination.

Isolation and identification of Enterobacteriaceae:

Tables (3&4) show the incidence and distribution of Enterobacteriaceae in the examined samples of meat products. The recorded results indicated that manufactured raw minced meat contaminated with Enterobacteriaceae organisms with higher extent than the other products, this indication of insufficient hygienic measures during processing and handling of manufactured raw minced meat, on the other hand Basterma was contaminated with lesser extent than the

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other products and this may be attributed to that the curing processing of Basterma play a great effect in survival and multiplication of microorganisms (FEHLHOBBER, 1981).

Isolation and identification of Coliforms:

The isolation and identification of coliforms in the examined meat product samples were recorded in tables (5&6).

The results recorded in this work in accordance with that findings of several researchers (LOTFI and YOUSSEF, 1966; SURKIEWICZ, et al. 1972; FOSTER, et al. 1977; EL-KHATIEB, 1982 and YOUSSEF, et al. 1984).

Coliforms bacteria in general are undesirable in foods and considered as an index of contamination and possible presence of enteric pathogens. Also such organisms lead to spoilage of foods due to their ability to grow well over a wide range of temperature, from below 10 C° to about 46 C° (FRAZIER, 1967).

B) Serological examination of isolated typical E.coli:

Table (10) showed that the strains of EPEC which could be isolated from the examined products.

The most common serotypes which could be isolated from manufactured raw minced meat were:

O_{127}/B_9 , O_{111}/B_4 , O_{86}/B_7 , O_{114}/B_{90} , O_{86}/B_{12} , O_{127}/B_{12} , O_{127}/B_8 , O_{55}/B_5 , O_{55}/B_5 .

E.coli is regarded as an organism which is normally found in the intestinal tract of man and animals. MISKIMIN, et al. (1976) recorded that E.coli count could be used as an indication of the microbiological quality of foods, but ensure the safety of food products. Therefore specific pathogens testing is necessary. EPEC strains have been shown to produce food poisoning symptoms (FERUSON and JUNE, 1952 and JUNE, et al. 1953). In the present study the incidence of these coli in the manufactured raw minced meat and fresh sausage were 58.34% and 30.76% respectively. The source of contamination may be the infected meat, spices, as well as human carriers (MEHLMAN, et al. 1976; YOUSSEF, et al. 1984 and HEFNAWY and YOUSSEF, 1984).

Isolation of Proteus species and other members of Enterobacteriaceae:

The summarised results recorded in tables (5&7) pointed that proteus species which could be isolated from the samples of manufactured raw minced, meat sausage and Basterma. While the members of Enterobacteriaceae which could be detected in the examined samples were recorded in tables (5&8).

Proteus which is indole negative is considered as pathogenic organisms and may cause food poisoning. When proteus spp. present in large number in unrefrigerated foods may lead to food poisoning (FRAZIER, 1967).

The results obtained allow to conclude that the microbiological examination was useful as it gives the first aid in judging the fitness of the product. It is important to measure the coliform count in meat products as to control the sanitary conditions under which the product has been produced and handled.

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Table (1)
Statistical analytical results of total Enterobacteriaceae
count/g in examined samples of meat products

Product	No. of samples	No. of positive samples		Min.	Count	
		No.	%		Max.	Average
Manufactured raw minced meat	25	25	100	1.4×10^3	7.5×10^5	9×10^4
Locally manu. Sausage	25	25	100	5×10^2	5.1×10^5	9.1×10^4
Basterma	25	25	100	8×10^2	2×10^5	3.2×10^4

Table (2)
Frequency distribution of examined samples of meat products
based on their Enterobacteriaceae count

Interval	Manuf. raw minced meat		Sausage		Basterma	
	No.	%	No.	%	No.	%
$10^2 - 10^4$	13	52	12	48	16	64
$10^4 - 10^6$	7	28	8	32	6	24
$10^6 - 10^8$	5	20	5	20	3	12
Total	25	100	25	100	25	100

Table (4): Distribution of Enterobacteriaceae organisms recovered from examined samples of meat products.

Product	No. of isolated strains		E. coli		Klebsiella spp.		Citrobacter spp.		Enterobacter spp.		Proteus rettgeri		Proteus morgani		Proteus vulgaris		Salmonella Typhi		Salmonella Typhimurium		Shigella spp.		Serratia spp.		Providencia spp.				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
Manufactured raw minced meat.	56	14 (25)	9	(16)	7	(12.5)	1	(1.7)	5	(8.9)	7	(12.5)	5	(8.9)	1	(1.7)	1	(1.7)	3	(5.3)	2	(3.5)	1	(1.7)					
Locally manufactured sausage	35	15 (42.8)	5	(14.2)	3	(8.5)	-	-	5	(14.2)	1	(2.8)	4	(11.4)	-	-	-	-	-	-	-	-	1	(2.8)	1	(2.8)			
Pasterma	16	3 (18.75)	5	(31.25)	-	-	2	(12.5)	4	(25)	1	(6.25)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	(6.25)	-	-

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Table (5)
Incidence of isolated organisms from examined samples of meat products

Isolates	Manuf. raw Minced meat		Sausage		Basterma	
	No.	%	No.	%	No.	%
Coliform	31	55.35	23	65.71	10	62.50
Proteus spp.	17	30.35	10	28.57	5	31.25
Other Enterobacteriaceae	8	14.28	2	5.71	1	6.25
Total	56	100	35	100	16	100

Table (6)
Incidence of isolated coliforms from examined samples of meat products

Isolates	Manuf. raw minced meat		Sausage		Bosterma	
	No.	%	No.	%	No.	%
E.coli	14	45.16	15	57.69	3	30
Klebsiella spp.	9	29.03	5	19.23	5	50
Citrobacter spp.	7	22.58	6	23.07	-	-
Enterobacter spp.	1	3.22	-	-	2	20
Total	31	100	26	100	10	

Table (7)
Incidence of isolated Proteus species from examined
samples of meat products

Isolates	Manuf. raw minced meat		Sausage		Basterma	
	No.	%	No.	%	No.	%
Proteus rettgeri	5	29.4	5	50	4	80
Proteus margonii	7	41.17	1	10	1	20
Proteus vulgaris	5	29.4	4	40	-	-
Total	17	100	10	100	5	100

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Table (8)
Incidence of isolated other Enterobacteriaceae microorganisms
from examined samples of meat products

Isolates	Manuf. raw minced meat		Sausage		Basterma	
	No.	%	No.	%	No.	%
Salmonella typhi	1	12.5	-	-	-	-
Sal. Typhimurium	1	12.5	-	-	-	-
Shigella spp.	3	37.5	-	-	-	-
Serratia spp.	2	25.0	1	50	1	100
Providencia spp.	1	12.5	1	50	-	-
Total	8	100	2	100	1	100

Table (9)
Incidence of isolated E.coli strains from examined samples
of meat products

Isolates	Manuf. raw minced meat		Sausage		Basterma	
	No.	%	No.	%	No.	%
Enteropathogenic E.coli (EPEC)	14	58.34	4	30.76	-	-

