قسم : المراقبة الصحية على الأغذية •
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دراسة تواجد الميكروبات المحلله للبروتينات في بعض الاغذية

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أجريت التجارب على مائة عينة من منتجات اللحوم والألبان في مدينة أسيوط لايجاد كمية ونسبة تواجد الميكروبات المحلله للبروتينات سواء كانت هذه الميكروبات المحبه للبرودة أو المتوسطه والعالية لتحملها لدرجات الحراره وكان متوسط العدد الكلي لتلك الميكروبات في عينات الهامبورجر كالآتي•

٢×١٠^{٤} ، ٣×١٠^{٥} ، ٦×١٠^{٣}/ جرام وفي السجق ٦×١٠^{٥}، ٢×١٠^{٦}، ٥×١٠^{٣}/جرام، واللبن الطازج ٣×١٠^{٦}، ٢×١٠^{٨} أقل من ١٠ ميكروب/سم^{٣} وفي الجبن الابيض الدمياطي كانت النسبة كالاتي: ٣×١٠^{٥}، ٨×١٠^{٦}، أقل من $١٠^{٦}$ميكروب/جرام•

وبتصنيف تلك المجموعات أثبتت النتائج أن الأنواع السائدة في مجموعة Proteolytic psychrophiles كانت كالاتي:

cinetobacter, Aeromonas hydrophilia, Enterobacter liquefacent, E.coli, Micrococci, Moraxella spp. Pseudomonas and Proteus spp.

في حين كانت الانواع السائدة في المجموعة الثانية Proteolytic mesophiles هو كمايلي:

B.cereus, B.cereus var. mycoides, B. subtilis, B. megaterium, E. coli, Lactobacilli, Proteus spp. and Pseudomonas aeruginosa.

بينما وجد أن الانواع السائدة في المجموعة الثالثة Proteolytic thermophiles كانت كالتالي:

B. cereus, B. cereus var mycoides, B. circulans, B. coagulans, B. stearothermophilus.

وقد نوقشت أهمية تواجد تلك الميكروبات وكذلك الاشتراطات الصحية اللازمة لتفادي تواجدها في المنتجات الغذائية من أصل حيواني•

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INCIDENCE AND LEVEL OF OCCURRENCES OF PROTEOLYTIC MICROORGANISMS IN SOME SELECTED FOODS

(With 4 Tables)

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SUMMARY

100 samples of some selected food items (Hamburger, raw sausage, raw milk and soft cheese) were examined for the presence of psychrophilic, mesophilic and themophilic proteolytic microorganisms. Their average counts/g. of the afere mentioned types were $2x10^4$, $3x10^5$ and $6x10^3$ in hamburger, and $6x10^5$, $2x10^6$ and $5x10^3$ in raw susage, respectively. While in raw milk the average counts were $3x10^6$, $2x10^8$ and / 10/ml, and in soft cheese the average counts were $3x10^5$, $8x10^6$ and / 10/gm, respectively.

The predominant isolates of proteolytic psychrophiles were, Acinetobacter, Aeromonas hydrophilia, Enterobacter liquefacient, E. coli, Micrococci, Moraxella spp. Pseudomonas and Proteus spp., Proteolytic mesophiles were; B. cereus, B. cereus var. mycoides, B. subtilis, B. megaterium, E. coli, Lactobacill, Proteus spp. and Pseudomonas aeruginosa. The proteolytic thermophiles were; the aerobic sporeforming organisms of genus Bacillus; B. cereus, B. cereus var mycoides B. circulans, B. coagulans, B. polymyxa. B. subtilis and B. stearothermophilus.

INTRODUCTION

Deterioration in quality of flesh and dairy foods during storage and after processing is mainly due to the action of spoilage organisms. Several organisms are capable of attacking the largest nitrogen molecules naturally occuring in foods (JAY and KONTOU, 1967; LERKE, et al. 1967). Although storage of these foods under ideal conditions of refrigeration can minimize the proliferation of spoilage flora, the contaminating organisms present can releae proteose enzyme which had been reported to bring about adverse changes in freshness characteristices of foods even when such foods stored at-30°C HERBERT, et al. (1971); MARTH and FRAZIER (1975); FRAZIER and WESTHOFF (1978); I.C.M.S.F. (1980); PROZIA and PEARSON (1980) and VENUGOPAL (1984).

Many of psychrophilic, mesophilic and thermophilic organisms are capable of producing proteose enzyme which constitutes one of the most important enzymes hindering the succesful use of U.H.T. heat treated milk, in addition to their spoilage problems in processed food industry (CHOPRA and MATHUR, 1983).

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The present study was conducted to detect the incidence and level of occurrence of proteolytic psychrophiles, mesophiles and thermophiles in some selected food items in Assiut City.

MATERIAL and METHODS

Collection of samples:

100 samples of some selected food items (25 samples each of hamburger, raw sausage, raw milk and soft cheese) were collected from different localities in Assiut City

Enumeration of the total proteolytic count:

The total proteolytic count was determined by plating appropiate dilution of the previously prepeared food samples on calcium caseinate agar media (FRAZIER and RUPP, 1928 and BRANDT, 1939). The inoculated plates were incubated at 7°C for 10 days for enumeration of proteolytic psychrophiles; at 32°C for 2 days for enumeration of proteolytic mesophiles and at 55°C for 2 days for enumeration of proteolytic thermophiles (ICMSF, 1978). All organisms showed caseinolytic activity characterized by clear hallo zone around the colonies were counted and isolated, then were picked up for pureficaction and further identification.

Identification of isolates:

The isolates were identified according to COWAN and STEEL (1974) and MAC FADDIN (1976).

RESULTS

The results were recorded in table 1, 2, 3 and 4.

DISCUSSION

The summarized results given in Table (1) pointed out that the average count of proteolytic psychrophiles, mesophiles and thermophiles in the examined samples of hamburger were $2x10^4$, $3x10^5$ and $6x10^3$ and in sausage were $6x10^5$, $2x10^6$ and $5x10^3$; while in the examined samples of raw milk, the averages were $3x10^6$, $2x10^8$ and 10 and in soft cheese the averages were $3x10^5$, $8x10^6$ and 10, respectively. Due to lack of literature concerning the proteolytic organisms in meat products the results obtained in this study can not be compaired with the results of other investigators, while those obtained from the raw milk samples is somewhat higher than those reported by CHOPRA (1982) and NACHEV, et al. (1975).

Proteolytic psychrophiles:

Interpretation of results given in Table (2) revealed that the predominant isolated species among proteolytic psychrophiles gorup were Acinetobacter, Aeromonas hydrophilia, Alcaigenes faecalis, Enterobacter liquefacient, E. coli, Flavobacter spp., Lactobacillus spp., Micrococci, Moraxella app. Proteus rettegeri and Proteus mirabilis. Although psychrophilic bacteria are generally non pathogenic to man, they are considered the most responsible causative organisms of refrigerated food spoilage even when such foods were stored at -30°C (CHOPRA and MATHUR, 1983; I.C.M.S.E. (1980), DUITSCHAVER, et al. (1973) and THEULIN, et al. (1966).

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Proteolytic mesophiles:

The results given in Table (3) revealed that, the predomnant isolated species among proteolytic mesophiles group were; Aeromonas hydrophilia, Aeromonas var proteolytica, B. cereus, B. cereus var mycoides, B. subtilis, B. megatrium, E. coli, Lactobacillus spp., Flavobacter spp., Micrococcus luteus, Proteus rettegeri and Proteus vulgaris. Mesophilic species are found on foods held at refrigerator temperature, they apparently do not grow at this temperature but do grow at temperatures within the mesophilic range if other conditions are suitable (JAY, 1978).

Proteolytic thermophiles:

The results given in Table (4) revealed that, B. cereus, B. cereus var. mycoides, B. circulans, B. coagulans, B. polymyxa, B. subtilis and B. stearothermophilus were the most predominant proteolytic thermophiles which could isolated from the examined food samples.

The sporeforming organisms are widely sistributed in nature and gain enterance to foods during preparation and processing (FOSTER, et al. 1959 and JAY, 1978).

Although microbial growth does not occur in frozen foods held below -10°C, large numbers of proteolytic enzymes remain active at the usual storage temperatures for frozen products, consequently deterioration in quality during frozen storage will occur. Therfore freezing will only slow but not arrest the development of enzymatic spoilage after it has begun (PETERSON and GUNDERSON, 1960 and ICMSF, 1980).

The use of high het treatments can result in commercially sterile food products, spoilage can occur quite frequently, because the sporeforming organisms characterized by their high heat resistance and their thermostable proteose enzyme which lead to spoilage of such contaminated foods (CHOPRA and MATHUR, 1983).

Therefore, control measures must be adopted to reduce the microbial population, prevention of subsequent contamination, rapid cooling of such foods which suporting microbial growth before storage an finally avoidance of fluctuation inthe storage temperatures.

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Table (1)

Statistical analytical Results of the Total Proteobytic Counts In Some Selected Foods

	Hamburger			Sausage			Milk			Cheese		
	Ps.	Mes.	Therm.	Ps.	Mes.	Therm.	Ps.	Mes.	Therm.	Ps.	Mes.	Therm.
Minimum	/ 10^2	$2x10^3$	/ 10^2	$2x10^4$	$2x10^5$	$4x10^2$	$2x10^2$	$2x10^7$	/ 10	/ 10^2	/ 10^2	/ 10
Maximum	$5x10^5$	$5x10^6$	$6x10^4$	$3x10^6$	$9x10^7$	$2x10^5$	$2x10^8$	$4x10^9$	$2x10^2$	$5x10^6$	$6x10^8$	$8x10^2$
Mean	$2x10^4$	$3x10^5$	$6x10^3$	$6x10^5$	$2x10^6$	$5x10^3$	$3x10^6$	$2x10^8$	/ 10	$3x10^5$	$8x10^6$	/ 10

Ps. : Psychrophiles.
Mes. : Mesophiles.
Therm : Thermophiles.

Table (2)
Proteolytic Psychrophiles

Proteolytic Psychrophiles	Hamburger		Sausage		Milk		Cheese	
	F	%	F	%	F	%	F	%
Acinetobacter	10	8.6	2	3.2	-	-	-	-
Aeromonas hydrophilia	10	8.6	3	4.8	3	2.5	5	5.2
Alcaligenes faecalis	5	4.3	-	-	6	5.0	8	8.3
Citrobacter freundii	3	2.6	1	1.6	4	3.3	7	7.3
Enterobacter Liquefacient	4	3.5	2	3.2	15	12.5	10	10.4
Escherichia Coli	5	4.3	3	4.8	16	13.3	5	5.2
Flavobacter spp.	3	2.6	7	11.0	7	5.8	3	3.1
Lactobacillus casei	-	-	-	-	7	5.8	3	3.1
L. fermenti	-	-	3	4.8	5	4.2	6	6.3
L. buchneri	4	3.5	2	3.2	-	-	-	-
L. viridescens	2	1.7	1	1.6	-	-	2	2.1
Micrococcus luteus	2	1.7	5	7.9	8	6.7	10	10.4
M. roseus	10	8.6	4	6.3	11	9.2	7	7.3
M. varians	11	9.5	3	4.8	10	8.3	9	9.4
Morexella spp.	12	10.3	7	11.0	-	-	-	-
Pseudomonas cepacia	2	1.7	1	1.6	1	0.8	-	-
Ps. diminuta	3	2.6	2	3.2	2	1.7	-	-
Ps. fragi	2	1.7	2	3.2	-	-	-	-
Ps. fluorescens	4	3.5	1	1.6	-	-	-	-
Proteus retegeri	13	11.2	6	9.5	17	14.2	10	10.4
proteus mirabilis	11	9.5	8	12.7	8	6.7	11	11.5
Total	116	100	63	100	120	100	96	100

Table (3)
Proteclytic Mesophiles In Some Selected Foods

Proteolytic mesophiles	Hamburger		Sausage		Milk		Cheese	
	F	%	F	%	F	%	F	%
Aeromonas hydrophilia	11	5.7	3	2.5	7	4.5	-	-
" " var.-proteolytica	4	2.1	2	1.6	1	0.6	6	7.0
Acinetobacter	7	3.6	3	2.5	-	-	-	-
Bacillus dereus	20	10.3	16	13.2	11	7.1	5	5.7
B. " " var mycoides	17	8.8	2	1.6	13	8.4	2	2.3
B. subtilis	26	13.4	19	15.6	15	9.7	6	7.0
B. licheniformis	9	4.6	2	1.6	-	-	-	-
B. megaterium	9	4.6	6	4.9	10	6.5	15	17.2
Citrobacter freundii	-	-	2	1.6	8	5.2	-	-
E. Coli	17	8.8	10	8.2	14	9.0	10	11.5
Enterobacter liquefacient	4	2.1	2	1.6	7	4.5	3	3.4
Flaobacter Spp.	3	1.5	1	0.8	12	7.7	6	7.0
Lactobacillus Spp.	16	8.2	17	13.9	15	9.7	7	8.0
Micrococcers luteus	8	4.1	2	1.6	10	6.5	71	12.6
Morexella Spp.	6	3.1	-	-	-	-	-	-
Proteus rettegeri	20	10.3	16	13.2	19	12.2	7	8.0
P. vulgaris	17	8.8	10	8.2	13	8.4	9	10.3
Pseudomonas aeruginosa	-	-	9	7.4	-	-	-	-
	194	100	122	100	155	100	87	100

Table (4)
Proteolytic Thermophiles In Some Selected

Proteolytic Thermophiles	Hamburger		Sausage		Milk		Cheese	
	F	%	F	%	F	%	F	%
Bacillus cereus	5	5.8	2	4.9	19	18.1	70	14.9
B. cereus var mycoides	7	8.1	3	7.2	13	12.5	7	10.4
B. circulans	6	7.0	4	9.8	10	9.5	9	13.4
B. coagulans	4	4.7	1	2.4	16	15.3	12	18.0
B. licheniformis	2	2.3	4	9.8	10	9.5	4	6.0
B. megaterium	8	9.3	2	4.9	5	4.8	2	3.0
B. polymyxa	9	10.5	-	-	5	4.8	1	1.5
B. pulvifaciens	7	8.1	1	2.4	1	0.9	1	1.5
B. pumilus	5	5.8	2	4.9	1	0.9	2	3.0
B. subtilis	18	21.0	12	29.3	13	12.4	10	13.4
B. stearo thermophilus	15	17.4	10	24.4	12	11.4	5	13.4
Total	86	100	41	100	105	1000	67	100