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MICROBIAL ASPECTS OF LOCALLY MANUFACTURED MAYONNAISE

(With 5 Tables)

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السمات الميكروبيولوجيه للمايونيز المصنع محلياً

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يستخدم المايونيز فى كثير الاحيان بمفرده أو يضاف الى اللحوم والاسماك ومنتجاتها على نطاق واسع. لذلك تم جمع وفحص عدد ثلاثون عينه من المايونيز المصنع محلياً والمتداول بالاسواق للوقوف على مدى حالتها الصحيه وسلامتها للمستهلكين. تم فحص العينات ميكروبيولوجياً وقد وجد أن متوسطات العدد الكلى للميكروبات ، البكتريا المتجرثمه الهوائيه ، المكورات العنقوديه ، العصويات اللبنيه ، الفطريات فى عينات المايونيز المفحوصه هى ٢ ر٤٤ ، ٣ ر٣٣ ، ٢٦ ، ٢ر٣٧ ، ١ ر١ x ١٠^{٢}بكتريا / جم على التوالى. لم يتم عزل ميكروبات السالمونيلا ، المكور العنقودى الذهبى من هذه العينات. وجد أن أنواع البكتريا المتجرثمه هى: Bacillus subtilis, B. megaterium and B.polymyxa. بينما كانت أنواع العصويات اللبنيه هى Lactobacillus Plantarum and L. brevis. وكانت أنواع الخمائر هى Saccharomyces spp., Debaryomyces spp.,Pichia spp. وكانت أنواع الفطريات هى Cladosporium spp. and Geotrichum spp. وقد وجد أن متوسطات المعامل الهيدروجين هو ٨٩ ر٣ . وقد تم مناقشة الاجراءات الصحيه التى يجب مراعاتها لتحسين جودة المايونيز المعروض للبيع وللحفاظ على سلامة المستهلكين.

SUMMARY

Commercially locally manufactured mayonnaise was examined and evaluated microbiologically. The mean pH value was 3.89 (3.2-4.4). The microbiological examination revealed that the mean values of standard plate count, Aerobic spore forming count, staphylococci count and total yeast and mould count of mayonnaise examined samples were 44.2, 33.3, 26, 37.2 and 1.1x10^{2} CFU/g respectively. Bacillus spp., Lactobacillus spp., coagulase negative staphylococci, Saccharomyces spp., Deparyomyces spp.,

Cladosporium spp. and Geotrichum spp. could be isolatted from mayonnaise samples at varying percentages from 3.3 o 33.3%. Salomonella and coagulase positive sttaphylococci failed to be detected. Suggested hygienic measures for improving the quality of mayonnaise and to safeguard the consumers were discussed.

Keywords: Microbiology - local mayonnaise.

INTTRODUCTION

Mayonnaise may defined as a semisolid emulsion of edible vegetable oil, egg, vinegar and / or lemon juice, with salt and/or glucose. Mayonnaise usually added to cooked meat and meat salads.

The finished product has a pH of 3.0 to 4.1. The aqueous phase contains 9 to 11% salt and 0.7 to 10% sugar *(LONGREE, 1967 and JAY, 1978).*

The nutrient content of mayonnaise is suitable for supporting growth of many spoilage microorganisms such as yeast, few bacteria and moulds *(JAY, 1978).* Growth of microorganisms takes place in aqueous phase of mayonnaise and causes alterations of sensory quality and changes with potentailly toxic effects *(TRAVERIA, 1992).*

Mayonnaise has been associated with outbreaks of food poisoning, due to Salmonella and Staphylococci *(GENIGEROGIS, 1989; PALMU, 1992 and RADFORD and BOARD, 1993).* On the other hand, *ERICKSON and JENKISINS (1991)* reported that commercial mayonnaise represent negligible consumer safety risks.

This study was designed as an attempt to throw spot light on the microbial aspects of commerical mayonnise.

MATERIAL and METHODS

Collection of samples:

Thirty random samples of locally commercially mayonnaise (Gober firma) were collected from different supermarkets in Assiut and Zagazig city and transferred to the laboratory, under strict hygienic measures for microbiological examinations.

Preparation of samples:

Ten grams of mayonnaise samples were added to 90 ml of 0.1% peptone water and homogenized for 2 min. In sterile homogenizer then decimal dilutions were made.

PH determination:

The pH value was determined according to standards methods *(APHA, 1985)* with a pH meter (Microcomputer PH meter HI 8424 Portable, England) equipped with a standard combination electrods.

Microbiological examination:

1. Standard plate count was determined on Tryptose Glucose Yeast Extract agar according to *APHA, 1985.*
2. Aerobic spore forming count, the prepared dilution were heated at 80°C for 10 min., suddenly cooled then plated on Nutrient agar containing 0.1% starch *(APHA, 1985).* The plates were incubated at 30-32°C for 2 days. Isolates were purified and identified according to *KRIEG and HOLT (1984).*
3. Staphylococci were counted and identified on Baird-Parker's medium and also were checked for coogulase production by the tube method according *PAIRD-PARKER, 1979.*
4. Lactobacilli were enumerated by using MRS agar medium, the plates were incubated at 37°C for 2 days. Isolates of Lactobacilli were identified according to *SHARPE, 1979.*
5. Isolation of Salmonella was carried out on selenit or tetrathionate broth as enrichment and brilliant green and/or deoxycholate citrate agar as plating medium *(ISO, 1975).*
6. Total yeasts and moulds count were determined on potato dextrose medium *(APHA, 1985).* The fungal isolates were identified according to *LOODER and KRIEGER VAN RIJ (1970) and SAMSON et al. (1981).*

RESULTS

The results were tabulated in 1-5 tables.

Table 1: Statistical analytical results of pH calue in commercial mayonnaise samples.

No. of samples	Min.	Max.	Mean	S.E.M.+
30	3.2	4.4	3.89	0.06

Table 2: Frequency distriution of pH value in commercial mayonnaise samples.

Intervals	Frequency of samples	%
2.2->3.7	7	23.3
3.7->4.2	16	53.4
4.2-4.7	7	23.3
Total	30	100.0

Table 3: Microbial counts of examined commercial mayonnaise samples.

Microorganisms count	Positive samples		Counts		
	No	%	Min.	Max.	Mean.
Standard plate	27	90	25	60	44.2
Aerobic spore forming	7	23.3	25	48	33.3
Staphylococci	5	16.7	20	35	26
Lactobacilli	9	30	25	50	37.2
Yeast and mould	30	100	30	250	110

Table 4: Incidence of bacterial isolates in commercial mayonnaise samples.

Isolates	No.	%
Bacillus subtilis	4	13.3
Bacillus megaterium	3	10.0
Bacillus polymyxa	1	3.3
Lactobacillus plantarum	5	16.7
Lactobacillus brevis	4	13.3
Coagulase negative staphylococci	5	16.7

Table 5: Incidence of isolated yeasts and moulds in commercial mayonnaise samples.

Isolates	No.	%
Yeasts:		
Saccharomyces spp.	10	33.3
Debaryomyces spp.	6	20.0
Pichia spp.	5	16.7
Rhodotorula spp.	4	13.3
Moulds:		
Cladosporium spp.	3	10.0
Geotrichum spp.	2	6.6

DISCUSSION

Results are presented in Table (1) reveal that the pH value of examined samples ranged from 3.2 to 4.4 with a mean value of 3.89 + 0.06. Most of samples (53.4%) were in the range of 3.7 to 4.2 (Table 2). The obtained results agree to a certain extent with that reported by *KURTZMAN et al. (1976) and SMITTLE (1977).* The wide range of pH value in examined samples may be due to variation in the temperature and time holding the product and amount of acetic acid added.

It is evident from the results given in Table (3) that the mean value of standard plate count, aerobic spore forming, staphylococci, lactobacilli and yeast and mould counts were 44.2, 33.3, 26, 37.2 and 110 CFU/g respectively. Comparatively lower counts were obtained by *SMITTLE (1977),* who mentioned that the microbial content of mayonnaise was very low (< 10/g).

Staphylococci count declines in high acid foods whereas enterotoxin is stable at low pH (4-4.5), therefore, high acid foods may contain enterotoxins without any viable staphylococci *(TATINI, 1981).*

Bacillius subtilis, Bacillus megaterium, Bacillus polymyxa, Lactobacillus brevis and coagulase negative staphylococci were isolated from mayonnaise samples at varying percentage from 3.3 to 16.7% (Table 4).

Salmonella and coagulase positive staphylococi failed to be detected in the examined mayonnaise samples. This result comply with *SAITOH et al. 1980,* who attributed this result to the lower pH value than 5.0 was effecting in preventing the growth of Salmonella.

Saccharomyces spp., Debaryomyces spp., Pichia spp., Rhodotorula spp., Cladosporium spp. and Geotrichum spp. were the yeast and moulds species which could be isolated from mayonnaise samples ranging from 6.6 to 33.3% (Table 5). Nearly similar findings were reported by *SMITTLE (1977), JAY (1978) and FRAIZER and WESTHOFF (1988).*

The commercial mayonnaise may be contaminated by kitchen workers or by using raw and cracked eggs *(PALMU, 1992 and RADFORD and BOARD, 1993).*

From the obtained results, it is appeared that the mayonnaise has antimicrobial properties due to its acidity and these results are in accordance with *DOYLE et al. (1982).*

In conclusions, good manufacturing practices include strict microbiological control of raw ingredients, avoiding craked eggs, proper handling and careful cleaning of utensils and equipment should be done to improve the quality of produced mayonnaise.

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