Dept. of Microbiology and Animal Hygiene,
Fac. of Vet. Med., Alexandria University,
Head of Dept. Prof. Dr. H.A. Torky.

RAPID DETECTION OF FAECAL COLIFORM ORGANISMS IN WATER AFTER 7-HOURS

(With 2 Tables)

By

H. SAMAHA

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الاكتشاف السريع للميكروب القولوني المعوى في المياه

بعد ٧ ساعات

حامد سماحة

تم جمع خمسون عينة من مياه ترعة المحمودية ، مياه المجارى وكذلك مياه الآبار وفحصت من الناحية الميكروبيولوجية لوجود الميكروب القولوني المعوى باستخدام أختبار ٧ ساعات ، طريقة الترشيح الغشائي والعدد الاحتمالي الأكبر ووجد أن نتيجه أختبار ٧ ساعات كانت مساوية تقريبا لطريقة الترشيح الغشائي · ومن ناحية أخرى كانت طريقة العدد الإجمالي الاكبر تفوق كل من الطريقتين الأخرتين · كما لوحظ أن طريقة أختبار ٧ ساعات مباشرة ، بسيطة ، سريعة ودقيقة وتحتاج فقط الى ٧ ساعات ·

SUMMARY

Fifty water samples were collected from Mahmoudia Canal, sewage water well water and examined bacteriologically for rapid detection of faecal coliforms using 7-hours faecal coliform test the standard membrane filter technique and the most probable number test.

The obtained results by the 7-hours faecal coliform test were nearly similar to those of the membrane filter technique. On the other hand, the most probable number offaecal coliform was more superior than the other two methods.

Moreover, the 7-hours faecal coliform method provides a direct, simple, rapid, accurate and requires only seven hours.

INTRODUCTION

The need for rapid determination of the sanitary quality of water has cited most often in relation to testing the emergency or temporary water supply. The udefulness of rapid bacteriological test must be determined by several importnt factors including ease of use, accuracy and sensitivity.

In recent years, new rapid techniques have beendevelopment for detection of faecal coliforms in water such as the use of radio-isotopes (LEVIN et al., 1956), fluorescent antibody technique (DANIELSSON, 1965) the use of foaming agents (BRETZ et al., 1966), colorimeteric B-galactosidase assay (WARREN et al., 1978) and coliphage (BURAS and KOTT, 1972).

The routine bacteriological examination needs about 3-4 days during which water may be consumed by livestock.

The aim of the present work is to evaluate the 7-hours faecal coliform method as a rapid diagnostic test for detection of faecal coliforms.

MATERIAL and METHODS

A total of 50 fresh water samples were collected from three sources in Behera and Alexandria. Of these 25 were obtained from different parts of Mahmoudia canal, 10 from Localities near the drains of sewage and 15 from wells situated in Alexandria provinces. The samples were subjected to the following tests :

1. The rapid 7-hours faecal coliform (Van DANSEL et al., 1969):

The indicated water samples were filtered through membrane filters with 0.45 Um pore size and 37 mm in diameter. Membranes were placed on the m-3-hours faecal coliform agar. The inoculated plates were incubated at 41.5°C for 7-7.5 hours. The membranes were then examined with the aid of steroesmicroscope.

Verification of the colonies was then done by picking 10 yellow colonies from one replicate plate into lauryl tryptose broth and incubated at 37°C for 24 hours. Loopfuls from each positive tube were transfered to E.coli broth. Inoculated tubes were incubated in water bath at 44.5°C for 48 hours.

2. Standard 24 hour faecal coliform test (A.P.H.A., 1975) :

The same procedure used in the 7-hour faecal coliform was performed with the 24 hours faecal coliform test but the temperature of incubation was 44.5°C for 24 hours.

3. Standard faecal colifrom MPN count :

The most probable number of faecal coliforms was determined by using the multiple-tube fermentation technique as recommended by OBLINGER and KOBURGER (1975).

RESULTS and DISCUSSION

The number of faecal coliforms detected in well water samples by 7-hour faecal coliform test, 24 hours membrane filter test and the most probable methods were significantly lower than those recovered from either Mahmoudia canal and Sewage water (Table 1). These results may attributed to various physico-chemical and biological factors including the adsorption and sedimentation of bacteria. However, the presence of organic matter in both Mahmoudia and Sewage water affects the survival of faecal coliforms (CARLUCCI and PRAMER, 1959), while the presence of inorganic salts in well water were potentially toxic to faecal coliforms (GAMESON and SAXON, 1967). Generally, these results are higher than that recorded by REASONER et al. (1979).

On the other hand, the data presented in Table (1) shwed that the most probable number method was found to be more superior in enhancing faecal coliform recovery

but less precise than 7-hours or the standard 24 hours faecal coliform methods. These results are in accordance with the results obtained by GREEN et al. (1977) and STEVENS et al. (1977). It is also revealed from this table that the 7-hours method generally matching the standard 24 hours faecal coliform method a finding which support the results obtained by PUGSLEY et al. (1973), REASONER and GELDREICH (1974) and GELDREICH (1981).

The results recorded in Table (2) revealed that the percentage of verification of faecal coliforms by the 7-hours method (83.3) was lower than that of the 24 hours method (92.9). These results are in accordence with those obtained by GELDREICH (1981). However, a lower percentage was recorded by REASONER et al. (1979) and as much as 67.3%.

From the abover mentioned results, it can be concluded that the 7-hours faecal coliform method may be considered as a rapid, simple, accurate, sensitive and economic test for detection of faecal coliform bacteria. It requires only seven hours to obtain the most convenient results.

Table (1): Statistical analysis of data obtained from the bacteriological examination of water samples collected from Mahmoudia Canal, Sewage water and well water.

Source	Mean MPN FC./100 ml	Membrane filter method		Mean ratio	
		Mean 24 hour FC/100 ml	Mean 7 hour FC/100 ml	24h FC/ MPN FC.	7-h FC/ MPN FC.
Mahmoudia Canal	299.000	194.000	219.000	0.07	0.07
Sewage water	360.000	230.000	213.000	0.62	0.55
Well water	1100.000	157.000	150.000	0.12	0.13

Table (2): Correlation of the 7-hours FC. test with the 24 hour M-FC methods.

Method	No. of Colonies picked	No. of Colonies picked	Precent of Verification
7 hour FC	210.000	176.000	83.8
24 hour FC	170.000	158.000	92.9

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