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BEHAVIOUR OF LISTERIA MONOCYTOGENES DURING PREPARATION AND STORAGE OF YOGHURT

(With One Figure)

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سلوك ميكروب الليستيريـــــــا Listeria monocytogenes
أثناء تصنيع وتخزين الزبادى

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تعتبر الـ Listeriosis من الأمراض الخطيرة التى تصيب الإنسان فى شكل وبـــاء نتيجة تناول اللبن أو منتجات الألبان الملوثة بميكروب الـL.monocytogenes للذلـــــك أجريت هذه الدراسة لمعرفة سلوك هذا الميكروب فى الزبادى أثناء تصنيعه أو تخزينه فـــى الثلاجة · وقد قمنا بتصنيع الزبادى معمليا من اللبن بعد تعقيمه ثم حقنه بالميكروب عند ٤٠م° وتم أخذ عينات من اللبن بعد الحقن وكذلك من الزبادى بعد التصنيع لمعرفة عدد ميكـــــروب L.monocytogenes وكذلك الرقم الهيدروجينى · ثم أخذت عينات يومية من الزبادى المحقون أثناء حفظه فى الثلاجة عند ٥ + ١م° لتقدير عدد هذا الميكروب وكذلك الرقم الهيدروجينى للزبادى أثناء التخزين · وقد تبين من هذه الدراسة أن ميكروبL.monocytogenesيتناقص فى العدد أثناء التصنيع وكذلك أثناء التخزين حتى نهاية اليوم الرابع حيث لـــم يمكـن إكتشافه فى الزبادى بعد ذلك · بينما وجد أن الرقم الهيدروجينى تناقص من ٦ر٧ بعـــد التصنيع حتى ٤ر١ عند نهاية اليوم الرابع · وقد تم مناقشة الخطورة الصحية لهذا الميكـــروب والشروط الصحية الواجب توافرها لمنع تلوث الزبادى بميكروب L.monocytogenes

SUMMARY

Two lots of yoghurt were prepared to contain Listeria monocytogenes V7 (milk isolate, serotype 1) at an initial inoculum of 3 x 10^7 cells/g., and then were refrisgerated at 5 ± 1 °C. Viable counts of L. monocytogenes as well as pH value of yoghurt were determined at 0 time and daily thereafter. L. monocytogenes survived until the end of the fourth day at a population of less than 10 cells/g. The pH value of yoghurt decreased sharply from 6.6 to 4.7 by the end of preparation, and a low value of 4.1 was reached at the end of the fourth day.

INTRODUCTION

Listeriosis is one of the most recognized bacterial infection of man. It has been assumed that humans usually infected by ingestion and that listeriosis was primarily a foodborne disease (BOJSEN-MOLLER, 1972 and ANONYMOUS, 1985).

Shedding of Listeria in milk from infected dairy animal has been documented (DONKER-VOET, 1962; STAJNER, 1971 and GITTER et al., 1980). Furthermore, isolaion of L. monocytogenes from milk of clinically normal cows has been reported by several investigators (HYSLOP & OSBORNE, 1959; SCHULZ, 1967 and GITTER et al., 1980).

The first massive outbreak of listeriosis was reported by SEELIGER (1961). More recently an outbreak of listeriosis occurred in USA, and was due to consumption of pasteurized milk (FLEMING, 1985). In the same year, another outbreak of listeriosis was recorded also in USA, and was traced to consumption of fresh high moisture Mexican-Style cheese (USPHS, 1985).

As yoghurt is one of the most popular dairy products in different countries, it is quite useful to know what would happen if yoghurt is made from milk contaminated by L. monocytogenes.

MATERIALS and METHODS

Cultures :

Strain of L. monocytogenes V7 (milk isolate, serotype 1) used in this study was obtained from the Dept. of Food Science, University of Wisconsin, USA. The Culture of L. monocytogenes was prepared using Tryptose broth as described by BYSER et al. (1985). Starter cultures for yoghurt (Strept. thermophilus and Lactobacillus bulgaricus) grown in sterile skim milk, were obtained from the Dept. of Fod Science, Faculty of Agriculture, Assiut University.

Preparation and sampling of yoghurt :

Two lots of yoghurt were prepared from sterile milk. Milk was inoculated with L. monocytogenes at 45°C immediately after addition of the starter to provide 3 x 10^7 cells/ml. Addition of the starter cultures was done according to LAMPERT (1975). The infected yoghurts with controls were kept in refrigerator at 5 ± 1°C. Samples for the Listeria count and pH were taken from milk after inoculation, from prepared yoghurt and daily thereafter. The samples were prepared for examination according to theStandard Methods (MARTH, 1978).

Enumeration of L. monocytogenes :

Tryptose Agar (Defico) suplemented with 40 mcg/ml Nalidixic acid and 30 U/ml polymyxin B. sulphate, was used as described by HOFER (1983). Surface plating technique was done for each sample and its dilutions. The plates were incubated at 37°C for 24 h. Confirmatory tests were done on the suspected colonies as described by SEELIGER (1961).

pH determination :

The pH of yoghurt was determined by using an Orion pH meter model 701, equiped with standard electrode.

RESULTS

The obtained results were recorded in Fig. 1.

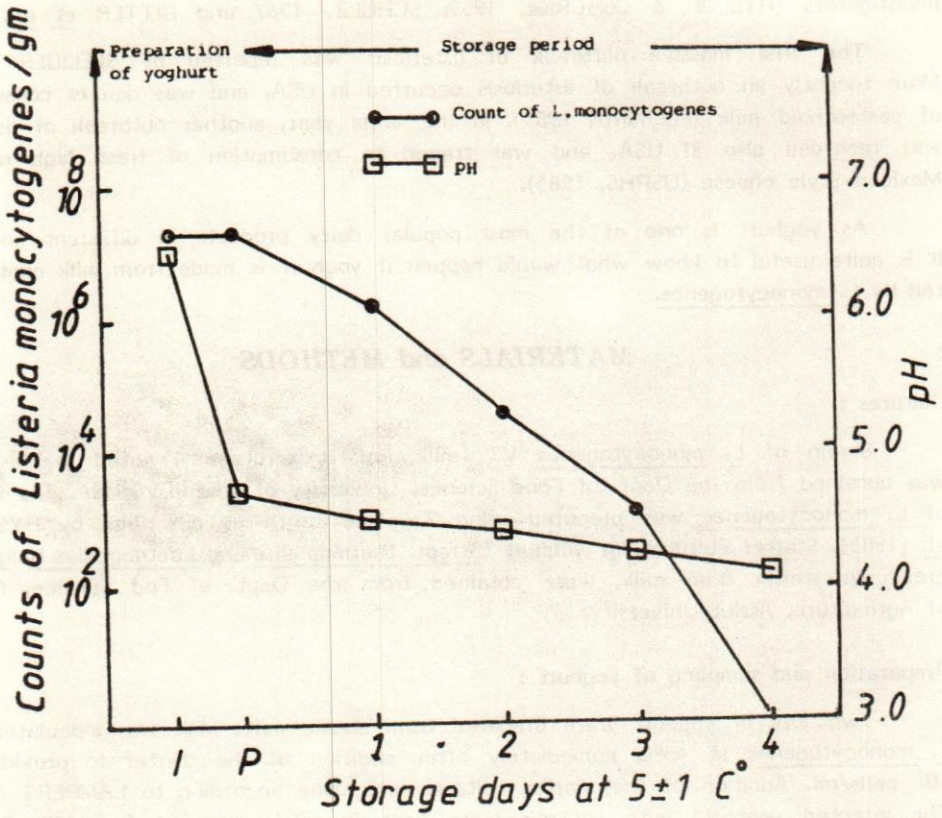

Figure 1: Behaviour of L.monocytogenes strain V7 during preparation and storage of yoghurt.
I = Inoculated sterile milk. P = Prepared yoghurt.

DISCUSSION

The results in Figure 1 revealed that there was no change in the number of L. monocytogenes during the period of yoghurt preparation. The organism began to lose its viability during refrigerated storage and reached a minimum of / 10 cells/g. at the end of the fourth day, where no colonies could be detected on the plate. A sharp drop in the pH value of yoghurt from 6.6 to 4.7 occurred by the end of its preparation (Fig. 1). A low value of 4.1 was reached at the end of the fourth day of storage.

It is evident from the results that the failure of L. monocytogenes to grow in yoghurt, and the loss in its viability may be due to lactic acid production and

resultant lowering pH value of yoghurt (4.7 - 4.1). These findings are parallel to the conclusion of IRVIN (1968) who stated that L. monocytogenes failed to grow at pH value slight below 5.5, and lose its viability at lower pH. The behaviour of L. monocytogenes in yoghurt during its refrigerated storage and in early stages of cottage cheese manufacture prepared by RYSER et al. (1985) appears to be similar.

It is noteworthy from this study that contamination of yoghurt by L. monocytogenes from the view point of a potential health hazard should not be ignored. Listeria could contaminate the yoghurt through raw milk used without sufficient heat treatment or through contaminated equipments used for its preparation or distribution, and could survive in yoghurt for at least 3 days. Therefore, sufficient heat treatment of milk used for yoghurt preparation, and stringent hygienic measures must befollowed during preparation and distribution of the product.

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