

SHORT COMMUNICATION

THE BACTERIA QUALITY OF THE INDIGENOUSLY FERMENTED MILK PRODUCT - 'NONO' IN MAIDUGURI MUNICIPALITY, NIGERIA.

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ABSTRACT

Fifty samples of 'nono', a fermented milk product akin to yoghurt, were carefully collected from three markets in Maiduguri municipality, and were examined for the presence of pathogenic bacteria. Twenty-eight percent of the samples were found to be contaminated with aciduric pathogenic bacteria that may cause milk-borne diseases equally in consumers. Fourteen percent of the isolates were positive for *Escherichia coli*. Ten percent for *Staphylococcus aureus*, and four percent *Streptococcus pyogenes*. Thirty-six samples showed no growth of any pathogenic bacteria. It is hoped that as peri-urban and rural dairy cattle get more Veterinary service and the women manufacturing the 'nono' employ better hygienic measures, the future 'nono' would be a more wholesome product, free from any pathogenic bacteria of public health significance. By then, the Maiduguri 'nono' would have achieved international recognition.

Key Words: Fermented milk, 'Nono', pathogenic bacteria

INTRODUCTION

The indigenously fermented cow milk, the 'nono' is a staple diet of many people in Northern Nigeria. It is usually prepared by cow Fulani and other local dairy women under poor hygienic conditions. As they have realised that the fermented milk possess a much better keeping quality, the women producers soon discovered that the fermentation process could be initiated by adding to fresh milk a small amount of the sour milk from the day before. The milk and the water used during the preparation are not pasteurized. The fermented milk product -

'nono' is usually adulterated with local stream water and with milky white infusion obtained from the baobab fruit (*Adansonia digitata L.*). Therefore there is opportunity for its contamination with pathogenic microorganisms which consequently made the 'nono' a potential means for the transmission to man of some milk-borne infectious diseases (Schwabe 1969).

Shehu (1988), Umoh, *et al*, (1988) and Shehu and Adesiyun (1990) examined bacteriologically the 'nono' obtained in Zaria, Kaduna State, Nigeria. They isolated *Staphylococcus aureus*, the tubercle bacillus and coliform bacteria of faecal origin. The extent of contamination and the kinds of microorganisms association with the 'nono' available in Maiduguri municipality have not been previously reported. The purpose of this communication is to report on the bacteriological examination which was carried out to determine the pathogenic bacterial contents of metropolitan Maiduguri 'nono' and the public health significance of such contaminated 'nono' available from markets in Maiduguri municipality, Borno State, Nigeria.

MATERIALS AND METHODS

10ml each of the locally fermented milk samples were carefully and aseptically collected from three markets in Maiduguri, Borno State, Nigeria into sterile universal bottles. The sample were recorded. The whole fifty samples were later kept at - 20°C in a freezer until examined.

The fermented milk samples were taken out of the freezer and allowed to thaw. The samples were later homogenized in a shaker for two minutes. The milk samples were later centrifuged in a bench refrigerated centrifuge (Heitich-universal 11 product) at 1000 r.p.m.

for 5 minutes. The deposit from every sample was treated as follows.

Three films, on glass slides, were prepared from every deposit and two films were stained by Ziehl-Neelsen's method for acid fast bacteria and the other film was stained by Gram's method after Preston and Morrell (1962). These tests were performed in order to have an idea of the kinds of bacteria associated with every sample. A loopful at a time from every deposit was plated onto each of two sheep blood agar plates and onto each of two plates of the listed selective media. The ingredients were of Oxoid Ltd 20 Southwark Oudge Road London SE1 (HF).

Mannitol Salt Agar for the isolation of *Staphylococcus aureus*; The plates was prepared and used according to Davis (1959). The coagulase positive Staphylococci were identified by their bright yellow zones. Such colonies were later picked off and subcultured onto Oxoid nutrient agar to avoid interference with coagulase and other diagnostic tests.

- (ii) Eosin Methylene Blue Agar Plates were prepared after Cruickshank (1968). They were used for the detection of *Escherichia coli* and nonlactose fermenting intestinal pathogens. The former were identified by their greenish metallic sheen colour while the later were colourless.
- (iii) Desoxycholate citrate Agar (DCA) and MacConkey Agar (MCA) plates were prepared after Hynes (1942) and Cruickshank (1968) respectively. They were used for the isolation of pathogenic coliform bacteria in the following general:- *Pseudomonas*, *Proteus*, *Salmonella* and *Shigella* - which are non-lactose fermenters. All the plates were incubated at 37°C in an incubator and were examined after 24 hours and after 48 hours.

Thioglycollate Broth (TB) was prepared according to the formula prescribed in the Pharmacopeia (1970) for sterility tests. This medium was for the isolation of *Clostridium* spp. A loopful of every deposit was inoculated

into each of two bottles of TB media and incubated at 37°C for 48 hours. The TB media were subcultured onto BA plates and incubated anaerobically for 48 hours. Lowenstein - Jensen medium for isolation of acid fast tubercle bacillus was not employed because there was no indication for its use.

The isolates from the plates were further identified by methods described by Cowan and Steel (1970). In the tests performed no attempts were made to determine whether the Staphylococci, the Streptococci and the *E. Coli* were of human origin. The *E. Coli* were of faecal origin being positive for Eijkman test after Report 71 (Department of Health and Social Security 1969).

RESULTS AND DISCUSSION

The results of the bacteriological examination of fifty 'nono' samples were associated with three species of potentially pathogenic bacteria. *Escherichia coli* (7) 14%; *Staphylococcus aureus* (5) 10%; and *streptococcus pyogenes* (2) 4%. The pH of the samples varied from 3.9 to 4.8. By statistical analysis the three aciduric pathogens showed no significant difference in their incidence and so had equal chance to cause infections in susceptible consumer of the 'nono' ($P > 0.05$).

Of the fifty samples examined, the investigation showed that 72 percent of the 'nono' were bacteriologically safe for human consumption because that high percentage of samples contained no pathogenic bacteria. The diseases which consumers of the 'nono' may likely acquire from the infectious agents isolated include enterotoxaemia from *Staphylococcus aureus*, scarlet fever and septic sore throat from *Streptococcus pyogenes* and gastroenteritis from *Escherichia coli* (Soltys 1963). It is however certain that consumers will not repeatedly buy from sellers whose 'nono' are unwholesome and associated with health hazard of any kind.

The sources of bacterial contamination of milk and milk products are the dairy animals, the human handlers and the environment (Schwabe 1969). The bacterial isolates of 'nono' therefore may differ from place to place

PATHOGENIC BACTERIA IN "NONO"

to reflect the bacterial infectious agents related to these factors at the time of investigation. Shehu (1988) isolated the tubercle bacillus and escherichiae from 'nono' in Zaria; Umoh, *et al*, (1988) isolated staphylococci also in Zaria. The observed differences are understandable. The Zaria isolates are different to some extent from the isolates presently reported in Maiduguri 'nono' in which no tubercle bacillus was seen but *Streptococcus pyogenes* was isolated in addition to the other isolates.

The various values of pH recorded for the samples of 'nono' investigated were found to have no apparent effect on the kinds of isolates obtained from the samples because they were all aciduric pathogenic bacteria. A similar observation has been reported by Shehu and Adesiyun (1990). The baobab fruit is commonly eaten in Nigeria and may not be a health hazard. It contains tartaric acid in the fruit pulp which is used to make refreshing drink and to season food (Vickery and Vickery 1979). The baobab infusion appears to be a mere convenient adulterant for 'nono' producers. Fermented milks can carry pathogenic infections acquired before or after their fermentation. Even though most of the pathogens are eventually killed by the ensuing high acidity yet those infections as presently observed may survive long enough to be transmitted to the consumers.

Dairy women who make 'nono' would therefore certainly benefit from modern education on Sanitary measures to adopt in order to produce 'nono' of high quality which is free from any pathogenic infections. 'Nono' is one of the products of rural economy and native dairy industry for which there is ever a ready market. Its production is an area of endeavour where the organizations which promote local small industries have a role to play by modernizing production technique. As the veterinary service to peri-urban and rural dairy cattle increases, and dairy women who manufacture 'nono' employ hygienic procedures, the future fermented milk 'nono' would be a more wholesome article of diet for the growing population of 'nono' eaters.

It is hoped that by that time the 'nono' would be having international recognition and be listed among yoghurt, dahi and Koumiss which are identical product under different names in specific geographical areas such as Mediterranean, India and Central Asia, respectively.

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