

ORIGINAL ARTICLE

An Outbreak of Neonatal Gastroenteritis
due to E. Coli

by

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Abstracts

An outbreak of E. coli diarrhea in the neonatal ward of the Pediatric Department, Gunung Wenang General Hospital Manado, Indonesia has been reported. Factors influencing the easy and rapid spreading of infection have also been forwarded.

The outbreak was apparently initiated by a patient admitted to the hospital which then involved 33 infants. Positive stool cultures of 16 infants revealed E.coli 055 : K 59 (B) and 0126 : K 71 (B) H2.

Oral Kanamycin and Tetracycline gave satisfactory results. Controlling measures carried out succeeded in preventing more widespread of the outbreak. Due to ever-changing resistance of E. coli to antibiotics identification of the causative agent followed by a sensitivity test remains the key to successful treatment.

Introduction

The outbreak of neonatal diarrhea in nurseries has been reported in many places and is mostly caused by EPEC. It is usually found in nursery wards of overcrowded hospitals where cross-infection plays a major role. Biological characteristics of *E. coli*, particularly its resistance to antibiotics also play an important part in these outbreaks.

This paper reports our experience of an outbreak of *E. coli* gastroenteritis in the Pediatric Department, Gunung Wening Hospital Manado, Indonesia, at the end of January 1974.

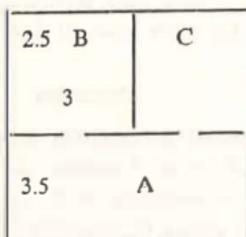


FIG. 1: Outline of the former temporary neonatal ward

Term infants were generally discharged at the age of 3 days. Other infants requiring hospitalization from outside were admitted directly either into the "high risk" room or the "isolation" room.

With the exception of term healthy infants who were breast-fed, all of the affected cases were fed with commercial formulas.

The nursery staff consisted of only 4 midwives and 6 paramedical students, who were on shift duty every 8 hours.

Hospital background

Our neonatological subdivision was newly established in 1972, and was attached to the Obstetrical Department at the time of the outbreak. It occupied a temporary building near the delivery room. About 35 infants were cared for every day in the nursery which at that time measured 6 × 6 square meters only. Term infants without complications were cared for in the term suite interconnecting with the "high risk" room and "isolation" room. To enter these rooms one has to pass across the term suite. (Fig 1).

A. Normal infants ward

B. Premature and high risk room

C. Isolation room

Movement of staff between the 3 suites did occur very easily, especially during the night when there was a smaller number of person on duty. Routine procedure to prevent cross-infection in the nursery consisted of hand-washing with 2% creoline in water from a single basin, located between the "isolation" room and the term suite. Gowns were not worn as a matter of routine.

Clinical illness and epidemiology

The first patient who was found to have *E. coli* gastroenteritis was born

outside the hospital. He was admitted with the clinical symptoms of poor feeding, abdominal distention diarrhea up to 7-10 times in 24 hours. A few days afterwards, 5 healthy term infants showed similar signs and symptoms who later on were also found to have *E. coli* enteritis. Within a brief period these cases were followed by another 27 term infants and prematures totaling 33 of whom 16 revealed various *E. coli* strains in their stool cultures.

The affected babies with positive cultures were 2-10 days old of whom 7 were prematures. No severe dehydration was encountered. Only 2 of them, both prematures, had intractable diarrhea, complicated with septicemia and died. The duration of diarrhea ranged from 5-20 days with a mean of 9, 8 days.

The mortality rate was 6% (2 out of 33 cases). The affected infants were thought to have been cross-infected by the first infant via the hands of nursing staff either through the milk-bottles or thermometers. The outbreak was brought under control by undertaking necessary measures.

Bacteriological investigation

Analysis of samples of every possible environmental source of infection revealed the presence of *E. coli* in the water used to wash milk-bottles. It was regretted that the hands of nursery personnel were not investigated. However, their stool cultures did not reveal any *E. coli* pathogen. Stool specimens of the affected cases were taken for 3 consecutive

days, cultured directly on McConkey agar and the colonies were tested with *E. coli* antisera, manufactured by Bio Farma, consisting of 11 types antisera. Sixteen positive cultures of the affected infants revealed *E. coli* 055 : K 59 (B) and 0126 : K 71 (B) H2.

Antibiotic treatment

Oral Kanamycin (100 mg/kg b.w./day) and Tetracycline (25 mg/kg b.w./day) were given to all patients except for 2 septicemia prematures to whom parenteral Ampliclox was added. A satisfactory result was achieved with the exception of those 2 who died after intensive treatment for more than 10 days.

Discussion

Bacterial investigation showed only 16 out of 33 stool cultures (50%). *E. coli* positive consisting of *E. coli* 055 : K 59 (B) (2 cases), *E. coli* 0126 : K 71 (B) H2 (3 cases) and both (11 cases). Contrary to our findings, Mc Donald and Charter (1956) in their study in neonatal wards found that *E. coli* 0126 could not cause gastroenteritis. In this respect, it is very important to find out the exact role of *E. coli* pathogen in our environment during a diarrheal outbreak in the neonatal ward.

The outbreak might also be due to viral infection such as Rotavirus and influenza or even due to a new serotype of *E. coli* which were not detected in this investigation. The role of bottle feeding was obviously an important determinant, since all affected infants were bottle fed.

The outbreak of gastroenteritis occurred in a very short time affecting a great number of newborn infants. From this evidence it is very important to carry out a study to determine whether or not an airborne type of dissemination of coli infection occurs in our nursery ward. However, cross infection with different *E. coli* strains can occur from infant to infant in isolated cubicles even when there are good facilities and experienced personnel (Ironsides et al., 1971).

It is considered that infant to infant cross-infection via hands of nursery personnel is likely to be commonly the case to maintain one or more *E. coli* serotypes in a nursery for a long time, as hand-washing with hexachlorophene failed to reduce the contamination significantly. It is also very important to note that the majority of the personnel in the intensive care nursery (ICN) carry the organisms in the intestinal tract and on hand and in 10% of newborns have *E. coli* in their pharyngeal bacterial population (Vata et al., 1972).

All the above explain the easy and rapid spreading of *E. coli* infection in a newborn nursery, especially when the nursery room is small and overcrowded, and the staff is limited as was our situation during the outbreak.

In controlling an outbreak of *E. coli* in a nursery ward appropriate attention should be paid to nursing skill and strict attention toward and cubical technique, including hand-washing for every personnel including doctors, rigid adherence to all principles of barrier nursing in pedi-

atric wards, disposable gloves should be used as a more effective preventive measure, and the wards should be closed during the outbreak.

In our case, abandoning the temporary ward and moving into another more spacious room, providing additional staff, paying scrupulous attention to hand washing and thermometer handling, and encouraging breast feeding, succeeded in controlling the outbreak within a relatively short period.

Kanamycin and Tetracycline were given to our patients in spite of the fact that Neomycin and Colistin are considered the most suitable drugs for *E. coli* infection. Until now there has been no agreement yet about the role of antibiotics. Antibiotics are not uniformly effective in the treatment of *E. coli* diarrhea. In *E. coli* gastroenteritis rapid development of resistance to antibiotics should be taken into consideration. Thus, constant surveillance of susceptibility of *E. coli* in neonatal infection to antibiotic is very important.

The effectiveness of the drug seems to be related to the strain of microorganism, the place and the time of disease outbreak, the dose and the route of administration and the constitutional condition of the patient (South, 1971; McCracken, 1971; Nicopolous and Arseni, 1972).

We are therefore of the opinion that in spite of various antibiotics recommended, no single drug can be considered as the drug of choice for *E. coli* diarrhea. Identification of the causative strain followed by sensitivity test remains the gateway to adequate treatment.

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