Necrotizing Enterocolitis Among Newborn Infants Suffering from Gastroenteritis
A Clinical evaluation of 17 cases.

by

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Abstract

Seventeen infants with NNEC were evaluated. The diagnosis was based on clinical, laboratory and roentgenographic findings. Twelve out of them had a low birth weight (less than 2500 grams) and 5 were premature.

Since only 2 cases had asphyxia at 1 minute after birth, asphyxia apparently played only a small role as the perinatal factor in the development of NNEC. Beside gastro — enteritis, bronchopneumonia and meningitis were the accompanying diseases in 2 cases and 1 case respectively. Bacterial findings from the stool and cerebrospinal fluid were as follows:

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— *E. Coli* 0111 K 58 (b), 0126 K 71 (B) H2 were cultured from the stool of 7 infants.

— *Pseudomonas from cerebrospinal fluid* was found in 1 case.

Prior to the onset of symptoms, all of these infants were fed with milk formula. Therefore the authors believe that infections and formula feedings play an important role in the development of NNEC.

The survival rate of our cases was poor with 52% deaths (9 out of 17), and 2 of them had intestinal perforation. Anemia which develops rapidly should be taken into account in the management of NNEC.

**FIG. 1: Clinical Signs and Symptoms of 17 cases**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal distention</td>
<td>17</td>
</tr>
<tr>
<td>Gastric residual/vomiting</td>
<td>17</td>
</tr>
<tr>
<td>Lethargy</td>
<td>5</td>
</tr>
<tr>
<td>Apnea</td>
<td>7</td>
</tr>
<tr>
<td>Jaundice</td>
<td>12</td>
</tr>
<tr>
<td>Respiratory distress</td>
<td>9</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>9</td>
</tr>
<tr>
<td>Sclerema</td>
<td>9</td>
</tr>
</tbody>
</table>

### Radiological Investigations:

Radiological findings confirmed the clinical diagnosis.

Four radiological features may be found in NNEC, namely:

1. Intestinal distention with or without fluid levels.

   This evidence can be used as a warning sign in the development of pneumatosis, since it appears prior to the development of pneumatosis.

2. Pneumatosis.

   Sometimes it is very difficult to demonstrate intramural air which can be easily misinterpreted as stool mixed with air. Hence serial x-rays are advisable to confirm the clinical diagnosis. The appearance of pneumatosis in the form of linear or curvilinear streaks of air within the bowel wall is pathognomonic.

3. Pneumoperitoneum.

   Free peritoneal air can be seen in patients with intestinal perforation which varies from small volume seen only in erect position to a massive air appearance.


   Portal vein gas is an ominous radiological finding which can be considered as the terminal stage with a high mortality rate. Intestinal air enters the portal circulation through the necrotic intestinal mucosa. Death frequently occurs in
Twelve of 17 cases (70.6%) were low birth weight infants, weighing less than 2500 grams, whereas 5 of these were preterms. The birth weight of 3 of our cases born outside the hospital was unknown, but on clinical assessment they were found to be fullterm infants.

The age of onset or the age at which the clinical diagnosis was established varied from 4 to 18 days (mean: 10.9 days). It seemed that there was no correlation between birth weight and day of onset.

### Perinatal Conditions

There are many perinatal risk factors which have been reported and suspected of accounting for the development of NNEC. Among those factors in our cases were namely:

<table>
<thead>
<tr>
<th>Maternal factors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation: 1st</td>
</tr>
<tr>
<td>2 - 5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blood Pressure: Normal Hypertension (130/90)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
</tr>
<tr>
<td>6 cases</td>
</tr>
<tr>
<td>3 cases</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antenatal care: Unbooked infants</th>
</tr>
</thead>
<tbody>
<tr>
<td>bad antenatal care (1 - 3 antenatal visits)</td>
</tr>
<tr>
<td>good antenatal care</td>
</tr>
<tr>
<td>4 cases</td>
</tr>
</tbody>
</table>

| Anemia: Anemia with Hb less than 6 gm/100 ml | 1 cases       |
| Normal                                    | 16 cases      |

### Neonatal Factors:

- Gastroenteritis 17 cases
- Bronchopneumonia 2 cases
- Meningitis 1 cases
- Recurrent apnea 1 cases
- Apgar Score (1 minute)
  - 0 — 3 2 cases
  - 4 — 6 1 cases
  - 7 — 10 11 cases
  - unknown 3 cases
- Type of feeding:
  - human milk only —
  - human milk and bottle feeding 3 cases
  - bottle feeding 14 cases

All infants except 3 were fed with a milk formula prior to the development of the disease. In the history, inadequate breast milk or no production of breast milk were the main reasons for using bottle feedings.

### Clinical Signs and Symptoms

The disease was characterized by abdominal distention, prolonged gastric emptying, vomiting, lethargy, apnea, jaundice, respiratory distress, cyanosis, and sclerema. But all these clinical manifestations might not always be present in each case. However, abdominal distention and prolonged gastric emptying were always present in each of our cases. Apnea, cyanosis and sclerema were seen among severe cases.

### Necrotizing Enterocolitis

**Introduction**

NNEC is an acute and serious disease of newborns and young infants resulting in a high mortality rate, usually being diagnosed in its advanced stage, and it is primarily found among premature infants.

With the many publications of this disease having been reported there seems to be an increased frequency of it. This increase of frequency is probably not only related to a better recognition of it, but also to the enhanced practice of bottle feeding. This disease is characterised clinically by lethargy, irritability, prolonged gastric emptying with or without vomiting, abdominal distention, apneic episodes, and the passage of blood macroscopically or microscopically in the stools. Radiologically it is characterised by pneumo-intestinalis.

In advanced cases the infant may be in shock, with frequent apneic episodes, may have septicemia, and signs of intestinal perforation with peritonitis.

The etiology of this disease is still unknown, although many factors have been explained which account for its pathogenesis. Among those factors are: Infection (Mizrahi et al., 1965), Cow's Milk (Barlow et al., 1974), early feeding with Bottle Milk (Krouskop et al., 1974) hyperosmolar feedings (Book et al., 1976), and ischemia of the gastrointestinal tract (Tzulukian, 1976). The purpose of this paper is to report our experience with the epidemiological aspects, diagnosis, management, and outcomes of 17 cases.

### Material and Methods

From December 1975 to September 1977, there were 17 newborns, being diagnosed as NNEC in the neonatal intensive-ward, Gunung Wenang Hospital, Manado, Indonesia. (Abbreviation used: NNEC: Neonatal Necrotizing Enterocolitis).

### Clinical Diagnosis

The clinical diagnosis was based on the following criteria:

1. Clinical Findings:
   - lethargy
   - slight or severe abdominal distention and ileus
   - apneic episodes
   - bloody stools or positive guaiac test,

2. Radiographic Findings:
   - Radiological findings confirmed the clinical diagnosis of NNEC
   - Radiological findings may be pneumo-intestinalis, and a dynamic ileus with or without pneumoperitoneum or pneumoportalis.

### Management

When the clinical diagnosis of NNEC was established, the management consisted of the following procedures:

1. Shock therapy was instituted, if a patient was in shock by using a mixture of electrolytes in dextrose 5% with a composition as follows:
— Na⁺ — 2 mg/100 ml
— K⁺ — 2 mg/100 ml
— Cl⁻ — 4 mg/100 ml

2. Intravenous feedings of ½ strength aminofusin 600 in dextrose 10% at the rate of 140 ml/kg body weight/day which is the equivalent of 100 cal/kg body weight/day.

Oral feedings were ceased for 3-5 days.

This solution provided the nutrients as follows:

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>amount/kg body weight in 140 ml/kg b.w./day</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL Isoleucine</td>
<td>240 mg</td>
</tr>
<tr>
<td>L Leucine</td>
<td>168 mg</td>
</tr>
<tr>
<td>L Lysine</td>
<td>140 mg</td>
</tr>
<tr>
<td>DL Methionine</td>
<td>210 mg</td>
</tr>
<tr>
<td>DL Phenyl alanine</td>
<td>280 mg</td>
</tr>
<tr>
<td>DL Threonine</td>
<td>140 mg</td>
</tr>
<tr>
<td>DL Tryptophane</td>
<td>70 mg</td>
</tr>
<tr>
<td>DL Valine</td>
<td>224 mg</td>
</tr>
<tr>
<td>L Arginine</td>
<td>448 mg</td>
</tr>
<tr>
<td>L Histidine</td>
<td>70 mg</td>
</tr>
<tr>
<td>DL Alanine</td>
<td>420 mg</td>
</tr>
<tr>
<td>Glycine</td>
<td>980 mg</td>
</tr>
<tr>
<td>L Proline</td>
<td>140 mg</td>
</tr>
</tbody>
</table>

Total amino acid 3.5 gm/kg body weight/day

B. Carbohydrate (gm/100 cc)
— Sorbitol | 5 |
— Glucose | 10 |

C. Vitamins (mg/100 cc)
— Ascorbic acid | 20 |
— Inositol | 25 |
— Nicotinamide | 3 |
— Pyridoxine HCL | 2 |
— Riboflavine 5 phosphate Sodium | 0.12 |
— Rutin | 10 |

D. Electrolyte (meq/l)
— Na⁺ | 17.5 |
— K⁺ | 12.5 |
— Mg⁺⁺ | 2.5 |
— Acetate | 17.5 |
— Malate | 11 |
— Cl⁻ | 19 |

2. Parenteral antibiotics:
— Ampiclox: 100 mg/kg body weight/day administered intravenously in divided doses.
— Garamycin: 8 mg/kg body weight/day in divided doses.

3. Blood transfusion if necessary

4. After improvement of clinical and radiological findings, and negative guaiac test, gradual oral feedings are then begun concomitantly with the reducing of IVFD. Breast feeding was encouraged in all patients when deemed advisable. Oral feeding was started at the rate of 20 ml/kg body weight/day and by the 5-7th day the average daily intake of 120 cal/kg body weight, Apgar score, gestational age, and types of feeding were recorded.
Twelve of 17 cases (70.6%) were low birth weight infants, weighing less than 2500 grams, whereas 5 of these were preterms. The birth weight of 3 of our cases born outside the hospital was unknown, but on clinical assessment they were found to be fullterm infants.

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| **Jaundice** | 12 |
| **Respiratory distress** | 9 |
| **Cyanosis** | 9 |
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Number of cases

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   Portal vein gas is an ominous radiological finding which can be considered as the terminal stage with a high mortality rate. Intestinal air enters the portal circulation through the necrotic intestinal mucosa. Death frequently occurs in
infants with portal vein gas finding. The cause of this death is septicemia due to gram negative organism. (Insert figure 2 and 3).

Radiological investigations among our 17 cases were as follows:
Pneumointestinalis 17 cases
Pneumoperitonum 2 cases

Portugal vein gas 4 cases

All of our cases with pneupertoneum and portal vein gas died.

Stool cultures were done in all patients and yielded E. coli pathogens in 7 cases. Pseudomonas was found in the cerebrospinal fluid and stool culture of one infant.

<table>
<thead>
<tr>
<th>Case</th>
<th>B.W.</th>
<th>Gestational age</th>
<th>Onset of disease</th>
<th>Hb (gm/100 ml)</th>
<th>Thromb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. F</td>
<td>2100</td>
<td>38 — 40 weeks</td>
<td>18 days</td>
<td>9.8</td>
<td>114,000</td>
</tr>
<tr>
<td>2. F</td>
<td>1360</td>
<td>30 — 32</td>
<td>5</td>
<td>10.8</td>
<td>180,000</td>
</tr>
<tr>
<td>3. M</td>
<td>2760</td>
<td>38 — 40</td>
<td>15</td>
<td>8.2</td>
<td>197,000</td>
</tr>
<tr>
<td>4. M</td>
<td>2560</td>
<td>38 — 40</td>
<td>10</td>
<td>13.6</td>
<td>222,000</td>
</tr>
<tr>
<td>5. F</td>
<td>2100</td>
<td>36 — 38</td>
<td>8</td>
<td>13.6</td>
<td>210,000</td>
</tr>
<tr>
<td>6. M</td>
<td>2230</td>
<td>38 — 40</td>
<td>10</td>
<td>10.8</td>
<td>184,000</td>
</tr>
<tr>
<td>7. F</td>
<td>1770</td>
<td>36 — 38</td>
<td>12</td>
<td>12</td>
<td>186,000</td>
</tr>
<tr>
<td>8. M</td>
<td>2750</td>
<td>38 — 40</td>
<td>15</td>
<td>8</td>
<td>96,000</td>
</tr>
<tr>
<td>9. F</td>
<td>2450</td>
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<td>8</td>
<td>11</td>
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<td>195,000</td>
</tr>
<tr>
<td>13. F</td>
<td>2280</td>
<td>38 — 40</td>
<td>10</td>
<td>10.5</td>
<td>156,000</td>
</tr>
<tr>
<td>14. M</td>
<td>1600</td>
<td>34 — 36</td>
<td>7</td>
<td>10.8</td>
<td>196,000</td>
</tr>
<tr>
<td>15. F</td>
<td>3000</td>
<td>38 — 40</td>
<td>8</td>
<td>8</td>
<td>125,000</td>
</tr>
<tr>
<td>16. M</td>
<td>2100</td>
<td>38 — 40</td>
<td>18</td>
<td>13.5</td>
<td>230,000</td>
</tr>
<tr>
<td>17. F</td>
<td>2820</td>
<td>38 — 40</td>
<td>4</td>
<td>6</td>
<td>54,000</td>
</tr>
</tbody>
</table>

Discussion

Anemia and thrombocytopenia can be easily seen among severe cases. However, it seems that there is no correlation between Hb concentration with birth weight, and gestational age.

The etiology of NNEC is still obscure and is considered to be multifactorial with many predisposing factors including low birth weight infant, particular-
ly prematurity (Hopkins et al., 1970; Frantz et al., 1975; Denes et al., 1970; Book et al., 1976, 1976a, 1976b), bottle feedings (Kroupkop et al., 1974; Bell et al., 1971) hyperviscosity syndrome (Leake et al., 1975), and umbilical catherization (Hopkins et al., 1970).

Hypoxia or ischaemic injury of the bowel wall (Touloukian et al., 1972; Barlow et al., 1974; Santuli et al., 1975), direct injury of the mucosal wall by hyper — osmolar feeding (Nasraallah et al., 1968; De Lemos et al., 1974; Book et al., 1976), and infection with gram negative microorganisms such as Salmonella (Stein et al., 1972); Klebsiella (Hill et al., 1974), Pseudomonas aeroginosa (Santuli et al., 1975), and E. Coli (Speer et al., 1976), have been suggested as etiological factors.

The current most acceptable theory of the pathogenesis is hypoxia which evokes a reflex resulting redistribution of blood, shunted away from less vulnerable organs like the mesenteric, the renal and the peripheral vascular bed to the first class organs (the brain and the heart) which would suffer irreversible damage if deprived of adequate perfusion.

The mucosal cells, which are highly sensitive to ischaemia, stop secreting protective mucous. Hence, proteolytic autodigestion of the mucosa occurs.

Once the integrity of mucus is broken, it will be invaded by gas forming micro organisms. Bacteria are absorbed into the lymphatics and into the radicles of the portal venous system, leading to overwhelming sepsis and death (Touloukian et al., 1967; Barlow et al., 1974).

From our observation it can be seen that diarrhea, bottle feeding and infection are the most important multiple factors responsible for the development of NNEC. It is also thought that low birth weight infants born from mothers with hypertension and poor antenatal care, and infants with pneumonia were predisposed to the development of NNEC.

All our cases prior to the development of diarrhea received bottle feedings, and out of 17 cases in which a stool culture was made, 10 were found to contain E. Coli and Pseudomonas.

The role of bottle feedings in the development of NNEC may be as follows:


2. Although the prevalence of protein in milk allergy is very low, less than 1% (Lembthal, 1975), it cannot be eliminated as a factor which cause diarrhea in our cases. As far as we know there is no publication on the prevalence of protein allergy among neonates in Indonesia.

3. Formula feeding lack protective factors such as IgA, IgG, active lymphocyte and macrophages, specific antibodies against many types of organisms (especially the most important bacterial pathogen of the neonate E. Coli), growth enhancer of gram positive lactobacilli,
an anti staphylococcal agent, lysozyme and lactoferrin (Goldman and Smith, 1973; Burlow et al., 1974). Therefore in premature infants where enteric immnunity is still immature, formula feedings will cause overgrowth of enteric bacteria. The clinical onset of NNEC is varied from an insidious onset with increasing gastric retention of food and occult blood in stools, developing over several days, to a fulminating course within a few hours with lethargy, abdominal distention and peritonitis.

Figure 1 shows a variety of clinical signs and symptoms; abdominal distention, prolonged gastric residue and lethargy were the main clinical signs and symptoms of our cases.

Our criteria for the diagnosis of NNEC in this evaluation were too strict, whereas x-ray examination required pneumointestinalis and/or pneumoperitoneum and portal vein gas. Hence this may be one of the causes of our delay in making an early diagnosis, with the result that the vast majority of our cases, 9 out of 17, were severe with frequent apnea, cyanosis, lethargy and sclerema. Anemia and thrombocytopenia were also encountered among our severe cases.

In an attempt to prevent severe cases and to reduce the mortality rate, an accurate early diagnosis should be made. Book et al. (1976), found that in testing stools from one day to four days prior to the onset of NNEC, 71% of the cases showed reducing substances to be strongly positive. In the authors' opinion, a neonate with diarrhea, especially of low birth weight, who has abdominal distention, a positive guaiac test, and positive reducing substances in the stool with unspecified radiological findings in the x-ray such as a foamy appearance or a bowel distention should be treated as a NNEC. A series of x-ray and blood examinations are advisable for detecting the progression of the disease.

Portal vein gas was first reported by Wolfe and Evans in 1955. Since then this finding has been widely reported by Goldstein et al., 1966, Touloukian et al., 1967; Stevenson et al., 1971; Miskin and Reilly 1969; and Yu et al., 1977), and suggested to be the ominous sign. (Wilson and Wooley 1969; Hopkins et al., 1970). Six of our cases with portal vein gas, accompanied by severe clinical symptoms and signs such as frequent apnea, cyanosis, lethargy and sclerema, died.

The management of all of our cases was mainly only conservative treatment by withholding oral feeding, institution of parenteral feedings and administration of antibiotics intravenously, the outcome of this regimen was rather poor where 9 out of 17 cases (51%), died.

Although some of our cases were absolutely surgically indicated such as perforation (Touloukian et al., 1967, Stevenson et al., 1971), sudden clinical deterioration or the obvious progressive clinical course of the disease (Stevenson et al., 1971), because of a lack of neo-

so that breast feeding programme and family planning could go together perfectly.

Beside that the member of low income mothers who did not join the family planning (54%) shown in table 9 must be underlined although we are grateful for the increases of family planning acceptors which are being reported by medical personnel everywhere.

As a conclusion we recommend:

1. The attitude of the medical personnel and fasting policy for the baby after birth must be revised or changed.

REFERENCES


early breast feeding (2-3 hours) by the medical personnel is correct (10%) and it must be imitated intensively. Regular campaigns have to be made for this key persons. (Doctors and midwife in the hospital or midwifery).

After one year breast feeding campaign in Jakarta, it is shown that the number of mothers who want to give breast feeding has increased. For example from 66.4% to 88% (Table 3), from 17.7% to 72.7% (6 months), from 10% to 66% (9 months), 0.8% to 32.1% (12 months). Even until 18 months there were 10.3%, 1.7% until 24 months and the longest was 2.5 years by one mother. High and middle income group show a rather better attitude in which half of them are still giving breast feeding until 6 months although only 10% until 1 year old. Willingness and/or working mothers are the main reasons to stop breast feeding.

In low income mothers the factors to stop breast feeding are more complicated. Usually caused by factors which are out of mother's capability. But it could be solved by health education and changing the attitude of medical personnel (7.4%) in the hospital or midwifery.

Lopez (1979) said that the role of medical personnel (midwife, nurses and home visitors) are important for mother's decision of giving breast feeding. A special mother's room in public buildings (station, airport, market, plant, office, hospital and others) must be considered, because 68% of high income group mothers do not want to give breast feeding in public (Table 5a). The attitude of mothers to understand and to give breast milk is good (Table 5b and 5c) but the important thing is to do it by themselves. Generally (52.5%) the mother gives solid food earlier (3-6 months) as shown in Table 5 while the policy of the pediatric department is 5-6 months.

In the low income group or in the rural areas, additional food is given earlier as we can see in this study that there was a baby who was given banana when he was still 7 days old.

Table 7 shows that in most cases banana is the first additional food. The solid food which is popular is rice porridge although the pediatricians always suggest milk porridge or steamed rice.

The pediatricians must keep this fact and change their way of thinking about infant feeding, according to the society factor and use the most wellknown local resources. For using solid food the influence of industrial plants (S.N.M. 7.8%) seems greater than pediatricians suggestions, (milk porridge 5.2% and steamed rice 4.2%).

Very interesting is that low income mothers prefer IUD to the pill or other family planning methods, although the middle and high income mothers prefer the pill. Considering that in Indonesia 95% are of the low income group and most of them prefer IUD than the pill, the use of IUD as a family planning method would increase in the future surgical facilities in our hospital, surgical intervention could not be conducted. Looking back to our severe cases, we felt that early surgical intervention before becoming moribund, where the infant was too ill to be operated upon, was absolutely necessary. The mortality rate can be reduced by conducting early surgical intervention among indicated cases. (Wayne et al., 1975; Touloulkian 1976). Parenteral feeding may not be overlooked in the management of NNEC, because the infusion of amino acids can deteriorate the infant condition particularly among low birth weights, whose activities of certain amino acids will be imbalanced and elevated which may have harmful effects.

Our infusion which contain a higher concentration of amino acids compared to the advisable requirements (Fomon, 1974), particularly proline and cystein are a high risk as they frequently develop into metabolic complications. However, during these observations we did not see any complication as the result of parenteral feedings. This may be because our intravenous feeding procedures were too short to develop any complications, and because of the highly caloric contents of our infusates. But, further study of this solution is needed to find out the effect of short term parenteral feeding, compared to the low concentration of amino acids.

REFERENCES


The reasons for not joining family planning:

- Have only a few children 25%  
- Afraid 15%  
- The breast milk become worse 7.5%

Told by the health centre personal that it was not good (?) 25%  
No reason 50%  

**Table 10: The most popular family planning method (101 mothers — Cipto Mangunkusumo Hospital — Jakarta — 1978)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Method</th>
<th>Income group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High and middle (16)</td>
</tr>
<tr>
<td>1.</td>
<td>I.U.D.</td>
<td>25%</td>
</tr>
<tr>
<td>2.</td>
<td>Pill</td>
<td>43.8%</td>
</tr>
<tr>
<td>3.</td>
<td>Calendar system</td>
<td>25%</td>
</tr>
<tr>
<td>4.</td>
<td>Condom</td>
<td>—</td>
</tr>
<tr>
<td>5.</td>
<td>Other:</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Sterilisation</td>
<td>6.2%</td>
</tr>
<tr>
<td></td>
<td>Diaphragm</td>
<td>—</td>
</tr>
</tbody>
</table>

**Discussion**

Table 1 shows that high income mothers gave breast feeding more than 4 hours after delivery and more than half gave it 24 hours after delivery. On the other hand the low income mothers gave earlier, one at 2 hours after birth, 8 at 4 hours and almost half (48.1%) before 12 hours. So filling immunity gap of the intestine by breast milk is better in the low income group. If we are only concerned about the immunity problem, the Necrotizing Enterocolitis problem is more serious in the high income group. Based on this data, the attitude of medical personnel (midwifery or hospital) and their policy or procedure to fast babies for 6 - 12 hours must be changed.

Indirect influence (table 2) of industrial milk have to be changed too. During the pregnancy the care of the breasts must be done to get a better production of breast milk. (Table 2; 27.5% because no breast milk). Suggestion to give
TABLE 8: The main reason why breast feeding is better than artificial milk. 176 mothers
Cipto Mangunkusumo Hospital — Jakarta, 1978

<table>
<thead>
<tr>
<th>No.</th>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Breast feeding is the best and it contained complete materials and vitamins which are needed for growing.</td>
<td>23.9% (= 42)</td>
</tr>
<tr>
<td>2.</td>
<td>Breast milk is more healthy, contained antibodies, is sterile and seldom causes diarrhea.</td>
<td>15.9% (= 28)</td>
</tr>
<tr>
<td>3.</td>
<td>Breast feeding is more practical, easy to get and present no problem.</td>
<td>11.2% (= 20)</td>
</tr>
<tr>
<td>4.</td>
<td>Breast feeding is more economical on the other hand artificial milk is expensive.</td>
<td>10.2% (= 18)</td>
</tr>
<tr>
<td>5.</td>
<td>Love and tenderness between mother and child are more expressive.</td>
<td>9.7% (= 17)</td>
</tr>
<tr>
<td>6.</td>
<td>The breast milk’s temperature is stable and fit.</td>
<td>13 (7.4%)</td>
</tr>
<tr>
<td>7.</td>
<td>Guaranteed that it is clean.</td>
<td>12 (6.8%)</td>
</tr>
<tr>
<td>8.</td>
<td>The children grow better with breast milk.</td>
<td>11 (6.3%)</td>
</tr>
<tr>
<td>9.</td>
<td>Breast milk is a nature, original and pure material.</td>
<td>7 (4.0%)</td>
</tr>
<tr>
<td>10.</td>
<td>(1) Breast milk never became sour.</td>
<td>3 (1.7%)</td>
</tr>
<tr>
<td></td>
<td>(2) It is made directly from mother’s blood.</td>
<td>3 (1.7%)</td>
</tr>
<tr>
<td></td>
<td>(3) The baby does not want artificial milk.</td>
<td>1 (0.6%)</td>
</tr>
<tr>
<td></td>
<td>(4) Artificial milk is cow’s milk.</td>
<td>1 (0.6%)</td>
</tr>
</tbody>
</table>

TABLE 9: Family Planning (101 mothers — Cipto Mangunkusumo Hospital Jakarta 1978)

<table>
<thead>
<tr>
<th>Income group</th>
<th>Family planning +</th>
<th>Family planning —</th>
</tr>
</thead>
<tbody>
<tr>
<td>High and middle (16)</td>
<td>93.8%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Low (85)</td>
<td>45 %</td>
<td>54.1%</td>
</tr>
</tbody>
</table>


