Faecal Contamination of Feeding Bottles Contents, Among Artificially Fed Children

Abstract: This study was carried out to investigate the bacterial contamination of feeding bottles contents in artificially fed children presenting with diarrhoea at the Paediatric outpatient clinic in Khartoum Hospital.

Methods: Hundred bottle fed infants presenting with diarrhoea were included in the study. Specimens were collected from the contents of the feeding bottles and the faeces of children.

Results: Hundred and ten bacterial species were isolated from the contents. E. coli was the commonest isolate [33 (30%)]. Different other bacterial species were also isolated with very high count (1X10⁶ - > 15X10⁵/ml). Twenty one enteric pathogens were isolated from the stool specimens [Enteropathogenic E. coli (7) and Shigella species (14)]. The antibiotic sensitivity of the E. coli and Shigella species showed high resistance to co-trimoxazole (57.5%, 53.3% respectively) and to co-amoxiclav (85% - 53.3% respectively).

Conclusion: Awareness to the hazards of the feeding bottles among the community should be raised and breast feeding should be encouraged.

Key words: diarrhea, enteric pathogens, E. coli.
in sterile physiological saline (1/10, 1/100, 1/1000). All original and diluted samples were cultured on blood agar, Mc Conkey agar and nutrient agar plates. The stool samples were cultured on Mc Conkey agar, xylose lysine de-oxycholate (XLD) agar and selenite F broth. All inoculated media were incubated at 37 °C. After an overnight incubation, the growth was examined and identified using staining methods, biochemical testing and serological tests, whenever indicated. Antimicrobial sensitivity testing was done for the isolated enteric pathogens using modified Kirby – Bauer method15. The antibiotics used were cephalexin (30 µg), nalidixic acid (30 µg), gentamicin (10 µg), co-trimoxazole (25 µg) and co-amoxiclav (38 µg).

**Results:**

Different types of contents were noticed in the feeding bottles (45 water with sugar, 33 juices and 22 milk). High bacterial counts were detected in all types of contents (table 1).

**Table 1:** Relationship between bottle contents and the bacterial count.

<table>
<thead>
<tr>
<th>RBC</th>
<th>Bottle Content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Milk</td>
</tr>
<tr>
<td>1 – 1X10⁶</td>
<td>7</td>
</tr>
<tr>
<td>1.1 – 5X10⁶</td>
<td>5</td>
</tr>
<tr>
<td>5.1 – 10X10⁶</td>
<td>3</td>
</tr>
<tr>
<td>15X10⁶</td>
<td>1</td>
</tr>
<tr>
<td>&gt;15X10⁶</td>
<td>6</td>
</tr>
</tbody>
</table>

RBC= Range of Bacterial Count.
WWS= Water with Sugar.

**Table 2:** The antibiotic susceptibility of the isolated enteric pathogens.

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>E. coli (40)</th>
<th>Shig. spp. (15)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensitive</td>
<td>Resistant</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>18 (45%)</td>
<td>22 (55%)</td>
</tr>
<tr>
<td>Co-trimoxazole</td>
<td>17 (42.5%)</td>
<td>23 (57.5%)</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>38 (95%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td>Nalidixic acid</td>
<td>32 (80%)</td>
<td>8 (20%)</td>
</tr>
<tr>
<td>Co-amoxiclav</td>
<td>6 (15%)</td>
<td>34 (85%)</td>
</tr>
</tbody>
</table>

The total bacterial isolates from the contents of the bottles were 110. Some of the specimens yielded more than one bacterial species. The types of the bacteria isolated were as follows: E. coli 33 (30%), Strep. Faecalis 19 (17.3%), Enterobacter spp. 16 (14.5%), Cedaceae daviseae 9 (8.2%), Klebsiella spp. 7 (6.4%), Staph. Aureus 7 (6.4%), Candida spp. 6 (5.5%), Proteus spp. 4 (3.6%), Pseudomonas spp. 3 (2.7%), Citrobacter spp. 3 (2.7%), S. Cholerae suis 2 (1.8%) and Shigella flexeri 1 (0.9%).

The enteric pathogens isolated from the stool specimens were: Enteropathogenic E. coli (7), Shigella flexeneri (9), Shigella dysentriae (3), Shigella boydii (1) and Shigella sonnei (1).

The antibiotic susceptibility of E. coli isolates and Shigella spp. showed moderate resistance to co-trimoxazole and co-amoxiclav, (table 2).

**Discussion:**

Bottle feeding plays a major role in diarrhoeal diseases and malnutrition in young children. It is rather difficult to prevent bacterial contaminations of the feeding bottle contents during preparation and handling. Poor hygiene practices further exaggerate the problem. The samples tested in this study were derived from both bottles content and the stool from the infected infants. E. coli (30%), was the commonest isolate from the bottles content. It is the common known indicator of fecal contamination of water supplies. Its presence indicates unsafe water for consumption by human beings16. Enteropathogenic E. coli and Shigella spp. were isolated from the stool of the targeted
infants, proving that fecal contamination of the bottles content plays a major role in the exposure to enteric pathogens. Similar results were reported from Saudi Arabia, Bengal, South Africa, Netherland and Brazil where Enteropathogenic E. coli and Shigella spp. were found to be the commonest cause of diarrhoea in children\textsuperscript{17-21}. Antibiotic sensitivity of the isolated enteric pathogens revealed resistance to the commonly used antibiotics in accordance to other findings\textsuperscript{22, 23}. The exposure of the children to bacterial strains carrying resistance to the commonly used antibiotics will lead to the colonization by such organisms. This will divert the prescriptions towards more potent and expensive antibiotics in the future.

**Conclusion:**

In conclusion, bottle feeding has a negative impact on infants’ health by enhancing the spread of enteric pathogens causing diarrhoeal diseases. Health education of the public should be adopted to increase the awareness of the danger of feeding bottles and to encourage breast feeding as the natural safe procedure.

**References:**

18. Dutta S, Mondal S K, Saha M R et al. Isolation of E. coli to detect faecal contamination of infant and their mothers in west Bengal. Department of Microbiology and Epidemiology, National Institute of Cholera and Enteric Diseases, 1995