Short Communication

Do Baby Wet Wipes Change Periurethral Aerobic Flora?

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SUMMARY: There is massive enteric bacterial colonization in the periurethral region during infancy. Fecal soiling is considered to be responsible for this colonization. We hypothesized that baby wet wipes containing chemical cleansing compounds, which are used for the cleaning of babies after diaper soiling, could be a contributing factor in this colonization. Thus, the effect on periurethral flora of two different methods of baby cleaning was compared. Periurethral culture samples were obtained from 173 infants who were cleaned with baby wet wipes (Group A, n = 96) or water and napkins (Group B, n = 77) after diaper soiling. The colonization of uropathogens and the presence of flora were analyzed. The results of the periurethral cultures were similar in both groups. The rates of uropathogen colonization only, uropathogen and skin flora colonization, and skin flora only or no growth in Groups A and B were 18.7, 61.5, and 19.8%, and 14.3, 66.2, and 19.5, respectively. The differences between the groups were statistically insignificant (P > 0.05); however, there was no significant difference in the frequency of uropathogen isolation between males and females. We therefore concluded that baby wet wipes are as safe as water for the cleaning of babies after diaper soiling.

The normal flora of skin and mucosal surfaces provide a natural defense against colonization with new infectious agents. The periurethral region (PR) becomes colonized with aerobic and anaerobic microorganisms that appear to function as a natural barrier against colonization by uropathogens (1). Massive colonization of uropathogens in the PR of both sexes during infancy has been reported in several studies (2-5). Fecal soiling is considered to be the cause of colonization. Generally, baby wet wipes (BWW) containing chemical compounds are used for cleaning of babies after diaper soiling; thus, the PR is frequently exposed to the chemical compounds in BWW. We hypothesized that frequent exposure to the chemical compounds in BWW may contribute to uropathogen colonization in the PR. Therefore, we planned this study and cultured the samples obtained from the PR in male and female infants using either BWW or water for cleaning, and we then compared the results regarding uropathogens.

With the informed consent of the parents, periurethral cultures were taken from 173 healthy infants aged between 1 and 24 months who were cleaned with either BWW (n = 96) or water and napkins (n = 77). None of the infants had taken any antibiotics for at least 3 weeks before the culture sampling. Group A included infants cleaned with BWW (50 girls, 46 boys), and infants cleaned with water and napkins comprised Group B (42 girls, 35 boys). All infants in Group A were cleaned with the same brand of BWW. All of the male infants were uncircumcised. The chemical ingredients of BWW (Uni WipesTM, Istanbul, Turkey) were propylene glycol, polyethylene glycol-7-glyceryl cocoate, cetrimonium chloride, polyoxypropylene glycol-1, polyethylene glycol-9 lauryl glycol ether, and cocaoamidopropyl betaine. These compounds are not antiseptics, but are chemical cleansing agents. The samples were immediately inserted in modified Stuart's transport medium (Gul Biyoloji Laboratuvarı [GBL], Istanbul, Turkey). They were inoculated in 5% sheep blood agar (GBL), eosin-methylene blue agar (GBL), and Sabouraud dextrose agar (GBL), and incubated at 37°C for 24-48 h in aerobic conditions. After the incubation period, organisms were identified by classical microbiological methods and API systems (BioMerieux, Marcy l’Etoile, France). Isolation of enteric Gram-negative bacteria, Enterococcus spp., Staphylococcus aureus, and Candida albicans were accepted as uropathogen colonization. Alpha hemolytic Streptococci, coagulase-negative Staphylococci, and Lactobacillus were accepted as skin flora at PR.

In Groups A and B, 59 (61.5%) and 51 (66.2%) of periurethral cultures, respectively, had uropathogens with skin flora and there was no significant difference between the groups (P > 0.05) (Table 1). In Group A, 18 (18.7%) infants had only uropathogen isolation, whereas in Group B 11 (14.3%) did (P > 0.05). According to gender, there was no difference between the groups in the isolation frequency of uropathogens (Table 1). Enteric Gram-negative bacteria (Escherichia coli, Klebsiella spp., Proteus spp.) were the most commonly isolated microorganisms in both groups (56.2% in Group A and 49.3% in Group B), and there was no significant difference (P > 0.05) (Table 2). Staphylococci were the second most commonly isolated microorganism in both groups (16.6% in Group A and 23.3% in Group B), and there was no significant difference (P > 0.05). Furthermore, enteric Gram-negative bacteria and Staphylococci were the most commonly isolated microorganisms in girls and boys, and there was no significant difference between the groups according to gender (P > 0.05) (Table 2).

Infants in each group were divided into subgroups according to their age (1-6 months [A1, B1], 7-12 months [A2, B2], and 13-24 months [A3, B3]), and no difference were found between the groups in the isolation frequency of uropathogens (82.3, 70.0, and 85.8% in Subgroups A1, A2, and A3, respectively and 85.7, 80.0, and 72.7% in Subgroups **TABLE 1**

<table>
<thead>
<tr>
<th>Group</th>
<th>Uropathogen Isolation</th>
<th>Skin Flora</th>
<th>No Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>18 (18.7%)</td>
<td>14 (14.6%)</td>
<td>64 (66.2%)</td>
</tr>
<tr>
<td>Group B</td>
<td>11 (14.3%)</td>
<td>20 (26.3%)</td>
<td>40 (52.6%)</td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>Group</th>
<th>Enteric Gram-negative Bacteria</th>
<th>Staphylococci</th>
<th>Lactobacillus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>35 (36.2%)</td>
<td>27 (28.4%)</td>
<td>19 (20.0%)</td>
</tr>
<tr>
<td>Group B</td>
<td>24 (31.2%)</td>
<td>18 (23.1%)</td>
<td>19 (24.7%)</td>
</tr>
</tbody>
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B1, B2, and B3, respectively). There was no difference in isolated bacteria in the subgroups of Group A, and enteric Gram-negative bacteria were the most commonly isolated organisms (56.4, 55.0, and, 57.1% in Subgroups A1, A2, and A3, respectively). Also, in Subgroups B1 and B2, there was no difference in isolated bacteria, and enteric Gram-negative bacteria were the most commonly isolated organisms (57.1 and 60.0% in Subgroups B1 and B2, respectively): but, in Subgroup B3, Staphylococci were the most common isolated organism (40.9%), and enteric Gram-negative bacteria (27.2%) were cultured at a lower rate than in Subgroups B1 and B2 ($\chi^2 = 6.05$, $P = 0.048$).

The PR becomes colonized with aerobic microorganisms after birth. During the first 6 months of life, a massive enteric bacterial flora is established in the PR of both sexes (2). The number of bacteria begins to decrease substantially in later infancy. This enteric bacterial colonization may be due to fecal soiling and the immune system. As the child grows and acquires control of the anal and bladder sphincters, fecal contamination is reduced. Also, as boys get older, the foreskin becomes more easily retractable and this decreases bacterial exposure. As the child grows, the bacterial content of the PR resembles the normal skin flora and growth of aerobic cultures may not occur (5).

BWW are generally preferred by mothers for cleaning of babies. The use of antibiotics and antiseptics can alter periurethral flora (1,6,7). Therefore, we planned this study to investigate the possible correlation between exposure to the chemical cleansing compounds found in BWW and changes in infantile periurethral flora. Our results showed that there was no difference in the isolated bacteria and their frequency of occurrence between Groups A and B. There was a high isolation rate of uropathogens in both groups; 80.2% in Group A and 80.5% in Group B. Skin flora without uropathogens or no growth were found in 19.8% and 19.5% of the cultures in Groups A and B, respectively. The colonization of enteric bacteria in both groups was frequent. These findings are in agreement with those of previous studies (2-5). We included both female and male infants in the study. The preputial sac can act as a reservoir for uropathogens (3,8), but the frequency of the isolated bacteria was similar in both genders. According to our findings, we can say that the adhesion of uropathogens to the PR of girls is similar to that of the preputial sac. The frequency and quantity of the uropathogens in the PR diminish substantially as children grow (2,3,5). We classified the infants into 3 groups; 1-6 months (excluded neonatal period), 7-12 months, and 13-24 months; however, we found that there was no difference between the groups in the frequency of uropathogen isolation. Yet, the frequency rate of enteric Gram-negative bacteria in Subgroup B3 was strikingly small.

In conclusion, the use of BWW for the cleaning of babies after diaper soiling was not found to affect uropathogen colonization and flora in the PR of the study infants. Therefore, BWW appear to be as safe as water for the cleaning of babies.

### REFERENCES