Brief Report: Adherence to Fluid Recommendations in Children Receiving Treatment for Retentive Encopresis

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Objective  Limited data are available regarding whether children being treated for retentive encopresis are adherent to recommendations to increase their daily fluid intake. The purpose of this study was to examine fluid adherence in children who received treatment for retentive encopresis.  Methods  A retrospective chart review was performed using diet diary data for 26 children (ages 3–12) who completed a group behavioral intervention for retentive encopresis.  Results  Mean daily intake of clear fluid increased significantly during treatment and children relied primarily on water and juice to make this dietary change. However, adherence rates to clear fluid goals were <50%.  Conclusions  Children’s increased clear fluid intake did not equate to high fluid adherence. Children’s high juice consumption is concerning as it could place them at risk for other negative health consequences. Future research should examine whether enhanced fluid education and use of behavior change strategies yield higher fluid adherence.

Key words  adherence; encopresis; nutrition.

Recommendations to increase clear fluids (noncaffeinated, nondairy drinks) are frequently included in multi-component treatments for retentive encopresis and attention to fluid intake is important given the combined effects of fluid and fiber on promoting regular, soft bowel movements (Felt et al., 2008; McGrath, Mellon, & Murphy, 2000; North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition, 2006). Specific fluid targets, adherence to these targets, and behavioral techniques to help families meet these goals are rarely reported. This makes it difficult to evaluate the efficacy of the goals and strategies used to target fluid intake as well as to draw conclusions about which fluids children might tolerate in large quantities. Few studies in the pediatric literature report on adherence to fluid recommendations, but it can be hypothesized that rates may be low given that adherence to food-based dietary recommendations is estimated to be under 50% (Quittner, Modi, Lemanek, Levers-Landis, & Rapoff, 2008).

By anecdotal parent report, we have learned that increasing children’s clear fluid intake is one of the most difficult components of the treatment and that children seemed to tolerate higher quantities of fluid if offered sweetened beverages (e.g., juice). In light of this feedback, we conducted an exploratory retrospective chart review to examine children’s adherence to our prescriptions regarding fluid type and quantity. We tested the following hypotheses: (a) children who participated in our group intervention would increase their intake of clear fluids from the first to last weeks of treatment, (b) children’s adherence to their prescribed clear fluid goals would be <50%, (c) children’s fluid intake would consist primarily of juice during the last week of treatment, and (d) children’s juice intake would exceed age-based guidelines for juice intake as outlined by the American Academy of Pediatrics (AAP; American Academy of Pediatrics, 2001).

Methods

This study was conducted at a large, Midwestern university medical center. The inclusion criteria were child age...
between 4 and 12, diagnosis of retentive encopresis, and participation in the group treatment from 2005 to 2007. Children were excluded if more than 2 days of diet diary data were missing in either the first or final weeks of treatment. Thirty-six medical charts were reviewed for inclusion in the study. Ten charts were eliminated due to missing data, yielding a final sample of 26 children (73% inclusion rate). Documentation of a waiver of informed consent was obtained from the University Institutional Review Board as daily diet diaries were collected as part of standard clinical care.

**Intervention**

Families completed either five group sessions over 6 weeks (younger children, 3–5 years) or six sessions over 7 weeks (older children, 6–11 years). Topics included the physiology of retentive encopresis, medication, fiber and clear fluids, toilet sits, and maintaining treatment gains. Children earned stickers for meeting treatment goals specific to toilet sitting, medication, and fiber targets and received prizes during group sessions if they met the weekly sticker goals (Opipari et al., 1999). Below, we present the treatment components related to children’s fluid intake. Readers are referred to the original publication for a complete description of the group treatment program (Opipari et al., 1999).

**Fluid Recommendations**

Education and treatment recommendations specific to fluid was covered in two sessions. In the first session, instruction focused on the importance of adequate fluid intake and how to identify clear fluids (i.e., noncaffeinated, nondairy drinks). Children also received their first clear fluid goal, which was twice the child’s age-based fiber goal: \[\text{age} + 5 \text{grams of fiber}] \times 2 \text{ (Felt et al., 2008).} 

Two weeks later, children received their second clear fluid goal, which was twice their new fiber target of \[\text{age} + 10 \text{ grams of fiber}] \text{.}

**Diet Recording**

Parents were taught how to complete diet diaries during the first session and kept these records for each day during the entire group treatment program. Feedback on self-monitoring efforts and graphs depicting children’s actual and average daily clear fluid intake for all previous weeks of treatment were provided to parents beginning in the third week.

**Data Analysis**

Fluid data were tabulated from children’s diet diaries. Statistical analyses were performed using SPSS statistical software (version 15, SPSS, Inc., Chicago, IL, USA) to test each of the study hypotheses. Analyses were conducted for the group as a whole, with the exception of Hypothesis 4 and exploratory paired sample t-tests, which were analyzed separately for the younger and older child groups. Effect sizes for all paired t-tests were calculated as outlined by Rosnow and Rosenthal (2005). Group means for children’s mean daily intake [total weekly intake/number of days of diet diary data provided] were tabulated for the first and final weeks of treatment for total clear fluid (all nondairy, noncaffeinated fluids) and also for the following individual fluid categories: water (tap water, bottled water, flavored water), juice (100% juice only), other clear fluids (fruit and non-100% juice drinks, lemonade, sports drinks, slurpees/slushees, fruit punch), milk (cow’s milk and soy milk), and soda (regular and diet).

To test Hypothesis 1, mean daily clear fluid intake from children’s first and last weeks of treatment was compared using a paired sample t-test. To test Hypothesis 2, adherence to fluid recommendations was examined on a weekly basis by comparing children’s mean daily clear fluid intake [total weekly clear fluid intake/number of days of diet diary data] to their individual clear fluid goals. Children were labeled adherent if their mean daily clear fluid intake was equal to or higher than their prescribed daily clear fluid goal. This calculation was performed for each of the four weeks that children were given clear fluid goals and group percent adherence was calculated by dividing the number of children who were adherent by the total number of children included in the study for each week of treatment. To test Hypothesis 3, children’s mean daily intake for each fluid category was compared for the final week of treatment. Finally, to test Hypothesis 4, children’s mean daily intake of juice was compared to the upper-limit values of the age-based guidelines for juice provided by the AAP for children ages 3–7 years and 8–12 years: 6 fluid ounces for children ages 3- to 6-years-old and 12 fluid ounces for children ages 8- to 12-years-old (AAP, 2001). Exploratory paired sample t-tests were performed for each separate fluid category in order to gain an appreciation of changes to children’s daily fluid intake patterns.

**Results**

Children in this study were 62% male, 85% White, had a mean age of 6 years (SD = 2 years), and had a mean body mass index (BMI) of 16.71 (SD = 1.76). Data regarding bowel movement functioning were available for 23 participants. Children’s stool frequency increased from 11.96 (SD = 7.4) to 16.13 (SD = 14.54) per week and frequency
of stools in the toilet increased significantly from 4.96 (SD = 3.65) to 9.17 (SD = 6.33) (t_{22, 23} = -3.37, p \leq .00) per week from pre- to post-treatment.

Comparison of Fluid Intake First to Last Week of Treatment

Consistent with Hypothesis 1, paired comparisons revealed that children’s mean clear fluid intake increased significantly from 16 fluid ounces during the first week of treatment to 24 fluid ounces during the last week of treatment (Table I; p \leq .001), reflecting a 30% increase in fluids.

Adherence to Clear Fluid Goals

Consistent with Hypothesis 2, results found that only 48% of children met their first clear fluid goal and only 20% of children met their second clear fluid goal. Specifically, children averaged a mean of two fluid ounces (SD = 10 ounces) less than their first goal and 10 fluid ounces (SD = 11 ounces) less than their second fluid goal.

Fluid Type

In opposition to Hypothesis 3, mean daily water intake was higher than mean daily juice intake for the sample during the final week of treatment (Table I). When examining changes in fluid intake from the first to final weeks of treatment, children significantly increased both their water and juice intake from the first to final weeks of treatment (both p \leq .05; Table I). When examined by age, younger children significantly increased their juice intake (p \leq .05) and older children significantly increased their water intake (p \leq .05).

Age-based Juice Guidelines

As predicted in Hypothesis 4, findings revealed an increase in the percent of children exceeding age-based guidelines for juice recommendations from 35% (n = 9) at the beginning of treatment to 46% (n = 12) at the end of treatment. When analyzed by child age, 46% of younger children (n = 6; children <7-years old) and 23% (n = 3) of older children exceeded age-based guidelines in the first week of treatment and this increased to 54% (n = 7) of younger children and 39% (n = 5) of older children during the last week of treatment.

Discussion

We describe adherence to clear fluid goals and changes in fluid intake patterns for 26 children who participated in a group treatment for encopresis. This is one of the few studies in the encopresis literature to discuss fluid adherence and adds to the small body of literature on healthy children’s fluid intake patterns, particularly their water consumption.

Our results that children were successful in increasing their clear fluid intake but generally did not achieve the minimum daily fluid intake recommended based on age-based fiber goals. In addition, children’s ability to meet fluid targets worsened as clear fluid goals increased. Children modified the type of fluid they consumed according to treatment recommendations, with the largest increases occurring in their daily intake of water and juice. However, children’s increase in juice intake was problematic because close to half of the sample met or exceeded the AAP age-based guidelines for juice during the last week of group treatment (AAP, 2001). Many children also consumed large quantities of other high-sugar, high-calorie liquids (e.g., fruit punch and sports drinks) in an effort to achieve their clear fluid goals. While increasing clear fluid intake may help to decrease symptoms of constipation, achieving this goal via greater intake of juice or other high-sugar, high-calorie drinks is not ideal given the increased risks for dental carries and becoming overweight.

### Table I. Changes in Daily Fluid Intake (Fluid Ounces) Across Treatment

<table>
<thead>
<tr>
<th>Fluid Type</th>
<th>First Week M (SD)</th>
<th>Last Week M (SD)</th>
<th>t-test</th>
<th>p</th>
<th>Effect size</th>
<th>CI (^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear fluid</td>
<td>15 (11) 23 (11)</td>
<td>-4.54 .00 .67</td>
<td>-11.11</td>
<td>-4.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>6 (6)</td>
<td>9 (8)</td>
<td>-2.62</td>
<td>.02 .46</td>
<td>-6.17 to -74</td>
<td></td>
</tr>
<tr>
<td>Juice</td>
<td>6 (4)</td>
<td>8 (6)</td>
<td>-2.42</td>
<td>.02 .43</td>
<td>-4.95 to -39</td>
<td></td>
</tr>
<tr>
<td>Other CF(^b)</td>
<td>3 (4)</td>
<td>4 (6)</td>
<td>-8.24</td>
<td>.00 .16</td>
<td>-2.64 to 1.13</td>
<td></td>
</tr>
<tr>
<td>Soda</td>
<td>2 (3)</td>
<td>2 (4)</td>
<td>-1.44</td>
<td>.16 .28</td>
<td>-1.69 to 0.30</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>6 (4)</td>
<td>5 (5)</td>
<td>-0.86</td>
<td>.42 .17</td>
<td>-1.13 to 2.77</td>
<td></td>
</tr>
<tr>
<td><strong>Younger children</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear fluid</td>
<td>13 (6) 23 (8)</td>
<td>5.59 .00 .46</td>
<td>-10.83</td>
<td>1.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>4 (3)</td>
<td>7 (7)</td>
<td>-1.60</td>
<td>.14 .54</td>
<td>-6.61 to -0.8</td>
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</tr>
<tr>
<td>Juice</td>
<td>6 (3)</td>
<td>10 (8)</td>
<td>-2.32</td>
<td>.04 .29</td>
<td>-4.72 to 1.68</td>
<td></td>
</tr>
<tr>
<td>Other CF(^b)</td>
<td>3 (4)</td>
<td>4 (7)</td>
<td>-1.08</td>
<td>.30 .00</td>
<td>-2.65 to 2.63</td>
<td></td>
</tr>
<tr>
<td>Soda</td>
<td>2 (2)</td>
<td>3 (5)</td>
<td>-1.23</td>
<td>.24 .21</td>
<td>-1.59 to .80</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>9 (7)</td>
<td>5 (4)</td>
<td>-0.90</td>
<td>.39 .08</td>
<td>-2.53 to 3.32</td>
<td></td>
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<tr>
<td><strong>Older children</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear fluid</td>
<td>17 (14) 22 (13)</td>
<td>-1.78 .10 .85</td>
<td>-13.44</td>
<td>-6.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>8 (7)</td>
<td>11 (7)</td>
<td>-2.24</td>
<td>.05 .42</td>
<td>-8.43 to 1.30</td>
<td></td>
</tr>
<tr>
<td>Juice</td>
<td>6 (5)</td>
<td>7 (5)</td>
<td>-1.04</td>
<td>.32 .56</td>
<td>-7.42 to -2.3</td>
<td></td>
</tr>
<tr>
<td>Other CF(^b)</td>
<td>3 (5)</td>
<td>2 (1)</td>
<td>-0.01</td>
<td>.99 .30</td>
<td>-4.54 to 1.53</td>
<td></td>
</tr>
<tr>
<td>Soda</td>
<td>2 (3)</td>
<td>2 (3)</td>
<td>-0.73</td>
<td>.48 .33</td>
<td>-2.75 to .77</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>6 (4)</td>
<td>6 (6)</td>
<td>-0.29</td>
<td>.77 .25</td>
<td>-1.77 to 4.25</td>
<td></td>
</tr>
</tbody>
</table>

\(a\) CI, 95% confidence interval.
\(b\) Other CF, other clear fluids (juice and fruit drinks, lemonade, sports drinks, slurshes, powdered drink mixes).
Overall, our data demonstrate some success in increasing children’s fluid intake and offer a direction for modifying the intervention to provide families with strategies for how to meet clear fluid targets easier and for modifying the quality of children’s fluid intake to include primarily water and low-calorie, low-sugar fluids. For example, data suggest a need to inform parents of the nutritional impact of different types of fluid on children’s diet and to explore parental experience with regulation of children’s fluid intake (Walker, 2005). Behavioral strategies may help parents increase children’s daily fluid intake while balancing child discomfort and negative mealtime behaviors due to the physiologically smaller size of children’s stomachs and abdominal pain from constipation. Examination of environmental barriers to fluid intake, such as the availability of different fluid types (Cullen et al., 2003) and the types of fluids parents’ model for their child will also be important. Finally, we need to offer salient targets for clear fluid intake and teach parents strategies for rearranging behavioral contingencies so children receive more frequent reinforcement for healthy fluid choices (Herrnstein, 1970).

Data presented in this study were collected from primarily white, middle to upper class families in southeastern Michigan whose child’s clinical treatment was covered by medical insurance or paid for out of pocket. Families were not recruited for research, so this sample is likely highly representative of the population served at our university medical center and the ability to generalize our findings to families with different demographic characteristics may be limited. Diet diaries were completed based upon child and parent self-report, which may compromise their reliability due to social desirability and recency effects. It is also our experience that fluid intake may be underreported, especially when meals and snacks occur in the absence of parents. Providing parents with a modified diary form that can be sent to school or sports practice and giving children water bottles or pre-packaged drinks may increase the reliability of self-report data.

**Conclusion**

This study found that children significantly increased their fluid intake but still struggled to achieve prescribed daily clear fluid goals. We also found that children were most likely to increase their intake of both water and juice in efforts to meet their fluid targets, which may present inadvertent health consequences. The success of behavioral modification techniques in improving dietary adherence in other pediatric conditions (Kahana, Drotar, & Frazier, 2008; Stark, 2003) suggests that similar strategies should be applied to increase clear fluid adherence and water intake in children with encopresis. Once adherence to fluid recommendations has been established, the relationship between fluid and constipation can then be explored via a dismantling study and fluid recommendations can be refined to discern how much clear fluid children need to consume in order to experience clinically significant results with respect to decreasing symptoms of constipation.

**Conflicts of interest:** None declared.

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**References**


