

# Treatment of retentive encopresis with diet modification and scheduled toileting vs. mineral oil and rewards for toileting: a clinical decision

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## ABSTRACT

- Objective* This clinical trial compared the effectiveness of diet modification and scheduled toileting (DS group) to mineral oil and rewards for toileting (MR group) in a sample of retentive encopretic children.
- Design* Twenty-five (23 male, 2 female) subjects were randomly assigned to either DS or MR in a 2 (group) × 3 (pre-test, post-test, 6-month follow-up) design.
- Setting/sample* Subjects were treated in a gastroenterology clinic of a children's hospital. Eighty-five percent of the total sample had a history of chronic constipation, with an average of 3.7 soiling accidents and 2.6 appropriate bowel movements in the toilet per week.
- Interventions* Treatments compared increased dietary fiber and scheduled toileting with mineral oil and contingency management.
- Results* A majority of subjects, regardless of assigned group, showed increased normal bowel movements, and 58% remained accident free at six-month follow-up yielding comparable global outcomes. However, treatments differed in both immediate and long-term benefits and liabilities, as MR lead to more bowel activity including accidents.
- Conclusions/implications for practice* How parents perceive the increase in soiling with mineral oil or slower progress with dietary changes alone may suggest optimal matches of children to treatments in present clinical decision making and in future research.
- Keywords:* encopresis, dietary fiber, mineral oil, scheduled toileting, rewards for toileting
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## Introduction

Functional encopresis is currently defined as 'the repeated voluntary or involuntary passage of feces of normal or near-normal consistency into places not appropriate for that purpose in the individual's own sociocultural setting, nor due to any physical disorder in a child four years of age or older'.<sup>1</sup> To avoid excluding children in need of treatment, others<sup>2</sup> have recommended a broader definition that lowers the age to three years-old and includes only soiling that occurs with a regularity sufficient to result in moderately negative social and emotional consequences for the child.

Encopresis is present in 1-3% of the secondary school aged population, and the problem generally declines with age.<sup>3</sup> Encopretic children are reported to experience poor peer relationships, lowered self-esteem, social isolation, anxiety, depression, and increased family discord.<sup>4,5</sup>

Empirically validated subtypes of soiling problems have not been established, but Boon and Singh<sup>6</sup> have proposed a model of classification that not only acknowledges earlier definitions but also emphasizes an effort to match specific treatments to the type of encopretic child. They distinguish between the retentive and nonretentive encopretic with the former having the primary symptoms of chronic constipation, colonic impaction, abdominal pain, passage of large diameter stool, and frequent accidents.

This classification method which highlights the problem of chronic constipation reflects current research on the pathogenesis of encopresis. For example, a recent study has suggested a possible physiological mechanism that includes abnormal levels of gastrointestinal hormones that may predispose encopretic children to chronic constipation.<sup>7</sup> Up to 90% of encopretics present for treatment with associated constipation, a history of painful defecation and severe withholding.<sup>8</sup> Further, recent evidence from a nine year study indicated that 96% of children over age three years who presented for soiling problems routinely with-

held bowel movements, and 73% had fecal impactions indicative of constipation.<sup>9</sup> Treatment of fecal soiling accompanied by recurrent constipation presents a formidable challenge to health care providers as it has been related to a poor treatment outcome.<sup>10,11</sup>

The problem of reducing soiling accidents and increasing appropriate use of the toilet has been addressed with behavioral treatments i.e. punishing or ignoring soiling accidents and reinforcing use of the toilet as well as accident free days.<sup>2,12-14</sup> Used alone, such interventions do not address the problem of constipation, and may promote withholding of stools by reinforcing less bowel activity in order to avoid soiling.

The problem of constipation has been directly treated by physicians using enemas and laxatives, the most common being mineral oil.<sup>4,9,15,16</sup> On their own, these treatments may increase soiling

accidents in the effort to correct constipation.

Increasing dietary fiber intake is an alternative to using laxatives to correct constipation, this may offer a slower acting but more lasting solution to constipation. Three previous investigations have incorporated such diet modification into behavioral treatment packages and were found to be effective.<sup>20-22</sup> However, they have not been compared to standard management with mineral oil and behavioral procedures.

This randomized outcome trial was designed to evaluate the diet modification and scheduled toileting (DS) treatment package in a larger sample and to compare it to a more widely researched and used treatment package using mineral oil. Mineral oil and rewards for toileting treatment (MR) used large doses of mineral oil to reduce constipation and individually tailored rewards to increase bowel movements on the toilet. Results for this treatment or minor variations of it have been reported in 13 previous studies, and on average, 69% of children receiving such treatments completely stopped soiling.<sup>2,12</sup>

We predicted two differences between the treatments. First, we anticipated that children who received DS would have fewer soiling accidents over the course of

... the contingency management program of rewarding bowel movements in the toilet was more effective at increasing and maintaining appropriate toileting than was simple scheduling or stimulus control of visits to the toilet.

treatment. This was based on the supposition that increasing dietary fiber would reduce constipation more gradually than mineral oil and thereby result in fewer soiling accidents. Second, we anticipated that children who received DS would be less likely to relapse at six-month follow-up due to the lifestyle change of altering a diet as opposed to the short term change of 'taking medicine'.

## Methods

### Design and subjects

This experiment was conducted as a randomized two group design with pre-test and post-test as well as six-month follow-up. Twenty three boys and two girls were randomly assigned to either DS or MR treatment groups with a coin toss.

Children were recruited through public service announcements and letters to physicians. All children met DSM IV<sup>1</sup> criteria for functional encopresis as jointly determined by a clinical psychologist and pediatric gastroenterologist. They also met the following criteria for retentive encopresis:

- 1) history of periodic constipation of at least 2 months
- 2) history of periodic multiple accidents of at least 2 per day
- 3) duration of soiling of at least six months. Of the 56 respondents to the study announcement, 8 (14%) declined treatment, 6 (11%) were excluded for medical problems, 6 (11%) were excluded because they were not soiling (i.e. constipation only), 6 (11%) were judged to have significant emotional or behavioral problems, 3 (5%) lived too far away, and 2 (4%) did not meet the age criteria.

### Procedure

Institutional Review Board approval was obtained prior to recruitment of subjects. All participants attended an initial medical examination at a pediatric gastroenterology clinic and any questions about the research were answered and informed consent was obtained. Parents were asked to complete a week of food consumption and bowel activity records before treatment

began.

At their initial visit, children received a history and physical examination to rule out organic pathology associated with soiling and to determine if initial bowel evacuation was needed. If palpation of the abdomen, rectal examination and recent history indicated fecal impaction, the gastroenterologist recommended using enemas to evacuate the child's bowel at home.

At the first treatment visit, the details of the assigned treatment were explained to parents and children. Parents and children answered questions about treatment credibility and expectations for success. Parents were also given food consumption and bowel activity records to be completed and returned at each weekly follow-up visit. To minimize home disruption, parents were instructed to begin the assigned treatment on a weekend and a first day follow-up telephone call was made to assist the parents with implementation problems.

Each week thereafter, parents and children of each group attended follow-up visits, lasting approximately 30 minutes, with a psychology doctoral student. They received guidance in implementing all aspects of their child's assigned treatment and weekly bowel activity and food consumption records were collected and distributed. At each visit the gastroenterologist reviewed the patient's treatment progress and this continued weekly until the child stopped soiling, terminated participation in the study or the 18 week treatment period elapsed. Treatment credibility and efficacy ratings were repeated at the end of treatment. In addition, each family was mailed food consumption and bowel activity records six months after treatment ceased, and they were interviewed by telephone.

For both groups, parents were asked to avoid making negative comments towards their children if they failed to produce a scheduled bowel movement or had a soiling accident to avoid treatment adherence problems. They were instructed to inform school officials to grant their children free access to the toilet during school.

### Interventions

#### Diet modification and scheduled toileting

DS treatment comprised increasing dietary fiber intake and scheduling regular toileting practice to coincide

with the gastro-colic reflex that occurs approximately 15 minutes after eating.

Benefits of increasing dietary fiber intake and the mechanics of the gastro-colic reflex were explained. Following Houts and Peterson,<sup>21</sup> a list of foods with different amounts of dietary fiber, scaled according to a point system, was given to parents and children. Points were awarded for eating a normal portion (249 g or 29.6 ml) of different foods, and each fiber point corresponded to approximately 1 g of dietary fiber. A bar graph of each child's weekly fiber point score was constructed from poster board and colored markers and showed the fiber points already earned during baseline. Children were encouraged to earn more points each week by eating 'the right foods'. At weekly follow-up visits, children colored in their accumulated fiber points while their parents and therapist praised them for their treatment efforts.

DS treatment included a morning routine involving both components of the treatment. Before breakfast, children drank a cupful of a warm liquid such as water or juice. This was followed by a bowl of bran cereal of the child's choice and any additional type of breakfast food they desired. Fifteen minutes after breakfast, the child was seated on the toilet for 10 minutes or until a bowel movement occurred, whichever came first. During the first week of treatment only, if the child failed to have a bowel movement, a pediatric glycerin suppository was administered by the parents and the child was again seated on the toilet for 10 minutes or until there was a bowel movement. If the child still failed to have a bowel movement, he or she was reminded to use the toilet later in the day when the need arose. After the first week of treatment, if the child failed to have a bowel movement following breakfast, parents were instructed to have the child practice toileting 15 minutes after the meal that occurred closest to the time when soiling accidents typically occurred as determined from their weekly records.

#### **Mineral oil and rewards for toileting**

MR treatment comprised daily administration of mineral oil and rewards for appropriate bowel movements in the toilet. Parents were told to give their child mineral oil twice daily to ensure regular bowel movements and to overcome stool withholding. To increase palatability, the mineral oil could be refrigerated or mixed with a fruit juice. Parents were told that the initial goal

was to produce two to three loose bowel movements daily, and they were told to have the child sit on the toilet whenever necessary throughout the day.

Mineral oil was given in 5 steps of decreasing doses. During the first week, 60 ml of mineral oil were given before breakfast and before bedtime. If the child produced at least one to two loose bowel movements a day, the dosage was reduced by approximately 45% every two weeks. If after a scheduled reduction in dosage the child failed to produce the expected number of bowel movements, the dosage reverted to the prior level for an additional two weeks. If consistent progress was maintained, the mineral oil was discontinued. Because rather large dosages of mineral oil were used, steps to protect against mineral oil seepage were taken by using sanitary napkins for clothing and a large plastic cover to protect the mattress.

Beginning with the first week of treatment and continuing to the end of treatment, rewards were used to encourage regular bowel movements. This consisted of a star chart on which the child received a star for every appropriate bowel movement each day. The child was required to earn at least five stars per week in order to earn a reward. The reward (e.g. a toy, play time with parents, having a friend over for the night, movie, etc.) was decided upon by the child in consultation with the therapist and the parents. Parents were instructed to reward their children promptly. The child's chart was reviewed by the therapist during the weekly visits and the child was praised for their efforts.

#### **Records and dependent measures**

At pre-treatment, post-treatment, and six-month follow-up, parents provided weekly records of their child's dietary intake and bowel activity.

##### **Food consumption record**

Parents recorded all foods, snacks and beverages consumed by the child for each day during each week. These records were scored according to the fiber point scale reported in Houts and Peterson<sup>21</sup> and yielded a total fiber point score for each week.

##### **Bowel activity record**

Parents reported the number of soiling accidents each

day over a one week period, and they indicated the type of accident as either 1) a liquid stain, or 2) a formed accident. The number of bowel movements in the toilet each day were reported and categorized as: 1) liquid, 2) formed of normal size, or 3) formed of abnormal size (either extremely small or extremely large). This record provided weekly frequencies of: soiling accidents, bowel movements in the toilet, and type of bowel movements in the toilet.

### Success, failure, drop out, and relapse

Four categories of treatment outcome were defined as follows. All children who attained four consecutive accident-free weeks while maintaining regular and normal bowel movements within the 18 week treatment period were counted as treatment successes. All children who remained in treatment for 18 weeks but failed to reach the success criteria and did not show an average of at least 25% increase in appropriate toileting and an average of at least 25% decrease in accidents compared to baseline were counted as treatment failures. Otherwise, those who prematurely terminated treatment were counted as dropouts. At six-month follow-up children were counted as relapses if they had even one soiling accident.

In addition to assessing outcome by the aforementioned categories, we also computed three other measures of children's response to the two treatments: *number of days to reach criterion* (e.g. four consecutive accident free weeks accompanied by regular bowel movements in the toilet); *number of soiling accidents per week*; and *number of bowel movements in the toilet per week*. The soiling accidents and bowel movements in the toilet were recorded by the parents and categorized by types.

Three measures of treatment integrity were specifically designed for this study and collected: 1) weekly fiber point score was the total number of fiber points computed from weekly records, 2) credibility of treatment was a rating (7 point Likert scale) provided by parents to assess their belief in the efficacy of treatment, and 3) confidence in the therapist was a rating (7 point Likert scale) provided by parents to indicate their confidence in the therapist.

### Statistical methods

Statistics included the Chi-square test, the *t*-test for the difference between two independent means, a

**Table 1:** Pre-treatment characteristics of children in DS vs. MR groups

Variables	DS	MR	Significance
Mean age	8.4	8.1	ns
% males	92	92	ns
% with prior treatment	58	62	ns
% primary encopresis	83	86	ns
Mean weekly bms			
in toilet	2.7	2.8	ns
Mean weekly soiling accidents	4.1	3.6	ns
Mean years of constipation	5.6	5.2	ns
Mean grams of fiber per week	31.0	35.2	ns
Mean rating of treatment credibility (1-7)	5.6	4.9	ns
Mean rating of therapist credibility (1-7)	5.8	5.6	ns

repeated measures multivariate analysis of variance, and a repeated measures multivariate analysis of covariance, with significance accepted at the 0.05 level. Results were expressed as mean  $\pm$  SD.

## Results

### Preliminary analyses

As indicated in Table 1, there were no significant pre-treatment differences between the DS and MR groups on any of the relevant variables. One subject in each group was instructed by the gastroenterologist to complete the bowel evacuation procedure. Both children required only one set of enemas. No other enemas were given to subjects of either treatment during the study. In the DS group, only two subjects required the use of a suppository to produce a bowel movement and this was only on the first morning of treatment. No other suppositories were administered to any subjects.

### Categorical outcome at post-treatment and six-month follow-up

At post-treatment, there were no treatment differences in the number of children who reached the success

criterion of four consecutive accident-free weeks  $\chi^2(1, N = 19) = 0.11, p = 0.26$ . Likewise, there were no treatment differences in the number of weeks needed to reach the success criterion (DS: mean = 10.63 weeks, SD = 4.34 vs. MR: mean = 10.18 weeks, SD = 4.33). Similarly, there were no group differences in the number of children who dropped out of treatment  $\chi^2(1, N = 25) = 1.12, p = 0.29$ . Further, there were no group differences in relapse at six-month follow-up,  $\chi^2(1, N = 16) = 0.78, p = 0.62$ .

Although no significant group differences in categorical outcome were detected, we did observe differences between the two treatments in the first six weeks of treatment regarding the frequency and type of both soiling accidents and bowel movements in the toilet.

### Frequency and type of soiling accidents

For the first six weeks of treatment, a repeated measures analysis of covariance using total number of baseline accidents as a covariate showed that children in the MR group had more than twice as many soiling accidents (adjusted mean = 7.12) compared to children in the DS group (adjusted mean = 2.79),  $F(1, 20) = 4.64, p < 0.05$ . Separate analyses for each type of soiling accident showed that MR treatment produced twice as many liquid stains (adjusted mean = 6.25) as DS treatment (adjusted mean = 2.36),  $F(1, 20) = 5.12, p < 0.05$ . The treatments did not differ significantly in terms of formed accidents. Over the first six weeks of treatment, the two treatments produced significant reductions in both types of accidents (all  $ps < 0.05$ ), but the rate of these reductions did not differ significantly between treatments (all  $ps > 0.60$ ).

After the first six weeks of treatment and through six-month follow-up, there were no between group differences in terms of either overall frequency of soiling accidents or specific types of soiling accidents (all  $ps > 0.41$ ).

### Frequency and type of bowel movements in the toilet

For the first six weeks of treatment, a repeated measures analysis of covariance using total number of baseline bowel movements in the toilet as a covariate showed that children in the MR group had more bowel movements in the toilet (adjusted mean = 18.76) than did children in the DS group (adjusted mean = 13.37),  $F(1, 18) = 8.21, p < 0.01$ . Separate analyses for each type of bowel movement showed that MR treatment resulted in many more liquid bowel movements (adjusted mean = 5.25) than did DS treatment (adjusted mean = 0.64),  $F(1, 20) = 4.16, p = 0.05$ . This difference was especially evident in the first two weeks of treatment, but disappeared thereafter.

Similarly, children in the MR group had more normal bowel movements in the toilet during the first two weeks only (adjusted mean = 25.49) than did children in the DS group (adjusted mean = 16.32),  $F(1, 20) = 6.17, p < 0.05$ . There were no significant group differences in the rate at which normal bowel movements were increased. In contrast, a separate analysis showed that children who received DS treatment had more abnormal bowel movements in the toilet (adjusted mean = 5.03) than did children who received MR treatment (adjusted mean = 1.84),  $F(1, 20) = 4.10, p = 0.05$ . This was due to a higher frequency of abnormally small bowel movements in the DS group. Both treatments produced significant reductions in the frequency of abnormal bowel movements.

### Fiber points, credibility of treatment, and confidence in therapist

As expected, children who received DS treatment consumed more dietary fiber than did children who received MR treatment. Using baseline fiber points as a covariate, a repeated measures analysis of fiber points from post-treatment to six-month follow-up showed that children in the DS group earned more fiber points at both times ( $M = 113.75$  SD = 48.94 and  $M = 101.63$  SD = 49.41, pre to post) than did children in the MR group ( $M = 24.09$  SD 16.64 and  $M = 24.36$  SD = 18.84, pre to post),  $F(1, 16) = 34.04, p < 0.001$ . As indicated by failure to detect differences over time between post-treatment and six-month follow-up either alone or as a function of treatment (all  $ps > 0.35$ ), children who received DS treatment maintained their diet change at follow-up.

At both post-treatment and follow-up, parents rated the two treatments as highly credible, and they expressed similar confidence in the therapist. Neither of these ratings of treatment integrity indicated significant change in parents' beliefs over time (all  $ps > 0.50$ ).

## Conclusions and implications for practice

Our results showed that retentive encopretic children treated with a combination of increased dietary fiber and scheduled toileting were as likely to reach a success criteria of four consecutive accident free weeks as children treated with a combination of mineral oil and rewards for toileting. For those children who stopped soiling, a majority did so after 11 weeks with either treatment package. In terms of categorical outcome at post-treatment, we did not observe differences that would warrant recommending to health care professionals one treatment over the other. This was most likely the result of low statistical power due to small sample sizes. However, our results do suggest that there are relative differences in the benefits and liabilities associated with the two treatment packages, both in the early weeks of treatment and in the long term. It is believed that these outcomes are most relevant to the clinical judgments made regarding the individual treatment of patients with this disorder.

As previously mentioned in the literature,<sup>12,23</sup> most psychological interventions for childhood encopresis have been inadequate in dealing with the chronic nature of constipation and retention of stools that is common to most encopretic children. In this regard, we found as we had predicted that our mineral oil treatment package produced a more immediate increase

in bowel activity than did our dietary fiber treatment package. This was evident in the first six weeks of treatment in which the mineral oil treatment resulted in both more bowel movements in the toilet and more soiling accidents. In terms of producing a more rapid increase of bowel movements in the toilet, we suspect that the relative benefit of mineral oil treatment was reflected in fewer of those families dropping out of treatment in the first eight weeks. It is possible that the quicker results achieved with the mineral oil maintained parents' motivation to continue the treatment because immediate progress was observed. Considering the greater time and effort required to implement

diet modification as opposed to giving mineral oil twice a day, it is understandable that the slower response achieved with diet modification led to premature termination of the treatment as suggested by the results.

Our mineral oil treatment package also resulted in an increase in soiling accidents, especially in the first two weeks. This relative liability was apparently not sufficient to offset the benefits of increased appropriate toileting. How parents perceive the inconvenience of an increase in accidents is something that future investigations should assess. In the meanwhile, for those parents that report significant frustration and hostility due to the child's soiling, it may be advisable to use dietary fiber treatments rather than mineral oil. At the very least, parents and children should probably be told that using mineral oil to treat the constipation component of encopresis may produce a temporary increase in accidents which will decline as the child makes more frequent appropriate use of the toilet. Also, treatments that rely on increasing dietary fiber to overcome constipation should be accompanied by warnings that the necessary change in bowel activity may take several weeks.

In general, our understanding of how child and parent perceptions influence the treatment of encopresis is rather limited. Levine and Bakow<sup>24</sup> and Stark *et al.*<sup>25</sup> have reported that encopretic children whose parents perceive the children as having behavioral problems at home are less likely to be successfully treated than are those encopretic children who are not perceived as having such additional problems. Poor cooperation between parents and children has been hypothesized to be the explanation for such findings. Certainly, choosing a treatment that minimizes such conflict is desirable.

Considering the long term outcome and contrary to our expectation, we failed to find evidence for better maintenance of treatment gains in the diet modification and scheduled toileting treatment. Despite the fact that our six-month follow-up showed that children who received diet modification and scheduled toileting continued to maintain their increases in dietary fiber intake, more of these children had repeat soiling accidents than did children who received mineral oil and rewards treatment. Also, children who had received mineral oil and rewards for toileting continued to have more bowel movements in the toilet at six-month follow-up. Apparently, the contingency management

program of rewarding bowel movements in the toilet was more effective at increasing and maintaining appropriate toileting than was simple scheduling or stimulus control of visits to the toilet. This finding underscores Doleys<sup>13</sup> previous recommendation that treatment programs that use cathartics and laxatives should routinely include specific reinforcement for appropriate toilet use. The collaboration between physicians and psychologists in the optimal management of encopresis has been echoed by others.<sup>2,12</sup>

If in a clinical setting both of these treatments are equally effective in eliminating soiling, tailoring the treatment to the family, based on circumstances that would suggest which treatment would be more practical to implement or which treatment would appeal more to the patient, allows the clinician greater freedom in dealing with the problem. For example, some families may readily expend much effort in preparing nutritious foods for their children (including more dietary fiber). For these families, a treatment that promoted a 'healthy' increase in dietary fiber to deal with constipation may well be more readily accepted over mineral oil and thus lead to greater treatment compliance.

Additionally, a study focusing on the acceptability of either dietary manipulation or mineral oil with regard to certain predictor variables, such as socioeconomic status, family topography (i.e. two or single parent family, presence of other adult family members, etc.) and the level of a family's knowledge of current nutritional standards, may reveal which treatments fit with which type of family circumstances. This predictive knowledge would allow the clinician to tailor the treatment to the patient's unique circumstances.

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#### Biosketches

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#### Commentary

This interesting paper evaluates the outcome of two treatments of retentive encopresis. They compare diet modification and scheduled toileting vs. mineral oil and rewards for toileting.

In our encopresis clinic, we favor quite a similar approach: initial thorough cleansing of the child's bowel, diet modification, mineral oil and laxatives, scheduled toileting, rewards, long-term follow-up and support. At the initial visit, an abdominal X-ray is part of the evaluation, in order to explain to parents the importance of fecal impaction, and we monitor the cleansing of the child's bowel by a follow-up abdominal X-ray at the first follow-up visit.

We generally combine regular use of laxatives and mineral oil. Our dosage of mineral oil is around 10 ml twice a day. To increase palatability, we tell parents to mix it with yogurt or ice cream.

Our goal is to obtain one loose bowel movement daily, and we offer rewards for compliance to the treatment, whatever the results obtained.