Pelvic organ prolapse, constipation, and dietary fiber intake in women: A case-control study

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Objective: This study was undertaken to determine whether there is an association among pelvic organ prolapse, constipation, and dietary fiber intake.

Study design: Sixty consecutive women with prolapse were compared with 30 control women without prolapse. All women completed 2 validated questionnaires to assess constipation and dietary fiber intake. Multivariate analysis was performed.

Results: The risk for constipation was greater in women with prolapse than controls (odds ratio 4.03, 95% CI 1.5-11.4). Median insoluble fiber intake was significantly lower in women with prolapse (2.4 g) than controls (5.8 g, \( P < .01 \)). The increased risk for constipation was reduced but remained significant after controlling for age and insoluble dietary fiber intake (odds ratio 2.9, 95% CI 1.1-13.5).

Conclusion: Women with pelvic organ prolapse are at a higher risk for constipation than controls. This increased risk for constipation is partially explained by lower intake of dietary insoluble fiber by women with prolapse than controls.

Pelvic organ prolapse can affect as many as 50% of adult women over the age of 40 years. Though the condition is not life threatening, it can be debilitating, leading to decreased quality of life and withdrawal from social activity.

The cause of pelvic organ prolapse is not clear. Childbirth injury is considered the leading cause. Other risk factors include genetic factors, neurologic diseases, advanced age, and chronic constipation. It is generally considered that for women predisposed to pelvic organ prolapse, the development of the disease is inevitable and cannot be reliably prevented.

Of all the factors implicated in the development of prolapse, constipation is the only factor that may be modifiable. However, the role of constipation in causing pelvic organ prolapse is not clear. Imaging of the pelvic floor through evacuation proctography suggests that the increased bearing down pressure to evacuate stool during constipation produces anatomic changes in the pelvic floor similar to the expulsion of the fetus during
the second stage of labor. However, clinical studies investigating the association of pelvic organ prolapse with constipation are limited. In addition, the cause of constipation was not investigated in these studies.

Lack of dietary fiber intake is considered to be one of the most common causes of chronic constipation. However, a MEDLINE search using a key words “diet” or “fiber” and “prolapse” did not yield any study that in which dietary intake had been investigated in women with pelvic organ prolapse.

The aim of this study is to determine whether there is an association among pelvic organ prolapse, constipation, and dietary fiber intake. Our hypothesis is that women with pelvic organ prolapse are more likely to have constipation than controls and that this constipation is related to their dietary fiber intake.

Material and methods

A case-control study approved by the Institutional Review Board was performed. The study group consisted of 60 consecutive women diagnosed with pelvic organ prolapse on their initial visit. Thirty consecutive women without significant pelvic organ prolapse reporting for annual gynecologic examination were recruited for the control group.

Inclusion criteria were age greater than or equal to 40 years and completion of constipation and dietary fiber intake questionnaires. Study subjects had pelvic organ prolapse stage II or greater according to the Baden-Walker system and control subjects had no prolapse or stage I prolapse only. Exclusion criteria were pregnancy, women with chronic medical conditions such as diabetes mellitus, irritable and inflammatory bowel disease, neurologic disorders such as multiple sclerosis, and history of significant gastrointestinal cancers or fistula. Informed consent was obtained.

Data on known risk factors for pelvic organ prolapse including age, parity, type of delivery, and estrogen status were collected. Women were classified as hypoestrogenic if they had undergone spontaneous or surgical menopause, were not taking hormone replacement, and had loss of vaginal rugosity.

Constipation and dietary fiber intake questionnaires were administered to 109 women. The return rate for questionnaires was 83% such that complete data were available on 60 study subjects and 30 controls. Only 6% of eligible women declined to participate in the study. The physicians performing clinical evaluation on study subjects did not have access to the questionnaire results.

Data on constipation were collected with a self-administered, validated, constipation-specific instrument, the Patient Assessment of Constipation Symptom Questionnaire (PAC-SYM). It assesses the symptom of constipation as experienced by the patient over time. It consists of 12 items in 3 subscales: stool symptoms (hardness of stool, size of stool, straining, inability to pass stool), rectal symptoms (burning, pain, bleeding, incomplete bowel movement), and abdominal symptoms (discomfort, pain, bloating, cramps). Item values are scored from 0 to 4, with 4 indicating the worst symptom severity. The PAC-SYM requires 15 minutes to complete. Constipation was defined as a score of 0.35 or greater (corresponding to moderate symptom severity). Women were also asked if they ever used manual pressure to assist defecation, this was recorded as perineal, rectal, or vaginal.

Dietary fiber intake was determined using the National Cancer Institute Dietary History Questionnaire (DHQ). The DHQ is a food frequency questionnaire that asks respondents to report their usual frequency of consumption of each food from a list of foods for the past year. It consists of 124 food items and includes both portion size and dietary supplement questions. It takes 1 hour to complete. A respondent with grade 12 education can complete it independently. The correlation of the DHQ with “truth model” for measuring dietary fiber intake in women was 0.77. DietCalc software developed by the National Cancer Institute is used to calculate daily dietary fiber intake in grams from the DHQ.

Data were analyzed with SAS (SAS Institute Inc, Cary, NC). Within the study group and the control group, we summarized age, weight, parity, and PAC-SYM scores by using means and SD and then compared the 2 groups using 2-sample t test for independent samples. Dietary fiber intake was described using medians and compared using the Wilcoxon rank sum test for independent samples. Estrogen status, prior pelvic surgery, and type of delivery were summarized using proportions, and then the χ² test (or Fisher exact test) was used to compare the 2 groups. Crude odds ratios (OR) with 95% CIs were calculated to quantify the increased risk for constipation for women with pelvic organ prolapse compared with control women. To control for the possible confounding effect of age and dietary fiber, logistic regression analysis was used to determine adjusted ORs.

The sample size was calculated with Sample Size Calculator of Epi Info (Center for Disease Control, Atlanta, Ga). We assumed a baseline constipation prevalence of 10% in the control group and 50% in the study group as reported earlier in the literature.

To detect a difference of .1 and .5 in the proportions of constipation of the 2 groups, we estimate that 45 women with pelvic organ prolapse and 20 control women without prolapse were required to provide power = 0.90 at a 2-tailed alpha = .05. On the basis of a questionnaire completion rate of 75%, we estimated that a sample size of 60 women in the study group and 30 women in the control group was required.
Results

There was no significant difference in the mean age, parity, type of delivery, and estrogen status of cases and controls (Table I). Women with pelvic organ prolapse were significantly more likely to have undergone pelvic surgery than controls.

Table II shows the PAC-SYM scores of women with and without pelvic organ prolapse. Women with pelvic organ prolapse had significantly higher total and subscale constipation scores than controls. On analysis of individual items within the questionnaire, the commonest constipation symptom reported by women with pelvic organ prolapse was straining to evacuate (69%) as compared with sense of incomplete evacuation (45%) and hard stools (35%) by control women. When constipation was defined as a PAC-SYM score of 0.35 or greater, 42 women in the pelvic organ prolapse group reported constipation compared with 11 women in the control group. When constipation was not seen. The constipation score of women with pelvic organ prolapse was significantly lower (2.5 ± 0.7) for women using manual pressure. The mean constipation score was high (2.5 ± 0.7) for women using manual pressure. All 3 women who used digital insertion in vagina had grade II or higher posterior vaginal wall prolapse. Of 18 women, 5 (28%) women reporting the use of manual pressure had no prolapse or only grade I posterior vaginal wall prolapse.

A relationship between the severity of prolapse and constipation was not seen. The constipation score of women with stage II (1.73 ± 0.7), III (1.82 ± 0.6), and IV prolapse (1.81 ± 0.9) was similar (P for trend = .8).

Median total dietary fiber intake was similar in women with prolapse (14.5 g) and controls (12.1 g, P = .7). Median soluble fiber intake was significantly greater in women with prolapse (12.6 g) compared with controls (6.7 g, P < .01). Women with prolapse had significantly lower median insoluble fiber intake (2.4 g) than controls (5.8 g, P < .01). Thirty-six women with prolapse were using fiber supplements (containing soluble fiber) compared with 5 controls (χ² = 7.8, P = .01).

On stepwise regression analysis, women with prolapse had an increased risk for constipation compared with controls even after controlling for age, prior pelvic surgery, and total fiber intake (OR 3.9, 95% CI 1.4-11.9, P = .006). The risk for constipation was lower when insoluble fiber was introduced in the model but remained significant (OR 2.9, 95% CI 1.1-13.5, P = .02).

### Table I  Demographic data of women with and without pelvic organ prolapse

<table>
<thead>
<tr>
<th></th>
<th>Prolapse (n = 60)</th>
<th>Controls (n = 30)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)*</td>
<td>54 ± 1.3</td>
<td>52 ± 2.4</td>
<td>.73</td>
</tr>
<tr>
<td>Parity*</td>
<td>2.8 ± 2.1</td>
<td>2.1 ± 2.4</td>
<td>.68</td>
</tr>
<tr>
<td>Weight (lb)*</td>
<td>151 ± 21.7</td>
<td>147 ± 25.6</td>
<td>.93</td>
</tr>
<tr>
<td>Prior pelvic surgery†</td>
<td>13 (22%)</td>
<td>5 (17%)</td>
<td>&lt; .01†</td>
</tr>
<tr>
<td>Spontaneous vaginal delivery†</td>
<td>53 (88%)</td>
<td>27 (90%)</td>
<td>.97</td>
</tr>
<tr>
<td>Cesarean section†</td>
<td>9 (15%)</td>
<td>4 (13%)</td>
<td>.98</td>
</tr>
<tr>
<td>Forceps/vacuum†</td>
<td>5 (8%)</td>
<td>2 (7%)</td>
<td>.95</td>
</tr>
<tr>
<td>Hypoestrogenic†</td>
<td>39 (65%)</td>
<td>17 (57%)</td>
<td>.58</td>
</tr>
</tbody>
</table>

* In test of equal means using 2-sample t test for independent samples.
† In test of equal proportions using χ² test.

### Table II  Mean PAC-SYM score of women with and without pelvic organ prolapse

<table>
<thead>
<tr>
<th></th>
<th>Prolapse (n = 60)</th>
<th>Controls (n = 30)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal symptoms*</td>
<td>2.4 ± 0.6</td>
<td>0.11 ± 0.6</td>
<td>.004†</td>
</tr>
<tr>
<td>Rectal symptoms*</td>
<td>0.7 ± 0.8</td>
<td>0.08 ± 0.8</td>
<td>.006†</td>
</tr>
<tr>
<td>Stool symptoms*</td>
<td>1.2 ± 0.8</td>
<td>0.31 ± 0.5</td>
<td>.005†</td>
</tr>
<tr>
<td>Total score*</td>
<td>1.86 ± 0.7</td>
<td>0.28 ± 0.65</td>
<td>.007†</td>
</tr>
</tbody>
</table>

* In test of equal means using 2-sample t test for independent samples.
† P < .01.

### Table III  Distribution of the stage of pelvic organ prolapse in the study and control groups

<table>
<thead>
<tr>
<th>Stage of prolapse*</th>
<th>Prolapse (n = 60)</th>
<th>Controls (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>27 (90%)</td>
</tr>
<tr>
<td>I</td>
<td>0</td>
<td>3 (10%)</td>
</tr>
<tr>
<td>II</td>
<td>10 (17%)</td>
<td>0</td>
</tr>
<tr>
<td>III</td>
<td>45 (75%)</td>
<td>0</td>
</tr>
<tr>
<td>IV</td>
<td>5 (9%)</td>
<td>0</td>
</tr>
</tbody>
</table>

* Maximal stage of pelvic organ prolapse at any site according to the Baden-Walker system.
Comment

The only independent risk factor for pelvic organ prolapse identified in this study was constipation. Interestingly, we did not note a relationship between prolapse and parity or the type of vaginal delivery. This may have been due to the relatively small sample size. Other authors too have failed to report an association between pelvic organ prolapse and obstetric factors. This suggests that factors in addition to association between pelvic organ prolapse and obstetric trauma may have a role in the pathogenesis of pelvic organ prolapse.

We used a validated symptom-specific questionnaire to determine the risk of constipation. Women with pelvic organ prolapse reported higher scores on all subscales of constipation compared with control women. We excluded known confounding variables in the relationship of prolapse and constipation such as age and neurologic disease. Thus, our first hypothesis that there is an association between constipation and pelvic organ prolapse appears to be valid. Whether this association is causal in nature is less clear. It has been suggested that constipation may in fact be the result of long-standing prolapse such that stool gets trapped in the pouch of a posterior vaginal wall prolapse. We noted this finding in a small number of women with large posterior vaginal wall prolapse who report using digital pressure in the vagina to aid evacuation.

An important finding of our study is that we did not note an association between constipation and the type of prolapse. High constipation scores were reported by women with predominantly posterior wall prolapse as well as by women who had predominantly anterior vaginal wall prolapse and relatively well-supported posterior vaginal wall. Some women with predominantly anterior vaginal wall prolapse and high constipation scores even reported using perineal pressure to aid defecation. Analysis of constipation subscales showed that the straining factor was more prominent in women with prolapse, and stool subscale was more prominent in control women with constipation. This suggests that chronic straining during constipation may produce generalized weakness of the pelvic floor.

Similar to Spence-Jones et al and Weber et al, we did not note an association between constipation and the severity of prolapse. Thus, a direct-cause effect relationship between constipation and prolapse may not exist. It is possible that long-standing constipation contributes to the development of pelvic organ prolapse by causing additional injury to pelvic floor supports that have already been weakened by genetic or obstetric factors.

That chronic straining during constipation can cause pelvic floor injury is biologically plausible. Prolonged terminal motor latency has been noted in women with chronic constipation. It is possible that chronic strain-
and constipation to increase their intake of insoluble fiber from whole grain cereals to the recommended levels with a view to preventing worsening prolapse or recurrence of prolapse after treatment.

References