ABSTRACT

Objectives. To evaluate whether the symptoms associated with benign prostatic hyperplasia can be aggravated by infrequent sex, which has been suggested historically, using cross-sectional data from the Olmsted County Study of Urinary Symptoms and Health Status Among Men.

Methods. In 1989 and 1990, 2115 white men between the ages of 40 and 79 years were recruited from a random sample of Olmsted County residents (55% participation rate). During follow-up, these men completed a self-administered questionnaire that assessed lower urinary tract symptom severity, and 81% reported the frequency of ejaculation during the previous month.

Results. Overall, men who reported ejaculating at least once a week were less likely to have moderate to severe (International Prostate Symptom Score greater than 7) symptoms than men reporting no ejaculations (odds ratio 0.62, 95% confidence interval 0.51 to 0.75). The dose-response relation was strong, with men who reported more frequent ejaculations having the lowest prevalence of moderate to severe symptoms. Similar associations were seen for peak urinary flow rates, prostate volume, and health-related quality of life. The associations with urologic measures did not exist within the age decade, however. Thus, after adjusting for age, the odds ratio for ejaculation frequency and symptom severity was 0.99 (95% confidence interval 0.79 to 1.24) and was similar for peak urinary flow rates and prostate volume.

Conclusions. These cross-sectional data suggest that the frequency of ejaculation has no effect on lower urinary tract symptoms, peak urinary flow rates, or prostate volume; the apparent protective association appears to be an artifact caused by the confounding effects of age.

There are many myths in modern medicine that are sometimes still reflected in the advice given to patients. One such myth is that “exercising” the prostate can prevent prostate dysfunction.1 It has been suggested that in the presence of benign prostatic hyperplasia (BPH), sexual abstinence can lead to an exacerbation of symptoms or other untoward complications,2 but this construct would be extremely difficult to test scientifically.1 If, however, sexual activity did prevent this exacerbation, persons with greater sexual activity should be healthier in terms of measures of prostatic health/function, a construct that could be tested.

Increased sexual activity is associated with other, more general health benefits.3–9 Those with greater sexual activity report, on average, better overall health. Cross-sectional studies, however, cannot sort out the cause and effect. It is possible that better health prevents decreases in libido or that men without health problems do not experience decreases in libido or that frequency of sexual activity actually betters overall health. Regardless of directionality and causation, age could be a powerful confounder of this association. That is, age is related to declines in general health, sexual activity,10–13 and urologic health.14,15

Despite the pessimism expressed in that early textbook,1 we sought to assess the nature of the association between sexual activity and prostatic...
and general health in the context of the Olmsted County Study of Urinary Symptoms and Health Status Among Men. Specifically, we sought to examine the association between the frequency of ejaculation and measures of prostatic and general health, as well as the potential confounding of age on these associations.

**MATERIAL AND METHODS**

Many of the details of the study cohort have been previously published. A stratified random sample of white men between the ages of 40 and 79 years on January 1, 1990 was drawn. The community medical records of all selected men were screened for history of prostatectomy, prostate cancer, and several other medical conditions known to interfere with voiding function, other than BPH. After these exclusions, 3874 men were invited to join the study, of whom 2115 participated (55% participation rate). Study subjects were visited in their home and asked to complete a questionnaire covering demographic information, lower urinary tract symptom severity with questions similar to the International Prostate Symptom Score (IPSS), and satisfaction with sexual activity. Men also had their lower urinary tract function measured by means of a portable uroflow meter (Dantec 1000).

Of the 2115 participants, 537 (25%) were randomly selected for a detailed clinical examination that included serum prostate-specific antigen determination, digital rectal examination, and transrectal sonographic imaging of the prostate to measure the prostate volume. The prostate volume was estimated from the anteroposterior, transverse, and superoinferior diameters, using the formula for a prolate ellipsoid, \( \pi/6 \times \) anteroposterior \( \times \) transverse \( \times \) superoinferior.\(^\text{22}\)

The cohort was actively followed up biennially with a protocol similar to the initial examination. In the first and second follow-up visits, men who did not participate in the follow-up were replaced by men randomly selected from the community, after undergoing similar screening measures as baseline. In the second round of follow-up, an additional question about general health-related quality of life during the past year was added. Possible responses included excellent, very good, good, fair, and poor. Men were also questioned about satisfaction with their sex life in the previous 30 days. Possible responses included very dissatisfied, dissatisfied, neutral or mixed, mostly satisfied, or very satisfied. During the third biennial visit, men were asked how often they had ejaculated in the previous 30 days. This question was answered by 81% of participants during that round. Virtually no difference was found in the demographic or urologic parameters between those who completed the question on frequency of ejaculation and those who did not, except that data on urinary symptom severity were more likely to be missing for men who did not answer the question on frequency of ejaculation. In addition, during that round, the uroflow measurements were taken of the clinical subset only. The Mayo Clinic Institutional Review Board approved all protocols.

**Statistical Analysis**

For all analyses, only men who provided information on the frequency of ejaculation were included. Descriptive statistics were calculated for the cohort overall and by age strata. Bivariate associations between the frequency of ejaculation and other factors were assessed by contingency tables. The frequency of ejaculation was dichotomized at zero to four versus more than four times per month. It was also assessed as an ordinal measure for categories of 0, 1 to 4, 5 to 12, and more than 12 times per month. Urologic measures were dichotomized according to standard cutpoints. The IPSS was dichotomized as 0 to 7 versus more than 7, peak flow rate as less than 12 mL/s versus 12 mL/s or greater, and prostate volume as 30 cm\(^3\) or less versus greater than 30 mL. General health status was dichotomized as poor, fair, or good versus very good or excellent. Satisfaction with sex life was dichotomized as very dissatisfied-neutral versus mostly or very satisfied. To assess the potential confounding effects of age, the results were stratified according to age decade at the time of completing the third follow-up questionnaire. Differences across age strata were tested with the Breslow-Day test of homogeneity of the odds ratio. In the absence of evidence for effect modification, summary odds ratios were estimated using the method described by Mantel and Haenszel. Tests for trend with increasing sexual frequency were tested with the Mantel extension. For all analyses, a nominal P value of less than 0.05 was considered statistically significant. All analyses were conducted using Statistical Analysis Systems statistical software.

**RESULTS**

Overall, the median (25th, 75th percentile) age of men in this study sample in the third round of follow-up was 57.4 years (50.0, 66.9) and the median IPSS was 6.0 (3.0, 11.0). A strong age-related increase in IPSS was noted across successive age groups (Fig. 1a), as previously reported. The prevalence of low peak urinary flow rates demonstrated a cross-sectional increase across successively older age groups (Fig. 1b), as did the prevalence of an increased prostate volume (Fig. 1c), lower health-related quality of life (Fig. 1d), and decreased sexual satisfaction (Fig. 1e). The frequency of ejaculation showed a cross-sectional decline across successively older age groups (P for trend <0.001). The prevalence of men ejaculating at least once per week was 79%, 69%, 42%, and 18% for men in their 40s, 50s, 60s, and 70s or older, respectively.

When the frequency of ejaculation was compared with the measures of prostate health, consistently strong cross-sectional associations were found (Table I). Approximately 50% of men who ejaculated less than once per week had moderate to severe lower urinary tract symptoms compared with 38% of men who ejaculated more frequently (odds ratio [OR] 0.62 and 95% confidence interval [CI] 0.51 to 0.75). Similar associations were seen for other measures of prostate health, including peak urinary flow rates (OR 0.47, 95% CI 0.31 to 0.73) and increased prostate volume (OR 0.53, 95% CI 0.34 to 0.80). In addition, a strong cross-sectional association was noted between the frequency of ejaculation and general health status. Approximately 61% of men who ejaculated less than once per week reported very good to excellent health compared with 80% of men who ejaculated more frequently (OR 2.58, 95% CI 2.08 to 3.20).
A strong dose-response relation with increasing frequency of ejaculation for all measures was noted (Table II). For example, relative to men who reported no ejaculations in the past month, men who ejaculated 1 to 4, 5 to 12, or more than 12 times per month were 0.78, 0.57, and 0.38 times, respectively, as likely to report moderate to severe symptoms than none to mild symptoms (P for trend <0.001). A similar dose response was noted in the cross-sectional relationship between the frequency of ejaculation and health-related quality of life.

Even more pronounced was the association between the frequency of ejaculation and sexual satisfaction.

Because age was strongly related to both frequency of ejaculation and each of the health measures, we assessed the potential confounding effect of age by examining the associations within age strata. Although an overall association was found between the frequency of ejaculation and urologic measures, this association did not persist in the age-stratified results (Table III). For example, 33% of men in their 40s who ejaculated less than once per week reported moderate to severe symptoms compared with 31% who ejaculated more frequently (OR 0.93, 95% CI 0.57 to 1.54). The odds ratio for men in their 50s, 60s, and 70s was 0.79 (95% CI 0.54 to 1.14), 1.21 (95% CI 0.82 to 1.80), and 1.12 (95% CI 0.56 to 2.23), respectively. Similar associations were seen across age strata for each of the urologic measures. As a result, the age-adjusted measures of association between frequency of ejaculation and urologic measures hovered around the null.

In contrast to the results for urologic measures, the age-specific results for the association between

### TABLE 1. Cross-sectional association between frequency of ejaculation and urologic measures

<table>
<thead>
<tr>
<th>Ejaculations/mo</th>
<th>IPSS ≤7</th>
<th>IPSS &gt;7</th>
<th>Qmax (mL/s) ≥12</th>
<th>Qmax (mL/s) &lt;12</th>
<th>Prostate Volume (cm³) ≤30</th>
<th>Prostate Volume (cm³) &gt;30</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–4</td>
<td>381 (50.5)</td>
<td>374 (49.5)</td>
<td>113 (63.8)</td>
<td>64 (36.2)</td>
<td>74 (49.0)</td>
<td>77 (51.0)</td>
</tr>
<tr>
<td>&gt;4</td>
<td>588 (62.2)</td>
<td>357 (37.8)</td>
<td>194 (78.9)</td>
<td>52 (21.1)</td>
<td>141 (64.7)</td>
<td>77 (35.3)</td>
</tr>
</tbody>
</table>

Odds ratio (95% CI) for age-stratified results:

- IPSS ≤7: 0.62 (0.51–0.75)
- IPSS >7: 0.47 (0.31–0.73)
- Qmax (mL/s) ≥12: 0.53 (0.34–0.80)
- Qmax (mL/s) <12: 0.79 (0.54 to 1.14)
- Prostate Volume (cm³) ≤30: 1.21 (0.82 to 1.80)
- Prostate Volume (cm³) >30: 1.12 (0.56 to 2.23)

**Key:** IPSS = International Prostate Symptom Score; Qmax = peak urinary flow rate.

Data presented as number of patients, with the percentage in parentheses, unless otherwise noted.
frequency of ejaculation and general health and sexual satisfaction persisted, although modestly attenuated. Thus, when adjusted for age, a positive cross-sectional association remained between the frequency of ejaculation and general health (OR 2.13, 95% CI 1.67 to 2.72). The age-adjusted odds ratio for sexual satisfaction was 5.08 (95% CI 4.06 to 6.36).

**COMMENT**

These cross-sectional results failed to provide support for an association between the frequency of ejaculation and urologic measures. Although the unadjusted relationships demonstrated a strong relationship, with a correspondingly strong dose response, this appeared to be solely a result of the confounding effects of age. Within age strata, little evidence was found for a cross-sectional association, suggesting that the observation is merely because urologic health is generally worse in persons with advancing age. This contrasts with the finding that an increased frequency of ejaculation is associated with better overall health and sexual satisfaction. For this, the relationship persisted after adjustment for age.

These results should help to debunk the myth that increased sexual activity prevents the exacerbation of symptoms of BPH. Although historically proposed, this myth has never been experimentally evaluated, perhaps in part because the biologic rationale behind the myth is not compelling. However, if a true cause-and-effect relationship existed, there should be some evidence of an inverse association between the frequency of ejaculation and these urologic measures, even cross-sectionally. The test of this hypothetical construct in this study provided an indirect assessment and as no association was found after adjusting for age, provides little support for the underlying hypothesis. From a different perspective, however, the negative results could be considered encouraging by some. That is, the observation that no difference exists once age is taken into account suggests that BPH, per se, may not have a negative impact on sexual health, at least as measured by frequency of ejaculation. This differs from findings from clinical series of patients and subjects enrolled in clinical trials of treatment of BPH. However, it is not clear whether the apparent associations observed in these other studies were due to selection factors,

**TABLE II.** *Dose-response relationship between frequency of ejaculation and urologic and quality-of-life measures*

<table>
<thead>
<tr>
<th>Ejaculations/ (mo)</th>
<th>IPSS (&gt;7 vs. ≤7)</th>
<th>Qmax (≤12 vs. &gt;12 mL/s)</th>
<th>Prostate Volume (&gt;30 vs. ≤30 cm³)</th>
<th>Health-Related Quality of Life (Excellent, Very Good vs. Good, Fair, Poor)</th>
<th>Sexual Satisfaction (Satisfied vs. Neutral, Dissatisfied)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.0*</td>
<td>1.0*</td>
<td>1.0*</td>
<td>1.0*</td>
<td>1.0*</td>
</tr>
<tr>
<td>1–4</td>
<td>0.78 (0.58–1.06)</td>
<td>1.40 (0.70–2.80)</td>
<td>0.72 (0.35–1.46)</td>
<td>1.95 (1.42–2.63)</td>
<td>2.18 (1.54–3.08)</td>
</tr>
<tr>
<td>5–12</td>
<td>0.57 (0.43–0.76)</td>
<td>0.64 (0.35–1.27)</td>
<td>0.40 (0.21–0.80)</td>
<td>4.00 (2.95–5.42)</td>
<td>7.91 (5.65–11.06)</td>
</tr>
<tr>
<td>&gt;12</td>
<td>0.38 (0.26–0.57)</td>
<td>0.48 (0.19–1.18)</td>
<td>0.45 (0.20–1.03)</td>
<td>3.72 (2.44–5.67)</td>
<td>11.04 (7.09–17.18)</td>
</tr>
</tbody>
</table>

*Reference category.

**TABLE III.** *Cross-sectional age-specific and age-adjusted associations between frequency of ejaculation* *and urologic and quality-of-life measures*

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>IPSS (&gt;7 vs. ≤7)</th>
<th>Qmax (≤12 vs. &gt;12 mL/s)</th>
<th>Prostate Volume (&gt;30 vs. ≤30 cm³)</th>
<th>Health-Related Quality of Life (Excellent, Very Good vs. Good, Fair, Poor)</th>
<th>Sexual Satisfaction (Satisfied vs. Neutral, Dissatisfied)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40–49</td>
<td>0.93 (0.57–1.54)</td>
<td>1.30 (0.34–4.96)</td>
<td>1.35 (0.27–6.75)</td>
<td>2.10 (1.26–3.52)</td>
<td>4.02 (2.45–6.60)</td>
</tr>
<tr>
<td>50–59</td>
<td>0.79 (0.54–1.14)</td>
<td>0.75 (0.28–2.01)</td>
<td>0.61 (0.26–1.42)</td>
<td>1.90 (1.25–2.87)</td>
<td>7.20 (4.81–10.78)</td>
</tr>
<tr>
<td>60–69</td>
<td>1.21 (0.82–1.80)</td>
<td>0.89 (0.39–2.03)</td>
<td>1.60 (0.72–3.57)</td>
<td>2.43 (1.54–3.83)</td>
<td>4.65 (3.04–7.10)</td>
</tr>
<tr>
<td>70+</td>
<td>1.12 (0.56–2.23)</td>
<td>1.88 (0.41–8.77)</td>
<td>1.54 (0.27–8.89)</td>
<td>2.52 (1.24–5.14)</td>
<td>3.78 (1.92–7.48)</td>
</tr>
<tr>
<td>Age-adjusted</td>
<td>0.99 (0.79–1.24)</td>
<td>0.95 (0.56–1.61)</td>
<td>1.10 (0.66–1.84)</td>
<td>2.13 (1.67–2.72)</td>
<td>5.08 (4.06–6.36)</td>
</tr>
</tbody>
</table>

* Ejaculation frequency <1 per week vs. ≥1 per week.

Key: IPSS = International Prostate Symptom Score; Qmax = peak urinary flow rate.

Data presented as the odds ratio, with the 95% confidence interval in parentheses.
different measures of sexual health, or the lack of taking age into account.

Although the association of urologic measures disappeared after accounting for age differences, it is interesting that the association with general health persisted even after adjustment for age. This suggests that the association is not just an age-related phenomenon, but again, the directionality is not clear. That is, men who are in better health may engage in sexual activity more often than men who are not. Alternatively, increased sexual activity may lead to improved perceptions of health. This cross-sectional association has been observed in other settings, but not all. Longitudinal follow-up of a cohort may help to sort out the directionality.

The association between frequency of ejaculation and satisfaction with sex life was even stronger. Again, the cross-sectional nature of the data precludes the opportunity to assess cause and effect. The strong association does, however, provide a measure of construct validity of the measure of frequency of ejaculation. Similar associations have been documented in other studies, and these make intuitive sense. Men who are not satisfied with their sex life would probably tend not to engage in sexual activity as often or may not be satisfied because, among many possible reasons, they do not engage in sexual activity as often as they would like.

When interpreting these results, several potential limitations should be kept in mind. In addition to the problems inherent in cross-sectional data, there may be additional limitations imposed by misclassification. All urologic measures have some component of measurement error. It is unlikely, however, that the amount or direction of error would differ according to the frequency of ejaculation. There could also be misclassification of the measure of frequency of ejaculation. Although the information was collected by questionnaire and not face-to-face, inherent biases may exist resulting from the willingness to report this information. The question was asked to include both masturbation and intercourse, but systematic underreporting or over-reporting of ejaculations associated with either or both could occur. Indeed, 19% of men refused to provide this information at all. However, no differences were found in the urologic and demographic parameters between those willing to provide this information and those who did not. The potential problem related to participation may extend to the study overall, because the baseline participation rate was 55%. However, the medical histories of participants and nonparticipants demonstrated relatively few differences between these groups and, when present, were often of minimal magnitude. Finally, generalizations may be limited because of the study setting and population. The findings may not extend to other segments of the population, whether geographic, racial, or ethnic.

Despite these potential limitations, these data provide no evidence of an association between the frequency of ejaculation and prostatic disease. The apparent inverse association that is present in the unadjusted analyses, and potentially a source of the mythical benefits of “exercising” the prostate, appears to be an artifact due to the confounding effect of age. Moreover, no evidence was found that men with BPH are less likely to engage in sexual activity, once age differences were taken into account. However, an association between better overall self-perceived health status and greater satisfaction with sexual life and frequency of ejaculation, regardless of age, does appear to exist.

ACKNOWLEDGMENT. To Sondra Buehler for her assistance in preparing the manuscript and to the members of the study team without whose efforts this work would not be possible; the dedication of members of the cohort participating in the study was invaluable.

REFERENCES