

## Women Urinate in the Standing Position Do Not Increase Post-Void Residual Urine Volumes

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**Aims:** The effects of standing while voiding have seldom been investigated in women. We evaluate urodynamic parameters of voiding while standing in healthy women using uroflowmetry and post-void residual urine volume assessment. Results are compared with crouching and sitting. **Methods:** Between July and October, 2008, a total of 30 healthy, nulliparous female volunteers were enrolled. Ages were 22–37 (mean: 28 ± 4). Urodynamic studies were performed for all in sitting, crouching and standing positions; 3, 3 and 5 times in each position, respectively. Volunteers used homemade auxiliary appliances for collecting urine from the urethra and draining it forward when standing. Volume, maximum flow rate, mean flow rate and post-void residual urine volume were compared. **Results:** Maximum and average flow rates in the sitting and standing positions were significantly different, but not between sitting and crouching or between crouching and standing. There were no differences in voided volume and post-void residual urine volume. There's no apparent learning curve for women in the standing position. **Conclusions:** Though flow rates are decreased while standing, post-void residual volume is not significantly different. Women have another choice for voiding in public restrooms. *NeuroUrol. Urodynam.* 29:1299–1300, 2010. © 2010 Wiley-Liss, Inc.

**Key words:** female; residual volume; urodynamics

Preferred voiding position is affected by culture, education, and environment. Women usually void while sitting. However, women may urinate in special positions to avoid touching toilet seats when using a public convenience. Moore et al.,<sup>1</sup> reported that 85% of British women prefer to crouch over public toilet seats when using a public convenience. Females usually do not void while standing, but it is possible to avoid getting clothes wet by using an auxiliary appliance for collecting urine from the urethra and draining it forward.

Despite the convenience, standing is not popular among females. Uroflowmetric measurements and post-voiding residual (PVR) urine volume are affected by voiding positions in healthy males.<sup>2</sup> Complete emptying of the urinary bladder is crucial to avoiding urinary infection and stone formation.<sup>3,4</sup>

We investigate voiding position effects (sitting, crouching, and standing) using uroflowmetry (UFM) and PVR urine volume assessment. From July to October 2008, 30 healthy, nulliparous female volunteers were enrolled; ages were 22–37 (mean: 28 ± 4). Urodynamic studies were performed for sitting, crouching, and standing, 3, 3, and 5 times each, respectively. Volunteers used homemade auxiliary appliances (Fig. 1) for collecting urine from the urethra and draining it forward when standing (Fig. 2).

Uroflowmetric parameters and post-void residual urine volumes in the sitting, crouching, and standing positions were shown (Fig. 3). There were no differences in voided volume (VV) and PVR between any posture. There was no evidence of a learning curve for the standing position (Fig. 4).

Micturition is not only a physiological endeavor but also a socialized process. The environment and the position are important factors. In public, women often avoid voiding in the traditional sitting position in dirty public lavatories. However, in the crouching position, muscles on both sides undergo



Fig. 1. Homemade auxiliary appliances.

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Fig. 2. Volunteers used homemade auxiliary appliances for collecting urine from the urethra and draining it forward when standing.

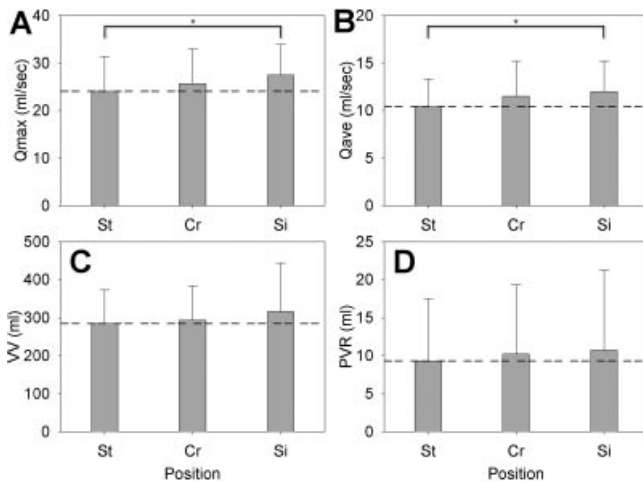


Fig. 3. Maximum (A) and average (B) flow rates between the sitting and standing positions were significantly different, but the differences between sitting and crouching and between crouching and standing were not. There were no differences in voided volume (C) and post-void residual urine (D) between any voiding positions (Q<sub>max</sub>, maximum flow rate; Q<sub>ave</sub>, average flow rate; VV, voided volume; PVR, post-void residual urine; GEE, generalized estimating equations for testing effect of time; ANOVA, repeated analysis of variance for testing effects of time).

considerable exertion, which is not only unnatural but also puts elderly and physically weak women at risk of falling.

With auxiliary appliances, urination in the standing position is an alternative.<sup>5</sup> In the current study, the data shows Q<sub>max</sub> does not increase with repeated episodes in the standing position, nor there was a decrease in the amount of residual urine in the bladder. This indicates the absence of a learning curve and no need for extensive practice. Women are able to achieve normal voiding without significant residual urine in the standing position on the first time that they try. They may be encouraged to do so when traveling, in public toilets, or even in outdoor environments where no appropriate facilities are available.

In this study, volunteers employed homemade auxiliary appliances, made of folded art paper. There are commercialized devices available that allow women to urinate in a

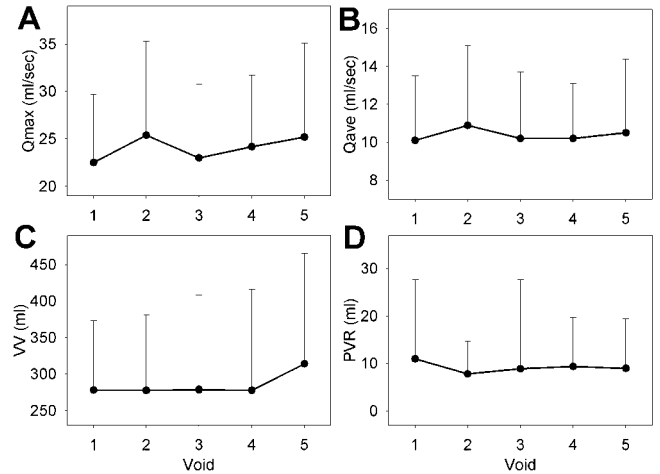


Fig. 4. There was no evidence of a learning curve for the standing position. All P-values were greater than 0.1950 for Q<sub>max</sub> (A), Q<sub>ave</sub> (B), VV (C), or PVR (D), using either GEE or ANOVA tests (Q<sub>max</sub>, maximum flow rate; Q<sub>ave</sub>, average flow rate; VV, voided volume; PVR, post-void residual urine; GEE, generalized estimating equations for testing effect of time; ANOVA, repeated analysis of variance for testing effects of time).

standing position.<sup>5</sup> The major concern for commercialized devices is limited availability. People cannot buy commercialized devices from local stores in many countries. However, if they were, it could lead to increased expense. These implements can be easily self-made using art paper, cardboard, or other materials with good water-resistant qualities. Once acquainted with the techniques, women can make one appliance anytime with the material around her, like art paper from magazines or advertisement inserts.

The limitations of this study are that only young (average age: 28), nulliparous, healthy, female volunteers were assessed. Older and multiparous women may undergo relaxation of the pelvic floor musculature, resulting in cystocele, uterine prolapse, and other associated problems. To better understand micturition in the standing position in women of all age groups, especially elderly women, more research is needed.

Our study shows though Q<sub>max</sub> and Q<sub>ave</sub> were decreased during standing when compared with sitting, the PVR was not different. It is still feasible for healthy women to void while standing, in view of toilet hygiene. Women do not need to learn how to void while standing and can get the same efficiency in bladder evacuation as for sitting, though it is slower. Women have another choice in voiding position when using a public convenience.

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