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# EXPLORING THE USE OF FREQUENCY-VOLUME CHARTS

**Aims of Study**

Frequency-volume charts are an important tool in the investigation of patients with lower urinary tract (LUT) dysfunction, because they provide the ability to study LUT function during normal daily activities. The information obtained by frequency-volume charts is currently limited to the number of voidings, the voided volumes, the distribution of voidings between daytime and nighttime, the registration of episodes of urgency and leakage and the number of incontinence pads used. Little research has been done to incorporate a sensory evaluation into these charts. However adequate sensation of bladder filling is important for a proper bladder function. Currently, sensory information related to bladder filling is mainly deducted from cystometric studies in which patients have to be catheterized and in case of conventional cystometry, the bladder is artificially filled. To what extent these factors confound the sensory evaluation remains unknown. Therefore we studied whether frequency volume charts can be used as a non-invasive tool for sensory evaluation. Furthermore we studied the agreement between sensory data derived from these charts with those obtained during conventional cystometry.

**Methods**

Fifteen healthy female nulliparous students without urological history between 18 and 24 years old were asked to fill out a 3 day frequency-volume chart during normal daily activities. They noted the time and volume of each micturition and scored the grade of perception of bladder fullness according to predefined grades before each micturition (table 1). All volunteers also underwent a conventional cystometric bladder filling at 30 mL/min and were asked to describe all sensations related to bladder filling. Furthermore they correlated these sensations to the same predefined grades of perception of bladder fullness that was used on the frequency-volume charts.

**Table 1**

| | |
|---|---|
| **No desire to void** | |
| 0 | No bladder sensation |
| 1 | First sensation of bladder filling<br>Voiding can easily be delayed for more than 60 minutes |
| **Desire to void** | |
| 2 | First desire to void<br>Voiding can be delayed for at least 30 minutes |
| 3 | Strong desire to void<br>Voiding cannot be delayed for more than 15 minutes |
| 4 | Urgent desire to void<br>Voiding cannot be delayed for more than 5 minutes |

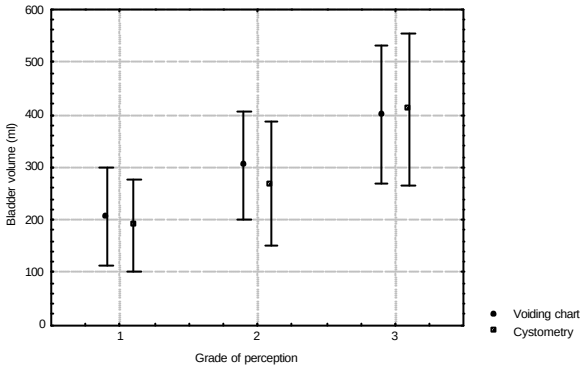
**Results**

In total, 326 micturitions were recorded during daytime. These data are presented in table 2.

**Table 2**

| Grade of bladder fullness | Mean ± SD(mL) | 95% CI (mL) | Range (mL) | Number (%) |
|---|---|---|---|---|
| 0 | 110 ± 59 | 95 – 126 | 10 – 300 | 18.7 |
| 1 | 206 ± 94 | 190 – 221 | 10 – 500 | 46.3 |
| 2 | 303 ± 105 | 280 – 325 | 100 – 650 | 25.5 |
| 3 | 402 ± 133 | 353 – 448 | 200 – 650 | 9.5 |
| 4 | / | / | / | 0 |

The voided volumes between the different grades of perception of fullness were significantly different ( $P < 0.001$). Moreover, the grade of perception of bladder fullness was positively correlated with the volume voided (Rs 0.67, $P < 0.001$). Sixty-five percent of the voidings was graded without desire to void (grade 0 and 1), whereas only 9.5% of the voidings was graded as strong desire to void (grade 3). No volunteer reported an urgent desire to void (grade 4). During cystometry, all volunteers reported three different sensations of filling. First sensation of filling was described at 190 ± 88 mL (95%CI: 176-204mL, range 22-321mL), first desire to void at 268 ± 117 mL (95%CI: 243-293mL, range 128-509mL) and strong desire to void at 410 ± 145 mL (95%CI: 358-463mL, range 273-715mL). The mean volumes for the different sensations of bladder fullness on the charts and during cystometry were not significantly different ($P > 0.2$). This is shown in the figure. The mean differences respectively were 16 mL for grade 1; 34 mL for grade 2; 10 mL for grade 3.




## Conclusions

Data from our pilot study, which explored the use of frequency-volume charts in healty female students, show that the information obtained from these charts can be extended beyond just recording “classical” parameters such as voided volumes: these charts can be used as a non-invasive non-expensive tool to evaluate sensations of bladder filling during normal daily activities. Moreover sensory data deducted from frequency-volume charts show a good agreement with sensory data from cystometric bladder filling. Because the largest part of the micturitions was made without a desire to void in the healthy female population we studied, the distribution of sensation-related micturitions may provide a new parameter to study bladder behaviour. Including a sensory evaluation into frequency-volume charts and evaluating the distribution between sensation and non-sensation related micturitions may improve the power of these charts to discriminate between different pathologies. The use of these “sensation-related frequency-volume charts” is currently investigated in different groups of incontinent patients.