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# URINE FLOW RATES IN WOMEN WITH SYMPTOMS OF PELVIC FLOOR DYSFUNCTION

Hypothesis / aims of study

Previous studies of urine flow rates (UFRs) in women with symptoms of pelvic floor dysfunction (1, 2) have shown associations of abnormally slow UFRs with age (1, 2), urodynamic diagnosis (1), prior hysterectomy and increasing grades of uterine and/or vaginal prolapse (2) when compared with normative data (3). This study, involving by far the largest cohort of women with symptoms of pelvic floor dysfunction to date, aims to test the above associations and all other possible clinical and urodynamic associations of abnormally low UFRs using multivariate analysis.

Study design, materials and methods

The patients were 1140 women presenting consecutively for their initial urogynecological assessment including urodynamics and studied prospectively. Women were encouraged to attend with a comfortably full bladder. Measurement of UFRs was on a calibrated modern uroflowmeter. Uroflowmetry data were applied the equations for the Liverpool nomograms (3) for the respective maximum (MUFR) and average (AUFR) centiles obtained. Only data within the 15-600ml range of interpretability for the nomograms data was included. Data was further separated according to (i) MUFR and AUFR under 10$^{th}$ centile Liverpool Nomogram; (ii) MUFR and AUFR 10$^{th}$ centile Liverpool Nomogram and above. Factors associated with MUFR or AUFR under 10$^{th}$ centile were assessed using multiple logistic regression. These included age, parity, presenting symptoms, prior hysterectomy, menopause / hormone replacement therapy (HRT) use, previous continence surgery, all grades of prolapse as well as all the urogynecological diagnoses except voiding dysfunction (VD - as this diagnosis has an abnormally slow UFR in its definition).

Results

Of the 1140 women, the data from 193 (17%) women were outside the range of interpretation of the Liverpool Nomograms. This left the data from 947 women. The demographic characteristics are included in Table 1, noting in particular that, like previous studies (1, 2) symptomatic women have much slower UFRs than asymptomatic women.

In **univariate** analysis, the prevalence in symptomatic women of UFRs under 10$^{th}$ centile Liverpool Nomogram increased significantly with age , parity, symptoms of prolapse and voiding dysfunction, menopause (with and without HRT use), uterine, anterior vaginal and vaginal vault prolapse and inversely with symptoms of stress incontinence. Table 2 shows the OR (95%CI) and p-values of the significant associations.

In **multivariate** analysis, the main significant association of abnormally slow UFRs is age, with other previously quoted associations losing significance. There were separate significant relations between abnormally slow UFRs and the diagnoses of urodynamic stress incontinence (USI – MUFR only) and detrusor overactivity (DO – AUFR only). Table 3 shows the multivariate analysis of factors determining low UFRs.

Interpretation of results

The main positive association of abnormal slow UFRs (both MUFR and AUFR) is with age. There are significant relationships with the diagnoses of USI (MUFR only – positive) and DO (AUFR only – inverse).

Concluding message

Age appears to be the main significant association of abnormally low UFRs in women with symptoms of pelvic floor dysfunction.

**Table 1. Demographic characteristics by group (MUFR [AUFR] under 10$^{th}$ centile Liverpool Nomogram vs 10$^{th}$ centile and over)**

| | **Under 10$^{th}$ Centile Liverpool Nomogram** | | **10$^{th}$ centile or over Liverpool Nomogram** | |
|---|---|---|---|---|
| ***Number of women (%)*** | MUFR<br>283 (29.88) | AUFR<br>294 (31.05) | MUFR<br>664 (70.12) | AUFR<br>653 (68.95) |
| ***Age – Median (range)*** | MUFR<br>65 (18 – 90) | AUFR<br>63 (27 – 89) | MUFR<br>54 (18 – 90) | AUFR<br>54 (18 – 90) |
| ***Parity – Median (range)*** | MUFR<br>2 (0 – 9) | AUFR<br>2 (0 – 9) | MUFR<br>2 (0 – 9) | AUFR<br>2 (0 – 9) |
| ***UFR centile – Median (range)*** | MUFR<br>9.6 (2.6 – 25.7) | AUFR<br>5.75 (1.2 – 13.5) | MUFR<br>22 (4.6 – 72.2) | AUFR<br>10.5 (1.1 – 45.2) |

**Table 2. Univariate analysis of factors associated with MUFR (AUFR) under 10th centile**

| | MUFR < 10$^{th}$ Centile | | | AUFR < 10$^{th}$ Centile | | |
|---|---|---|---|---|---|---|
| | No (%) | OR | p-value | No (%) | OR | p-value |
| Age (every 10 years) | | **1.75** | **<0.001** | | **1.51** | **<0.001** |
| Parity 4+ | 44 (34.92) | **1.59** | **0.084** | 52 (41.27) | **2.09** | **0.006** |
| SI (symptom) Yes | 136 (23.90) | **0.49** | **<0.001** | 137 (24.08) | **0.45** | **<0.001** |
| VD (symptoms) Yes | 46 (40.71) | **1.73** | **0.008** | 54 (47.79) | **2.27** | **<0.001** |

| | | | | | | |
|---|---|---|---|---|---|---|
| Prolapse (symptoms) Yes | 116 (39.19) | **1.87** | **<0.001** | 119 (40.20) | **1.83** | **<0.001** |
| Menopausal Yes, No HRT | 60 (33.71) | **3.01** | **<0.001** | 70 (39.33) | **3.30** | **<0.001** |
| Menopausal Yes, with HRT | 178 (38.86) | **3.76** | **<0.001** | 173 (37.77) | **3.09** | **<0.001** |
| Uterine prolapse grade 1 | 55 (28.50) | **1.57** | **0.03** | 62 (32.12) | **1.66** | **0.011** |
| Uterine prolapse grade 2 | 24 (32.00) | **1.85** | **0.028** | 30 (40.00) | **2.33** | **0.002** |
| Uterine prolapse grade 3 | 14 (60.87) | **6.12** | **<0.001** | 11 (47.83) | **3.21** | **0.008** |
| Anterior Vag prolapse grade 2 | 52 (39.69) | **1.80** | **0.005** | 54 (41.22) | **1.90** | **0.002** |
| Anterior Vag prolapse grade 3 | 26 (50.98) | **2.85** | **0.001** | 29 (56.86) | **3.57** | **<0.001** |
| Vaginal vault prolapse grade 1 | 55 (36.67) | **1.63** | **0.010** | 60 (40.00) | **1.83** | **0.001** |
| Vaginal vault prolapse grade 2 | 23 (46.94) | **2.49** | **0.002** | 26 (53.06) | **3.10** | **<0.001** |
| Vaginal vault prolapse grade 3 | 14 (73.6) | **7.89** | **<0.001** | 13 (68.42) | **5.93** | **<0.001** |

**Table 3. Multivariate analysis of factors associated with UFRs under 10$^{th}$ Centile**

| | Adjusted OR (95% CI) | p value |
|---|---|---|
| MUFR < 10$^{th}$ Centile | | |
| Age (every 10 years) | **1.58** (1.39 to 1.81) | **<0.001** |
| Final Diagnosis USI | **1.63** (1.07 to 2.49) | **0.023** |
| | | |
| AUFR < 10$^{th}$ Centile | | |
| Age (every 10 years) | **1.36** (1.20 to 1.54) | **<0.001** |
| Final Diagnosis DO | **0.65** (0.43 to 0.98) | **0.04** |


References

1. Brit J Urol 1990, 65;5:483-487
2. Int Urogynecol J 1999,10:378-383
3. Brit J Urol 1989, 64:30-38



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|---|---|
| ***Specify source of funding or grant*** | **Nil** |
| ***Is this a clinical trial?*** | **No** |
| ***What were the subjects in the study?*** | **HUMAN** |
| ***Was this study approved by an ethics committee?*** | **Yes** |
| ***Specify Name of Ethics Committee*** | **St Vincents and Mater Health, Sydney** |
| ***Was the Declaration of Helsinki followed?*** | **Yes** |
| ***Was informed consent obtained from the patients?*** | **Yes** |