

PREVALENCE OF “LOW-COUNT” BACTERIURIA IN FEMALE URINARY INCONTINENCE VERSUS CONTINENT FEMALE CONTROLS: A PROSPECTIVE CROSS-SECTIONAL STUDY.

Hypothesis / aims of study

Detrusor Overactivity (DO) is an extremely common condition affecting women. In the majority of cases, the etiology of DO is completely unknown (idiopathic detrusor overactivity, IDO). A higher rate of bacteriuria in women with IDO compared to stress incontinent controls has been demonstrated, suggesting an association between IDO and urinary infection (1).

All previous studies on the association between bacteriuria and urinary incontinence used Kass' traditional definition of “significant bacteriuria” ($>10^5$ CFU/ml) (1,2). This threshold was originally founded on studies of asymptomatic women and those with overt pyelonephritis. The 10^5 CFU/ml threshold is now considered insufficiently sensitive for women with lower urinary tract dysfunction; expert guidelines endorse the inclusion of “low-count” bacteriuria (10^3 - 10^5 CFU/ml) in the assessment of women with acute dysuria (3). However, the appropriate microbiological criteria for women with non-dysuric urinary incontinence remain unknown.

We undertook a prospective cross-sectional study of the prevalence of bacteriuria, including “low-count” bacteriuria, in women with IDO, other urinary incontinence and continent female controls. Our hypothesis was that bacteriuria would be more prevalent among incontinent women and, within the incontinent group, more prevalent among women with IDO.

Study design, materials and methods

A prospective cross-sectional study conducted in a single urogynecology unit over a 20-month period. Study catheter urine specimens (CSU) were obtained from women with urinary incontinence attending for routine urodynamic testing. Control CSUs were obtained from continent women undergoing routine gynaecological procedures in the operating theatre. Exclusion criteria were: current dysuria or fever, voiding dysfunction (post-void residual bladder volume (PVR) ≥ 100 ml), pregnancy or <6 weeks post-partum, suspicion of neurogenic bladder and antibiotic use within the preceding 4 weeks.

CSU study specimens were cultured to include “low-count” bacteriuria at the 10^3 CFU/ml threshold, using Horse Blood Agar incubated at 35°C in 7% CO_2 and McConkey's agar incubated at 35°C in air, which grow all known pathogens and contaminants. Specimens with bacteriuria $<10^3$ CFU/ml were considered sterile. Pyuria was assessed using haemocytometer counts on uncentrifuged specimens, with a count of >10 white cells/ μL considered significant pyuria.

Risk factors which have been associated with risk of UTI were collated prospectively into a computerized database and subject to multivariate regression analysis to identify variables that were independently associated with the presence of bacteriuria $\geq 10^3$ CFU/ml. Factors assessed included age, diabetes mellitus, a history of recurrent UTI, sexual activity, PVR, menopausal status and degree of cystocele. SPSS software, version 18.0 (IBM Corporation, Somers, NY, USA) was used to perform univariate and multivariate analyses. Fisher's exact test was used to compare categorical data in the univariate analysis. Logistic regression analysis was carried out. An *a priori* estimation of sample size indicated that $n=62$ women would be required in both the study (incontinent) and control (continent) groups to yield 80% power to detect a significant difference between the groups, assuming $\alpha = 0.05$.

Results

Between 1st August 2009 and 31st March 2011, 151 women undergoing urodynamic testing met inclusion criteria and were recruited. Reference CSU specimens were obtained from 62 continent women, for a total of 213 study specimens. Overall, the prevalence of any bacteriuria $\geq 10^3$ CFU/ml was significantly higher among the incontinent women (odds ratio [OR] 4.06; $p=0.036$). Two-thirds of incontinent bacteriuric women grew “low-count” bacteriuria only. The prevalence of both “low-count” (OR 5.4) and “high-count” bacteriuria (OR 2.5) was (non-significantly) higher in the incontinent group.

Urine culture result (CSU)	Incontinent (n=151)	Continent (n=62)	OR (95% CI)	P
“Low-count” bacteriuria	12 (8.3)	1 (1.6)	5.4 (0.76 to 235.2)	0.061
“High-count” bacteriuria	6 (4)	1 (1.6)	2.52 (0.30 to 118.0)	0.345
Any bacteriuria $\geq 10^3$ CFU/ml	18 (11.9)	2 (3.2)	4.06 (0.92 to 37.0)	0.036

Table 1 - Prevalence of bacteriuria in incontinent women versus continent controls; n (%)

On multivariate regression analysis, the only risk factor found to be independently associated with bacteriuria $\geq 10^3$ CFU/ml was the presence of a cystocele \geq Grade II ($p=0.025$).

Factor	OR (95% CI)	P
Age	1.03 (0.98 to 1.08)	0.26
Recurrent UTI	0.82 (0.21 to 3.22)	0.77
Diabetes mellitus	1.33 (0.31 to 5.73)	0.70
Sexually active	0.98 (0.30 to 3.19)	0.97
Post-menopausal	0.74 (0.19 to 2.88)	0.66
Cystocele ≥ Grade II	0.26 (0.08 to 0.84)	0.025
Post-void residual	0.992 (0.35 to 2.80)	0.90

Table 2 – Multivariate regression analysis of independent risk factors for bacteriuria

A sub-analysis of the prevalence of bacteriuria according to urodynamic diagnosis was performed. Compared to the baseline prevalence among continent controls, the only significant difference was seen in women with bladder oversensitivity (odds ratio 13.8; $p=0.0017$). Women with pure DO (OR 4.4) and any DO (OR 3.7) showed a higher prevalence of bacteriuria $\geq 10^3$ CFU/ml than continent women, though not statistically significant. The rate of sterile pyuria in women with bladder oversensitivity (31%) was higher than both continent women (2%; $p=0.003$) and stress-incontinent women (4%; $p=0.018$) but not different from women with pure DO (9%; $p=0.08$).

Interpretation of results

To our knowledge, this is the first study on the prevalence of bacteriuria in female urinary incontinence compared to the background incidence in continent female controls. We found that women with non-dysuric urinary incontinence had significantly higher rates of bacteriuria than continent controls, using a sensitive microbiological threshold of $>10^3$ CFU/ml. The finding that two-thirds of specimens positive for bacteriuria grew “low-count” bacteriuria only appears to support the inclusion of “low-count” bacteriuria into the microbiological assessment of female urinary incontinence.

Although age, sexual activity, diabetes mellitus and post-menopausal status have all previously been linked to risk of UTI, our multivariate regression analysis did not find these to be independent risk factors for bacteriuria $\geq 10^3$ CFU/ml. Women with DO and bladder oversensitivity, two conditions characterised clinically by urinary urgency, had higher rates of bacteriuria than continent controls (OR 4.4 and 13.8 respectively), which suggests a possible association between bacteriuria and lower urinary tract symptoms in these women.

Concluding message

Women with urinary incontinence have higher rates of bacteriuria than continent controls, even in the absence of dysuria. The microbiological assessment of female urinary incontinence should incorporate “low-count” bacteriuria.

References

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