

DELIVERY MODE IS THE MAJOR DETERMINANT OF STRESS URINARY INCONTINENCE IN PAROUS WOMEN: ANALYSIS OF 288 IDENTICAL TWINS

Hypothesis / aims of study

Identical twin studies are regarded as an ideal methodology for assessing the contribution of environment to human disease states, providing a degree of 'natural control' over genetic variance that cannot be achieved within random samples of unrelated individuals. We conducted an extensive survey of incontinence symptoms at the world's largest annual gathering of twins, to determine the main environmental risk factors associated with stress urinary incontinence (SUI).

Study design, materials and methods

The 67-item survey of incontinence and pelvic floor symptoms was completed by 144 identical twin sister pairs (n=288) attending the 2003 Twins Days Festival. To account for correlated data within pairs, we implemented logistic regression models for repeated binary measures. A wide array of medical, obstetrical and demographic factors underwent univariate analysis and entered multivariate regression based on $p < .25$. Three models were utilized: (A) all pairs including those with nulliparous women (n=288), (B) pairs for which both sisters gave birth by either vaginal or cesarean delivery mode (n=196), and (C) pairs for which both sisters specifically had at least one prior vaginal birth (n=146). This facilitated evaluation of all demographic, environmental and obstetrical risk factors in the dataset while maintaining statistically valid reference groups. Univariate (t-test, chi2) and stepwise multivariate analyses were performed with Excel® and SAS®.

Results

Demographics of the sample included mean age 47.5 (21-79), parity 1.8 (0-7), 45% menopausal, mean BMI 26.6, 90.3% Caucasian and 7.0% African American. Past surgeries included hysterectomy (20%) and SUI repair (2.4%). Stress incontinence was reported by 53.9% of the overall cohort; 91% had 1-5 weekly episodes, 9% had >5. Among 83.8% of parous women who had at least one vaginal birth, 65.5% reported SUI. Among 16.2% of parous women who delivered by 'cesarean only', 35.5% reported SUI.

Regression Model A focused solely on non-obstetrical factors, confirming associations between SUI and age >40 (OR 4.6, $p=0.001$), menopause (OR 1.8, $p=0.02$), parity (OR 2.8 for 1 birth; OR 4.9 for >2 $p=0.001$) and BMI >30 (OR 2.8, $p=0.002$).

The major study findings derive from *Model B*, designed to assess obstetrical risk factors in parous-parous twin pairs. This model revealed delivery mode as the strongest, and indeed, the only variable remaining independently predictive of SUI – with delivery by 'cesarean only' conferring a nearly 3-fold reduction in SUI risk relative to those having undergone vaginal birth (OR 0.36, $p=0.013$). Non-significant factors included parity, BMI, prolonged 2nd stage, newborn weight and hysterectomy. Finally, *Model C* evaluated factors specific to the vaginal birth mode. Despite a trend toward more SUI after forceps (OR 1.8, $p=0.16$), neither forceps nor episiotomy (OR 1.2, $p=0.71$) reached significance.

Interpretation of results

This represents the first application of an identical twin research design to female incontinence, providing nearly complete control over genetic risk factors ('nature') that may often confound the study of environmental risk factors ('nurture'). Among all modifiable risk factors, delivery mode appears to be the most potent determinant of stress urinary incontinence in parous women. At all levels of parity, vaginal childbirth conferred a markedly higher risk of SUI (OR=2.78, $p=0.013$) than 'cesarean only' birth.

Concluding message

Delivery mode is the major environmental determinant of SUI, among younger childbearing women. These findings may provide new insight into the epidemiology of female incontinence, and highlight the impact of obstetrical choices on post-reproductive urinary function.