

POST-PARTUM INCONTINENCE, BMI AND LOWER URINARY TRACT SYMPTOMS AT MIDLIFE: 12-YEAR FOLLOW-UP OF A POPULATION-BASED PROSPECTIVE COHORT

Hypothesis / aims of study

Observational cohort studies in women at mid-life suggest that a higher BMI increases the risk of both incident stress urinary incontinence (SUI) and incident urgency urinary incontinence (UUI) [1,2]. Although weight loss is effective for SUI, the effects on UUI were not consistently demonstrated in randomised trials [3]. One possible explanation for the disparity between observational and interventional studies might be reverse causality, in which an early or mild form of incontinence is associated both with increased BMI, and subsequent clinically significant UUI.

Post-partum incontinence is associated with a range of lower urinary tract symptoms (LUTS) at mid-life, but little is known about the impact of post-partum incontinence on change in BMI, or about the impact of change in BMI on LUTS other than SUI and UUI. The aim of this study was therefore to investigate the causal sequence of post-partum incontinence, change in BMI, and LUTS at mid-life in a large population-based cohort, and specifically to test whether the impact of post-partum incontinence on individual LUTS is mediated by change in BMI.

Study design, materials and methods

The Avon Longitudinal Study of Parents and Children (ALSPAC) recruited 14,541 pregnant women expected to deliver between April 1991 and December 1992. 13,998 of these women with a live born child were sent a questionnaire at 8 months post delivery, including the item: "Since the baby was born have you had problems holding urine when you jump, sneeze etc?" We coded either of the responses "Yes but not in past month" or "Yes have had in past month" as indicating post-partum incontinence. 10,164 of these women were again contacted, at between 11 to 13 years after delivery, including 14 items from the validated Bristol Female Lower Urinary Tract Symptom (BFLUTS) questionnaire. Most items follow the response categorisation of the SUI item "Does urine leak when you are physically active, exert yourself, cough or sneeze?" (Responses: "never", "occasionally", "sometimes", "most of the time", "all of the time"). For these items we classified women reporting symptoms \geq sometimes as cases. For nocturia we classified women reporting ≥ 2 voids/night as cases. For daytime frequency we classified women reporting ≥ 9 voids/day as cases. We examined the effect of post-partum incontinence on change in BMI using multivariable linear regression. Multivariable logistic regression was then used to examine the separate effects of post-partum incontinence and change in BMI on each LUTS with adjustment for most important confounders. We applied the Sobel test to assess the role of change in BMI as mediator of the effect of post-partum incontinence on LUTS.

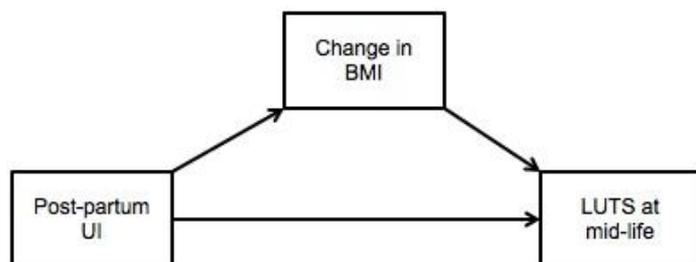


Figure: Directed acyclic graph plotting causal sequence between post-partum UI, change in BMI and LUTS at mid-life

Results

At 8 months post-partum, 11,213 (response proportion 80%) women returned questionnaires. At 12 years post-partum 7,276 women (72%, median age 43, range 29-58) returned questionnaires, of whom 5,930 had complete data on all relevant outcomes and covariates. At 8 months the prevalence of post-partum incontinence was 31%. In multivariable linear regression, adjusting for pre-pregnancy BMI, age, and highest educational level, post-partum UI was significantly associated with change in BMI at 12 year follow up (+0.230kg/m², p=0.006). Post-partum incontinence was strongly associated with SUI at follow up (see table), but also associated with most other LUTS including UUI, urinary urgency, and nocturnal enuresis. Change in BMI was also positively associated both SUI and UUI, as well as with most storage symptoms (see table). We observed significant mediation by change in BMI of the effect of post-partum UI on SUI, UUI, nocturia, urinary urgency, unconscious incontinence, and nocturnal enuresis (see table).

	Post-partum UI	Change in BMI /kg/m ²	Sobel Test***
	OR (95%CI)	OR (95%CI)	p
Stress Incontinence	5.9 (5.2-6.8)**	1.05 (1.03-1.07)**	0.01
Urgency Incontinence	3.1 (2.7-3.4)**	1.05 (1.04-1.07)**	0.01
Urinary Urgency	1.7 (1.5-2.0)**	1.05 (1.02-1.07)**	0.03
Daytime Frequency	1.3 (1.1-1.5)**	1.02 (0.99-1.04)	0.23
Nocturia (≥ 2 / night)	1.2 (0.9-1.5)	1.10 (1.07-1.13)**	0.01
Unconscious Incontinence	3.5 (2.4-5.3)**	1.11 (1.06-1.16)**	0.02

Nocturnal Enuresis	1.9 (1.3-2.8)*	1.13 (1.08-1.18)**	0.01
Hesitancy	1.3 (1.0-1.7)	0.99 (0.95-1.04)	0.70
Straining	0.9 (0.5-1.6)	1.04 (0.97-1.13)	0.30
Intermittency	1.4 (1.0-2.0)*	0.97 (0.92-1.03)	0.36
Dysuria	1.5 (1.3-1.8)**	1.00 (0.98-1.03)	0.79
Incomplete Emptying	1.5 (1.3-1.8)**	1.06 (1.03-1.08)**	0.03

Table: Adjusted odds ratios for individual LUTS at mid-life, with post-partum incontinence and by unit change in BMI (both multivariable models adjusted for age, highest educational level, and pre-pregnancy BMI) *=P<0.05, **= P<0.001 ***For mediation by change in BMI

Interpretation of results

The association of post-partum UI with increased BMI at follow up, might reflect either the physical impact of incontinence on women's ability to exercise, or its profound psychological impact. These results demonstrate both direct effects of post-partum UI on a range of incontinence, storage and voiding LUTS, and an indirect effect on incontinence and storage LUTS mediated by change in BMI. While these data provide new insight into the progression of LUTS across the lifecourse, our conclusions about causality are limited by a lack of information about LUTS before pregnancy, and a lack of data about change in BMI during pregnancy itself.

Concluding message

Post-partum incontinence is significantly associated with increase in BMI over 12 years follow-up, with impact on development of a wide range of LUTS. These results emphasise the importance of preventing weight gain across mid-life, especially for women with post-partum incontinence, and provide a further rationale for active intervention to prevent and treat post-partum incontinence.

References

1. Am J Epidemiol 2007;165:309-18
2. Obstet Gynecol 2007;110:346-53
3. N Engl J Med 2009; 360:481-90

Disclosures

Funding: UK Medical Research Council, Wellcome Trust, ICS Research Grant **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** North Somerset & South Bristol REC. **Helsinki:** Yes **Informed Consent:** Yes