Familial risk of urinary incontinence in women: population based cross sectional study

Yngvild S Hannestad, Rolv Terje Lie, Guri Rortveit, Steinar Hunskaar

Abstract

Objective To determine whether there is an increased risk of urinary incontinence in daughters and sisters of incontinent women.
Design Population based cross sectional study.
Setting EPINCONT (the epidemiology of incontinence in the county of Nord-Trøndelag study), a substudy of HUNT 2 (the Norwegian Nord-Trøndelag health survey 2), 1995-7.
Participants 6021 mothers, 7629 daughters, 332 granddaughters, and 2104 older sisters of 2426 sisters.
Main outcome measures Adjusted relative risks for urinary incontinence.
Results The daughters of mothers with urinary incontinence had an increased risk for urinary incontinence (1.3, 95% confidence interval 1.2 to 1.4; absolute risk 23.3%), stress incontinence (1.5, 1.3 to 1.8; 14.6%), mixed incontinence (1.6, 1.2 to 2.0; 8.3%), and urge incontinence (1.8, 0.8 to 3.9; 2.6%). If mothers had severe symptoms then their daughters were likely to have such symptoms (1.9, 1.3 to 3.0; 4.0%). The younger sisters of female siblings with urinary incontinence, stress incontinence, or mixed incontinence had increased relative risks of, respectively, 1.6 (1.3 to 1.9; absolute risk 29.6%), 1.8 (1.3 to 2.3; 18.3%), and 1.7 (1.1 to 2.8; 10.8%).
Conclusion Women are more likely to develop urinary incontinence if their mother or older sisters are incontinent.

Introduction

A genetic predisposition may play a part in the development of urinary incontinence in women, a common condition which is often chronic and burdensome.[1 2] We investigated the familial risk of urinary incontinence in the daughters, granddaughters, and sisters of incontinent women.

Methods

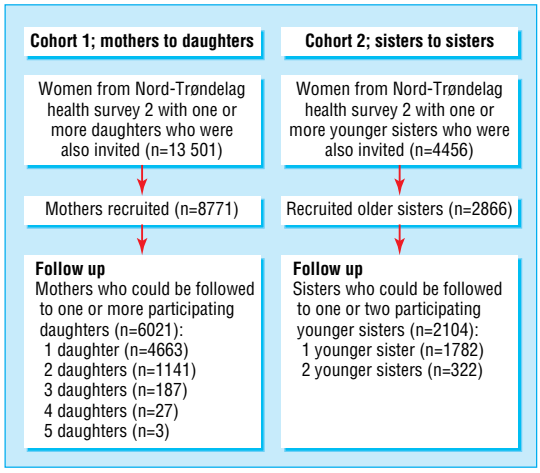
Our study, the Norwegian epidemiology of incontinence in the county of Nord-Trøndelag study (EPINCONT), is a substudy of the population based Nord-Trøndelag health survey (HUNT 2) carried out in one Norwegian county during 1995-7. We recruited women from the health survey. These women completed a questionnaire on urinary incontinence. The incontinence study is described in detail elsewhere.[3]

We identified female relatives from the health survey population by linking data to the kinship registry of Statistics Norway. Participants gave written consent to use their data for research. Among women with information on urinary incontinence, we identified two cohorts of mothers and older sisters and their daughters and sisters, respectively. We did not include half sisters.

When the women reported involuntary loss of urine, we inquired further about their symptoms. We classified incontinence as stress incontinence, urge incontinence, or mixed incontinence. Symptoms were defined as slight, moderate, or severe according to a validated index on the basis of the frequency of incontinence episodes and the amount of leakage at each episode.[4]

Statistical analysis

We compared the risk of urinary incontinence in the daughters of incontinent women with that in the daughters of continent women. We also compared the risk of incontinence in the sisters of incontinent older sisters with the risk in sisters of continent older sisters. We estimated relative risks with corresponding 95% confidence intervals from log binomial regression models using the general linear model program in STATA[5]; this was done because the odds ratios for



Recruitment and follow up of two familial cohorts from Nord-Trøndelag health survey 2, 1995-7

Section for General Practice, Department of Public Health and Primary Health Care, University of Bergen, Kalfarveien 31, N-5018 Bergen, Norway
Yngvild S Hannestad *post doctoral fellow*
Guri Rortveit *post doctoral fellow*
Steinar Hunskaar *professor*
Section for Epidemiology and Medical Statistics, Department of Public Health and Primary Health Care, University of Bergen
Rolv Terje Lie *professor*
Correspondence to Y S Hannestad Yngvild.hannestad@isf.uib.no

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Table 1 Characteristics of two cohorts of women. Values are numbers (percentages) of women unless stated otherwise

Characteristic	Cohort 1		Cohort 2	
	Mothers	Daughters	Oldest sisters	Younger sisters
Median (interquartile range) age (years)	60 (52-69)	33 (26-40)	39 (33-45)	34 (28-40)
Median (interquartile range) parity	3 (2-4)	2 (0-3)	2 (2-3)	2 (1-3)
Median (interquartile range) body mass index	27.0 (24.3-30.1)	24.2 (22.1-27.1)	24.7 (22.6-27.8)	24.2 (22.1-27.1)
Type of incontinence:				
Any*	2257 (29.6)	1427 (18.7)	548 (22.6)	471 (19.4)
Severe*	678 (8.9)	152 (2.0)	72 (3.0)	57 (2.3)
Stress†	979 (43.4)	823 (57.7)	323 (58.9)	268 (56.9)
Urge†	268 (11.9)	127 (8.9)	36 (6.5)	39 (8.3)
Mixed†	932 (41.3)	415 (29.1)	160 (29.1)	142 (30.1)

*Estimates of prevalence.
†Distribution among incontinent women. Values do not add up to 100% because women with unclassifiable incontinence due to lack of information were excluded.

common conditions obtained from standard regression techniques are not good approximations of relative risks. To account for correlation in data from the same family, we carried out robust estimations of variances and confidence limits with clustering of daughters who were sisters (cohort 1, figure) and clustering of sets of female siblings of older sisters (cohort 2). We adjusted for age, body mass index, and number of children of the women at risk.

Results

We recruited 8771 of 13 501 (65.0%) mothers and 2866 of 4456 (64.3%) older sisters who were surveyed for the Nord-Trøndelag health survey during 1995-7 (figure). We were able to follow up 68.6% (6021 of 8771) of the mothers (cohort 1, mothers to daughters) and 73.4% (2104 of 2866) of the sisters (cohort 2, sisters to sisters). Table 1 lists the characteristics of the two cohorts.

Daughters of mothers with any type of urinary incontinence had a 1.3-fold risk of being incontinent (table 2). The risk for having the same type of incontinence as the mother was slightly higher (urge incontinence was not statistically significant). The relative risk of severe urinary incontinence in the daughters of mothers with severe incontinence was 1.9. The risks were highest for severe stress incontinence and severe mixed incontinence. We could not calculate risk estimates for severe urge incontinence because of small population numbers.

When we could investigate urinary incontinence in both the daughters and the granddaughters of mothers (322 families), we found no increased risk in the granddaughters if only the mothers were incontinent. When both mothers and daughters had urinary incontinence, however, the risk for incontinence in granddaughters was 2.4 (95% confidence interval 1.1 to 4.3). We were unable to estimate risks according to type of incontinence because too few women could be followed through the three generations.

Female siblings had a 1.6-fold increased risk of urinary incontinence if their older sisters were incontinent (table 3). This risk was not significantly different from that between mothers and daughters (1.3-fold risk; $P = 0.07$). The risks for stress and mixed incontinence in female siblings of older sisters with similar symptoms were 1.8-fold and 1.7-fold, respectively. Too few sisters had severe or urge incontinence to estimate the risk of these symptoms.

Discussion

Women are at an increased risk of urinary incontinence if their mothers or older sisters are incontinent. In contrast to previous studies,[6 7] our study investigated the familial risk of urinary incontinence based on independently self reported information from individual women. Our results are consistent as we found an increased risk both from mothers to daughters and from sisters to younger sisters. The quality of our familial data was ensured because we were able to link the records of the women through an official registry using their unique personal identification numbers.

The prevalence of urinary incontinence among the mothers whose daughters were lost to follow up and among available daughters whose mothers were not recruited was similar to that of women of the same age in previous analyses of the study population. This reduces the likelihood of bias from non-recruitment or loss to follow up.

Reporting bias was possible in our study as women with incontinent relatives may be more knowledgeable about symptoms and therefore more likely to report having the condition than women with continent rela-

Table 2 Observed risks of incontinence in daughters of mothers with incontinence. Risks relate to daughters whose mothers were continent

Condition in mother	Slight, moderate, or severe incontinence				Severe incontinence			
	No of daughters at risk	No (%) incontinent	Crude relative risk (95% CI)	Adjusted relative risk (95% CI)*	No of daughters at risk	No (%) incontinent	Crude relative risk (95% CI)	Adjusted relative risk (95% CI)*
Type of incontinence:								
Any	2257	525 (23.3)	1.39 (1.25 to 1.53)	1.31 (1.19 to 1.44)	678	27 (4.0)	2.37 (1.56 to 3.59)	1.94 (1.26 to 3.00)
Stress	979	143 (14.6)	1.50 (1.26 to 1.79)	1.52 (1.28 to 1.81)	201	5 (2.5)	3.58 (1.42 to 8.98)	2.98 (1.11 to 8.03)
Urge	268	7 (2.6)	1.79 (0.84 to 3.85)	1.80 (0.83 to 3.92)	87	—	—	—
Mixed	932	77 (8.3)	1.74 (1.35 to 2.23)	1.55 (1.21 to 1.99)	379	8 (2.1)	2.96 (1.39 to 6.30)	2.07 (0.92 to 4.64)

Values for three types do not add up to number at risk for any incontinence as some women had unclassifiable incontinence due to lack of information.
*Adjusted for daughters' age, body mass index, and parity.

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What is already known on this topic

Older age, parity, and high body mass index are established risk factors for urinary incontinence in women

A genetic predisposition may also play a part in the development of this condition

What this study adds

Women are at an increased risk of urinary incontinence if their mothers or older sisters are incontinent

This association is present for both stress and mixed incontinence

tives. Previous research, however, indicates that such bias should have only a marginal effect on the observed risks.[8–10]

Our estimation of relative risks with confidence limits using log binomial models was validated against alternatives, including Poisson regression with robust estimation of confidence limits and transformation from odds ratios using the methods of Zhang and Yu, which provided similar results.[5 11]

Age and parity are important factors in the development of urinary incontinence. The women in our study who had a familial predisposition for urinary incontinence but were young and nulliparous, may develop incontinence when they have had children and are getting older.[1–3] We found, however, no significant differences across different age strata for the development of urinary incontinence.

One strength of our study is that we investigated several types of urinary incontinence, although there may be some discrepancy between symptom scores and urodynamic investigations.[12–14] We found that daughters were more likely to develop stress or mixed incontinence if their mother had these conditions as were the sisters of older siblings with these types of urinary incontinence. Urge incontinence is the least common type of incontinence and its prevalence is particularly low among young women.[1 3] For this reason we were unable to obtain precise values for urge incontinence in the daughters and sisters in our cohorts.

The symptoms of urinary incontinence are likely to have a complex cause, and known risk factors such as increasing age, pregnancy and childbirth, and high body mass index may further increase the risk among women with a familial predisposition.[2 3 15–19]

The Nord-Trøndelag health study (HUNT) is a collaboration between the HUNT Research Centre, Faculty of Medicine, Norwegian University of Science and Technology, Verdal; the National Institute of Public Health; the national health screening service of Norway, and Nord-Trøndelag county council.

Contributors: All authors participated in the design of the study, the analyses of the material, the interpretation of the data, and the writing of the paper. YSH is guarantor.

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Competing interests: None declared.

Table 3 Observed risks of incontinence in younger sisters of older sisters with incontinence (risks relate to younger sisters whose older sisters were continent)

Type of incontinence in oldest sister	Younger sisters at risk	No (%) of cases	Crude relative risk (95% CI)	Adjusted relative risk (95% CI)*
Any	548	161 (29.4)	1.78 (1.50 to 2.11)	1.59 (1.34 to 1.89)
Stress	323	59 (18.3)	1.99 (1.51 to 2.62)	1.77 (1.34 to 2.33)
Mixed	160	17 (10.6)	2.10 (1.33 to 3.33)	1.74 (1.08 to 2.82)

[YSH1][E2]*Adjusted for younger sisters' age, body mass index, and parity.

Ethical approval: This study was approved by the data inspectorate of Norway and by the regional committee for medical research ethics.

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Endpiece

First controlled clinical trial?

Sir John Elwes of Marcham Manor was considered an eccentric. When he badly cut both his legs, he left one untreated, but permitted the apothecary to treat the other, betting him his fee that the untreated leg would heal first. Sir John won by a fortnight. He died in bed in 1789, wearing worn-out shoes and a filthy old hat, grasping his walking stick—owning property worth £800 000 [$1 400 000; €1 200 000].

The Domesday Book. Ed T Hinde. London: Salamander Books, 2002:33

Jim Milledge *retired consultant respiratory physician, Hertfordshire*

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