

## *Chapter 3*

### *Urinary incontinence and overactive bladder in community-dwelling women aged 20-45 years: Risk factors and quality of life.*

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## **Introduction**

Urinary incontinence and overactive bladder symptoms (frequency and urgency) are common among adult women. The reported prevalence for urinary incontinence ranges between 14 and 71.5%.<sup>1-4</sup> The majority of studies focus on urinary incontinence. Less information is available about the prevalence of overactive bladder symptoms, but symptoms of urgency are reported to occur in up to 38% of women aged 40-60 years.<sup>4</sup> Increasing age and parity are among the most commonly reported risk factors for urinary incontinence<sup>3</sup>, but information on risk factors for overactive bladder symptoms is limited.

In the past two decades, much of the attention of researchers has focussed on the impact that urinary incontinence has on health-related quality of life (HRQoL). Both gynaecologists and urologists are increasingly aware that patients' satisfaction and improvement of HRQoL is an important outcome measure of therapeutic interventions for urinary incontinence and overactive bladder.<sup>5</sup> Where there is increasing information on HRQoL issues in clinical populations available, information on the impact of urinary incontinence or overactive bladder symptoms on HRQoL in community-dwelling women is much more limited. However, this information is important from a socio-economic point of view since it will provide health-care decision makers with information for future planning of care. Reports that do address the impact of urogenital symptoms on quality of life in the female population have some limitations.<sup>6-8</sup> First, HRQoL is usually measured with a generic quality of life instrument. Although these instruments are useful to compare HRQoL between different diseases, they are often less sensitive in measuring certain specific HRQoL aspects of a particular disease as compared to condition or disease-specific measurements. Secondly, attention has focussed on the consequences of urinary incontinence and not on symptoms of overactive bladder. Finally, the study population is usually a cohort of middle-aged or older women. Consequently, detailed information about urinary symptoms in younger women is not available.

The aim of our study is to explore risk factors for symptoms of urinary incontinence and overactive bladder in young community-dwelling women and to study the consequences of these symptoms on HRQoL.

## **Methods**

### *Study population*

The study population consists of a random population sample of 1393 women, between 20 and 45 years of age. This sample was obtained from the population registration office of a suburban area in the central part of the Netherlands in the first half of 1999. These women were invited to participate in a study on the prevalence and consequences of urogenital symptoms in the female community. All women received a questionnaire with an accompanying letter explaining the purpose of the study. Care was taken to encourage women without any urogenital symptoms to participate in the study, emphasizing the importance of their cooperation to compare their situation with that of women with urogenital symptoms. All women were sent a reminder after four weeks. One-thousand twenty-nine (73.9%) questionnaires were returned. Forty questionnaires were returned because of unknown address and 56 women refused to participate, leaving 933 (67%) fully evaluable women.

### *Measurements*

All women received a postal questionnaire that consisted of 162 items. The study was approved by the local ethics committee. For this particular study we used the data from the following items and scales that were included in the questionnaire.

For every woman data on age, parity, educational level (primary only versus secondary or higher), co-morbidity, body weight and length were collected. Data on weight and length were transformed into a Body Mass Index ( $BMI = \text{weight}/(\text{length})^2$ ). Co-morbidity factors that were measured were: diabetes, obstructive pulmonary disease, neurological diseases and rheumatological diseases.

Disease-specific quality of life was measured with the Urogenital Distress Inventory (UDI) and Incontinence Impact Questionnaire (IIQ).<sup>9</sup> The UDI consists of 19 items and each item measures if a *symptom* is present and the amount of bother the woman experiences from that symptom. The latter is measured on a four-point Likert scale ranging from not at all to greatly which was dichotomized in the analysis into: not bothersome (not at all, slightly) and bothersome (moderate, greatly). Following the recommended ICS definition of different types of urinary incontinence<sup>10</sup> and in concordance with other studies,<sup>4,11</sup> we selected two questions from the UDI to distinguish two types of urinary incontinence. A woman was considered to have stress-related urinary incontinence when she replied positively to the question “do you experience urine leakage related to physical activity, coughing or sneezing?”(hereafter referred to as stress incontinence). A woman was considered to have urgency-related urinary incontinence when she replied positively to the question “do you experience urine leakage related to the feeling of urgency?”(hereafter referred to as urge incontinence). Women were considered to have an overactive bladder when they replied positively to both the following questions: “do you experience frequent urination?” and “do you experience a strong feeling of urgency to empty your bladder?”. Finally, we decided to add the question “do you experience difficulty emptying your bladder” from the UDI, as an indicator of obstructive micturition, into our study.

The reason for this was that we wanted to test if the well-known relationship between difficulty emptying the bladder and overactive bladder symptoms in men with benign prostate hypertrophy also exists in women.

The original IIQ consists of 30 items about the impact of urogenital symptoms on four aspects of quality of life: physical functioning, emotional functioning, travel and social functioning.<sup>9</sup> A high score on the IIQ domains indicates that the person’s well-being on that particular domain is negatively affected. The original UDI/IIQ was translated by the process of forward-backward translation and the construct validity and internal consistency were tested on a population sample of 2043 women between 20-70

years of age (Chapter 2 of this thesis). Factor analysis (principal axis factoring with varimax rotation) of the translation of the IIQ revealed a fifth factor that contains 4 items about embarrassment. Cronbach's alpha for our five domains ranged from 0.83 (embarrassment) to 0.93 (mobility). Cronbach's alpha  $> 0.70$  is considered to indicate good internal consistency.<sup>12</sup> Pearson's correlations of the original domains with our domains were high and ranged from 0.84 (physical activity) to 0.96 (mobility and emotional). The embarrassment scale showed a high correlation with the original emotional (0.71) and social (0.76) scales. Data presented in this study are based on this five-scale version.

Generic quality of life was measured with the RAND-36.<sup>13,14</sup> The RAND-36 is a generic quality of life questionnaire that consists of 36 items about functioning on 8 domains: general health, physical functioning, mental health, social functioning, vitality, bodily pain, role limitation because of physical functioning and role-limitation because of emotional functioning. The total score on each domain ranges between 0 (worst) and 100 (best) quality of life.

#### *Statistical analysis*

Logistic regression was used to obtain crude and adjusted odds ratio's (OR) with 95% confidence interval (CI) for the different types of urinary incontinence and overactive bladder for possible associated factors. In multivariate logistic regression analysis the goodness-of-fit of the model was tested with the Hosmer-Lemeshow test. Since we expected that a substantial proportion of women would report more than one symptom and we were interested in the unique effect of each symptom, we used an ANOVA model with an experimental design to compare the main effects of the urogenital symptoms and possible interactions on the interval scales of the RAND-36 and IIQ domains. Age and BMI were entered into the model as co-variates and standardized regression coefficients were calculated with linear regression analysis. The significance level was set at  $p < 0.05$ . All statistics were performed with SPSS 10.0.

## Results

### *Characteristics and urinary symptoms of the population*

Table I shows the characteristics and comorbidity factors of the study population.

Age in years	34.2 (5.2)
Weight (Body mass index)	23.6 (4.2)
<b>Education level</b>	
Primary only	111 (11.8%)
Secondary or higher	822 (88.2%)
<b>Parity</b>	
0	389 (41.7%)
1	146 (15.6%)
2	260 (27.9%)
≥3	138 (14.8%)
<b>Comorbidity</b>	
Diabetes	4 (0.4%)
Obstructive pulmonary disease	75 (8.0%)
Rheumatological diseases	15 (1.6%)
Neurological diseases	20 (2.1%)

Values are numbers (%) or means (SD)

The prevalence of stress incontinence, urge incontinence and overactive bladder symptoms and combination of symptoms are shown in Table 2. The occurrence of combinations of symptoms were as follows. Women with stress incontinence were more likely to have urge incontinence as compared to women without stress incontinence (OR 4.8, 95%CI 3.2 - 7.0). Women with urge incontinence were more likely to have overactive bladder symptoms as compared to women without urge incontinence (OR 3.6, 95%CI, 2.5 - 5.2). The odds for women with stress incontinence to have overactive bladder symptoms was not significantly increased (OR 1.3, 95%CI, 0.9 - 1.7).

**Table 2.** Micturition symptoms of the study population (n=933)

Overall urinary incontinence (UI)	406 (43.7%)
Stress symptoms	365 (39.1%)
Urgency symptoms	143 (15.3%)
Overactive bladder	224 (24.0%)
Stress symptoms and urgency symptoms	100 (10.7%)
Overactive bladder and urgency symptoms	66 (7.1%)
Overactive bladder and stress symptoms	95 (10.3%)
Overactive bladder, stress- and urgency symptoms	47 (5.0%)

Symptoms are not mutually exclusive. Values are numbers (%)

The perceived impact of different symptoms was assessed by reporting the percentage of women who reported to be bothered by the symptom. Fifty-seven out of 224 women (25.5%) with overactive bladder symptoms considered this symptom as bothersome. For stress symptoms this was 11.3% (41/365 women), and for urgency symptoms 7% (10/143 women).

Among the 224 women with overactive bladder symptoms 19 women (8.5%) reported to have counselled their physician because of these symptoms. For women with stress symptoms this was 8.8% and for urge symptoms 12.7%.

#### *Uni- and multivariate analysis of possible determinants for urinary symptoms.*

We could not demonstrate any significant effect of comorbidity on the prevalence of any type of urinary incontinence nor on overactive bladder symptoms.

Table 3 shows the crude and adjusted odds ratio's of different types of urinary symptoms for possible associated factors. Only factors that were significantly associated in univariate analysis were entered into the multivariate analysis.



**Table 3.** Crude and adjusted odds ratios of overactive bladder, stress- and urgency symptoms for possible associated factors

	Overactive bladder		Stress incontinence		Urge incontinence	
	Crude	Adjusted†	Crude	Adjusted †	Crude	Adjusted †
<b>Parity</b>						
0 (reference)	1.0	-	1.0	1.0	1.0	1.0
1	1.2 (0.8-1.9)		2.5 (1.7-3.8)*	2.0 (1.3-3.1)*	1.6 (0.9-2.8)	1.5 (0.8-2.7)
2	0.9 (0.6-1.4)		4.1 (2.9-5.8)*	2.7 (1.8-4.0)*	2.0 (1.3-3.0)*	1.6 (0.9-2.7)
≥3	0.8 (0.5-1.2)		2.8 (1.8-4.2)*	1.7 (1.1-2.8)*	2.0 (1.1-3.3)*	1.8 (1.0-3.4)*
<b>Educational level</b>						
Primary only (reference)	1.0	1.0	1.0	1.0	1.0	1.0
Secondary or higher	0.5 (0.4-0.8)*	0.6 (0.4-0.9)*	0.6 (0.4-1.0)*	0.9 (0.6-1.3)	0.4 (0.3-0.6)*	0.5 (0.3-0.8)*
<b>BMI</b>						
Underweight < 20 (reference)	1.0	-	1.0	1.0	1.0	1.0
Normal weight 20-<25	0.9 (0.6-1.5)		1.8 (1.2-2.8)*	1.5 (0.9-2.4)	1.1 (0.6-2.0)	1.0 (0.6-1.9)
Overweight 25-<30	1.2 (0.7-2.0)		2.4 (1.5-3.9)*	2.1 (1.3-3.5)*	1.6 (0.9-3.0)	1.5 (0.7-2.8)
Obesitas 30-40	1.6 (0.8-3.1)		2.9 (1.5-5.5)*	2.0 (1.0-4.1)*	2.6 (1.2-5.6)*	1.7 (0.7-3.9)
Severe obesitas >40	1.3 (0.3-7.3)		3.9 (0.8-18.2)	3.3 (0.6-16.7)	-	-
Difficulty emptying bladder						
No (reference)	1.0	1.0	1.0	1.0	1.0	1.0
Yes	3.1 (2.0-4.8)*	3.0 (1.9-4.7)*	2.0 (1.3-3.1)*	2.3 (1.4-3.8)*	3.3 (2.1-5.4)*	3.3 (2.0-5.6)*

† Adjustments were made for age and other factors in the model that showed a significant association in univariate analysis

(crude odds ratio's). \* p&lt;0.05

The adjusted odds for overactive bladder symptoms was significantly decreased for higher educated women as compared to low educated women and significantly increased for women with obstructive micturition symptoms as compared to those without.

The adjusted odds for stress symptoms was significantly increased for parous women as compared to nulliparous women, for women with obstructive micturition symptoms as compared to those without and increased with increasing weight.

The adjusted odds for urgency symptoms was significantly increased for women who had three or more deliveries as compared to nulliparous women and for women with obstructive micturition symptoms as compared to those without. The adjusted odds for urgency symptoms was significantly decreased for higher educated women as compared to low educated women

#### *Urinary symptoms and quality of life*

The results of the ANOVA for the main effects of stress-, urgency- and overactive bladder symptoms and their interactions on the RAND-36 domains are shown in Table 4. Values are expressed as F-values with standardized regression coefficients. The predicted means (not shown) from the ANOVA model showed that all significant F-values indicated a reduction in score, which is consistent with a worse HRQoL. Urge incontinence symptoms only showed a statistical significant reduction of the score on the emotional role limitations. Stress incontinence symptoms showed a significant reduction of the score on the vitality and general health domains. Overactive bladder symptoms were significantly associated with a reduction in score on all RAND-36 domains, the strength of effect being 2 to 15 times that of stress- or urge incontinence. Several significant two-way interactions were found indicating that the effect of the combination of two factors was significantly independent from the effect of each symptoms separately.

**Table 4.** Effect of stress-, urge incontinence and overactive bladder symptoms on the RAND-36

	<b>RAND-36 domains</b>							
	Physical Function	Social Function	Mental Health	Physical Role limitation	Emotional Role limitation	Vitality	Pain	General health
<b>Co-variate</b>								
Age	2.8	0.1	0.04	2.1	0.4	1.1	3.1	1.7
<b>Main effects</b>								
Urgency symptoms	2.1 (0.05)	1.8 (0.05)	1.1 (0.04)	0.1 (0.01)	4.7 (0.08)*	1.0 (0.04)	1.6 (0.04)	0.01(0.01)
Stress symptoms	1.4 (0.04)	4.0 (0.07)	4.2 (0.07)	0.6 (0.03)	0.8 (0.03)	12.8(0.12)*	0.2 (0.02)	5.6 (0.08)*
Overactive bladder	25.4(0.17)*	13.3 (0.12)*	13.3 (0.12)*	21.2(0.15)*	6.6 (0.09)*	20.9(0.15)*	25.5(0.17)*	17.6(0.14)*
<b>2-way interactions</b>								
Urgency*Stress	0.4	0.2	1.0	0.3	2.5	0.3	0.8	1.0
Urgency*Overactive	0.6	3.8	5.8	5.3	5.4	7.4*	5.9*	13.1*
Stress*Overactive	0.1	5.4	6.8*	0.2	11.5*	5.3	0.4	1.1
<b>3-way interaction</b>	1.0	1.1	0.2	0.4	2.6	2.2	0.1	0.2

ANOVA experimental model. Values expressed as F-values. Standardized regression coefficients in brackets. \* p&lt;0.05

**Table 5.** Effect of stress-, urge incontinence and overactive bladder symptoms on the IIQ.

	IIQ domains					
	Total	Social Function	Physical Function	Mobility	Emotional	Embarrassment
<b>Co-variates</b>						
Age	1.6	0.6	0.5	5.4	1.2	0.1
<b>Main effects</b>						
Urgency symptoms	15.5(0.10)*	4.4 (0.10)*	9.9 (0.14)*	6.1 (0.11)*	8.1 (0.13)*	28.8 (0.24)*
Stress symptoms	0.9 (0.04)	1.2 (0.07)	0.5 (0.03)	0.6 (0.03)	0.6 (0.04)	0.5 (0.03)
Overactive bladder	13.4(0.16)*	6.4 (0.12)*	9.2 (0.14)*	24.4 (0.22)*	6.2 (0.11)*	4.9 (0.10)*
<b>2-way interactions</b>						
Urgency*Stress	4.9*	1.6	3.0	3.6	3.6	0.9
Urgency*Overactive	0.5	0.3	0.3	0.2	0.8	0.3
Stress*Overactive	0.1	1.0	1.0	0.1	0.3	0.1
<b>3-way interaction</b>	0.5	0.01	0.1	0.1	0.2	1.8

ANOVA experimental model. Values expressed as F-values. Standardized regression coefficients in brackets. \* p&lt;0.05

Table 5 shows the ANOVA results for the main effects of stress incontinence, urge incontinence and overactive bladder symptoms and their interactions on the IIQ. Values are expressed as F-values with standardized regression coefficients. The predicted means from the ANOVA model (not shown) showed that all significant F-values indicated a higher score, which is consistent with a worse HRQoL. Both urge incontinence and overactive bladder had a significant negative effect on all domains of the IIQ. The strength of effect for the two symptoms was approximately equal for the social, physical and emotional domains. Symptoms of overactive bladder had twice the effect of urge symptoms on the mobility domain, while the effect of urge incontinence on the embarrassment scale was twice the effect of overactive bladder. The effect of stress incontinence on the IIQ was neglectable.

## **Discussion**

The most important finding of our study was that symptoms of urgency and frequency of voiding (overactive bladder) are reported by one out of four young women, and that these symptoms negatively affect their HRQoL in all its domains. In fact, when measured with a disease-specific HRQoL questionnaire (IIQ), the effect of overactive bladder symptoms on HRQoL is equal to the effect of urge incontinence and much stronger than the effect of stress incontinence. The most profound negative effect of overactive bladder symptoms was recorded on the IIQ mobility domain. Apparently, in the young active female population, limitations in mobility due to urgency or frequency symptoms are especially distressful. The important effect that overactive bladder symptoms have on well-being is further supported by our finding that one out of four women with overactive bladder symptoms reports to be bothered by it. Nevertheless, only 8% of all women with overactive bladder symptoms sought medical help. Another important finding of our study was that there is a clear association between symptoms of difficulty emptying the bladder and stress incontinence, urge incontinence and overactive bladder symptoms. Finally, urge incontinence did not seem to affect HRQoL when measured

with the RAND-36, but proved to be as important as overactive bladder symptoms when measuring HRQoL with the IIQ.

This shows that the IIQ is more sensitive in measuring HRQoL consequences of urinary symptoms than the RAND-36.

In the last two decades, a lot of attention focussed on the prevalence of urinary incontinence and on its impact on quality of life.<sup>1,4,6-9,15-19</sup> Two main problems arise when studying the literature on the prevalence of urinary incontinence. The first problem is the lack of an uniform definition.<sup>20</sup> The second problem is that the prevalence of urinary incontinence in population based studies is probably overestimated. Women with urinary incontinence are probably more likely to respond to a questionnaire asking about these symptoms. These two problems, definition and sample bias, are also the possible limitations of our study.

Like other recent studies, we used a symptom-based definition of stress and urge incontinence, based on the recommendations of the International Continence Society.<sup>4,11</sup> The definition we used for overactive bladder (“a medical condition referring to the symptoms of frequency and urgency, with or without urge incontinence, when appearing in the absence of local pathologic or metabolic factors”) is the same as the one recently suggested.<sup>21</sup> In our study design we could not rule out local pathologic factors but we found no differences in diabetes or neurological disease between women with or without symptoms of overactive bladder. Using a symptom based diagnosis of urinary incontinence gives maximal weight to the perception of the severity of the problem by the woman herself. Objective measures, like frequency of incontinence episodes, urodynamic investigations or pad testing, are known to correlate only moderately with reported symptoms and psychosocial consequences.<sup>22,23</sup> Therefore, we believe that an objective diagnosis of urinary incontinence is not a requisite for epidemiologic studies on the consequences of urinary incontinence or overactive bladder symptoms for HRQoL. The differences we recorded between the three different urinary symptoms, both in associated factors as well as in their effect on HRQoL, supports our believe that the

selected questions basically identified different groups.

The second possible limitation of our study is the response rate. Although non-responders may have a lower prevalence of symptoms as compared to responders we tried to include as many women without symptoms as possible. This was done by carefully explaining the purpose of our study and the importance of cooperation even if the woman had no urinary symptoms. Nevertheless, results about the prevalence of urinary incontinence and overactive bladder symptoms in all population-based studies have to be interpreted with caution. Our study is no exception to this rule.

A large number of studies that evaluated the consequences of urinary incontinence on quality of life have been performed on selected samples of clinical patients.<sup>1,4,9,15-18</sup> Only a few studies have measured the consequences of urinary incontinence on HRQoL in a random population sample.<sup>6-8</sup> These population studies also showed that women with urge incontinence experienced a worse quality of life as compared to women with stress incontinence. However, these studies used generic HRQoL questionnaires<sup>6,7</sup> or Visual Analog Scales<sup>8</sup> to measure HRQoL, and also did not include symptoms of overactive bladder in analysis. The results therefore present a more global view of the impact of urinary incontinence on HRQoL. As we have shown, results may markedly differ between generic and disease-specific HRQoL questionnaires. With the use of the disease-specific IIQ we were better able to investigate associations between specific symptoms and HRQoL domains, and also better able to study the impact of specific worries (like embarrassment) incontinent women have, than with the RAND-36.

The pathophysiology of “idiopathic” overactive bladder (absence of neurological or metabolic factors) is largely unknown. We found two interesting factors that showed an independent positive association with urge- and overactive bladder symptoms, namely: (1) symptoms of difficulty emptying the bladder and (2) low educational level. For a better understanding of these findings we first have to consider the pathophysiology of overactive bladder symptoms in children and men.

In children, the concept of dysfunctional voiding, with bladder instabilities and overactivity of the pelvic floor muscles during voiding, is fairly well known.<sup>24</sup> Dysfunctional voiding eventually can result in urodynamically proven diminished bladder volume and bladder compliance, with bladder instabilities and pelvic floor contractions during voiding. It is unclear whether an overactive bladder leads to overactive pelvic floor muscles or whether poor relaxation during voiding may be a learned condition. In men, the relationship between bladder outlet obstruction in benign prostatic hypertrophy (BPH) and detrusor instability/urgency is well recognized.<sup>25</sup> There is increasing evidence that bladder outlet obstruction is associated with the development of post-junctional supersensitivity of the detrusor muscle cells, and that this may contribute to the development of detrusor instability.<sup>25</sup> If this bladder outlet obstruction is important in the pathophysiological chain of events for urgency and detrusor instability, it may explain both the findings in children and men. How about women? Our results show that women with overactive bladder and urgency symptoms also often report having difficulty emptying the bladder. This may be due to mechanical obstruction, like a large cystocele, or to difficulties with the relaxation of the pelvic floor during voiding. Since we studied a young population we do not believe that a large proportion of these women had cystoceles. Poor relaxation of the pelvic floor while voiding may simulate the bladder outlet obstruction seen in men with BPH. Like in BPH, long standing bladder outlet obstruction may eventually lead to instabilities and urgency.

Why in this context lower educated women are more likely to report symptoms of overactive bladder and urge symptoms is not clear. If they are more likely to report symptoms anyhow, than one would expect them to also reported more stress incontinence. However, lower educated women did not report significantly more stress symptoms as compared to well educated women. To our knowledge only one other study describes the relationship between the educational level and type and severity of urinary incontinence.<sup>11</sup> It was reported that higher educated women had an increased odds for stress incontinence and on the other hand, severe incontinence was related to a lower



educational level. No relationship between urge symptoms and educational level was reported. However, in that particular study, the five scale educational level was fitted into the model as a continuous variable. This may have biased the results. The same study showed a clear relationship between childhood enuresis and urge symptoms later in life. This suggests that failure to learn to control the bladder in early life is related to a higher degree of failure in later life. This learning process is complex and can be influenced by many intra-personal and environment factors, of which cognitive abilities may be one.

In conclusion, overactive bladder symptoms and symptoms of urinary incontinence are certainly not specific problems of middle-aged or older women. A substantial proportion of young women also experience these symptoms and are bothered by it. Overactive bladder symptoms are as troublesome as urge incontinence and therefore attention should not merely focus on incontinence. Since treatments are available and often non-invasive in character, we believe efforts should be undertaken to inform and educate this age group. The concept of poor relaxation of the pelvic floor causing urgency/detrusor instabilities in young women is far from proven but is interesting and in our opinion warrants further investigation.

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