138

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REPRODUCTIVE FACTORS ASSOCIATED WITH NOCTURIA AND OVERACTIVE BLADDER IN WOMEN – A POPULATION-BASED STUDY

Hypothesis / aims of study
We aimed to evaluate the association of nocturia and overactive bladder (OAB) with reproductive factors (parity, postpartum period, menopause, hormone therapy for menopause (HT), and hysterectomy) and surgery for stress urinary incontinence (SUI).

Study design, materials and methods
In 2003-2004, questionnaires were mailed to 3,000 randomly selected women aged 18-79 years, identified from the Finnish Population Register Centre, which also provided information on parity and date of birthgiving. Puerperium was defined as <6 weeks and postpartum period as 6 weeks to 12 months after birthgiving. Nocturia was defined as ≥2 voids/night and those who reported urinary urgency (sudden compelling desire to pass urine) often or always (in scale: never-rarely-often-always) were regarded as having OAB (using DAN-PSS [1] and AUA-SI [2]).

Prior hysterectomy, surgery for SUI and menopausal status (including menstruation and use of HT) were asked. Menopausal status was classified as:
1) premenopausal without hysterectomy and HT (menstruated during last year or <40 years)
2) postmenopausal without hysterectomy and HT (did not menstruate during last year)
3) women with HT (no difference between systemic and vaginal HT users in the prevalence of nocturia or OAB) and without hysterectomy
4) hysterectomised.

Potential confounding factors were assessed:
1) Physician-diagnosed comorbidity (40 diseases/conditions)
2) Prescribed medication (30 groups classified according to ATC-DDD classification [3])
3) Socio-demographic factors (marital status, education, employment, and urbanity)
4) Height and weight for body mass index (as a continuous variable)
5) Smoking (never, former, current)
6) Use of coffee (cup per day) and alcohol (grams per day); (both as continuous variables)

Nocturia risk score (NRS) and urgency risk score (URS) were separately calculated based on comorbidity and medication: each factor associated after adjustment for age (with $p < 0.10$ and reported by ≥10 women) was included in the model.
Hence, NRS and URS were calculated using formula: Score = $\sum(\text{Odds ratio}_{\text{factor}} - 1)_n$

Then, all factors associated ($p < 0.10$) with nocturia or urgency in the age-adjusted analyses were entered as potential confounding factors into a multivariate model. Finally, backward techniques were used to build the final model for nocturia and urgency, separately, with likelihood ratio tests used to determine significance. At least 10% change in the estimate (odds ratio) due to reduction of potential confounding factor was regarded as significant. The results indicated that confounding factors were age and NRS for nocturia; and age, URS, smoking, and education for urgency.

In the final analyses of nocturia/urgency, women who provided answer to every question on nocturia, urgency, reproductive and potential confounding factors were included. Logistic regression was used in the multivariate analyses (all reproductive and confounding factors included), with the presence of nocturia/urgency as the outcome.

Results
Of the 3000 women, 2002 (67%) took part, and of them 114 were excluded (due to pregnancy, puerperium, or urinary tract infection). Nocturia was reported by 11.3% (95% confidence interval (CI): 9.7, 13.0%) and OAB by 9.5% (95% CI: 8.0, 11.1%) of women (age-standardised to European standard population). Reproductive characteristics of the final study population (n = 1,728) are shown in Table 1.

Table 1. Characteristics of reproductive factors in the final study population

Characteristic	N (%)	Age-standardized prevalence (%)	95% CI
Parity (*number of children*)			
0	623 (36)	34.0	31.3 - 36.7
1	248 (14)	14.9	13.0 - 16.8
2	493 (29)	29.7	27.0 - 32.5
≥3	364 (21)	21.4	19.1 - 23.6
Postpartum period	53 (3.1)	2.6	1.9 - 3.3
Menopausal status			

Premenopausal	1159 (67)	59.7	56.2 - 63.2
Postmenopausal	276 (16)	19.8	17.4 - 22.2
Women with HT	123 (7)	8.8	7.2 - 10.4
Hysterectomised	170 (10)	11.7	9.9 - 13.5
Surgery for SUI	33 (1.9)	2.2	1.5 - 3.0

The only factor associated with OAB was surgery for SUI whereas parity and postpartum period had positive association with increased nocturia (p = 0.047 and p = 0.028, respectively). Furthermore, postmenopausal women reported more nocturia than premenopausal in the multivariate analysis (**Table 2**).

Table 2. Association of nocturia and OAB with reproductive factors among women in Finland

Reproductive and gynecologic factors	**Nocturia**		**OAB**	
	Odds ratio	**95% CI**	**Odds ratio**	**95% CI**
Parity (*per child*)	1.13	1.00 - 1.28	0.98	0.85 - 1.13
Postpartum period	2.83	1.12 - 7.20	0.77	0.18 - 3.34
Menopausal status				
Premenopausal	1.00		1.00	
Postmenopausal	2.31	1.20 - 4.42	1.15	0.56 - 2.36
Women with HT	1.80	0.90 - 3.60	0.82	0.37 - 1.84
Hysterectomised	1.84	0.94 - 3.61	1.29	0.63 - 2.63
Surgery for SUI	0.93	0.36 - 2.45	2.53	1.04 - 6.13

Interpretation of results

We conducted a questionnaire survey in a representative sample of Finnish people and achieved a high response rate. Increasing parity, as well as postpartum and postmenopausal period had positive association with nocturia while only surgery for SUI with OAB.

Concluding message

Reproductive factors associated with nocturia differed from those associated with OAB.

References

1. Scand J Urol Nephrol (1993) 27; 489-92.
2. J Urol (1992) 148; 1549-57.
3. http://www.whocc.no/atcddd/

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HUMAN SUBJECTS: This study did not need ethical approval because In accordance with Finnish regulations on questionnaire surveys, an exemption from ethical review was granted by the ethical committee of Tampere University Hospital (Tampere, Finland). but followed the Declaration of Helsinki Informed consent was obtained from the patients.