Original article

EVALUATION OF FACTORS RELATED TO THE OCCURRENCE OF FEMALE URINARY INCONTINENCE FEMININE

Emerson Oliveira[1]*, Lucia Maria Martins Zuliani[2], Juliana Ishicava[3], Soraya Vilela Silva[3], Samuel S. Rollemberg Albuquerque[3], Angela Mara Bentes de Souza[4], Caio Parente Barbosa[5]

Study conducted at Faculdade de Medicina do ABC, Obstetrics and Gynecology Department, Gynecological Pathology and Human Reproduction, Urogynecology and Vaginal Surgery Section, Santo André, SP, Brazil

ABSTRACT

Objective. To evaluate the risk factors related to occurrence of female urinary incontinence.

Methods. This was a case-control study recruiting 253 women (102 continent and 151 incontinent) who were invited to respond to an epidemiological questionnaire on possible risk factors for urinary incontinence. The factors analyzed were age, hormone status, race, body mass index, parity, types of delivery (normal, forceps or caesarean), weight of largest child at birth, use of episiotomy and/or analgesia during labor, history of hysterectomy, physical activity, smoking, diabetes mellitus status, constipation, history of bronchial asthma and/or chronic obstructive pulmonary disease, use of diuretics and/or antidepressants.

Results. Construction of a binary logistic regression model indicated that the following were risk factors for urinary incontinence: age [OR = 1.07 (CI 1.03 to 1.1)], vaginal delivery [OR = 1.5 (CI 1.1 to 12.0)], forceps delivery [OR = 35.0 (CI 3.7 to 327)] and weight of largest newborn [OR = 1.001 (CI 1 – 1.002)]. Additionally, caesarean delivery was identified as a protective factor [OR = 0.39 (CI 0.23 to 0.65)].

Conclusion. Independent risk factors for urinary incontinence included age, vaginal delivery, forceps delivery and birth weight of largest infant, while delivery by caesarean section was a protective factor.

Key Words: Urinary incontinence. Risk factors. Epidemiology. Natural Childbirth. Caesarean section.

***Correspondence:**
Rua das Figueiras, 1800
BL A - AP. 94
Bairro Campestre
Santo André - SP, Brazil
CEP: 09080-301

Introduction

In its latest publication, the International Continence Society (ICS) defines urinary incontinence (UI) as any involuntary leakage of urine. This is a change to the original definition, which only considered leakage to be UI if it caused patients social or hygienic discomfort, i.e. if it had a negative impact on quality of life. [1]

With this new definition, the ICS is recommending that urinary incontinence should be described in terms of a selection of specific and relevant factors, such as: type, frequency, severity, precipitating factors, social impact, effects on hygiene and quality of life, measures used to quantify leakage and whether the patient has sought help to alleviate symptoms. [1] Urinary incontinence is a relatively common finding, with a prevalence that varies from 5% among young women to around 50% among elderly women. [2,3] Stress urinary incontinence is the most common form of urinary complaint among women, followed by urge incontinence, particularly during menopausal transition. [4]

The prevalence of genitourinary symptoms in women and the risk factors associated with them have been widely studied. Differences in the prevalence of incontinence have been identified between different age groups and different populations. Among the young, middle-aged and elderly women in Norway, the prevalence rates of urinary incontinence were 9% to 11.7%; 26.9% to 30.1% and 31.9% to 38.7%, respectively. [2] Some authors have found that there are different risk factors for stress urinary incontinence than for urge incontinence. It has been suggested that research designed to detect risk factors and forms of prevention should be differentiated and specific for each type of incontinence. [5]

Few studies have been conducted in Brazil into the prevalence of urinary incontinence or its risk factors. Among elderly women

1- Doutor em Ciências da Saúde - Professor colaborador do departamento de Obstetrícia e Ginecologia e chefe do setor de Uroginecologia e Cirurgia Vaginal da Faculdade de Medicina do ABC, Santo André, SP
2- Médica - Residente do departamento de Obstetrícia e Ginecologia da Faculdade de Medicina do ABC, Santo André, SP
3- Acadêmicos do sexto ano do curso de Medicina da Faculdade de Medicina do ABC, Santo André, SP
4- Doutora em Ginecologia e Obstetrícia - Professora adjunta da disciplina de Ginecologia Patológica e Reprodução Humana da Faculdade de Medicina do ABC, Santo André, SP
5- Livre-Docente - Professor regente da disciplina de Ginecologia Patológica e Reprodução Humana da Faculdade de Medicina do ABC, Santo André, SP

(over 60) resident in the city of São Paulo, the prevalence of UI detected in interviews was 26.2%. [6] Risk factors cited for the development of stress urinary incontinence included: advanced age; white race; obesity; vaginal deliveries, in which, damage may occur to local musculature and innervation as the fetus passes; traumatic deliveries involving forceps and/or episiotomies; multiparity and pregnancy at an advanced age, estrogen deficiency, conditions associated with increased intraabdominal pressure; smoking; diabetes, collagen diseases; neuropathies and history of hysterectomy. [7]

However, published studies designed to investigate possible associations with these risk factors are scarce and existing results are contradictory. [8] In the light of the above we decided to conduct this study to investigate factors related to female UI.

Methods

Between October and February of 2010, we conducted a case-control study of 253 women being seen regularly at the *Maria José dos Santos Stein* Women's Hospital, which is in Santo André, SP, Brazil, and is affiliated to the *Faculdade de Medicina do ABC.*

All stages of this research were conducted in accordance with the principles of good practice for clinical studies involving human beings, in compliance with National Health Council Resolution 196/96 and were approved in advance by the Research Ethics Committee at the *Faculdade de Medicina do ABC*. With the exception of the UI-specific epidemiological questionnaire, all of the procedures described in this paper were part of these patients' routine medical care.

Patients were classified into one of two groups: with UI (Cases - comprising 102 women) and without UI, i.e. continent women (Controls – comprising 151 female volunteers). Patients were defined as having UI if they suffered urine leakage on effort (defined as involuntary leakage of urine via the urethra associated with coughing, sneezing or physical activities in general), had overactive bladder (symptoms or urgency with or without urge incontinence) or had mixed UI (a combination of stress UI and overactive bladder). The mean age of the UI cases was 54.1 ± 11.4 years and the mean age of the controls was 38.7 ± 14.2 years. The volunteers considered to be continent (Controls) denied any involuntary leakage of urine whatsoever.

For the purposes of this study we designed a questionnaire specifically for the analysis of possible risk factors for UI and this was administered via telephone by the investigators. The risk factors analyzed using this questionnaire were: age, hormone status, race, Body Mass Index, parity, types of delivery (normal, with forceps and/or via caesarean), weight of largest child at birth, use of episiotomy and/or analgesia during labor, history of hysterectomy, physical activity, smoking, *diabetes mellitus*, intestinal constipation, history of bronchial asthma and/or chronic obstructive pulmonary disease, use of diuretics and/or antidepressants.

Raw odds ratios were calculated for each risk factor and for those with statistical significance adjusted odds ratios were calculated by means of a binary logistic regression model, with 95% confidence intervals. The null hypothesis rejection threshold was set at 5% ($p < 0.05$). Statistical analysis was performed using SPSS version 15.0.

Results

All of the 235 women who were invited to participate answered the questionnaire. Table 1 lists the characteristics of both groups.

Analysis of Table 2 allows us to consider the following to be independent risk factors for UI: age [OR = 1.07 (CI 1.03 - 1.1); p = 0.001]; vaginal delivery [OR = 1.5 (CI 1.1 - 2); p = 0.003]; delivery with forceps [OR = 35 (3.7 - 327; p = 0.02]; and weight of largest child at birth [OR = 1.001 (CI 1 - 1.002); p = 0.018].

On the other hand, also with reference to Table 2, it can be seen that cesarean was the only factor that can be considered protective against UI [OR = 0.39 (CI 0.23 - 0.65); $p < 0.0001$].

Discussion

We conducted a cross-sectional, case-control study of 253 women who were interviewed by telephone. In this study we successfully demonstrated that age, vaginal delivery, delivery with forceps, and delivering a child of high birthweight have a direct relationship with UI. Furthermore, cesarean proved to be a protective factor against the condition. None of the other factors investigated in our study had an association with incontinence.

The literature states that obstetric events are the principle risk

Table 1 – Epidemiological characteristics of patients in the Case (Incontinent) and Control (Continent) groups

	Continent	Incontinent*
Age	38.7 ± 14.2	54.1 ± 11.4
Menopause	27 (20.1%)	64 (62.7%)
White race	79 (59%)	67 (65.7%)
BMI	25.5 ± 5.1	29.2 ± 5.5
Parity	2 ± 1.6	3.3 ± 2.3
Vaginal Delivery	1.2 ± 1.6	2.5 ± 2.3
Delivery with Forceps	0.01 ± 0.1	0.25 ± 0.71
Delivery by Caesarian	1.08 ± 1.1	0.58 ± 0.82
Weight > RN	3415g ± 642g	3759g ± 497g
Episiotomy	60 (44.8%)	74 (72.5%)
Analgesia	24 (17.9%)	25 (24.5%)
Hysterectomy	8 (6%)	17 (16.7%)
Physical activity	14 (10.4%)	22 (24.5%)
Smoking	20 (14.9%)	25 (24.5%)
Diabetes	6 (4.5%)	21 (39.2%)
Constipation	27 (20.1%)	40 (39.2%)
Asthma	0	9 (8.8%)
COPD	0	2 (2%)
Diuretics	5 (3.7%)	16 (15.7%)
Anti Depressives	1 (0.7%)	13 (12.7%)

* Group comprised 26 women with SIU, four with overactive bladder and 72 with mixed urinary incontinence

Table 2 – Odds ratios (raw and adjusted) for occurrence of urinary incontinence				
Risk factors	**Raw OR CI**	**p**	**Adjusted OR CI**	**p**
Age*	1.087 (1.06 - 1.11)	< 0.0001	1.07 (1.03 – 1.1)	0.01
Menacme	0.15 (0.08 - 0.28)	< 0.0001	1.05 (0.3 – 3.8)	0.9
Menopause	5.1 (2.8 – 9.1)	< 0.0001	2.04 (0.6 – 6.5)	0.2
White race	1.2 (0.7 – 2.1)	0.39	--------	------
BMI	1.1 (1.1 – 1.2)	< 0.0001	1.04 (0.9 – 1.1)	0.3
Pregnancies	1.4 (1.2 – 1.7)	< 0.0001	1.3 (0.9 – 1.9)	0.1
Parity	1.4 (1.2 – 1.7)	< 0.0001	0.9 (0.6 – 1.4)	0.8
Vaginal Delivery*	1.4 (1.2 – 1.7)	< 0.0001	1.5 (1.1 – 12.0)	0.003
Delivery with Forceps*	10.6 (2.3 - 47.56)	0.002	35.0 (3.7 – 327)	0.02
Delivery by Caesarian*	5.96 (0.44 – 0.88)	0.001	0.39 (0.23 – 0.65)	< 0.0001
Weight of largest NB*	1.001 (1.001 – 1.002)	< 0.0001	1.001 (1 – 1.002)	0.018
episiotomy	2.83 (1.6 – 4.98)	< 0.0001	2.4 (0.95 – 6.5)	0.06
Analgesia	1.2 (0.6 – 2.3)	0.47	--------	-----
Hysterectomy	2.7 (1.3 – 4.3)	0.02	0.9 (0.2– 3.9)	0.89
Physical activity	2.08 (0.98 – 4.4)	0.056	--------	-----
Smoking	1.5 (2.1 – 16.1)	0.17	--------	-----
Diabetes	5.8 (2.1 – 16.1)	0.01	0.58 (0.1 – 2.9)	0.5
Constipation	2.4 (1.3 – 4.3)	0.04	2.48 (0.9 – 6.6)	0.07
Asthma	--------	-----	--------	-----
COPD	--------	-----	--------	-----
Diuretics	1.4 (1.2 – 1.7)	0.04	2.5 (0.4– 13.5)	0.28

* Statistically significant

factors for UI. According to many authors, it is the perineal trauma that takes place during delivery that is primarily responsible for the condition. Some authors consider that nulliparous women have a significantly lower risk of developing UI. [9]

A recent review in the journal *Femina* entitled *Lower urinary tract, pelvic floor and pregnancy-puerperium cycle* demonstrated that vaginal delivery causes the greatest damage to the pelvic floor and mechanisms involved in urinary continence. [10]

An editorial in the *Revista Brasileira de Ginecologia e Obstetrícia* (RBGO) –entitled *The issue of cesarean sections* calls attention to the fact that vaginal delivery has an odds ratio (OR) of 2 with 95%CI of 1.5 to 3.1 for moderate to severe urinary incontinence with relation to cesarean, with the risk of urinary incontinence reducing from 10% to 5% if a woman has all her children by elective cesarean. Furthermore, the editorial's authors comment that much research has been published on the risks and benefits of vaginal and cesarean deliveries, but that there are few high quality studies. [11]

A recent randomized clinical trial comparing elective cesarean with vaginal delivery was unable to demonstrate a difference in the prevalence of urinary incontinence 2 years after delivery. [12]

Vaginal delivery parameters related to urinary incontinence were studied in the Norwegian EPICONT study which administered a questionnaire on urinary incontinence and variables related to delivery to 11397 women. A significant association was observed between any type of urinary incontinence and giving birth to a newborn weighing at least 4000 g; between stress urinary incontinence and giving birth to a newborn weighing at least 4000 g; epidural anesthesia and transpelvic delivery and, finally, between urge incontinence and giving birth to a newborn with head circumference greater than or equal to 38 cm. Incidentally, the authors also reported that the incidence of any type of urinary incontinence increases with parity, Body Mass Index and time since last delivery. [9]

Confirming the data above, a study of women with less than 65 years old who had given birth vaginally demonstrated statistically significant associations between any type of incontinence and birth weight greater than or equal to 4000 g; stress incontinence and elevated birth weight and peridural anesthesia; and between urge incontinence and head circumference greater than 38 cm. [13] With relation to age, a recent meta-analysis demonstrated that urinary incontinence increases in adulthood

(prevalence of 20% to 30%), peaks in middle age (prevalence of 30% to 40%) and increases constantly among the elderly (prevalence of 30% to 50%). [14]

The majority of studies of UI are conducted with white populations, but there are some comparative data that suggest that white women are more susceptible to the disorder than black women. [14] A recent study demonstrated a strict relationship between increase in Body Mass Index and presence of UI, and with emergence of urinary symptoms such as urinary urgency, increased frequency, nocturia and vesical tenesmus. [15] Finally, a study of 1700 women who answered an epidemiological questionnaire demonstrated that the prevalence of UI increased significantly in women with hysterectomies. [16]

We believe that this is one of the first studies in a Brazilian population conducted with the objective of determining the risk factors for UI. We conclude that the epidemiological profile of the condition in our population is similar to that in other parts of the world.

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