Three most important etiological factors of occurrence of stress urinary incontinence in nulliparous pre-and postmenopausal Polish women

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Abstract

Introduction: Stress urinary incontinence (SUI) is a chronic disease which occurs in 50% of women with urinary incontinence. It is estimated that in association with a longer life span and ageing of the population, this disorder will become even more prevalent and will exert an increasingly stronger effect on the deterioration of the quality of life.

Objective: The objective of the study is analysis of the factors affecting the occurrence of SUI.

Methodology: The analysis covered 260 patients aged 27-82. The criterion of enrolment into the study was: diagnosis of SUI without disorders of pelvi-genital statics, and negative obstetric history (nulliparous and non-pregnant women). The investigations covered, among other things, the effect surgeries in the area of the lesser pelvis, body mass index (BMI), cigarette smoking, concomitant internal diseases, and hormonal therapy, with consideration of the division into two groups: women before and after menopause. Statistical analysis was performed by means of chi 2 Pearson, t-Student test, and Fisher-Freeman-Halton test for p<0.05.

Results: The results of the analysis unequivocally indicate that the age of patients (p=0.0001), body mass index (BMI) (p=0.0001), and surgical procedure for the removal of the uterus by laparotomy (p=0.0001) exert the greatest effect on the occurrence of SUI in pre- and postmenopausal women. The effect of the remaining etiologic factors is rather controversial.

Conclusion: A comprehensive analysis of risk factors may contribute to the improvement of the results of treatment and quality of life of pre- and postmenopausal patients.

Key words

stress urinary incontinence, etiologic factors, obesity, age, urogynaecology, surgeries

INTRODUCTION

In women, urinary stress incontinence (SUI) is the involuntary loss or leakage of urine from the urethra during increases in intraabdominal pressure, which is not accompanied by the sensation of urinary urgency [1]. Women suffering from urinary incontinence constitute 70-80% of female patients reporting to a physician due to urinary system diseases. The relative frequency of occurrence of SUI is 50% among women with urinary incontinence, and considering the age of patients, in 15-20% of women aged 40-60, on average [2, 3]. It is estimated that in association with a longer life span and ageing of the population, the incidence of this disorder will increase and exert an increasingly greater effect on the decrease in the quality of life of society [1].

The symptoms of SUI statistically more often occur in women who are obese and perform physical work, as well as among those who delivered by the forces of nature. In some patients, the intensification of complaints occurs many

years after childbirth, during the menopausal period, and is most probably related with hormonal disorders which lead to decreased tension and relaxation of the muscles and fascia the pelvic floor [1, 4, 5]. In addition, a long labour, and so-called short and surgical labours terminated by the vaginal route are associated with lesions which may lead to SUI in the future. Less importance is ascribed to the number of childbirths [1, 4, 5, 6, 7]. It is also considered that extensive surgeries in the area of the lesser pelvis, such as colectomy or hysterectormy may lead to SUI by the loss of support of the urinary bladder [8]. Thoroughly collected history taking is usually sufficient to make a correct diagnosis of SUI. Patients report involuntary loss of urine during, e.g. coughing, sneezing, or performing physical activity. Obviously, the patients urinate more frequently, but this is intentional and conscious, because in this way they try to limit the amount of involuntary urination. Usually, involuntary loss of urine on effort is not accompanied by any other symptoms, such as painful urge, pain, and burning sensation in the urethra or polyuria [1, 9]. Considering the variety of the causes of SUI, there are many surgical methods of treatment for this symptom; however, the Burch and sling procedures are the most frequently used.

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The objective of the study was the presentation of this difficult clinical problem and the evaluation of the frequency of occurrence of stress urinary incontinence, with consideration of the most frequent risk factor of this disease in the group of nulliparous women before and after menopause, without pelvi-genital statics disorders.

MATERIAL AND METHOD

A prospective analysis of medical records was performed of patients aged 27-82 admitted to the Clinic of Surgical Gyneacology, and Mother and Child Health Clinic, the Gynaecological-Obstetric Clinical Hospital at the Medical University in Poznań, during the period January 2008 – December 2010, for diagnostic tests due to urinary incontinence. After medical history taking, the patients had urogynaecological examination performed, followed by the urodynamics test.

The criterion of enrolment into the study was: diagnosis of SUI without pelvi-genital statics disorders, and negative obstetric history (nulliparous and non-pregnant women). Statistical analysis covered 260 patients, with division into two groups: women before and after menopause. The effect was analyzed of, among other things, surgeries in the area of the lesser pelvis, BMI, cigarette smoking, concomitant internal diseases, and hormonal therapy. Statistical analysis was performed by means of chi 2 Pearson test. The p values $p<0.05$ were considered statistically significant.

RESULTS

The results of the analysis performed unequivocally indicate that the age of patients (p=0.0001), body mass index (BMI) (p=0.0001), and surgical procedure of the removal of the uterus by laparotomy (p=0.0001), exert the greatest effect on the occurrence of SUI (Tab. 1). The

data show that 84 postmenopausal women (49.41%) had undergone panhysterectomy, while 20% of premenopausal women had undergone surgery for removal of the uterus, only without ovaries, 22.2% of postmenopausal women had surgical procedure performed due to uterine fibroids vs. 38.3% of premenopausal patients, benign ovarian tumours – 34.8% vs. 44.8%, abnormal uterine bleedings – 43% vs. 17.2%, respectively. The effect of other etiologic factors is rather controversial. Cervical surgery procedures were performed in 5.6% of postmenopausal women and 1.4% of those before the menopause, whereas D and C procedures – 6.9% and 5.6%, respectively. The remaining procedures were appendicectomy, cholecystectomy, and thyroidectomy. Hormonal therapy was applied by 38% of premenopausal women, and this was mainly hormonal contraception in the form of oral contraceptive pills, while postmenopausal women took hormonal drugs, and in 32.35% of cases this was oral hormone-replacement therapy.

The entire study group was analyzed from the aspect of concomitant internal diseases. In as many as 82.3% of the women examined an additional internistic problem occurred, apart from SUI. The remaining percentage of patients (17.7%) did not report any additional diseases while medical history taking. The majority of patients among the above-mentioned 82.31%, especially those at an older age, reported a list of several additional health problems: cardiovascular diseases – 17.5% of postmenopausal women and 5.3% of premenopausal women; diabetes – 32% and 2%, respectively; depression or neurosis – 3.72% and 0.53%, respectively; and chronic infections of the urinary tract – 2.7% and less than 1%, respectively. The remaining disorders reported by patients during history taking were classified as 'others', because it was considered that they did not constitute significant data as the factors predisposing to urinary incontinence. Table 2 presents the remaining data.

Table 1. Most important factors affecting SUI

		Before menopause (n=90)	Menopause (n=170)	p
Age	mean±SD	42.73±9.43	57.76±8.78	p<0.0001**
BMI	standard	56 (61.80%)	59 (34.71%)	p<0.0001#
	25-29.9 1st-degree obesity	20 (22.47%)	48 (28.23%)	
	30-34.9 2nd-degree obesity	8 (8.99%)	44 (25.88%)	
	35-39.9 3rd-degree obesity	2 (2.25%)	18 (10.59%)	
	>40 giant obesity	4 (4.49%)	1 (0.59%)	
Abdominal hysterectomy	Yes	without appendages 18 (20.00%)	with appendages 84 (49.41%)	p=0.0001*
	No	72 (80.00%)	86 (50.59%)	

Level of statistical significance p<0,05 for p* – Chi 2 Persona test, p** – t-Student and p# – test Fishera-Freemana-Haltona

Table 2. The characteristic of studied population

		Before menopause (n=90)	Menopause (n=170)	p
place of residence	large cities >500 thousand	28 (31.11%)	55 (32.35%)	p=0.1023*
	100 – 500 thousand	18 (20.00%)	16 (9.41%)	
	do 100 thousand	15 (16.67%)	30 (17.65%)	
	rural area	29 (32.22%)	69 (40.59%)	
age at menarche	mean±SD	13.66±1.46	13.44±1.68	p=0.2982**
duration of complaints	up to 5 years	79 (87.78%)	154 (90.59%)	p=0.4909*
	over 5 years	11 (12.22%)	16 (9.41%)	
internal disorders	Yes	48 (52.22%)	111 (65.29%)	p=0.0597*
	No	42 (46.67%)	59 (34.71%)	
oral hormone therapy	Yes	38 (40.86%)	55 (32.35%)	p=0.1142*
	No	52 (57.78%)	115 (67.65%)	
cigarette smoking	Yes	4 (4.44%)	14 (8.24%)	p=0.2519*
	No	86 (95.96%)	156 (91.76%)	

Level of statistical significance p<0,05 for p* – Chi 2 Persona test and p** – t-Student

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DISCUSSION

Stress urinary incontinence may concern women at various ages, and may be caused by various etiologic factors. Stothers et al. [10] prove that age exerts the most significant effect on the occurrence of urination problems. Obesity significantly contributes to an increased prevalence of this disorder, and the reduction of body weight is of great importance in alleviation of the SUI symptoms. Pregnancy, childbirth, and surgical procedures concerning the pelvic fundus may increase the risk of occurrence of SUI [10, 11, 12, 13, 14]. According to Contreras Ortiz, the etiology of SUI is still poorly understood, among the main risk factors are age, pregnancy, childbirth and obesity [15]. Considering the above-mentioned report, in the presented study, patients in childbirth and those who were pregnant, were excluded from the statistical analysis because vaginal delivery and length of full term pregnancy may increase the risk of stress urinary incontinence. The analysis of factors which affect the occurrence of SUI performed in the group of 260 women aged 27-82, unequivocally showed that the age of patients (p=0.0001), body mass index (BMI) (p=0.0001), and surgical abdominal hysterectomy procedures (p=0.0001) had the most significant effect on the occurrence of the symptoms of urinary incontinence. The effect of the remaining etiologic factors was statistically insignificant and rather controversial.

Effect of age on the occurrence of SUI

The 20th century brought about a longer life span and, in consequence, a decrease in the quality of life of the elderly. The age of menopause is unchangeably assessed to be approximately 50. The symptoms of ageing of the urogenital system occur in about 50% of women. Considering the fact that women live statistically longer, one third of their life is during the postmenopausal period [3]. In postpenopausal period, the frequency of occurrence of SUI increases two-fold. This is due, among other things, to more frequent infections of the urogenital system, decrease in the level of estrogens in the organism, weakening of the walls of the urinary bladder, as well as the muscles supporting urination. The relationship between the function of the urinary system and level of hormones is confirmed by the fact that the cyclic hormonal changes which take place during the menstruation cycle cause changes in the parameters of the urodynamic test (E2 had a negative correlation with the Q-tip test in post-menopause patients). FSH had positive correlations with the post-void residual volume in the uroflowmetry and the voiding and flow times in the pressure-flow study, and a negative correlation with the peak flow rate in the pressure-flow study in pre-menopause women), as well as symptoms on the part of the urogenital system [9]. It is probable that estrogen receptors, to a certain degree, are responsible for the central control of micturition. It is presumed that the functioning of the structures involved in the control of micturition in SUI may, with age, become less efficient, and become a basis for pharmacotherpay, with the consideration of estrogens [1, 2, 3]. HRT is the standard treatment and should be applied wherever there are no clear contraindications. Estrogens affect the mechanism of urinary continence by increasing the urethral resistance, increased urinary bladder sensitivity threshold, as well as an increase in the sensitivity of alpha receptors of the urethral smooth muscles. The supplementation of the deficiency of sex hormones results in an improvement of subjective symptoms of urinary incontinence, urodynamic and ultrasound parameters. Most frequently, hormone therapy is applied in the form of vaginal globules or gel, which have the advantage of acting locally on the target organs [3, 9].

Considering the above-mentioned information, and the fact that menopause exerts an effect on stress urinary incontinence, this phenomenon has become a primary constant variable for the considerations and analysis of individual factors predisposing to urinary incontinence.

Effect of excessive body weight on the occurrence of SUI

An excessive body weight, i.e. excessively high BMI value, is among risk factors of urinary incontinence – the higher the BMI, the more intensified the symptoms of urinary incontinence. Obesity of the apple-shaped type (abdominal) is conducive. In addition, in obese women, stress urinary incontinence occurs 4-5 times more frequently than in women with a normal body weight [11]. The epidemiology of urinary incontinence in obese women has not been sufficiently recognized. In France, the prevalence of urinary incontinence was about 44%. Obesity, defined by BMI above 30kg/m (2), was well established as a risk factor (OR between 1.7 – 2.4) [12]. Theoretically, the increase in intra-abdominal pressure that coincides with an increased BMI results in a proportionally higher intravesical pressure, which overcomes urethral closing pressure and leads to incontinence. Obesity may be an important etiologic factor in SUI, but does not influence urodynamic parameters [13]. The analysis performed in the presented study showed that more than a half of the patients had a BMI value exceeding the standard, and a statistically significant relationship was observed between the groups examined (p<0.0001, Fisher-Freeman-Halton). Although the contribution of obesity in the complex etiopathogenesis of the development of urinary incontinence has not been fully recognized, certainly the reduction of body weight often results in the alleviation of symptoms, an improvement with respect to micturition control, and also improvement in the quality of life [14]. This is best evidenced by the fact that the weight loss obtained by a weight reduction diet programme or bariatric surgery, improves urinary symptoms of stress, urge or mixed incontinence [12].

Effect of gynaecological surgical procedures on the occurrence of SUI

Damage to the nerve-muscle structures of the fundus, and stratification of the abdominal pelvic fascia, is the cause of increase in the incidence of urinary incontinence. Undoubtedly, gynaecological surgeries are among the risk factors of stress urinary incontinence. Due to hysterectomy, there may occur loss of the normal fascial and ligamentous support of the urinary bladder, and support by the adjacent organs [15, 16]. Duru et al. [17] analyzed urodynamic outcomes before and after total hysterectomy for benign conditions, and reported if urinary function was changed after hysterectomy. They reported that overall, symptoms of urinary incontinence were significantly reduced after hysterectomy (relative risk [RR] = 1.37, 95% confidence interval [CI] [1.01, 1.84]). The urodynamic diagnosis of detrusor overactivity was significantly reduced after hysterectomy (RR = 1.58, 95% CI [1.16, 2.16]), but there was no significant reduction in the prevalence of urodynamic stress incontinence after hysterectomy (RR = 0.89, 95%

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CI [0.58, 1.38]). There was no significant change to urine flow rate after hysterectomy (RR = -0.36, 95% CI [-1.40, 0.68]) [17]. According Jędrzejczyk et al. [18], the largest number of cases of stress urinary incontinence in the group of 200 patients aged 33-85, were associated with surgical abdominal hysterectomy procedures. In addition, 55% of patients with SUI had undergone abdominal hysterectomy, 5% – vaginal hysterectomy, 20% – surgeries concerning the uterine appendages, 15% – plastic surgeries of vaginal walls, while 5% – Caesarean section [18]. In the group of patients with SUI analyzed, there was approximately 20% of premenopausal women who had undergone surgical abdominal hysterectomy without appendages, and about 50% of menopausal women who had undergone hysterectomy with appandages. Sometimes, analysis of the factors affecting the occurrence of SUI is relatively difficult. This may be evidenced by the fact that in 80-90% of respondents the complaints associated with urinary incontinence had lasted for about 5 years, which was probably due to relatively infrequent visits to a medical specialist. This might also be the result of an insufficient medical education of the women, cultural shame and embarrassment, as well as failure in the conservative treatment and variety of surgical techniques [1]. Pelvi-genital statics disorders are often concomitant with urinary incontinence, although not all patients with female genital prolapse experience and report complaints of this type. Symptoms of SUI may occur unexpectedly after surgical correction of pelvi-genital statics disorders. According to Rutkowska et al. [19], disguised urinary incontinence is noted in approximately 25% of patients with prolapse of the anterior vaginal wall, and surgical correction of statics disorders in these patients is associated with a high percentage of occurrence of SUI after the surgery [19]. Women with posthysterectomy vaginal vault prolapse present complicated reconstructive problems for the pelvic surgeon. Stress incontinence may not be demonstrated in these patients unless they are examined with a full bladder, with their prolapse carefully reduced to a normal anatomical position. Women with these disorders may require a suburethral sling procedure if they are to remain continent after correction of posthysterectomy vaginal vault eversion [20].

Hysterectomy determines life satisfaction on an average level and the type of indication for hysterectomy plays a significant role in the evaluation of the quality of life of women [21]. Stem-based therapy could be the next step in the treatment of urinary incontinence. In the future, it will enable an expansion of qualifications for women with SUI who, for various reasons, cannot undergo surgical treatment. With administration into the paraurethral region, stem cells contribute to the increase of urethral occlusion pressure and the restoration of normal urinary continence. But there are still many elements of therapy, such as the effectiveness or long-term side-effects, which need to be researched [22]. Polymorphism type G/GG of gene promoter encoding MMP-1 and polymorphism type 5A/6A of the gene promoter encoding MMP-3 are not associated with the risk of the development of pelvic organ prolapse and SUI [23].

Summing up, urinary incontinence is one of the most frequent chronic diseases occurring in women. Therefore, this disorder is mentioned among factors which exert a great effect on the psychological state of women suffering from this complaint. Considering the increase in life span, urinary incontinence affects an increasingly larger part of

the society. The symptoms may be troublesome enough to cause a considerable decrease in the quality of life of patients and their functioning in society.

CONCLUSIONS

1. Urinary incontinence is a frequent disorder affecting women at the age of both before and after menopause.
2. The symptoms of SUI are most often reported by patients with overweight and obesity.
3. A comprehensive analysis of the risk factors may contribute to an improvement in the results of treatment, and the quality of life of pre- and postmenopausal patients.
4. The authors declare that they have no conflict of interest.

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