

# Medical and psychosocial factors conditioning development of stress urinary incontinence (SUI)

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## Abstract

**Introduction:** Stress urinary incontinence (SUI) is the most frequent type of urinary incontinence among adult women.

**Objective:** The objective of the study was evaluation of the effect of environmental, systemic and obstetrical factors on the development of stress urinary incontinence, and diagnosing and determination of areas in which changes could be made.

**Material and method:** The study covered 313 females aged 30-75 living in the Lublin Region. The respondents were divided into two groups according to the clinical diagnosis, occurrence of symptoms of SUI or lack thereof: Group I – women with SUI symptoms (119), Group II – women without SUI (194). A diagnostic survey was conducted with the use of a self-designed research instrument based on the Gaudenz questionnaire, data from relevant literature and the 'competent judges' test. The following statistical tests were used to compare two structure indicators (fraction, frequency); chi-square test and t-Student test. Statistical analysis was performed by means of STATISTICA 9 (StatSoft) software.

**Results and conclusions:** Statistically significant differences were found between the group of patients with SUI and the control group, with respect to the number of deliveries and their duration. The study showed that there is a statistically higher probability of the development of SUI in the case of surgical delivery, or natural childbirth of a baby with a birth weight of 4000 g or more. The study showed that hard physical work and past gynaecological surgeries are risk factors of urinary incontinence. Barriers of a psychosocial nature were also found (feeling of shame and embarrassment accompanying disclosure of the SUI), which minimized the respondents' participation in urinary incontinence prophylactic actions.

## Key words

stress urinary incontinence, risk factors, prophylaxis, psychosocial and medical conditioning

## INTRODUCTION

Urinary incontinence is among the most frequent chronic female disorders, and constitutes a serious health problem in contemporary society. Data from various sources indicate that this disorder affects 15%-45% of women [1, 2, 3]. Urinary incontinence is an embarrassing problem. It is commonly considered to be 'physiologically' associated with the ageing of the body. However, studies show that this disorder also occurs at reproductive age and among nulliparas aged 17-25 [3, 4, 5, 6]. The factors predisposing to the development of stress urinary incontinence are: vaginal deliveries, genetic load (collagen deficiency), estrogens deficiency, chronic constipation, chronic cough, obesity, occupational load – heavy physical work [7, 8, 9, 10, 11, 12, 13]. Many studies conducted in the area of etiopathogenesis of urinary incontinence have not provided an answer which would fully explain the causes of this disorder. Due to the fact that the mechanisms of urinary incontinence have not been finally explained, this scope of problem remains in the focus of interest of many scientific centres worldwide [3, 14].

Due to the considerable prevalence and character of symptoms of SUI, it is mentioned among ailments exerting a great effect on the psychological condition of the women

who suffer from this disorder. Frequently, disguised urinary incontinence is the cause of decreased self-esteem, neuroses, depression states, and difficulties in sex life. It seems that an improvement in the quality of life of women suffering from the problem of urinary incontinence depends of the state of their knowledge concerning SUI risk factors and its symptoms, as well as the principles of effective prevention and treatment methods [15, 16].

Urinary incontinence prophylaxis should be started among young women, and should be biased towards the elimination of important risk factors. These actions should consist in encouraging patients to apply the principles of a health-promoting life style – discontinuation of smoking which would help eliminate chronic cough [3, 17], performance of regular exercises to strengthen pelvic floor muscles [18], prevention of obesity and maintenance of normal body weight [9, 19], as well as control of constipation by avoiding excessive pressure during defecation which, especially in childhood or old age, predisposes to the occurrence of stress urinary incontinence. An intensity of urinary incontinence may also be reduced by limiting excessive physical effort. Nevertheless, an adequate management of delivery is most important, avoiding clinically unjustified speeding-up of delivery, as well as proper management of long-lasting and surgical childbirths [16, 20]. Surgical deliveries, such as forceps delivery, unfavourably affect the occurrence of this disorder, because injuries of the tissues of the perineum and the uterine fundus are considerably greater than during physiological childbirth [21, 22, 23]. Later in women's lives,

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an early diagnosis of disorders in the statics of the genital organ becomes important, their surgical and rehabilitation treatment, as well as adequate treatment of the urinary system infections. During the peri- and post-menopausal period the use of hormone replacement therapy is important [11, 24].

The objective of the study was evaluation of the effect of environmental, systemic and obstetrical factors on the occurrence of stress urinary incontinence, and diagnosing and determination of areas in which changes could be made which would favour the participation of those interested in urinary incontinence prophylaxis.

## MATERIAL AND METHOD

The study covered 313 women aged 30-75 living in the Lublin Region. The respondents, divided into the following two groups according to the clinical diagnosis, the presence or lack of SUI symptoms.

Group I comprised 119 women treated at the Gynaecology Clinic of the Medical University in Lublin due to stress urinary incontinence. Group II – the control group, were 194 patients who reported to the Pre-clinical Outpatient Department in Lublin. The selection of the group was targeted.

The criteria for qualification of patients for the study were:

- presence of the symptoms of SUI confirmed by medical history and urodynamic test (*criterion for patients from Group I*);
- negative medical history concerning the presence of the symptoms of urinary incontinence (*criterion for patients from Group II*);
- negative history concerning the presence of neurological, psychical diseases, congenital defects concerning the urogenital system and a urinary fistula;
- lack of data in medical history concerning previous surgical treatment of urinary incontinence;
- age 30-75;
- consent expressed by a patient to participate in the survey.

The respondents were informed concerning voluntary participation in the study, its anonymity, and the use of information obtained exclusively for scientific purposes, in accordance to the Helsinki Declaration.

Identification of the environmental, systemic and obstetrical risk factors of SUI was performed using a questionnaire form. A self-designed research instrument was developed, based on the Gaudenz questionnaire [25], data from relevant literature [4, 16], and evaluated by competent judges, i.e. a gynaecologist-obstetrician, midwife with many-year professional experience, national consultant in the field of gynaecological and obstetric nursing, and a psychoprophylaxis specialist.

Prior to the study proper, a pilot study was conducted in order to verify the self-designed research instrument from the aspect of the contents and its comprehensibility (beginning of 2011), which covered patients with stress urinary incontinence. The results of pilot study were not included into the proper study, but only served the preliminary standardization of the research instrument. The study proper was completed in the second half of 2011.

In the statistical analysis of the results the following tests were used to compare two structure indicators (fraction, frequency); chi-square test and t-Student test. Statistical calculations were performed by means of STATISTICA 9 (StatSoft) software.

The p values <0.05 were considered statistically significant, which means that the probability of error consisting in the rejection of the true hypothesis does not exceed 5%.

## CHARACTERISTICS OF THE STUDY GROUP

Women with symptoms of SUI differed according to age, place of residence and education level (Tab. 1). The age of respondents treated due to SUI ranged from 33-74, mean age in this group was  $\bar{x} = 53.4$ . Patients in the control group were aged 30-75; mean age  $\bar{x} = 49.7$ .

The largest number of patients in the control group (62.4%) lived in urban areas. In Group I, 58.0% of patients were urban, and 42.0% – rural inhabitants.

More than 41.2% of respondents from the study group had a vocational education level, while 36.1% – secondary or post-secondary school education. Only every tenth patient with SUI examined (9.3%) possessed university education. In the control group, 37.6% of respondents had a secondary or post-secondary school education. Only a few patients without symptoms of SUI (5.7%) had elementary school education. A statistically significant relationship was observed between education level and the occurrence of stress urinary incontinence symptoms.

**Table 1.** Structure of patients in the study according to age, education level and place of residence

Age intervals	Study group (I) with SUI (n=119)		Control group (II) without SUI (n=194)	
	n	%	n	%
30-39	4	3.7	35	18.0
40-49	38	31.8	64	33.0
50-59	48	40.2	50	25.8
60-69	24	20.1	34	17.5
>70	5	4.2	11	5.7
Mean age	53.4		49.7	
$\chi^2 = 18.3667; p = 0.001$				
Education				
Elementary	16	13.4	11	5.7
Vocational elementary	49	41.2	61	31.4
secondary or post-secondary school	43	36.1	73	37.6
University	11	9.3	49	25.3
$\chi^2 = 38.3955; p = 0.0000$				
Place of residence				
Urban area	69	58.0	121	62.4
Rural area	50	42.0	73	37.6
$\chi^2 = 0.5953; p = 0.4403$				

Source: own studies.

## RESULTS

In respondents' opinions, the type of occupation performed, especially heavy physical work, has a significant effect on the occurrence of SUI. In the research material analysed, 65.5% of respondents treated due to SUI performed physical work.

Into other factors which exert a considerable effect on the occurrence of SUI, which were confirmed in own studies, may be classified past gynaecological surgeries ( $p < 0.05$ ), and urinary incontinence in family medical history ( $p < 0.05$ ).

Own studies did not confirm any relationship between SUI and selected disorders (diabetes, bronchial asthma), and cigarette smoking (Tab. 2).

**Table 2.** Effect of selected risk factors of development of stress urinary incontinence based on differences between patient with and without SUI

No.	Parameters	with SUI n = 119		without WNM n = 194		f. test z	p
		n	%	n	%		
1.	Type of occupation performed: intellectual work physical work	41 78	34.5 65.5	99 95	51.0 49.0	2.8633	p<0.05
2.	Load carried by patients performing physical work: up to 5 kg 6-10 kg over 10kg	8 21 49	0.3 26.9 62.8	43 38 14	45.3 40.0 14.7	5.0248 1.8053 6.5398	p<0.05
3.	Urinary incontinence in family medical history: Yes No	63 56	52.9 47.1	55 139	28. 71.6	5.3737	p<0.05
4.	Gynaecological surgeries: a. Yes b. No	44 75	37.0 63.0	41 153	21.1 78.9	3.0588	p<0.05
5.	Chronic internal diseases (bronchial asthma, diabetes): a. Yes b. No	19 100	16.0 84.0	24 170	12.4 87.6	0.8969	p>0.05
6.	Cigarette smoking: Yes No	23 96	19.3 80.7	32 162	16.5 83.5	0.6393	p>0.05

Source: own studies.

Own studies showed that the percentage of women with SUI was higher among those who vaginal delivered three or more children naturally; however, no significant relationship was observed between the number of childbirths and the occurrence of stress urinary incontinence ( $p>0.05$ ).

In addition, the study showed that the probability of the occurrence of SUI is statistically higher in the case of surgical deliveries, acceleration of labour, duration of labour longer than 24 hours, vaginal delivery of a baby with birth weight of 4000 g or more (Tab. 3). However, no statistically significant relationship was noted between surgical delivery, perineal tear, badly healing injuries of the perineum, and the occurrence of SUI ( $p>0.05$ ).

The patients examined evaluated the causes of the occurrence of SUI. Among self-reported causes of SUI, 31.9% of respondents mentioned past childbirth, 16.9% – past gynaecological surgeries, and only 21.8% – the period of menopause (Tab. 4). A statistically significant relationship was noted between the respondents' age and their subjective evaluation of the causes of SUI ( $p<0.05$ ). The youngest patients most often associated SUI with childbirth – 18.5%, those aged 50-59 – with menopause 13.4%, whereas the oldest patients, aged over 60, statistically most frequently were not able to report the major cause of SUI – 9.3%.

Among 119 women treated for SUI, every seventh respondent (15.2%) had not reported to a physician for advice for over 10 years from the occurrence of the first symptoms of the disease. More than a third of the women examined (36.1%) tried to cope with the problem of urinary incontinence themselves for the first 4-5 years, and more than a quarter for the period from 6-10 years (26.1%). Only

**Table 3.** Effect of delivery on development of stress urinary incontinence based on differences between patients with and without symptoms of SUI

No.	Parameters	with SUI n = 119		without SUI n = 194		f. test z	p
		n	%	n	%		
Number of vaginal childbirths:							
1.	1-2	57	47.9	128	66.0	3.15834	p<0.05
	3	30	29.4	38	19.6	0.9463	
	4 and more	22	20.2	21	10.8	1.2121	
	have never given birth	3	2.5	7	3.6		
Duration of Stage 1 of labour:							
2.	up to 3 hours	27	22.7	10	5.2	4.6643	p<0.05
	from 3 - 24 hours	75	63.0	168	86.6	4.8585	
	more than 24 hours	14	11.8	9	4.6	2.3453	
	have never given birth	3	2.5	7	3.6		
Course of childbirth (self-reported by patients):							
3.	light	34	28.6	132	68.1	6.792	p<0.05
	heavy	47	39.5	48	24.7	2.7558	
	very heavy	35	29.4	7	3.6	6.5015	
	have never given birth	3	2.5	7	3.6		
Surgical deliveries, third degree perineal tear:							
4.	Yes	18	15.1	11	5.7	2.1761	p<0.05
	No	98	82.4	176	90.7		
	have never given birth	3	2.5	7	3.6		
Delivery of a baby with weight of 4,000 g and more:							
5.	Yes	54	45.4	46	23.7	3.702	p<0.05
	No	62	52.1	141	72.7		
	have never given birth	3	2.5	7	3.6		

Source: own studies.

**Table 4.** Respondents' age and self-reported cause of development of SUI

Age	Causes of development of SUI											
	Delivery		Gynae- cological surgeries		Meno- pause		Post-meno- pausal period		Lack of specified cause		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
30-49	22	18.5	3	2.5	7	5.9	0	0	10	8.4	42	35.3
50-59	8	6.7	11	9.3	16	13.4	8	6.7	5	4.2	48	40.3
> 60	8	6.7	6	5.1	3	2.5	1	0.8	11	9.3	29	24.4
Total	38	31.9	20	16.9	26	21.8	9	7.5	26	21.9	119	100.0

$\chi^2 = 33.4685$ ;  $p = 0.0001$

Source: own studies.

few respondents (8.4%) reported for a medical examination within the first year of the duration of the disease (Tab. 5). The time which elapsed from the occurrence of SUI symptoms to the moment of reporting for medical examination depended on respondents' age ( $p<0.05$ ).

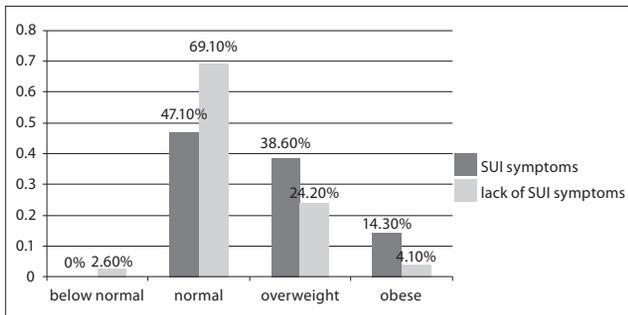
Nearly a half of the respondents who received treatment for SUI had a normal body weight (47.1%), whereas in the control group – 69.1%. In the control group, 24.2% of respondents were overweight, while in the study group – 38.6%. Obesity occurred in 14.3% of patients who had problems with urinary incontinence, and in 4.1% of respondents in the control group. Statistically significant differences in the mean values of the Body Mass Index were observed between patients in the study and control groups ( $t$ -Student=5.6287;  $p=0.0000$ ) – Figure 1. The BMI of over 25, evidencing overweight or obesity, was more frequently noted among patients treated for SUI, compared to the control group ( $p<0.05$ ).

**Table 5.** Respondents' age and time which elapsed from the occurrence of SUI symptoms to the moment of reporting to medical examination

Age	First symptoms of SUI and medical examination											
	0-1		2-3		4-5		6-10		>10		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
30-49	1	0.8	8	6.7	20	16.8	11	9.3	2	1.7	42	35.3
50-59	5	4.2	8	6.7	16	13.4	14	11.8	5	4.2	48	46.3
> 60	4	3.4	1	0.8	7	5.9	6	5.0	11	9.3	29	24.4
Total	10	8.4	17	14.2	43	36.1	31	26.1	18	15.2	119	100.0

$\chi^2 = 23.2368$ ;  $p = 0.0030$

Source: own studies.

**Figure 1.** Body mass Index and occurrence of stress urinary incontinence (SUI). Source: own studies

## DISCUSSION

Based on the literature available, it is not possible to unequivocally state the primary cause of stress urinary incontinence.

In their studies, Farrell et al. [26] evaluated the relationship between past delivery and the occurrence of the symptoms of urinary incontinence. An interesting observation is that the duration of the second stage of labour or weight of the foetus do not play any important role from the aspect of the problem discussed. Past vaginal deliveries are among the most important SUI risk factors [27, 28, 29]. Own studies confirmed that the percentage of respondents who delivered three or more children was higher in the group of patients treated due to SUI, compared to the control group. Nevertheless, no statistically relationship was found in the number of past deliveries between the study and control groups. Simeonova et al. indicated that women with SUI had a larger number of vaginal childbirths [30]. Studies by Thom et al., which covered a large population of women, showed that bearing two or more children significantly statistically increased the occurrence of SUI [16].

Own studies confirmed that the probability of the occurrence of SUI was higher in the case of past surgical delivery, acceleration of labour, duration of at least one labour longer than 24 hours and less than 3 hours, bearing by forces of nature a baby with birth weight of 4000 g or more ( $p < 0.05$ ).

The effect of obesity on the occurrence of urinary incontinence, presented, among others, by Thom, was also confirmed in own studies. The BMI values of over 30, which are the marker of obesity, simultaneously indicates the presence of a positive correlation with the occurrence of SUI [16]. In addition, the higher the BMI the more intensified the SUI symptoms [8]. From theoretical premises, it results that an increase in the amount of celiac fatty tissue and body covering fatty tissue increases abdominal pressure, resulting

in a decrease of relation between intravesical pressure and urethral pressure which, in consequence, leads to urinary incontinence. However, no significant differences in elevated values of pressures were found between obese women and those with a normal BMI. In the literature available, many researchers report that in patients with SUI an elevated BMI (overweight) is more frequent. This is also confirmed by the presented study [16, 31].

The studies by Thom et al. [16] showed that the reduction in body weight in pathological obesity obtained by a surgical method leads to an alleviation of the symptoms of SUI.

In the presented study a statistically significant relationship was observed ( $p < 0.05$ ) between positive family medical history of urinary incontinence and the occurrence of SUI. This could confirm the theory by Tomaszewski et al. concerning the heredity of SUI and, at the same time, explain the role of congenital deficiency or damage of collagen structure in the connective tissue [12].

Other urinary incontinence risk factors are past gynaecological surgeries. Based on relevant literature, surgical procedures performed within the lesser pelvis predispose to the development of SUI in the future. Black et al. [33] indicated that approximately 35% women with SUI had undergone hysterectomy in the past. According to the results presented in another report, SUI was diagnosed in 50% of patients with a past history of total hysterectomy surgery [10, 33]. This may be associated with the removal of cervical ligaments of the uterus, together with nerve fibres passing along them, which results in a decrease in urethral closure pressure. In own studies, a statistically significant relationship was also observed ( $p < 0.05$ ) in the number of past gynaecological surgeries between patients with SUI and the control group.

As many as 65.5% of patients treated in the Clinic due to SUI performed physical work; in this group 62.8% of respondents lifted loads of over 10 kg several times daily. Based on literature reports [4, 16, 17] and own studies, the hypothesis could be confirmed concerning the considerable effect of heavy physical work on the development of SUI by the weakening of the muscles of the pelvic floor.

Bump et al. reported that cigarette smoking increases the incidence of urinary incontinence in women by even as much as five times [32, 34]. Own studies did not confirm any relationship ( $p > 0.05$ ) between SUI and selected internal diseases (diabetes, bronchial asthma) and habits (cigarette smoking), similar to the studies by Chaliha et al. [29].

The patients examined evaluated the causes of the occurrence of SUI. Among self-reported causes of SUI, 31.9% of respondents mentioned past childbirth, 16.9% – past gynaecological surgeries, and only 21.8% – the period of menopause. A demographic analysis of women suffering from urinary incontinence presented by Arnfinn et al. [3] showed that in 36% of women SUI developed also during the reproductive period.

Among 119 women treated for SUI, 18 (15.2%) have not reported to a physician for over 10 years since the occurrence of the first symptoms of the disease. These women were convinced that the disease is the consequence of ageing of the body, is an incurable state, and in addition – an embarrassing disease. Only 10 patients (8.4%) reported to medical examinations within the first year of the duration of the disease. The cases described in literature also confirm marginal rates of women reporting to a physician at the

moment of occurrence of the symptoms of SUI [30]. Moreover, according to Barnick et al. [34], only every second woman who realized the presence of SUI sought advice from a doctor, and 30% of them wait for five years before reporting to a physician for a medical advice.

## CONCLUSIONS

1. Based on own studies, it was found that the following factors should be taken into consideration while determining the risk of the development of SUI in the future:
  - Number of childbirths and course of labour and delivery;
  - symptoms of SUI in pregnancy;
  - medical family history of urinary incontinence;
  - very hard physical work (lifting of loads);
  - abnormal BMI.
2. Time which elapsed from the occurrence of the first symptoms of SUI to the moment of reporting to a physician may be an evidence of low awareness (educational deficiencies) among women concerning the possibilities of SUI prophylaxis.
3. In addition, barriers of psychosocial nature were diagnosed (embarrassment accompanying the disclosure of SUI), which minimized the participation of the women interested in prophylactic and treatment actions in the area of urinary incontinence.

## FINAL STATEMENTS

Prophylactic actions should be undertaken aimed at the provision of normal mechanisms protecting against involuntary leakage of urine by the elimination of SUI risk factors. By means of adequate education concerning SUI, it is also necessary to provide information and support women psychologically in prophylactic actions and minimize embarrassment in seeking a doctor's opinion and treatment.

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