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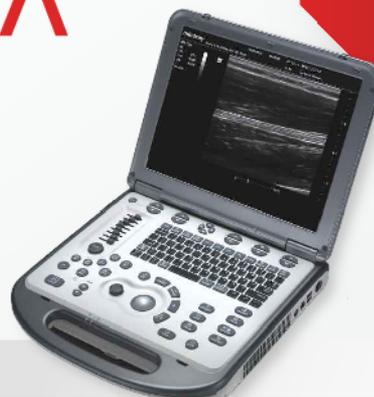
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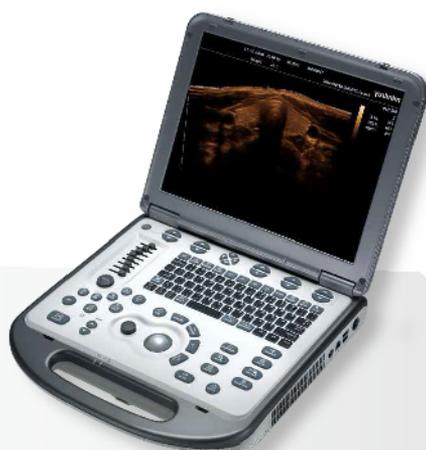
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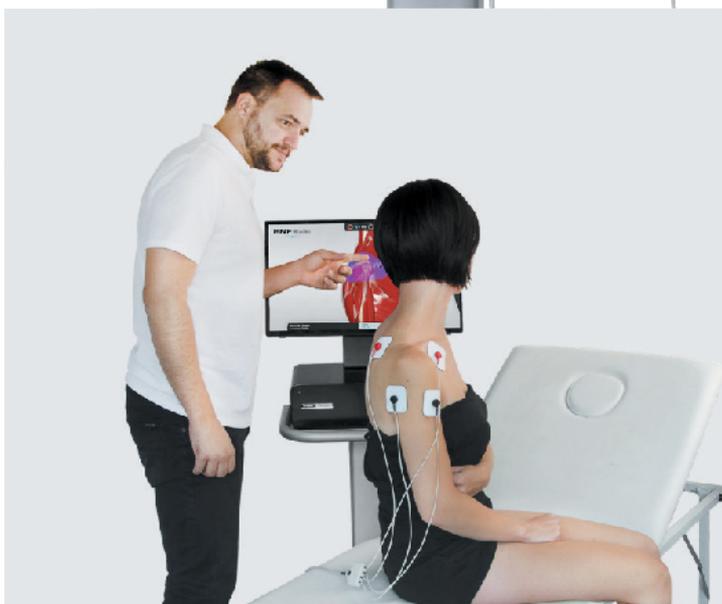
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# Analysis of selected risk factors and the level of awareness of urinary incontinence in women

*Analiza wybranych czynników ryzyka oraz poziomu świadomości dotyczącego nietrzymania moczu u kobiet*

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## Abstract

**Objective.** Research objective was to analyse selected risk factors for the incidence of urinary incontinence in a randomly selected group of women, as well as the frequency of accompanying symptoms. The level of consciousness and behaviour of women who experienced urinary incontinence were also analysed.

**Material and methods.** The survey covered 146 women aged 20 to 79, at the day rehabilitation ward at Professor Bogusław Frańczuk's Lesser Poland Orthopaedic and Rehabilitation Hospital in Krakow. The authors' questionnaire containing 32 questions and the Oswestry Disability Questionnaire (ODI) were used for the research.

**Results.** There was a statistically significant correlation between the incidence of urinary incontinence and age in the respondents. In the youngest age group, the mean for the declared urinary incontinence was 46.5, while in the older groups it was over 80. The results also indicate a significant increase in pain in the lumbar spine in the group that experienced urinary incontinence (mean = 20.93) in relation to the rest of the respondents (mean = 12.83).

**Conclusions.** The problem of incontinence is age dependent, but it is common in all age groups. There is a relationship between the incidence of urinary incontinence and the method of giving birth and perinatal factors. It has also been found that women experiencing urinary incontinence episodes suffer from more pain. The vast majority of women who experience urinary incontinence do not undertake any treatment attempts.

## Key words:

urinary incontinence, pelvic floor muscles, incontinence

## Streszczenie

**Cel pracy.** Celem pracy była analiza wybranych czynników ryzyka występowania nietrzymania moczu w losowo wybranej grupie kobiet, a także częstości występowania objawów towarzyszących. Przeanalizowano również poziom świadomości oraz postępowanie kobiet, które doświadczyły nietrzymania moczu.

**Materiał i metody.** Badaniem ankietowym objęto 146 kobiet w wieku od 20 do 79 lat, przebywających na oddziale dziennej rehabilitacji w Małopolskim Szpitalu Ortopedyczno-Rehabilitacyjnym im. prof. Bogusława Frańczuka w Krakowie. W badaniu wykorzystano autorski kwestionariusz ankietowy, zawierający 32 pytania oraz Kwestionariusz Niepełnosprawności Oswestry (ODI).

**Wyniki.** U badanych zaobserwowano istotną statystycznie zależność pomiędzy występowaniem nietrzymania moczu a wiekiem.

W najmłodszej grupie wiekowej średnia dla deklarowanego gubienia moczu wynosiła 46,5, podczas gdy w starszych grupach było to ponad 80. Wyniki wskazują także na znaczący wzrost dolegliwości bólowych odcinka lędźwiowego kręgosłupa w grupie, która doświadczyła nietrzymania moczu (średnia = 20,93) w stosunku do reszty badanych (średnia = 12,83).

**Wnioski.** Problem występowania nietrzymania moczu jest zależny od wieku, jednakże jest powszechny w każdej grupie wiekowej. Istnieje związek pomiędzy występowaniem nietrzymania moczu a sposobem porodu i czynnikami okołoporodowymi. Stwierdzono także występowanie większych dolegliwości bólowych u osób doświadczających epizodów gubienia moczu. Zdecydowana większość kobiet doświadczających nietrzymania moczu nie podejmuje żadnych prób leczenia.

## Słowa kluczowe:

nietrzymanie moczu, mięśnie dna miednicy, inkontynencja

## Introduction

According to the definitions of the World Health Organization (WHO) and the International Continence Society (ICS), urinary incontinence (UI) is defined as the uncontrolled leakage of urine out of the bladder, regardless of whether UI causes further problems of a hygienic, health or social nature [1]. Incontinence is twice as common in women than in men [2]. Approximately 10–40% of the population of all adult women experience episodes of UI [3].

In Poland, the data on the epidemiology of UI is divergent. Data collection is hindered by the intimate nature of the disease. It is estimated that around 2.5 million people suffer from incontinence [4]. Despite the fact that the disease affects a significant percentage of women, still few of them consult a physician. It is largely related to the embarrassing nature of the problem, which results in the lack of implementation of any diagnostics and treatment methods. Treatment of urinary incontinence requires the cooperation of specialists in many different fields [5]. One of them is urogynecological physiotherapy, which, despite the growing awareness of the need for pelvic floor muscle prophylaxis, is still not very popular among women. In Poland, it may be related to difficult and insufficient access to information in this field [6].

It is estimated that over 200 million women worldwide are unfamiliar with pelvic floor muscle exercises and their effects. Moreover, 50% of women cannot do them correctly [7]. The intimacy of the position of the pelvic floor muscles causes that their exercises are often omitted in general physical activity, despite their proven effectiveness in the treatment and prevention of stress urinary incontinence [8]. A barrier limiting access to urogynecological rehabilitation is also the lack of its reimbursement. On the other hand, a large proportion of women believe that urinary incontinence is a natural symptom of aging.

The consequences of urinary incontinence are visible in the family and social aspects. Affected people avoid physical activity, travel, social meetings, and sometimes quit their jobs. Many women, due to gradual isolation, experience mental problems which only then make them undertake treatment [9].

By defining and understanding the impact of risk factors for pelvic floor muscle weakness, preventive strategies can be properly implemented. Despite the fact that a number of methods of preventing and treating the disease have been developed, their implementation is often delayed, negatively affecting the effects of therapy.

## Objective

Research objective was to analyse selected risk factors for the occurrence of urinary incontinence in a randomly selected group of women, as well as the frequency of accompanying symptoms. The level of consciousness and behaviour of women who experienced urinary incontinence were also analysed.

**Material and methods**

The survey included 146 women at the day rehabilitation ward at Professor Bogusław Frańczuk’s Lesser Poland Orthopaedic and Rehabilitation Hospital in Krakow, in the period from June to September 2021. Research inclusion criteria: female gender, age from 20 to 80, non-pregnant, at the earliest one year after childbirth. Exclusion criteria were: neoplastic diseases, neurological diseases, mental diseases, demyelinating diseases and spine surgery. All participants were informed about the research objective and consented to it.

The method used in the study was a proprietary questionnaire, consisting of two parts, containing 32 questions. The first part contained socio-demographic data of the respondents. The second part of the questionnaire concerned the gynaecological and obstetric history. The Oswestry Disability Questionnaire (ODI) was also used. It allows for the assessment of disability caused by pain in the thoracolumbar spine. The questionnaire consists of 10 questions about the intensity of pain experienced during everyday activities. The response is scored depending on the severity of symptoms, ranging from 0 to 5 points [10].

The data obtained from the questionnaires was processed with the use of the Statistica 13 program. Statistically significant values were at the significance level of  $p = 0.05$ . Non-parametric Mann-Whitney and Kruskal-Wallis tests were used to test differences between groups. The results of the questionnaires were standardized by transformation on a scale ranging from 0-100 points. It was assumed that an average of closer to 100 points means a significant increase in the incidence of urinary incontinence and related risk factors in the study group. The closer the mean was to 0 points, the lower the intensity of the factor was. Zero points means no factor is present.

**Table 1. General characteristics of the study group**

Age group [years]	Weight [kg]			Height [cm]		BMI [kg/m <sup>2</sup> ]	
	n	mean	SD	mean	SD	mean	SD
20–29	43	65.67	14.11	167.79	5.78	23.29	4.53
30–39	36	66	13.04	167.41	5.88	23.53	4.46
40–49	24	67.66	13.16	165.95	5.90	24.61	4.90
50–59	11	77.45	12.08	166.09	4.42	28.11	4.42
60–69	21	72.66	9.83	162.71	4.72	27.42	3.34
70–79	11	72.90	12.06	160.54	4.53	28.21	4.13

*n* - number of data, *SD* - standard deviation

The age of the respondents ranged from 20 to 79. The most numerous group were women between the age of 20 and 30. The smallest group were those aged 51–60 and 71–79 (12 women). BMI values in women aged 20 to 50 were normal. The age group from 51 to 80 was overweight. Ninety-eight of the respondents were pregnant in the past.

The most common method of giving birth was a natural birth (87 respondents). During natural birth, an episiotomy was performed seventy-nine times. Caesarean section was performed in twenty-one women, while eight women had caesarean section and natural birth. Among the respondents, 26.71% gave birth once, 30.14% twice, 7.53% three times, 2.74% four times.

### Results

The development of urinary incontinence was reported by 63.01% of the respondents. Urinary incontinence developed in all age groups. Among the youngest group of respondents, the mean for the declared incidence of urinary incontinence was 46.5. With age, we notice an increasing mean value, which was also confirmed in the test performed, which showed a statistically significant difference ( $p = 0.02$ ). Among women over 50, the mean for the declaration of incidents of urinary incontinence before reaching the toilet is increasing. Among women over 70, 63.6% use the toilet more than eight times a day. There is a visible difference between the age groups in the question about urinary retention. More than half of women between the ages of 20 and 49 retain urine. The performed test showed a significant difference ( $p = 0.01$ ) between the studied groups. The tendency for an increased need to urinate at night increases with age. After the age of 60, more than half of the respondents use the toilet at night. The analysis of the results shows that the generation of urge to pass stools and urine decreases with age, especially in the group aged 70–79. However, the performed test showed no statistically significant difference.

**Table 2. Incidence of urinary incontinence in different age groups**

Question	Age group												p
	20–30		30–40		40–50		50–60		60–70		70–80		
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	
I	46.5	50.5	61.1	49.4	75.0	44.2	90.9	30.2	76.2	43.6	81.8	40.5	<b>0.02</b>
II	62.8	48.9	58.3	50.0	70.8	46.4	63.6	50.5	71.4	46.3	72.7	46.7	0.87
III	16.3	37.4	22.2	42.2	29.2	46.4	45.5	52.2	52.4	51.2	54.5	52.2	<b>0.01</b>
IV	34.9	43.7	47.9	45.3	70.8	34.3	61.4	34.2	48.8	39.1	56.8	40.5	<b>0.03</b>
V	39.5	49.5	36.1	48.7	58.3	50.4	36.4	50.5	38.1	49.8	63.6	50.5	0.36
VI	20.9	41.2	30.6	46.7	54.2	50.9	45.5	52.2	57.1	50.7	63.6	50.5	<b>0.01</b>
VII	44.2	50.2	50.0	50.7	54.2	50.9	27.3	46.7	28.6	46.3	54.5	52.2	0.39
VIII	81.4	39.4	69.4	46.7	54.2	50.9	45.5	52.2	47.6	51.2	36.4	50.5	<b>0.01</b>
IX	58.1	49.9	50.0	50.7	54.2	50.9	36.4	50.5	47.6	51.2	27.3	46.7	0.49

*I – Have you developed urinary incontinence? II Do you feel a sudden urge to urinate, forcing you to use the toilet immediately? III – Do you ever fail to hold your urine until you go to the toilet? IV – How often do you experience episodes of urinary incontinence? V – Do you use the toilet more than 8 times a day? VI – Do you use the toilet several times a night? VII – Do you use the toilet in advance? VIII – Do you hold urine? IX – Is there a need to push when urinating/ passing stools? SD – standard deviation, p – test probability*

The respondents were also divided into groups according to the BMI index. Statistical analysis showed no significant differences between the groups. However, in most of the questions about toilet habits, respondents with a higher BMI index obtained a higher mean value for the declared symptoms of urinary incontinence. This is especially true for incontinence, a sudden urge to urinate, problems with holding urine before going to the toilet, and more frequent use of the toilet.

**Table 3. Incidence of urinary incontinence depending on the BMI class**

Question	BMI class								p
	I		II		III		IV		
	mean	SD	mean	SD	mean	SD	mean	SD	
I	41.2	50.7	64.7	48.1	70.0	46.4	76.2	43.6	0.12
II	41.2	50.7	67.6	47.1	62.5	49.0	81.0	40.2	0.08
III	17.6	39.3	23.5	42.7	40.0	49.6	42.9	50.7	0.10
IV	35.3	45.1	51.8	44.3	48.1	40.6	57.1	36.4	0.37
V	23.5	43.7	42.6	49.8	55.0	50.4	38.1	49.8	0.16
VI	17.6	39.3	35.3	48.1	47.5	50.6	52.4	51.2	0.09
VII	29.4	47.0	48.5	50.3	42.5	50.1	47.6	51.2	0.54
VIII	76.5	43.7	64.7	48.1	55.0	50.4	61.9	49.8	0.47
IX	52.9	51.4	55.9	50.0	47.5	50.6	33.3	48.3	0.30

*I – Have you developed urinary incontinence? II Do you feel a sudden urge to urinate, forcing you to use the toilet immediately? III – Do you ever fail to hold your urine until you go to the toilet? IV – How often do you experience episodes of urinary incontinence? V – Do you use the toilet more than 8 times a day? VI – Do you use the toilet several times a night? VII – Do you use the toilet in advance? VIII – Do you hold urine? IX – Is there a need to push when urinating/ passing stools? SD – standard deviation, p – test probability*

**Table 4. Influence of perinatal factors on the declared incidence of urinary incontinence**

Perinatal factors	p
Natural childbirth	<b>0.001</b>
Childbirth by caesarean section	<b>0.001</b>
Episiotomy	<b>0.01</b>
Number of childbirths	<b>0.05</b>

Statistical analysis showed that there is a strong influence of natural childbirth and childbirth by caesarean section on the incidence of urinary incontinence compared to nulliparous women. One of the perinatal factors influencing urinary incontinence is an episiotomy. The number of childbirths also significantly influences urinary continence, and even among nulliparous women the percentage of women reporting urinary incontinence is high, amounting to 56%.

**Table 5. Pain intensity in the thoracolumbar region during everyday activities depending on the declared incidence of urinary incontinence**

Everyday activities	Urinary incontinence		No incontinence		p
	mean	SD	mean	SD	
Pain intensity	27.37	25.80	18.14	25.53	<b>0.025</b>
Personal care	9.47	17.71	3.53	7.70	<b>0.047</b>
Lifting	41.40	37.57	30.72	36.42	0.087
Walking	11.84	22.43	2.94	8.13	<b>0.008</b>
Sitting	28.42	27.68	20.10	25.01	0.071
Standing	31.84	27.88	22.06	30.68	<b>0.010</b>
Sleeping	16.21	16.32	9.80	12.88	<b>0.009</b>
Sex life	14.53	23.16	9.18	23.21	<b>0.032</b>
Social life	16.84	26.41	8.82	21.69	<b>0.021</b>
Travel	22.89	23.54	10.29	19.48	<b>0.000</b>
Total	20.93	18.21	12.83	15.13	<b>0.002</b>

SD - standard deviation, p – test probability

Among women who experience urinary incontinence, pain in the lumbar region is significantly more frequent ( $p = 0.01$ ). Based on the analysis of the Oswestry Disability Questionnaire, among women who report urinary incontinence, there was a visible increase in the intensity of back pain in the thoracolumbar region during various activities of everyday life. There were statistically significant differences between groups for activities such as: personal care, walking, standing, sleeping, sex life, social life and travel. Also, the mean value determining the degree of disability differs significantly between the two groups ( $p = 0.002$ ).

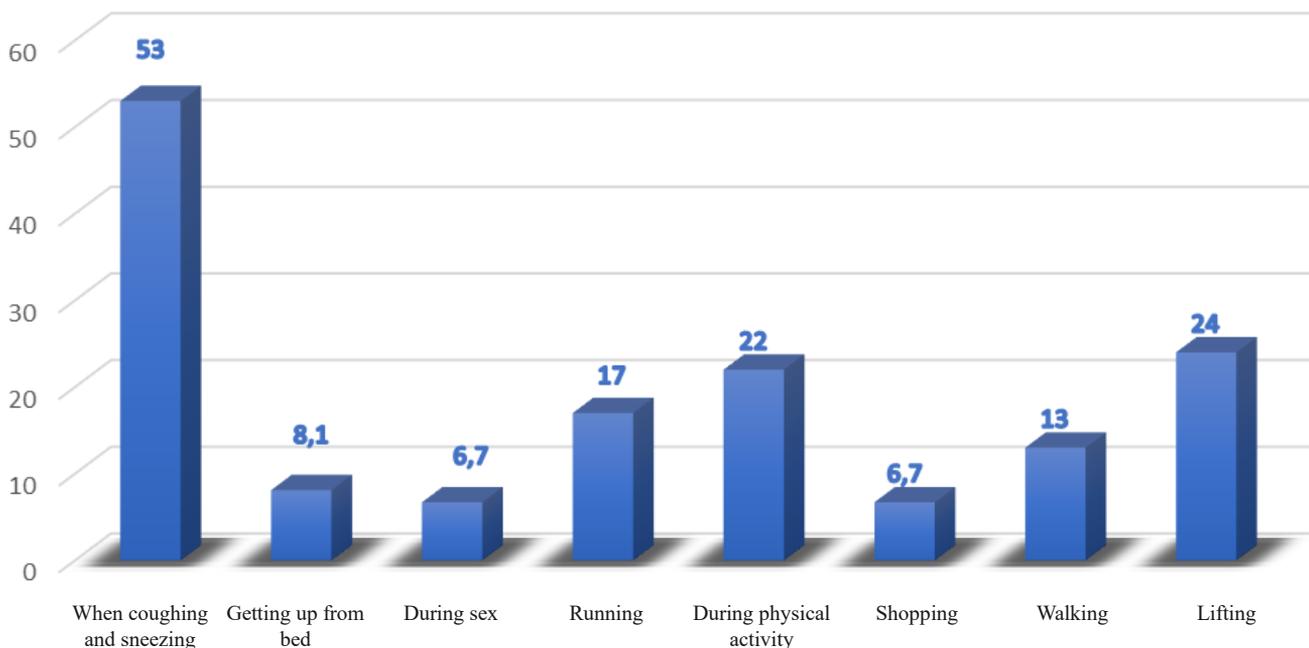
Among the respondents, when asked “Have you heard about pelvic floor muscle training?”, 92.47% of the respondents answered affirmatively. On the other hand, 56.85% of the respondents declared that they had exercised the pelvic floor muscles in their life. Women between the ages of 20 and 69 are more likely to declare that they have heard about the pelvic floor muscles than women over the age of 70. Twice as many women under 39 years of age performed pelvic floor muscle exercises in comparison to women between 40 and 59 years of age. Women aged 60–69 report that 61.90% of them activate the pelvic floor muscles. 81.81% of the respondents from the group aged 50–59 have knowledge of the area of the pelvic muscles, but do not exercise them. Among women in the group aged 70–79, although 72.73% had heard of the pelvic floor muscles, only 27% of the group had ever exercised them.

**Table 6. Declared knowledge about pelvic floor muscles and exercise in various age groups**

Age group [years]	Answer	Heard about the pelvic floor muscles		Exercised the pelvic floor muscles	
		n	%	SD	%
20–29	Yes	41	95.35	31	72.09
	No	2	4.65	12	27.91
30–39	Yes	34	94.44	24	66.67
	No	2	5.56	12	33.33
40–49	Yes	23	95.83	9	37.50
	No	1	4.17	15	62.50
50–59	Yes	9	81.82	3	27.27
	No	2	18.18	8	72.73
60–69	Yes	20	95.24	13	61.90
	No	1	4.76	8	38.10
70–79	Yes	8	72.73	3	27.27
	No	3	27.27	8	72.73

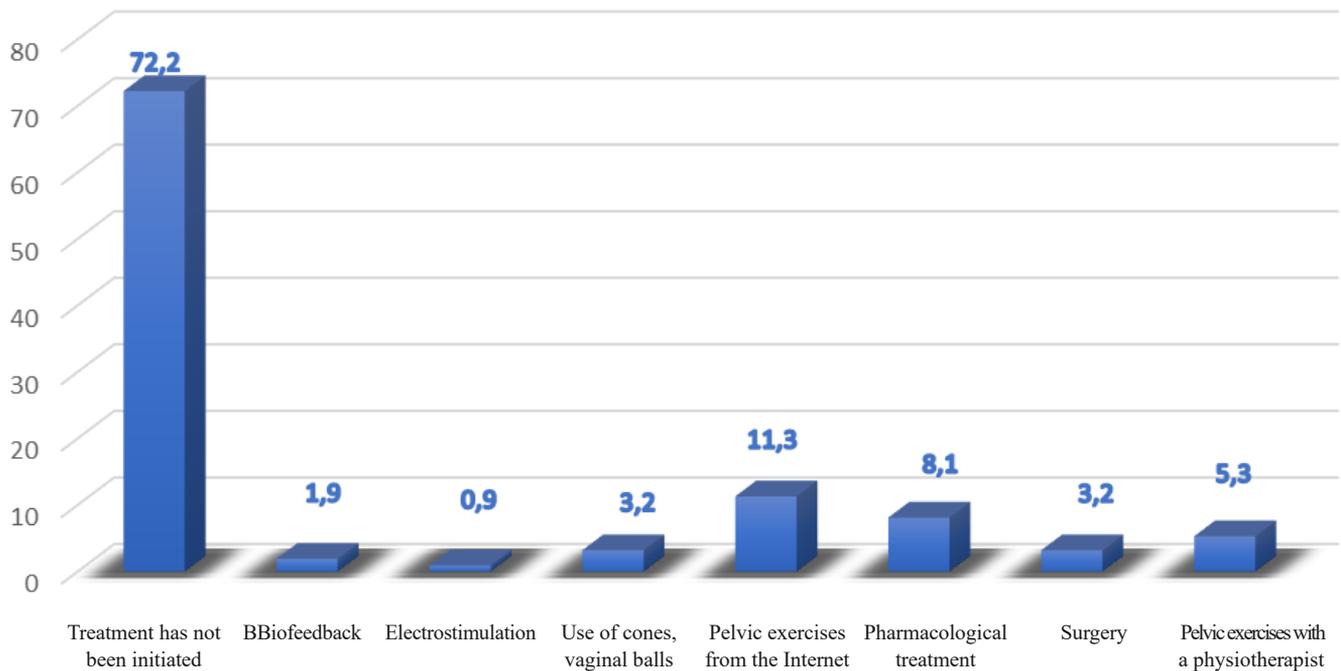
*n* - number of data, % - percentage of the respondents

Urinary incontinence was most common during coughing and sneezing (53.3% of the respondents). Women also reported incontinence while lifting, exercising, and running.



**Fig. 1. Incidence of urinary incontinence in various situations**

When asked “Have you reported the incidence of urinary incontinence to a physician?” as many as 75.9% of women who reported episodes of urinary incontinence answered negatively. In the corresponding question about reporting the problem to a physiotherapist, the percentage of negative answers was even higher and amounted to 91.6%.



**Fig. 2. Urinary incontinence treatment methods used**

Treatment of urinary incontinence was not initiated in 72.2% of women who noticed uncontrolled leakage of urine. Surgical treatment was performed in 3.2% of the women. Exercising the pelvic floor muscles in cooperation with a therapist was undertaken by 5.3% of women, while 11.3% performed exercises with instructions posted on the Internet. Exercises with the use of biofeedback were used by 1.9% of women.

To the question “Have you noticed any effects of your therapy?”, 15.9% of women declare that the problem was resolved. In 50% of respondents, the problem has decreased, while 34.1% did not notice any improvement.

### Discussion

It is commonly believed that age is one of the major factors of urinary incontinence [11, 12]. Our research investigated the influence of age on various problems related to urinary incontinence. According to them, incontinence affects respondents from all age groups, while a higher frequency of the problem has been confirmed in the older age group. Interestingly, younger respondents are significantly more prone to unfavourable toilet habits, such as urine retention.

Research confirms the importance of the influence of past childbirth, both by caesarean section and naturally, on the frequency of experiencing episodes of urinary incontinence. Research conducted by Gyhagen [13] among women after the first childbirth indicates the protective effect of caesarean section on urinary incontinence. According to the research by Bozkurt et al. [14] the first episode of urinary incontinence in 65% of women occurred during pregnancy or in the postpartum period. In the group of women after two or three childbirths, the problem of urinary incontinence affected 46% of women giving birth naturally and 32% of women after caesarean section. Our research also showed a significant effect of the number of childbirths on urinary incontinence.

The conducted research also shows a significant influence of an episiotomy as a factor generating urinary incontinence. In his research, Kılıc [15] showed that the number of childbirths significantly influences urinary incontinence, while urinary incontinence is not significantly correlated with the presence of an episiotomy.

In our research, an increased percentage of women experiencing urinary incontinence was noted in the groups with the highest BMI. However, the difference between the BMI classes for the various symptoms of urinary incontinence was on the border of statistical significance. According to the research by Subak et al. [16] increasing the BMI by five units is responsible for a 20–70% increase in the risk of urinary incontinence. However, according to the research by Osborn et al. [17] weight loss reduces the frequency of urinary incontinence symptoms.

Literature presents findings on the relationship between pelvic floor muscle dysfunction and ailments in the lumbar spine [18]. It may result from disorders within the muscle cylinder stabilizing the spine [19]. The conducted research confirms the above reports, because pain in the lumbar region in people declaring urinary incontinence was significantly greater during almost all everyday activities. Kumar et al. [20] demonstrated a significant effect of pelvic floor muscle training on the reduction of lumbar discomfort and on urinary incontinence.

In our research we observed a high percentage of women who have heard of pelvic floor muscles. It decreases in the oldest groups aged 60–80. It is consistent with literature data, where this percentage is about 75% of women [21]. However, in the research conducted by Derewiecki et al. [6] as many as 74% of women over 40 who experienced symptoms of urinary incontinence considered their knowledge insufficient.

Despite the fact that the respondents have heard about the pelvic floor muscles, the low level of knowledge translates into the prevention of urinary incontinence. The percentage of respondents who exercised the pelvic floor muscles at least once is slightly more than half. Based on the analysis of the results, there was no significant influence of pelvic floor muscle exercises on the incidence of urinary incontinence, which is contrary to the available literature [22]. This may suggest exercise is irregular or not performed correctly. In the research by Hill et al. [23] only 11% of respondents regularly exercise the pelvic floor muscles as prophylaxis.

According to our research, more than half of women have experienced episodes of urinary incontinence. Most often during coughing and sneezing, as well as lifting and exercising. This is consistent with research findings available in literature [19, 24].

The conducted research shows that a significant part of the group,

including women who experience episodes of urinary incontinence, did not report their problem to a physician. Derewiecki et al. [6] prove that the reason why women experiencing urinary incontinence do not start treatment is that they are embarrassed of disclosing the problem and the lack of knowledge about treatment options. The percentage of respondents who reported the problem to a physiotherapist was also very low. A significant proportion of women delay even 5 years before reporting the problem to a physician from the moment the problem appears [24].

Among the women who started urinary incontinence treatment, approx. 30% did not use the information available on the Internet. Over 60% of the respondents who undertook treatment experienced improvement. A very small percentage of women used supportive methods, such as EMG biofeedback and electrostimulation, which, as presented in literature, are effective in the treatment of urinary incontinence [25].

### Conclusions

1. The incidence of urinary incontinence is age dependent, however it is a common problem in all age groups.
2. The research clearly showed the relationship between urinary incontinence and the method of giving birth and perinatal factors.
3. The occurrence of greater pain in people experiencing episodes of urinary incontinence has been demonstrated.
4. The above research confirmed that the vast majority of women experiencing urinary incontinence do not make any treatment attempts. It is necessary to extend the research to define the reasons for opting out of healthcare.

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