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THE ROLE OF KEGEL EXERCISES IN WOMEN'S AWARENESS.

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ABSTRACT

Background: The first description of pelvic floor muscle exercises was presented in 1948 by Arnold H. Kegel. He determined that the use of contracting and relaxing exercises of pelvic floor muscles in women with incontinence problems restores deep feeling in the levator ani muscle, prevents lowering of the reproductive organs and stress urinary incontinence. Aim: Assessment and comparison of the knowledge of younger women without incontinence problems versus older women with incontinence problems about the familiarity, correctness and frequency of Kegel exercises, and an assessment of the effectiveness of these exercises. Methods: The research included a group of 400 women, 200 respondents were young women who do not suffer from incontinence and an equally large group of 200 women with incontinence problems. Data on the desirability of the exercises and their effects were obtained through a questionnaire as part of an original survey filled out voluntarily by the respondents. Statistica 10.0 package by StatSoft was used for the statistical analysis. Only non-parametric tests were used to analyse the variables. Analysis of variables was carried out using Pearson's chi-square test. Critical significance level of 0.95 was assumed for $p<0.05$. Results: It has been determined that the knowledge about the method of performing Kegel exercises among the respondents is high - 79.3%. Similarly, many respondents were convinced about the effectiveness of the exercises - 61.3% of women ($p=0.002$). Kegel muscle exercises were performed by 40.3% of the respondents, more often by young women (45%), who were not affected by this problem, in comparison to 35.5% ($p<0.001$) of women suffered from incontinence. Conclusion: It has been shown that it is necessary to motivate women to perform Kegel exercises and to supervise their correctness. Both these functions can be performed by midwives who have knowledge of Kegel exercises as well as frequent contacts with women in various life situations, which is why they can inform women about the essence and importance of these exercises.

Keywords: Kegel exercises, incontinence, pubococcygeal muscle

INTRODUCTION

The first description of pelvic floor muscle exercises was created and published in 1948 by Arnold H. Kegel. He observed that the use of pelvic floor contracting and relaxing exercises in women with stress urinary incontinence (SUI) restored deep feeling in the levator ani muscle [1]. The exercises proposed by Kegel and named after him strengthen the pubococcygeal muscles and teach their conscious control [2]. Over the years, it has been noticed that pelvic floor muscles made more flexible and strengthened due to exercise facilitate childbirth, prevent lowering of the reproductive organs and prevent stress urinary incontinence. In addition, they increase women's sexual satisfaction due to a better perception of sensory stimuli from the vagina during sexual intercourse [1].

Kegel recommended starting the exercises with 5 to 25 repetitions a day, as the pelvic floor muscles strengthened. The muscle contraction time should be about 8-10 seconds. Over the years, many different sets of exercises to strengthen the pelvic floor muscles have been proposed. However, so far, there is no optimal pattern for performing these exercises as regards the correct number of repetitions, strength and duration of muscle contraction [2].

The pelvic floor muscles together with the pelvic fascia play an important role in maintaining the statics of the abdominal cavity, pelvis and lower urinary tract [1]. These muscles consist of three layers. The outer or superficial layer includes the superficial transverse perineal muscle, the bulbospongiosus muscle and the ischiocavernosus muscle. The middle layer includes the deep transverse perineal muscle, the external sphincter muscle and the upper and lower fascia of the deep perineal pouch. The inner layer consists mainly of the levator ani muscle playing the most important role in urine retention and genital organs as well as the coccygeus muscles together with the upper and lower fascia of the deep perineal pouch [3].

Levator ani msucle and the external sphincter muscle consist in 70% of slow twitch fibres, mainly responsible for the maintenance of resting contraction and in 30% of fast twitch fibres, which are activated due to the increase in intra-abdominal pressure during exercise. Over the years, a disturbance in the proportion of these fibre occurs as a result of ageing processes, numerous natural births, obesity, competitive sports and hard physical work. The number of slow twitch fibres, resistant to fatigue, decreases, and fast twitch fibres tend to fatigue very easily. This leads to a reduction in the efficiency and strength of the pelvic floor muscles and results in various disorders, including urinary incontinence [1,3].

Urinary incontinence as per definition of the World Health Organization (WHO) and the International Continence Society (ICS) is an involuntary urine leak through the urethra, which in effect is a social and hygienic problem [4]. The incidence of urinary incontinence is difficult to determine due to the lack of unambiguous data hidden by patients. It is estimated that between 4 and 8 percent of the society suffers from this affliction. For several years, this percentage has been gradually increasing. In 2018, the problem of SUI around the world is estimated at around 420 million people - 300 million women and 120 million men (data adopted during the 6th International Consultation on Incontinence). In Poland, approximately 2.5 million patients suffer from SUI. Among women, SUI is more common than other chronic diseases, such as hypertension, depression or diabetes. According to the WHO, this condition can affect up to every third woman.

The European Association of Urology (EAU) indicates that 5-69% of women (the most frequently reported data range between 25-45%) and 1-39% of men have at least one urinary incontinence incident over a period of 12 months. On average every 3rd-4th woman around the world struggles with incontinence, about 30% before menopause and up to 60% after this period. The incidence of stress incontinence increases with age and is characteristic of the post-menopausal period. However, as the researchers point out, next to age, equally important factors that increase the risk of SUI incidents are the body mass index (BMI), as well as the number of pregnancies and type of delivery [4,5].

SUI treatment consists of conservative or surgical treatment [1]. The choice of the appropriate method of treatment depends on the type of urinary incontinence and the degree of advance of the disorder, but also on the fight against constipation as well as excessive BMI [1,5,6].

In the three-stage SUI scale, in the 1st* and sometimes in the 2nd* stage, it is recommended to start treatment with conservative methods due to lower risk of complications, lower costs and high effectiveness [7,8]. Conservative treatment includes kinesitherapy, Kegel exercises and physiotherapeutic procedures [1]. An important advantage of physical therapy using Kegel exercises is the fact that their result and effectiveness does not depend on the woman's age [9]. Polish and international gynaecological associations and the International Continence Society recommend kinesitherapy of the pelvic floor muscles not only in treatment but also in the prevention of urinary incontinence [10]. Prevention should be started already in young women, encouraging them to systematically perform Kegel exercises [9].

*SUI: 1st stage - urine loss only due to heavy exercise (e.g. lifting, coughing), 2nd stage - urinary incontinence under the influence of light physical activities, (standing up, walking, 3rd stage - uncontrolled urine loss also in the supine position.

Exercises of pelvic floor muscles should be recommended from the second half of pregnancy, and after childbirth from the second day of confinement, especially to women who have had SUI symptoms before or during their pregnancy. The most effective form of exercise are Kegel exercises performed lying down with legs raised, as the load on the muscles from the intestines is reduced and they receive a blood supply [10]. The most common mistake made by the practitioners is tensing the buttocks, adductor or abdomen muscles with an attempt to tighten the pelvic floor muscles [9-11]. Women with SUI should, in addition to exercises, keep a micturition diary which is an excellent method of self-control as well as a record allowing to monitor the progress of treatment [13]. In the patient's preparation for kinesitherapy, close cooperation between the patient and the medical employees participating in the rehabilitation process - midwives, physicians and physiotherapists - is very important. Exercises are selected individually for each patient, taking into account her age, accompanying conditions and general condition. Every woman is taught the correct abdominal breathing during exercises and the medical staff uses appropriate methods to motivate the patient to systematically perform exercises and develop systems of self-control and self-assessment [10].

Preparing the patient to perform Kegel exercises should start with the woman getting acquainted with the explanation of the topography, structure and function of pelvic floor muscles, the so-called deep perineal pouch. Transfer of this information should be concise and adapted to the perceptual abilities of women participating in the exercises. Visualisation techniques using films or computer animations may be used in order to teach how to activate specific muscle structures and to properly perform Kegel exercises. Each exercise should be precisely explained at each stage and performed by the instructor. The next stage is learning to consciously contract and relax the pelvic floor muscles. These exercises should be supported by exercises of other muscle groups: abdomen, thighs, buttocks, which allows for better identification of the pelvic floor muscles. It is important that the patient does not hold her breath during exercise, which may increase the effect of the abdominal prelum, possibly resulting in an increase of SUI symptoms [3,10].

It is often the most difficult to identify the levator ani muscles. For this purpose, it may be helpful to use a perinometer, which is used to measure the pressure with a probe placed in the vagina during muscle contractions, allowing the woman to observe the deflection of the indicator or mercury column. Another method of identifying the levator ani muscles is the insertion of two fingers into the vagina, and then tightening the vaginal walls on them [11-13].

Pelvic floor muscle training can also be performed using various techniques. One of them is the use of vaginal cones or Ben Va balls, which are kept in the vagina by shrinking the pelvic muscles to strengthen their strength [7,14]. These exercises should be performed twice a day for about 15-20 minutes. Weights are used in the beginning of the exercises, which can be easily maintained in the vagina. With the advancement of exercises, their weight is increased [15].

Exercises of the pelvic floor muscles are also used in yoga or Pilates. Positive effects of using Pilates have been observed in people suffering from low back pain, in women with breast cancer, and yoga is good for back pain, excessive weight, stress and problems with metabolism [6, 9, 11]. A characteristic feature of these methods is to achieve a body-mind balance by focusing one's mind and having proper control and precision of movement, among other things [10].

Purpose of the study

The purpose of the study was to get to examine the state of knowledge of women of all ages about Kegel exercises. In addition, an assessment was made whether the respondents themselves perform these exercises, how often and how they relate to the present SUI-related issues or their absence.

Material and method

The study was conducted from September 2016 to February 2017 among women staying in hospital wards and visiting outpatient clinics, undergoing treatment for urinary incontinence, among other things, in two Warsaw hospitals. The study involved 400 women. The first group A consisted of 200 younger women, aged 21 to 40 years, with an average age of 31.96, who did not report problems associated with incontinence. The second group consisted of 200 older women, average age of 51.27, aged 24 to 89 years, who had problems with incontinence. The study used the method of a diagnostic survey using an original questionnaire voluntarily filled out by respondents after informing them about the purpose of the study.

The statistical analysis of the collected material was carried out in the Statistica 10.0 package from StatSoft. Microsoft Excel was used to create the charts. Only non-parametric tests were used to analyse the variables. The choice of this type of tests was conditioned by the failure to meet the basic assumptions of parametric tests, i.e. the compatibility of the distributions of the variables tested with the normal distribution, which were verified by the Shapiro-Wilk W test. The analysis of variables having the character of qualitative data was carried out using Pearson's chi-square test. Critical significance level of 0.95 was assumed, which means that statistical significance of distribution disparities was concluded when the significance level p, determined on the basis of the calculated test value, met the inequality $p<0.05$.

Results

Of the 400 women surveyed, 317 (79.3%) of the respondents indicated the correct definition of performing

Kegel exercises. The results were analysed in two groups: group A without incontinence and group B of women reporting this problem. They showed that younger subjects from group A knew the correct definition statistically more often (p=0.016) in relation to older women from group B. Different definitions recognised as Kegel exercises are presented in Table 1.

Table 1. **Knowledge of the definition of Kegel exercises among 400 women.**

Definition of Kegel exercises	Group A young women without incontinence		Group B older women with incontinence		Total	
	n	%	n	%	n	%
Alternating contraction and relaxing of the muscles around the vagina and crotch	170	85.0%	147	73.5%	**317**	**79.3%**
Alternating contraction and relaxing of the abdominal muscles	0	0.0%	0	0.0%	0	0.0%
Alternating contraction and relaxing of the spine muscles	0	0.0%	0	0.0%	0	0.0%
Alternating contraction and relaxing of the buttocks	1	0.5%	2	1.0%	3	0.8%
Strengthening Kegel muscles	15	7.5%	19	9.5%	34	8.5%
The habit of correct method of urinating	0	0.0%	0	0.0%	0	0.0%
Emptying the whole bladder at each urination	0	0.0%	1	0.5%	1	0.3%
Bladder and urethra training	2	1.0%	0	0.0%	2	0.5%
I don't know	12	6.0%	31	15.5%	43	10.8%
Total	200	100.0%	200	100.0%	400	100.0%
Significance (p)	$\chi^2(5)=13.86$ **p=0.016**					

The majority of respondents - 245 (61.3%) - knew that Kegel exercises have a positive effect in stopping incontinence ($\chi^2(2)=1.73$ p=0.002) . Also in this matter, younger women who have not experienced this problem yet had statistically significantly more knowledge (Table 2).

The examined activity of women in the area of performing Kegel exercises showed that 40.3% (161) of the subjects perform the exercises. Among this group, women from group A performed the exercises slightly more often - in 45% (90) - as opposed to 35.5% (71) from the group with incontinence. The difference was statistically insignificant ($\chi^2(1)=3.75$ p=0.052) (Table 3).

The reasons that led the subjects to use Kegel exercises were different. In group B, women performed these exercises to stop incontinence and in group A more often they exercised prophylactically. However, 29 women from group A conducted exercises following recommendations after hospital treatment for other gynaecological reasons than SUI and as a result of knowledge acquired in

antenatal classes and 8 subjects exercised under fear of suffering from incontinence in the future (p=0.009) full data is presented in Table 4.

The frequency of pelvic floor muscle exercises varied, 25.6% younger women exercised and 31% of those suffering from incontinence performed them every day. Crotch exercises were performed the most once a week by 23.9% with incontinence and 16.7% without incontinence (Table 5).

When examining the effects of performing Kegel exercises, the most frequently obtained effects were assessed as good (40.4%), whereas 7.5% (12) of exercising women declared a lack of effects (Table 6).

Table 2. **Knowledge about the effectiveness of Kegel exercises in the prevention of urinary incontinence.**

Kegel exercises are an effective method of preventing urinary incontinence	Group A young women without incontinence		Group B older women with incontinence		Total	
	n	%	N	%	n	%
Yes	135	67.5%	110	55.0%	245	61.3%
No	7	3.5%	23	11.5%	30	7.5%
Lack of knowledge	58	29.0%	67	33.5%	125	31.3%
Total	200	100.0%	200	100.0%	400	100.0%
Significance (p)	$\chi^2(2)=11.73$ **p=0.002**					

Table 3. **Using Kegel exercises in the assessment of 400 examined women.**

Using Kegel exercises	Group A young women without incontinence		Group B older women with incontinence		Total	
	n	%	N	%	n	%
No	110	55.0%	129	64.5%	239	59.8%
Yes	90	45.0%	71	35.5%	161	40.3%
Total	200	100.0%	200	100.0%	400	100.0%
Significance (p)	$\chi^2(1)=3.75$ p=0.052					

Table 4. **Reasons for which 161 subjects performed Kegel exercises.**

Reasons for Kegel exercises were performed	Group A young women without incontinence		Group B older women with incontinence		Total		Significance (p)
	n	%	N	%	n	%	
Suffering from incontinence	0	0.0%	71	100%	71	44.1%	$\chi^2(1)=161.00$ **p<0.001**
For prophylactic purposes	59	65.6%	0	0.0%	59	36.7%	$\chi^2(1)=73.46$ **p<0.001**
Because a friend recommended doing these exercises	3	3.3%	1	1.4%	4	2.5%	$\chi^2(1)=0.60$ p=0.435
Because of the recommendations from the hospital, antenatal classes	29	32.2%	2	2.8%	31	19.3%	$\chi^2(1)=22.07$ **p<0.001**
Fear of suffering from incontinence in the future	8	8.9%	0	0.0%	8	5.0%	$\chi^2(1)=6.64$ **p=0.009**
Sometimes suffering from incontinence and wanting to prevent it	4	4.4%	0	0.0%	4	2.5%	$\chi^2(1)=3.23$ p=0.072
Familiarity with this problem from her family home and wanting to prevent it	2	2.2%	0	0.0%	2	1.2%	$\chi^2(1)=1.59$ p=0.206

Table 5. **Frequency of performing Kegel exercises among 161 women who perform them.**

Frequency of using Kegel exercises	Group A young women without incontinence		Group B older women with incontinence		Total	
	n	%	N	%	n	%
Once a week	15	16.7%	17	23.9%	32	19.9%
Twice a week	15	16.7%	6	8.5%	21	13.0%
Three times a week	24	26.7%	13	18.3%	37	23.0%
Four times a week	8	8.9%	8	11.3%	16	9.9%
Five times a week	5	5.6%	4	5.6%	9	5.6%
Six times a week	0	0.0%	1	1.4%	1	0.6%
Daily	23	25.6%	22	31.0%	45	28.0%
Total	90	100.0%	71	100.0%	161	100.0%
Significance (p)	$\chi^2(6)=6.23$ p=0.397					

Table 6. **Subjective assessment of the effect of using Kegel exercises among women who exercise.**

Subjective assessment of the effect of using Kegel exercises	Group A young women without incontinence		Group B older women with incontinence		Total	
	n	%	N	%	n	%
Very good	13	14.4%	4	5.6%	17	10.6%
Good	49	54.4%	16	22.5%	65	40.4%
Average	19	21.1%	25	35.2%	44	27.3%
Small	4	4.4%	19	26.8%	23	14.3%
No beneficial effects	5	5.6%	7	9.9%	12	7.5%
Total	90	100.0%	71	100.0%	161	100.0%
Significance (p)	$\chi^2(4)=30.63$ **p<0.001**					

Discussion

Exercises of the pelvic floor muscles are considered to be an effective, cheap, painless and non-invasive method used both in prevention and in the treatment of urinary incontinence in women. The positive impact of exercises on the functioning of the pelvic floor muscles was confirmed by researchers from all over the world [16-18]. According to descriptions in literature, Kegel exercises rely on conscious contraction and relaxing of pelvic floor muscles [15]. In order to achieve a good effect from the exercises, a good knowledge of the issues related to their performance is important, achieved thanks to the knowledge of the correct position of the muscles and their proper functions.

However, the most important thing in the process of restoring normal urination without incontinence is to systematically perform Kegel exercises. In the process of providing health care to women, midwives have frequent contact with them and can inform them how to prevent the problem at a moment when problems with incontinence have not yet appeared. They can also indicate the necessity of performing systematic and non-tiring Kegel exercises that do not require special conditions.

While assessing the knowledge of the surveyed women of the definitions of Kegel exercises, the majority of respondents from both groups (79.3%) showed correct knowledge in this respect. Comparing knowledge among the two groups, younger women who do not suffer from incontinence showed statistically better knowledge. Completely different results in their research were presented by Wojno et al. These authors studied the knowledge of SUI issues among 280 women of various age already treated for this reason.

In their assessment, 70% of women surveyed did not know what Kegel exercises are [19]. In a study conducted by Cichońska et al. among 110 women, it was also shown that the percentage of women who did not know the principles of Kegel exercises exceeded half (53%) of respondents. In the author's opinion, only 23% of the respondents knew the definitions and declared knowledge of the principles and purpose of these muscles [20]. In own study, the majority of respondents from both groups (61.3%) perceive Kegel exercises as an effective method of preventing urinary incontinence in women.

In the statistical assessment, significantly more often this knowledge is possessed by younger women who do not suffer from incontinence. Similarly, Derewiecki et al., who studied women aged above 40 with and without SUI symptoms at the Zamość Rehabilitation Clinic, found a lot of knowledge among the subjects. Most of the surveyed women over 40 years of age in both groups with SUI (52.63%) and without the symptoms of SUI (60%) considered exercises strengthening the pelvic floor muscles as an effective therapeutic and preventive method against urinary incontinence [21].

Sut et al. conducted a study among 60 pregnant women, aim of which was to assess the impact of Kegel exercises on pelvic floor muscles during pregnancy and the postpartum period [16]. These researchers showed that the exercises performed during pregnancy by the examined women significantly influenced the improvement of the pelvic floor muscles in terms of strength and resistance, which significantly prevented the occurrence of SUI symptoms. In addition, better results of these exercises were demonstrated in the group of women performing exercises under the supervision of an instructor than in the group of women who did not have such supervision [16]. According to many authors, better effects of pelvic floor muscle exercises are obtained as a result of training supervised by a physiotherapist compared to exercises without specialist supervision or training conducted only after verbal instructions without supervision [2,10,13].

According to literature descriptions, pelvic floor muscle exercises are considered the most effective form of SUI prevention. Proper and systematic performance of Kegel exercises reduces the risk of SUI occurring during pregnancy, after childbirth and later in a woman's life [8]. According to other sources, the implementation of pelvic floor muscle exercises before childbirth reduces the likelihood of problems with incontinence by as much as 9 times [9].

When assessing Kegel exercise by the respondents, over half of the younger women surveyed (55%) not suffering from incontinence said that they do not perform this kind of exercise. Similarly in the group of older women who suffer from incontinence, most of them (64.5%) does not use these exercises. In the analysed group of 400 women, exercises are performed only by 45% of younger women who do not suffer from incontinence, whereas 35.5% of older women who do suffer from SUI exercise their pelvic floor muscles.

In the studies conducted by Derewiecki et al. assessing the performance of Kegel exercises, the majority of respondents: 65% of women over 40 years of age not affected by problems with SUI performed Kegel exercises much less, and 16% of women with SUI exercised this muscle group [21]. In the studies conducted by Wojna et al., Kegel exercises were performed by 18.57% and 80% of women never used them [19].

In our own research, assessing the reason why women performed Kegel exercises, the younger ones who do not suffer from incontinence performed them for prophylactic purposes (65.6%), because midwives and physiotherapists recommended them during their stay in a hospital or in childbirth classes (32.2%). Also, nearly 9% of respondents performed the exercises for fear of problems with SUI in the future. Older women suffering from incontinence exercised pelvic floor muscles in 71% when the problem already occurred.

According to literature descriptions, pelvic floor muscle exercises are recommended both in the prevention of SUI and in the first-line treatment, especially in women with

stress and urgent urinary incontinence and an overactive bladder in 1st stage and sometimes in 2nd stage of the disorder. They should be performed for a minimum of 3 months [10,22]. Reduction of urinary incontinence as a result of this method of pelvic floor muscle exercise is achieved in 54-95% of exercising women [4,5,18,22].

Kao et al. conducted a study among 12 Taiwanese women, whose aim was to assess the impact of pelvic floor muscle exercises on reducing the symptoms of SUI and the quality of sexual life. These authors showed a significant reduction in problems associated with incontinence after 8 weeks of Kegel muscle exercises performed every day. They also stated that these exercises significantly improved the level of pleasure and excitement during sexual intercourse [18].

In our own studies, the frequency of Kegel exercises was low. Only 28% of the surveyed women from among 400 subjects exercised pelvic floor muscles daily, and 19.9% of the respondents exercised the least often - only once a week. According to literature descriptions, it is recommended to perform pelvic floor muscle exercises 3-4 times a week in three series of 8-12 repetitions, whereas contraction and relaxing of the muscles should last the same amount of time - about 6-8 seconds [5.15].

Methods such as yoga or Pilates seem to be a good alternative to Kegel exercises. Huang et al. studied the effect of yoga on the problem of incontinence among 92 Brazilian women suffering from this disorder. Researchers showed a reduction in symptoms in 66% of respondents after using this method. It has been shown that yoga can be an effective alternative for women who do not have access to a physician dealing with SUI and a physiotherapist familiar with urogynecological problems [23].

Torelli et al. conducted a study of 57 randomly selected healthy pregnant women who did not lead a physically active lifestyle and in whom the effects of contracting pelvic floor muscles using the Pilates method was studied. They showed an increase in endurance and strength of the pelvic floor muscles and restoration of normal muscle function after using this method [24].

The study, together with national and foreign reports on this subject, showed that the majority of women surveyed, regardless of incontinence problems, have knowledge about Kegel exercises. They also consider these exercises as an effective method of preventing incontinence. However, young women who have not experienced problems with incontinence have more knowledge about their effectiveness. Alarming is the fact that the pelvic floor muscle exercises are not performed by the majority of respondents, regardless of the fact of suffering from incontinence.

This study, conducted on a significant group of women, showed a great need for women's education in the field of physiotherapeutic methods used in prophylaxis and treatment of SUI. Moreover, the need has been indicated to motivate women to perform Kegel exercises by organising SUI prevention and educational programmes, in which midwives should participate alongside physiotherapists as they have frequent contact with women at every stage of their lives and can motivate women to perform Kegel exercises.

Urinary incontinence decreases the quality of women's life, leads to mental suffering, sexual dysfunction, and withdrawal from professional activity, hobbies and social contacts. This is because this intimate problem affects self-image, lowers self-esteem, and causes feelings of shame and stigma, and anxiety in public situations. It can lead to feelings of helplessness and depressive symptoms. Feelings of shame and the mechanism of avoidance/withdrawal used causes that women do not seek help when the problem arises, only after a period of ineffective attempts to conquer it alone [25].

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