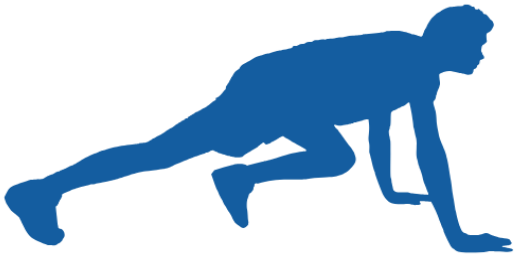

Physical activity and COVIDMOVE

UNIVERZITA MATEJA BELA V BANSKEJ BYSTRICI

BELIANUM

2024

Co-funded by
the European Union

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Number of project: 2021-1-SK01-KA220-HED-000023008

Title of project: The movement activity enhancement after the COVID19 pandemics

Acronym of project: COVIDMOVE

Publisher: Belianum. Matej Bel University Press

Banská Bystrica, 2024

Reviewers:

assoc. prof. Dr. Janka Kanásová, PhD.

Dr. Patrícia Shtin Baňárová, PhD.

ISBN 978-80-557-2204-7

EAN 9788055722047

https://doi.org/10.24040/2024.9788055722047

CONTENT

Chapter 2

Physical activity in incontinence problem

Many women worldwide struggle with urinary incontinence (UI), a multifaceted issue influenced by various factors. Urinary incontinence can be defined as a loss of bladder control or unintentional, involuntary leakage of urine (1). This condition is more prevalent among women than men and becomes increasingly common with age. It imposes a range of psychological, physical, and social burdens that negatively impact the quality of life (2). Epidemiological studies have shown that the prevalence of UI varies from approximately 5% to 70%. Most studies report that different types of UI occur in 25% to 45% of the population. Among women aged 70 years and older, over 40% of the female population is affected by this condition (3). Urinary incontinence poses a significant economic burden, with annual costs estimated between 19.5 billion and over 76 billion dollars. The demand for treatments related to UI is projected to increase by approximately 35% between 2010 and 2030 (4).

Managing urinary incontinence requires a personalized approach to diagnosis and treatment to improve patients' quality of life and reduce the discomfort associated with this condition. The Women's Preventive Services Initiative recommends annual screening for urinary incontinence in women. These screenings primarily involve screening questionnaires, a three-day bladder diary, a cough stress test, and post-void residual urine measurement. Subsequent treatment plans are based on the data obtained. Preventive measures, including physical activity and lifestyle modifications, are also being implemented. Overweight patients are informed about weight loss strategies, as obesity can lead to a fourfold increase in the risk of stress urinary incontinence (5).

Physical activity is a key and long-term form of therapy for UI because the functions of the lower urinary tract—storage and periodic voiding of urine—are regulated by a complex neuromuscular control system in the brain, spinal cord, and peripheral autonomic ganglia (6). Proper bladder emptying requires a coordinated, sustained contraction of the bladder with appropriate strength and duration. It is necessary to reduce the resistance of the bladder neck and urethra and ensure no obstruction in the urinary flow (7).

There are several treatment options available for UI. Weight reduction and improved posture through physical activity and diet can decrease pressure on the bladder and alleviate UI symptoms. Regular voiding can help avoid bladder overdistension. Reducing fluid intake, especially those containing caffeine and alcohol, can decrease the frequency of incontinence episodes. Pharmacotherapy may also help manage UI symptoms (8).

QUALITY OF LIFE IN WOMEN WITH URINARY INCONTINENCE

Studies assessing quality of life using the Health Utility Index (HUI) indicate that women report urinary incontinence (UI) as having a more negative impact than diabetes, hypertension, epilepsy, or connective tissue diseases (9). Quality of life deteriorates across all domains: psychological, social, functional, and sexual. Women often highlight a decline in self-confidence, a diminished sense of attractiveness, and reduced femininity (10). Body image perception may be a key determinant of quality of life in women and can serve as an important outcome measure in clinical trials (11). Urinary incontinence is associated with increased prevalence of depression and anxiety. A study conducted in Norway found a link between UI and depression in over 16,000 women over the age of 20 (12). Further studies indicate that 50-68% of women with UI suffer from sexual dysfunction, reporting issues such as decreased libido, anorgasmia, and dyspareunia. Symptoms of urinary tract infections also caused emotional distress and low self-esteem during sexual intercourse. As the condition progresses, women may gradually withdraw from professional, social, and personal activities (12). Due to the intimate nature of the disorder, many women consider genitourinary dysfunctions a taboo topic. Research shows that patients typically seek medical or physiotherapeutic help approximately five years after the onset of symptoms (13,14).

Despite the growing body of knowledge on urinary incontinence, women often feel underinformed and wish to know more about managing this condition. This is confirmed by a 2017 study involving 1,092 women aged 19-30, which found that 33% of respondents believe education on genitourinary disorders should be introduced at the school level. The authors emphasize the necessity of implementing preventive practices and educational programs targeting adolescent and young women (15). At the Józef Dietl Hospital in Krynica-Zdrój, a study was conducted on the impact of UI on depressive disorders in 100 women with incontinence admitted to the Gynecology Department. The research tools included a self-constructed questionnaire and the standardized Beck Depression Inventory. The results indicated that the most common type of UI was stress urinary incontinence. Depressive disorders were observed in 64% of respondents, with most women experiencing mild or moderate depression (63%). The predominant emotions among women with UI were shame (39%), anger (20%), and sadness (15%). The findings suggest that the prevalence of depressive disorders in women with UI increases with age and the duration of the condition. Psychological support was desired by 41% of the participants (16).

In their study, Perry et al. assessed anxiety and depression levels in women with urge urinary incontinence using the Hospital Anxiety and Depression Scale (HAD). They found that 56.6% of the participants experienced anxiety, while 37.6% suffered from depression (17).

Urinary incontinence significantly impacts the economic situation of patients, primarily due to the need for specialist consultations, procedures, therapies, and the purchase of specialized underwear, medications, or protective pads. Annually, over 12 billion dollars are spent on treatment. Patients bear 70% of the cost of conservative treatment out of pocket, which represents a substantial individual financial burden (18). In Poland, data from the National Health Fund (NFZ) estimated that in 2015, the costs associated with treating patients with genitourinary disorders amounted to 416 million PLN. Alarmingly, these costs are increasing by an average of 10% per year. When considering all expenditures related to treatment, the costs of managing urinary incontinence are comparable to those associated with breast cancer treatment (19).

The health status of women also negatively affects their professional lives. Due to the discomfort caused by urinary incontinence, women are more frequently absent from work, have lower productivity, and work at a slower pace (20). Given the aforementioned epidemiological data and risk factors, it seems prudent to implement physical activity for all patients as the most effective and economical intervention to improve the quality of life for women suffering from urinary incontinence.

TYPES AND FORMS OF INCONTINENCE

The term "urinary incontinence" refers to any involuntary leakage of urine, as defined by the World Health Organization (WHO) and the International Continence Society (ICS). Urinary incontinence (UI), also known as incontinence, has been recognized by the WHO as a lifestyle-related disease (21). The ICS has identified four types of urinary incontinence, based on physiological causes. The most common type is stress urinary incontinence (SUI), which results from excessive mobility of the bladder neck and failure of the sphincter mechanism. The next type is overactive bladder (OAB), caused by detrusor muscle overactivity and low bladder wall compliance, which can also include neurogenic bladder. The third type is overflow incontinence, primarily caused by detrusor underactivity and obstruction to urine outflow. The final type is extra-sphincteric incontinence, resulting from fistulas and developmental abnormalities (22).

Stress urinary incontinence (SUI) is the most frequently encountered form in women. The prevalence of this type of incontinence increases significantly with age. Studies indicate that approximately 24% of women aged 18-48, 37% of women aged 35-54, and 39% of women over the age of 55 are affected by SUI (23). In addition to age, risk factors for SUI include pelvic floor muscle weakness, often caused by pregnancy, vaginal delivery, obesity, and certain gynecological and obstetric procedures. Another factor influencing SUI is menopause, and the associated estrogen deficiencies negatively affect the epithelial condition of the bladder and urethra. The most common procedure leading to SUI is radical hysterectomy (24). SUI is characterized by uncontrolled, involuntary urine leakage occurring during coughing, sneezing, or physical exertion. A key feature of SUI is the absence of the sensation of urgency during urine leakage.

SUI can be classified into three degrees of severity according to Stamey (25). Grade I involves urine leakage only during sudden and significant increases in intra-abdominal pressure. Grade II is characterized by involuntary urine loss during moderate increases in intra-abdominal pressure, such as walking up stairs, jumping, or light physical work. Patients with Grade III SUI may experience urine leakage while lying down, standing, or walking. The ICS Standardization Committee recommends an alternative classification (according to Blaivas), considering the position of the bladder neck (26).

- Type 0: The bladder neck is closed and located above the pubic symphysis. It is incompetent during coughing, but there is no urine leakage.
- Type I: The bladder neck is lowered by 2 cm relative to the pubic symphysis. It is incompetent during coughing, and uncontrolled urine leakage occurs during exertion.
- Type II A: The bladder neck is lowered more than 2 cm relative to the pubic symphysis and is incompetent during coughing. Incontinence is observed in the bladder diverticulum with accompanying anterior vaginal wall prolapse.
- Type II B: At rest, the bladder neck is below the pubic symphysis. During coughing, it descends even further, accompanied by urine leakage.
- Type III: This type involves external sphincter incompetence.

Understanding these various forms and their underlying mechanisms is crucial for accurate diagnosis and tailored treatment approaches, aiming to improve the quality of life for those affected by urinary incontinence.

According to the International Continence Society (ICS) definition, overactive bladder (OAB) is characterized by involuntary detrusor muscle contractions that can be either spontaneous or provoked. The exact cause of OAB is not well understood, but it is believed to have a multifactorial origin. The main functions of the lower urinary tract are storage and voiding, and these functions are controlled by a balance between neurotransmitter systems via both autonomic and somatic pathways (27). Studies indicate that over 10% of the general population experience symptoms of OAB. Diagnosis begins with a targeted history and examination of the genitourinary system to assess the patient's burden of disease. First-line treatment includes conservative measures such as physical activity, fluid optimization, and pelvic floor muscle exercises. The next stage of treatment involves pharmacotherapy and minimally invasive procedures, such as intravesical injections of botulinum toxin A (28).

Overflow incontinence is characterized by dribbling urine loss due to bladder overdistension and significant distension of the bladder walls. This condition can be caused by impaired central nervous system function, such as medication effects or certain diseases like diabetic polyneuropathy or a herniated nucleus pulposus with nerve pathway damage. Urethral damage may also occur during surgical procedures (29).

Extra-sphincteric incontinence involves involuntary urine leakage through a fistula that bypasses a functionally competent urethral mechanism. This type of incontinence is marked by continuous urine leakage both day and night. Causes can be congenital, such as ectopic ureteral openings, or acquired, following surgery, radiotherapy complications, or childbirth (30).

In addition to above classification, there are other types of urinary incontinence (UI). Mixed urinary incontinence (MUI) is a combination of two types: stress and urge incontinence. The primary cause of MUI is poorly understood, and without a clear understanding of the underlying pathophysiological and anatomical changes, treatment is often incorrect (31). There are also unclassified types of UI (where symptoms do not fit into any specific category) and other types of UI that occur in various situations, such as during laughter or sexual intercourse.

Among women, stress urinary incontinence is the most common type. Depending on age and the population studied, its prevalence is estimated to be between 30% and 75%, urge urinary incontinence between 7% and 30%, and mixed incontinence between 14% and 61% (32).

DIAGNOSTICS AND ASSESSMENT METHODS

Urinary incontinence (UI), regardless of its type, is often not an isolated condition but rather a symptom of various abnormalities occurring within the human body (33). Initial diagnostics typically begin in the primary care setting, usually with a family physician. The primary examination aims to identify potential causes of UI. The next step involves determining the type of incontinence and appropriate treatment methods through the use of a questionnaire. This process includes reviewing a completed bladder diary, conducting a physical examination, and performing a cough stress test. Additional assessment components may include laboratory tests and measurement of post-void residual urine volume. If there are signs of hematuria, obstructive symptoms, or recurrent urinary tract infections, referral to a urologist or urogynecologist should be considered (34).

The patient history is often the most crucial factor in identifying the type and severity of urinary incontinence. It encompasses basic information such as age, body mass index (BMI), comorbidities (e.g., thyroid disorders, diabetes, asthma, neurological diseases), previous surgeries, occupational activities, and associated burdens, as well as pregnancies and childbirths. The detailed and varied nature of the questions allows for a precise assessment of symptoms and their severity (35).

During the diagnostic process, an evaluation of posture, breathing mechanics, and gait and mobility tests is also performed. Posture, joint mobility, and gait pattern significantly impact the proper functioning of the pelvic floor. A specific examination performed by a urogynecological physiotherapist is the palpation of the pelvic floor muscles—both static and dynamic per vaginam—using the Oxford scale in conjunction with the PERFECT scale test. This assessment evaluates proper contraction and relaxation of the pelvic floor, muscle strength through closure force and inward movement, maximal voluntary contraction (MVC), endurance, contraction symmetry, coordination with other muscles, and any compensatory mechanisms (36).

Ultrasound examinations are frequently used due to their ability to assess therapeutic effects for stress urinary incontinence (SUI). The most common and primary ultrasound method is two-dimensional (2D) ultrasound, which includes both transperineal (TP) and transabdominal (TA) approaches. Transperineal ultrasound allows visualization of the bladder neck, urethra, and vagina, as well as measurement of bladder neck mobility during contraction, conscious pelvic floor muscle activation, and the Valsalva maneuver (37).

The success of UI therapy largely depends on accurate diagnosis and appropriately tailored treatment.

POSTURAL CONTROL AND THE ISSUE OF URINARY INCONTINENCE

Urinary incontinence (UI) is a multifaceted problem influenced by various factors, including body posture, joint mobility, and gait pattern, all of which significantly impact the proper functioning of the pelvic floor. Women with UI often exhibit a reduced base of support and a forward shift of the center of gravity. This posture reduces the activity of postural muscles, including the pelvic floor muscles (38). Postural defects that predispose individuals to overloads in the pelvic floor area include forward head and shoulder posture (protraction) (39), increased thoracic kyphosis, and flattened lumbar lordosis (40). Limitations in the mobility of the hip joints and intervertebral lumbar segments directly affect pelvic mobility, leading to muscle atrophy, myofascial contractures, and altered muscle tone. Consequently, the reactive and reflexive efficiency of the pelvic floor muscles is compromised (41).

Restrictions in foot joint mobility can impact gait patterns. The absence of proper foot rolling leads to inefficient gait, faster fatigue, compensatory mechanisms in the trunk, and abnormal muscle tension in the lower limbs (42). Moreover, there is a strong correlation between diaphragm function and pelvic floor muscle (PFM) activity. Research indicates that PFM activation facilitates more efficient breathing, highlighting the interrelationship between diaphragmatic function and pelvic floor muscles (43). Factors affecting diaphragm function and leading to respiratory dysfunction primarily include postural defects, such as scoliosis, excessive thoracic kyphosis, and excessive anterior or posterior pelvic tilt (44). Another critical factor is limited spinal joint mobility due to increased tension in musculoskeletal structures, such as the iliopsoas muscle, hamstring muscle group, erector spinae, or thoracolumbar fascia (45).

Studies on postural responses in women with and without UI suggest that women suffering from UI performed step initiation tasks more slowly than women without UI (46). Urinary continence in women is maintained through the integrated action of pelvic floor muscles, supportive ligaments, fascial structures, and nerves. In women with stress urinary incontinence (SUI), the postural activity of the pelvic floor muscles is delayed, and their ability to maintain balance is reduced. Learning the correct timing of pelvic floor muscle contractions during activities such as coughing or sneezing can help women eliminate SUI. Proper timing is a crucial aspect of motor coordination and may be linked to proprioception. This relationship was demonstrated in a review study conducted by Kharaji et al. between 1998 and 2017 (47). The

authors observed changes in motor control, balance, coordination, and the role of proprioception in women with SUI.

Physical activity, as a form of prevention and therapy, should be tailored to the patient's posture and gait pattern to ensure that the effects of exercise are more beneficial and long-lasting.

SCIENTIFIC EVIDENCE SUPPORTING THE POSITIVE IMPACT OF PHYSICAL ACTIVITY IN WOMEN WITH URINARY INCONTINENCE

According to the World Health Organization (WHO), physical activity is a crucial and modifiable health factor across all age groups. Strong evidence suggests that, for adults aged 18 to 64, physical activity improves both cardiorespiratory and muscular fitness (48). Moreover, other studies have indicated that mild to moderate physical activity is associated with a reduced incidence of urinary incontinence (UI) in women (49, 50, 51). Research highlights numerous methods, both conservative and interventional, whose effectiveness in treating urinary incontinence has been clinically validated. The Agency for Health Care Policy Research and the European Association of Urology recommend that, for patients with genitourinary disorders, the initial focus should be on conservative treatment. This should include physical activity, pelvic floor muscle exercises, habit modifications, and physiotherapy treatments such as endovaginal electrostimulation or magnetic stimulation (52).

A synthesis of scientific evidence conducted by experts using modified Oxford and GRADE criteria provides guidelines for the treatment of patients with moderate UI. According to these guidelines, targeted physical activity is one of the most well-established forms of UI rehabilitation (53).

Scientific evidence for the protective effects of physical activity on UI can be found in numerous publications. Cross-sectional analyses by Hannestad et al. suggest that leisure-time physical activity is associated with a lower risk of UI, whereas the absence of physical activity increases this risk (54). Similarly, several prospective cohort studies, particularly the Nurses' Health Study, found that higher levels of physical activity reduce the risk of developing UI and decrease the risk of persistent UI (55). Mishra et al., in a study involving women born in 1946, demonstrated a higher prevalence of severe urinary incontinence in the group with a BMI >25 kg/m² maintained from age 20, compared to the group with normal body weight and a third group of women who were classified as overweight or obese at age 43 (56).

An observational study conducted in Spain between 2021 and 2022 included 1,446 women with UI. Women under 18 and those who had given birth in the past 12 months were excluded from

the study. The Urogenital Distress Inventory (UDI-6) scale was used to assess the impact of urinary symptoms. The primary variable was the level of physical activity, measured using the International Physical Activity Questionnaire (IPAQ), which classifies adult populations based on activity levels (low, moderate, and high). The study analyzed how low levels of physical activity affect UI symptoms. After adjusting for all variables, it was found that more severe urinary symptoms were associated with lower levels of physical activity or a complete lack of it (57).

Current scientific evidence suggests that overweight and obesity are significant risk factors for urinary incontinence (UI) in women. A cohort study conducted among young women aimed to investigate the association between physical activity and UI, taking into account body mass index (BMI). Data were collected from women born 17 years apart: 1973–1978 (group T1) and 1989–1995 (group T2). Women in both groups completed surveys on the day of the study and again four years later. The surveys assessed self-reported UI and BMI. In total, nine transitional BMI categories (based on BMI status at baseline and during follow-up) and four physical activity categories were created to evaluate the prevalence of UI using Poisson regression analysis. The obesity rate increased in both groups over the four years: from 6.6% to 10.4% in group T1 and from 11.7% to 19.6% in group T2. The incidence rate of UI was higher among women with a BMI >30 compared to women with a BMI <30. An inverse relationship was observed between physical activity and UI, suggesting that higher physical activity levels are associated with lower UI prevalence (58).

A systematic review and meta-analysis project was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The target group consisted of pregnant women without contraindications to physical activity. According to the study results, physical activity should be employed as a preventive measure against UI. Currently, it is recommended that all pregnant women without medical contraindications begin or continue regular aerobic exercise for at least 150 minutes per week (59). Another systematic review, which included fifty-seven articles considered to have the highest level of scientific evidence, indicates the protective effect of physical activity in pregnant women. Exercise can help prevent significant disorders such as gestational diabetes, excessive weight gain during pregnancy, hypertensive disorders, UI, fetal macrosomia, lumbopelvic pain, anxiety, and prenatal depression. To achieve the most benefits, adherence to current guidelines is essential, and the type and intensity of exercise should be tailored to the woman's previous fitness level (60). Additionally, in pregnant women who perform pelvic floor muscle (PFM) exercises

(primary prevention), the risk of developing UI in late pregnancy is reduced by 62%, and the risk of UI 3–6 months postpartum is lowered by 29% (61).

It is estimated that the prevalence of any type of urinary incontinence (UI) during the first year postpartum ranges from 32% to 64% for stress urinary incontinence (SUI) and 15% to 30% for other types of UI (62). The objective of a prospective cohort study conducted among postpartum women was to determine whether objectively measured moderate or vigorous physical activity in the early postpartum period could improve pelvic floor support. The study included nulliparous women in their third trimester of pregnancy, later excluding those who had a cesarean section or preterm delivery. Participants wore triaxial wrist accelerometers from 2 to 3 weeks and from 5 to 6 weeks postpartum for at least four days. The primary outcomes assessed one year postpartum included the burden of pelvic floor symptoms, including UI, evaluated using the Epidemiology of Prolapse and Incontinence Questionnaire.. The primary predictor was the average daily physical activity, ranging from moderate to vigorous intensity. Among the 825 participants eligible postpartum, 611 completed accelerometry and the one-year follow-up. The average age was 29 years. The study results indicated that moderate or vigorous physical activity postpartum either had a protective effect or no impact on other pelvic floor health parameters. Only a few women engaged in substantial physical activity, so these findings may not apply to women performing strenuous exercises soon after childbirth (63).

Davenport et al., in their systematic review and meta-analysis, demonstrated the protective effect of aerobic exercises combined with pelvic floor muscle training (PFMT) in women with postpartum UI. The review included 24 studies (982 women). Scientific evidence showed that antenatal PFMT combined with aerobic exercises reduced the risk of UI during pregnancy (15 randomized controlled trials) and in the postpartum period. Physical activity was beneficial in preventing the development of UI in women and reducing the risk and severity of prenatal and postnatal UI symptoms (64).

A randomized study was conducted involving a total of 40 women in the climacteric period with stress urinary incontinence (SUI), aged between 46 and 75 years. Participants were randomly assigned to two groups: one group performed an abdominopelvic exercise program, while the other group performed both abdominopelvic exercises and exercises to strengthen postural muscles. The primary outcome measures included SUI symptoms assessed using a 48-hour pad test and the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI-SF). These were evaluated at baseline, post-intervention, and after three months of follow-up. Differences between the groups were observed

immediately after the intervention. SUI symptoms improved in both groups from baseline to three months of follow-up. The addition of postural exercises to the abdominopelvic exercise program enhanced the therapeutic outcomes for women with SUI (65).

Additionally, a cohort of 36,843 women aged 54 to 79 years with urinary incontinence (UI) was examined. Surveys were conducted every two years from 2000 to 2008. Over 18,000 women reported persistent UI, which was noted in all surveys during this eight-year period. Odds ratios for persistent UI were estimated in comparison to no UI across various demographic categories related to age and lifestyle, based on reports from 2000. Increasing age, lower levels of physical activity, Caucasian race, higher number of childbirths, and higher body mass index (BMI) were associated with a higher likelihood of persistent UI, as were several health-related factors (e.g., stroke, type 2 diabetes, and hysterectomy). Black women had significantly lower odds of persistent UI compared to Caucasian women (66).

The interdisciplinary guidelines of the Polish Urogynecological Society regarding the diagnosis and treatment of stress urinary incontinence (SUI) highlight the adverse effects of excessive physical activity in women with urinary incontinence (UI). Activities such as lifting weights over 5 kg, intensive sports training, and other exercises that significantly increase intra-abdominal pressure are contraindicated for these patients (67).

A study conducted in Italy by Salvatore et al. in 2008 involved 679 women participating in various sports. The study aimed to assess the prevalence of SUI, identify specific sports disciplines more strongly associated with UI, and evaluate related risk factors. The questionnaire included questions about the general characteristics of the participants, the occurrence of UI related to sports or general daily activities, the timing of the onset of the condition, the frequency of UI episodes, the correlation of UI with specific movements or sports, subjective perception of limitations in such situations, and the need to modify the type of sport. UI was reported by 101 women (14.9%). Of these, 32 (31.7%) reported UI only during sports activities, 48 (47.5%) only in daily life, and 21 (20.8%) in both cases. Body mass index (BMI) and the number of childbirths were significantly associated with the risk of developing UI. Analyzing different types of sports activities, a higher percentage of UI was found among women participating in basketball (16.6%), athletics (15%), and tennis or squash (11%) (68).

A cross-sectional study conducted between September 1, 2020, and January 29, 2021, in the Czech Republic included 249 women who were professional athletes with a mean age of 22.18 ± 6.11 years. The study used the International Physical Activity Questionnaire (IPAQ), the

International Consultation on Incontinence Questionnaire-Urinary Incontinence (ICIQ-UI), the Overactive Bladder Questionnaire (OAB-q), and the Contilife Quality of Life Questionnaire for UI to assess participants. Sports were divided into six groups: functional mobilization sports (FMS), strength sports (SS), aesthetic-coordination and sensory-concentration sports (ACS), heuristic-individual and martial arts (HIS + MAS), team sports with a hockey stick (HCS-A), and team sports with a ball (HCS-B). Inclusion criteria were age 18–35 years, nulliparity, high-intensity physical activity confirmed by IPAQ (over 3000 MET-min/week) in the past 3 months, and participation in the sport at least 3 days per week for more than 2 years. Sports groups were classified according to the international classification created by Kodým in 1985.

The overall scores revealed significant differences between the sports groups. The highest incidence of UI was observed in the FMS group, while the lowest incidence was noted in the team sports group. In the FMS group, the risk of developing UI was 1.96 times higher compared to the team sports group. Other sports groups did not present a significant relative risk for developing UI (69).

Women with urinary incontinence (UI) can benefit from various forms of physical activity that are both safe and advantageous for their health. Yoga and Pilates are particularly beneficial because many of their exercises focus on strengthening the core and pelvic floor muscles. Research has shown that these forms of exercise can enhance pelvic floor muscle function and reduce the symptoms of urinary incontinence (70). Low-intensity aerobic exercises, such as brisk walking, stationary cycling, and swimming, are also safe activities for women with UI. These activities help maintain a healthy body weight, which is a critical factor in preventing and managing urinary incontinence (71).

Breathing techniques and exercises that improve posture can support pelvic floor muscle function, thereby reducing the risk of urine leakage during daily activities (72). An important aspect of physical activity for women with UI is balance exercises. In a study conducted by Chmielewska et al., eighteen women with urinary incontinence and twelve women without incontinence, aged 50–55, were assessed under four different test conditions: eyes open/full bladder, eyes open/empty bladder, eyes closed/full bladder, and eyes closed/empty bladder. The study recorded center of pressure (COP) parameters, including sway range, mean square, velocity, and COP area. Women suffering from UI had more difficulty maintaining postural balance than those in the control group. Therefore, developing a therapeutic program aimed at strengthening the trunk muscles and improving postural balance in women appears warranted (73).

Hypopressive exercises are a specific form of training involving certain postures and breathing techniques designed to reduce intra-abdominal pressure and strengthen the pelvic floor and abdominal muscles. In a study, 117 participants were randomly assigned to a hypopressive exercise group (n = 62) or a control group that did not receive any intervention (n = 55). Clinical and sociodemographic data were collected, as well as pelvic floor muscle strength (using the Modified Oxford Scale), symptoms of pelvic organ prolapse, bowel symptoms, and urinary symptoms (using the Pelvic Floor Distress Inventory-20, PFDI-20), and the impact of pelvic floor disorders (PFD) on women's lives (using the Pelvic Floor Impact Questionnaire-7, PFIQ-7), as well as the severity of urinary incontinence symptoms (using the International Consultation on Incontinence Questionnaire, ICIQ). The results showed improvement in the hypopressive exercise group regarding pelvic floor muscle strength after 8 weeks of intervention compared to the control group. Additionally, pelvic floor muscle contractility improved, and the severity and symptoms associated with urinary incontinence decreased (74).

Women engaging in targeted strength training may have stronger pelvic floor muscles (PFM) than non-exercising women. However, PFMs may still be too weak or slow to counteract intra-abdominal pressure or ground reaction forces during high-intensity activities (75).

These findings suggest that while targeted exercises such as yoga, Pilates, and hypopressive training can be highly beneficial for managing UI, care must be taken when engaging in high-intensity activities, especially those that significantly increase intra-abdominal pressure. It is essential for women with UI to choose appropriate forms of physical activity to strengthen their pelvic floor muscles while avoiding exercises that may exacerbate their condition.

Conclusion

The conducted research as part of the grant The movement activity enhancement after the COVID-19 pandemics (COVIDMOVE), project number: 2021-1-SK01-KA220-HED-000023008, indicates varied levels of physical activity among students from Poland, the Czech Republic, and Slovakia after the COVID-19 pandemic, measured in MET units (Metabolic Equivalent of Task). Slovak students demonstrated the highest level of physical activity, while Polish students showed the lowest. Among women, Slovak participants were more physically active than their peers from Poland and the Czech Republic (76). In light of the presented data highlighting gender differences in physical activity, it is essential to emphasize the role of educating young women on the importance of physical activity in protecting against urinary incontinence. Regular physical activity, especially exercises engaging various muscle groups, including the lower torso, promotes the maintenance of a healthy body weight, which also

reduces the risk of developing incontinence. Additionally, physical activity improves the flexibility and endurance of muscle tissues and positively affects the nervous system, supporting optimal bladder control functions. For young adults, particularly after periods of limited activity, such as the COVID-19 pandemic, recommendations to maintain the required level of physical activity appear crucial for long-term prevention, including counteracting issues related to urinary incontinence.

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