

## EFFECTIVENESS OF REFORMER PILATES EXERCISES ON SYMPTOMS AND QUALITY OF LIFE IN CHILDREN WITH BLADDER AND BOWEL DYSFUNCTION

**Received:** April 19, 2023

**Accepted:** May 24, 2023

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### Abstract

**Objective.** The study was conducted to investigate the effectiveness of reformer pilates exercises on symptoms and quality of life in children with bladder and bowel dysfunction (BBD).

**Methods.** Children diagnosed as having BBD by a physician and aged between 5-18 years were included in this study. They were divided into two groups: urotherapy group (control) and reformer pilates group (study). Written consent was obtained from both the children and the parents. Children in both groups received a standardized urotherapy. The study group also had 30 minutes of reformer pilates exercise sessions for 2 days a week. BBD symptoms were assessed using the Voiding Disorder Symptom Scoring (VDSS) and Bladder and Bowel Dysfunction Questionnaire (BBDQ). Quality of life was assessed using the Pediatric Incontinence Questionnaire (PinQ). Assessments were performed before and 8 weeks after the reformer pilates exercises.

**Results.** The study included 25 children (10 [40%] boys and 15 [60%] girls). Their median age was 9 years and their body mass index was 17.58 kg/m<sup>2</sup>. Of these 25 children, 16 were born by normal delivery, 9 of whom were delivered by cesarean section. None of the children used diapers during the day, but 10 of them continued to use diapers at night. The control (n = 16) and study (n = 9) groups were similar in terms of physical properties. The VDSS, BBDQ, and PinQ scores were significantly decreased in both groups (p < 0.05). The decrease in BBDQ and VDSS scores were more prominent in the study group than in the control group. The clinical trial registration number of this study is NCT05779709 (ClinicalTrials.gov.)

**Conclusion.** Reformer pilates exercises can provide additional benefits in the treatment of children with BBD as they were effective in reducing BBD symptoms and enhancing quality of life.

**Keywords:** Bladder and bowel dysfunction, reformer, pilates, urotherapy, quality of life

**How to cite:** Erçetin FN, Usgu S, Tiryaki S, Yakut Y. Effectiveness of reformer pilates exercises on symptoms and quality of life in children with bladder and bowel dysfunction. Cent Asian J Med Hypotheses Ethics 2023;4(1):67-76. <https://doi.org/10.47316/cajmhe.2023.4.2.01>

## INTRODUCTION

Bladder and bowel dysfunction (BBD) describes the urinary tract symptoms associated with bowel complaints. BBD symptoms are thought to represent 40% of pediatric urology consultations [1]. In children who do not have any neurological or physiological problems, micturition and defecation occur with the coordinated work of the involuntary bladder and bowel, voluntary contracting external urethral sphincter and external anorectal sphincter. For normal micturition and defecation, the pelvic floor muscles must be able to relax properly. This relaxation may not be achieved even in children with no neurological or physiological problems [2,3].

Urotherapy and pharmacological treatments are used in conservative BBD treatment. Urotherapy includes education of the child and family, diet (adequate fiber and fluid consumption), regular optimal voiding, daily physical activity, teaching normal toilet use, pelvic floor muscle training and relaxation [4]. Pilates is an exercise method that includes a series of movements that both strengthen and increase flexibility of the entire body without focusing on a specific muscle. It includes exercises that can work the pelvic floor muscles (PFMs), while avoiding intense abdominal contractions, holding breath, or straining that can create increased pressure on the pelvic floor [5].

Reformer pilates is a specific type that provides resistance exercise at certain weights with the pulley system relying basically on the same principles. Pilates exercises provide breathing and activation of the deep stabilizing muscles of the trunk in coordination with the PFMs. It includes exercises that focus on pelvic stability, mobility and body alignment. PFMs activation is carried out simultaneously with the trunk muscles in various positions in coordination with breathing. Such exercises are known to have an important role related to continence, maintenance of intra-abdominal pressure and respiratory mechanics [6].

Despite the increasing number of health care professionals using the pilates-based approach in rehabilitation, these pilates-based exercises in rehabilitation are still insufficient in the literature [7]. To our knowledge, none of studies investigated the usefulness of the pilates-based exercise principle in children with BBD. This study aimed to investigate the effectiveness of reformer pilates exercises on symptoms and quality of life in children with BBD.

## MATERIAL AND METHODS

### Participants

Children between the ages of 5-18 years who were diagnosed with BBD without any neurological abnormalities were invited. Children with neuropathic or anatomical abnormalities in the urinary tract or gastrointestinal tract, inflammatory bowel disease or any other disorder affecting bladder or bowel function and who requested withdrawal from the study at any stage were excluded.

The children who met the inclusion criteria were invited for pre-intervention meeting and assessments. The aim of study and the reformer pilates exercise intervention were explained to the parents and children during the meeting. The children and their parents who want to join the exercise sessions during the study were assigned in the reformer pilates group (n=9, study group) and those who did not accept to perform the reformer pilates exercises were assigned in the urotherapy group (n=15, control group). Both groups received a standardized urotherapy and the study group also performed 30 minutes of reformer pilates exercise sessions (2 sessions/weekly/8 weeks). Both groups were evaluated at the beginning of the study and at the end of the study. The physical and demographic information of the individuals (age, height, weight, body mass index, mode of delivery, toilet training age, nighttime diaper use) were recorded using the created patient evaluation form.

Study approval was obtained from Hasan Kalyoncu University Health Sciences Non-Interventional Research Ethics Committee with the date 19.04.2021 and decision number 2021/051. Before starting the study, the family and volunteers' information and family consent (consent) form, which included the content, purpose and information was read and approved by the parents who agreed to be included in the study. Age-appropriate consent was obtained from the children.

### Assessments

The Pediatric Bladder and Bowel Dysfunction Questionnaire (BBDQ) [8] and Voiding Dysfunction Symptom Scoring (VDSS) [9] were used to evaluate the BBD. The Pediatric Incontinence Questionnaire (PinQ) was used to evaluate the quality of life. All assessment were performed by face-to-face conversation in Hasan Kalyoncu University Application and Research Center between April 2021 and September 2021,

### Voiding Dysfunction Symptom Scoring

Voiding dysfunction symptom scoring was developed by Akbal et al. [9]. First, it was formed as an empirical

questionnaire consisting of questions about day/night symptoms, micturition, defecation habits and quality of life [10]. Then Akbal et al. excluded the question about quality of life and achieved a 90% rate in the specificity and sensitivity study they conducted for 8.5 points and above [10]. The questionnaire includes 13 questions for symptoms and 1 question for quality of life. The maximum score is 35, and the minimum score is 0.

#### **Bladder and Bowel Dysfunction Questionnaire**

The BBDQ was used to assess BBD. Drzewiecki et al. found that this questionnaire was reliable in detecting and evaluating the non-neuropathic pediatric BBD [11]. The questionnaire has 14-item and scores for all questions except the first question range from 0 to 4 points, with 0 points indicating no complaints and 4 points indicating the most severe complaints. In the first validation study performed on this questionnaire, 11 points or 52 points were shown as the threshold for BBD [11].

#### **Pediatric Incontinence Questionnaire**

Bower et al. developed the PinQ a cross-cultural tool specific to children with lower urinary tract dysfunction. This instrument has proven to be a reliable and valid tool for measuring the holistic impact of bladder dysfunction in children, and has been recommended for assessing the quality of life in children with urinary incontinence. The questionnaire was also used to measure changes in quality of life during therapy [12]. The PinQ consists of 20 items. Items have 5 response options following the Likert scale: 0 no, 1 difficult, 2 sometimes, 3 often, and 4 always. The maximum total score is 80 and higher score means a lower quality of life. The tool has 5 subscales as follows: social relations with peers, self-esteem, family and home, independence and mental health [12].

#### **Intervention**

Urotherapy training was given to both groups. In addition to urotherapy, individual reformer pilates training consisting of 30 minutes two days a week was given to the exercise group by an expert physiotherapist for 8 weeks in the study group. The purpose of urotherapy education was to teach children to empty the bladder regularly and completely. The standardized urotherapy which included instructions on daily fluid intake of at least 1,200 ml evenly distributed daily as described and voiding at 2-hour intervals until bedtime in which the voiding and defecation positions were taught not to perform avoidance maneuvers. In this training, families were given basic information about the anatomy and physiology of the lower urinary tract (LUT) and anorectum, normal voiding and

defecation, fluid consumption and voiding habits of children. The children were allowed to pee whenever they wanted occasionally at any time. Children were also asked to report the number of wet days.

#### **Reformer Pilates Exercises**

The basic pilates principles were explained to the children. Diaphragmatic breathing, neutral position of the pelvis, centering and pelvic floor control were taught with appropriate language for their age. Verbal help were given to maintain centering during each movement. The exercises (30 min) were started by doing 10 repetitions in combination with diaphragm breathing, and progressed 12 repetitions after 3 weeks, 15 repetitions after 6 weeks (frog series, leg circles series, hundred series, box series, side splits series) (Figure 2).

#### **Statistical Analysis**

SPSS 22.0 (Statistical Package for the Social Sciences) was used for statistical analysis of the data. For descriptive analyses, the variables determined by numerical measurement were expressed as median and min-max, and frequency values were calculated as percent (%) for non-numerical data. The normality of the data was checked with the Kolmogorov-Smirnov test. Wilcoxon Signed Ranks test was used for between group comparison and Mann Whitney U test was used for intergroup comparison analysis. The p-value was accepted as  $< 0.05$ . The sample size was calculated with G-power software (Version 9.1.3.7). At least 21 participants were estimated for the study with the medium effect size ( $f=0.50$ ), %80 power and  $\alpha=0.05$ . It was decided to include a total of 25 participants for possible dropouts.

#### **RESULTS**

A total of 27 children participated in the study. One was excluded for not meeting the inclusion criteria, one was excluded for his request for withdrawal (Figure 1). In total, 25 children (10 [40%] boys and 15 [60%] girls) were included in the study. The median age was 9 years and the body mass index was 17.58 kg/m<sup>2</sup>. Of these, 16 children were born by normal delivery, 9 of whom were born by cesarean section. None of the children used diapers during day, but 10 of them continued to use diapers at night. The groups were not significantly different in terms of physical properties (Table 1).

The VDSS, BBDQ, and PinQ values were not significantly different at pre-test ( $p > 0.05$ ), and decreased in both groups during the study ( $p < 0.05$ ). there was no change in the PinQ values, but a

significant difference was found only in BBDQ and VDSS values at post-test ( $p < 0.05$ ) (Table 2).

## DISCUSSION

In our study, which aimed to investigate the effectiveness of reformer pilates exercises on BBD symptoms and quality of life in children, the urotherapy and reformer pilates exercise training were found to be effective in decreasing the PinQ, BBDQ, and VDSS scores. The reformer pilates training resulted in more reduction in the VDSS and BBDQ scores.

The VDSS is a scoring system with proven reliability developed by Akbal et al. in our country. Its reliability has been proven in diagnosis, treatment, and follow-up [10]. LUT scores the gastrointestinal system and the quality of life associated with these systems. VDSS is a method that can be applied briefly when taking a history from the patient, and it increases the chances of successful diagnosis and treatment, as well as providing a quantitative evaluation of symptoms. This also helps children and families understand the importance of the situation. In a study evaluating the VDSS scores of 228 children with lower urinary tract dysfunction (LUTD) before and after urotherapy training and urotherapy, it was found that 69% of the children had normal scores and 26% recovered completely. The mean values before and after urotherapy were  $15.8 \pm 5.4$  and  $6.6 \pm 5.6$ , respectively [13]. At the point where urotherapy is accepted as the first-line treatment, it can be said that VDSS scores go in parallel with the course of treatment. In their prospective study involving 334 children with a diagnosis of BBD aged between 5 and 18 years, Barco-Castillo et al. showed the relationship between LUT symptoms and BBD when the VDSS score was above 8 [14]. In the present study, although VDSS scores decreased in both groups, they were more prominent in the reformer pilates training group. In this case, we can say that reformer pilates exercises significantly reduce LUTD and gastrointestinal system symptoms related to BBD.

The BBDQ is a reliable tool for diagnosing BBD as well as for identifying the different areas and symptoms that individually cause BBD. This feature of the questionnaire is useful as BBD is not an "all or nothing" dual type syndrome. BBD is a heterogeneous group of conditions with multiple symptoms and severity. There are currently several questionnaires for the assessment of BBD in children. Since the BBDQ was applied to over 1200 children, it was applied to children in a wide age range, and in this respect, it was found to be safe in terms of ease of application and ability to categorize BBDQ [15]. In the present study, there was a difference

in the BBDQ scores in both groups. Significantly greater improvement was seen in the training group. Although proper breathing pattern, body control and awareness, focusing on the pelvic floor, contraction and relaxation of the pelvic floor muscles were also taught during the urotherapy training, doing these during the exercise produced more positive results. This reduced symptoms such as urinary incontinence, urinary frequency and inability to reach the toilet, especially at night. From this, we can conclude that reformer pilates exercises have a rapid effect on the symptoms in the 8-week period.

Managing a more general and holistic well-being than the impact of illness, quality of life is an approved way of measuring a patient's perspective on his or her own life situation. For this reason, a pediatric incontinence quality of life measurement questionnaire (PinQ) was developed specifically. Attention to quality of life can alert the clinician and family to health problems directly related to BBD. Such a holistic treatment approach facilitates the compliance of the child and family with the treatment and creates a factor related to the positive treatment outcome by addressing psychosocial problems [16]. In the study by Equit et al., in which they investigated the impact of the quality of life of children with functional incontinence, the PinQ scores of 70 children with a mean age of 8.7 were followed up during the 3-month standard treatment period. After treatment, the children's scores decreased from 28.4 to 25.2 [17]. In another study conducted with 50 children with LUTD, a urotherapy program with play was investigated to increase motivation with standard urotherapy. The PinQ scores of the groups decreased equally [18]. In the present study, children's participation during exercise and seeing that they were self-medicating were different in this respect. In the present study, the score of the group that received only urotherapy decreased from 46.5 to 43. This result was similar to previous studies. The score of the reformer pilates training group decreased from 33 to 31. Despite this difference, no significant difference was found between the groups in terms of PinQ score in our study. This was thought to be due to the small size of the study group and the wide range created by the serious variation in quality of life with personal perception.

PFMs are not an isolated unit that works alone. The abdominal capsule surrounding the abdomen and pelvic organs is part of the core region. The core region consists of the diaphragm, superficial and deep abdominal muscles, and PFMs. These muscles work in coordination and contribute to continence, pelvic organ functions, intra-abdominal pressure formation, support

against gravity, lumbopelvic stability formation and respiration [19]. These children have an overactive abdominal wall that cannot be released due to overactive PFMs. The muscles of the lower abdomen (transversus abdominis and obliquus abdominis) act synergistically with PFMs. Both muscle groups should be relaxed during functional micturition and defecation. During inspiration, the diaphragm moves caudally, the abdominal muscles relax, the lung expands and the air fills into the abdomen, during expiration, the abdominal muscles contract, the intra-abdominal pressure increases, the lung shrinks and the air comes out. Synergistic work and intra-abdominal pressure facilitate micturition and defecation. Recent studies have consisted of isolated pelvic floor exercises and biofeedback exercises. In the present study, isotonic contraction, relaxation and body awareness training were given to the core muscles in combination with diaphragmatic breathing with reformer pilates exercises. Our study is unique in this respect.

The pelvic floor exercise protocol reported in children with dysfunctional micturition or defecation has not been standardized, but according to the recommendations of the International Children's Continence Society (ICCS), all children with diurnal urinary incontinence should receive standard urotherapy as the first treatment option [20]. The reason for applying urotherapy as a first-line treatment is that its effect has been proven in the literature, it depends not on certain equipment and materials, but on the training abilities of the professional and saves costs [21]. For this reason, urotherapy training is used as a reference point for alternative treatments. In a study by Zivkovic et al., comparing a group of children receiving urotherapy and pharmacotherapy with a group including diaphragmatic breathing exercises and pelvic floor training, 83% of the children in the exercise group had urinary incontinence, 66% had nocturnal enuresis, 100% had constipation, and 68% had decreased [22]. This study showed that interventions in the core area had an effect on BBD symptoms. In 2014, Seyedian et al. performed pelvic floor exercises with Kegel techniques using the Swiss ball in addition to urotherapy with children diagnosed with dysfunctional urination. They found that these exercises reduced symptoms [23]. Isolated pelvic floor contraction was studied with these techniques. In the present study, the core mechanism (diaphragm muscle), which includes the pelvic floor, was contracted and loosened synergistically using the principles of pilates using the reformer device. Saleem et al. compared modified pilates with standard physical therapy in women aged 20-45 years with urinary

incontinence and pilates affected the quality of life and incontinence severity more significantly [24]. The effect of pilates on the functional functioning of the pelvic floor has been proven in adult women. Similarly, the functionality of the pelvic floor in childhood was tried to be regulated by pilates and similar results were observed. In our study, the symptoms of all children in both groups decreased. However, the reformer pilates training group had a higher decrease in the VDSS, BBDQ, and PinQ scores. He showed that reformer pilates could be applied as an alternative treatment method.

The main limitation of our study is the small sample size. Although it is accepted as first-line treatment by ICCS, urotherapy and pilates training require the commitment and dedication of families. For this reason, few families agreed to participate in our study. Another problem was working with families who were unaware of this issue and heard the idea that physiotherapy programs could be used in the treatment of the disease for the first time with our study. As urinary incontinence is considered embarrassing in our society, most families and children stated that they prefer a pharmacological treatment that can cure the disease faster. Since our study included self-evaluation of children and families, this may also have caused an evaluation bias especially for quality of life scores.

From a practical point of view, BBD is increasing in children. It is important to support these children whose quality of life and self-esteem decrease and who are psychosocially worn out [25]. Reformer exercises can be applied together with multidisciplinary approaches as a method where family and children will be at the center, more fun and their participation can increase [26]. Especially in large areas such as Central Asia where the accessibility of the health system is difficult, or where an expensive, equipment and user-dependent method such as urotherapy cannot be provided, experts in the subject can direct families and children to exercises such as reformer that will train the pelvic floor [27].

## CONCLUSION

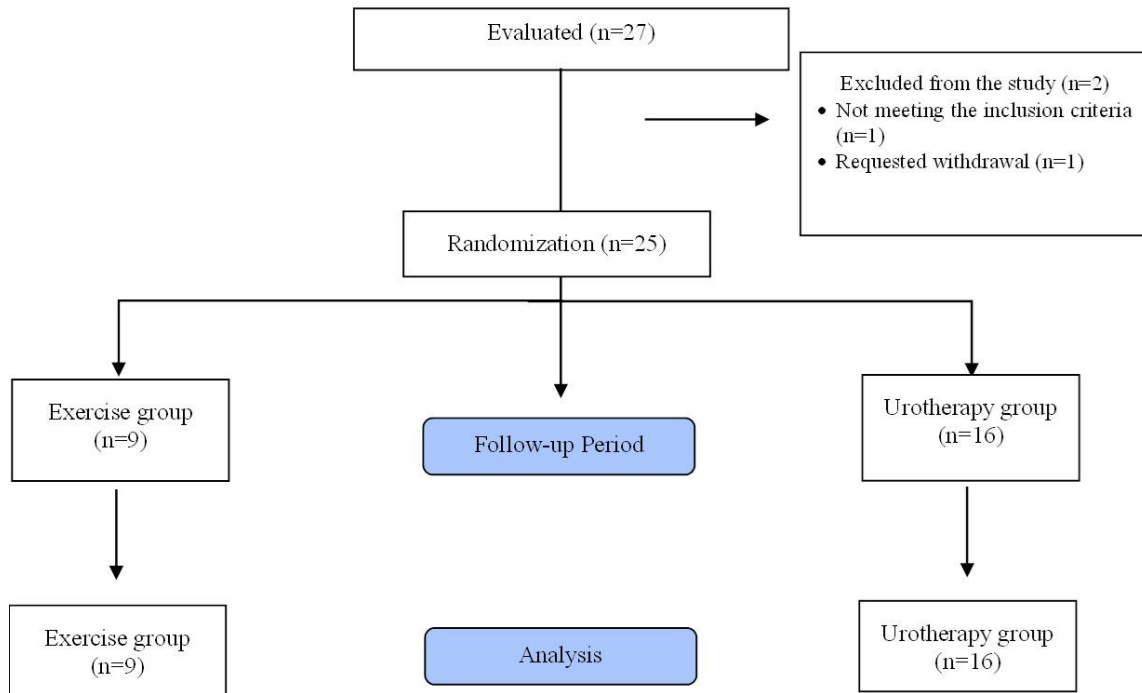
Short-term reformer pilates exercises are more effective in improving BBD symptoms and quality of life than urotherapy. PFMs and core region proper relaxation, contraction and control, and body awareness can help in reducing symptoms. In addition, the exercise approach emphasizes the importance of raising clinical awareness about the physiotherapy practices in the treatment of BBD.

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**Figure 1. Study flow chart**



**Figure 2. Some examples of exercises; a frog series, b leg circle series, c hundred series**

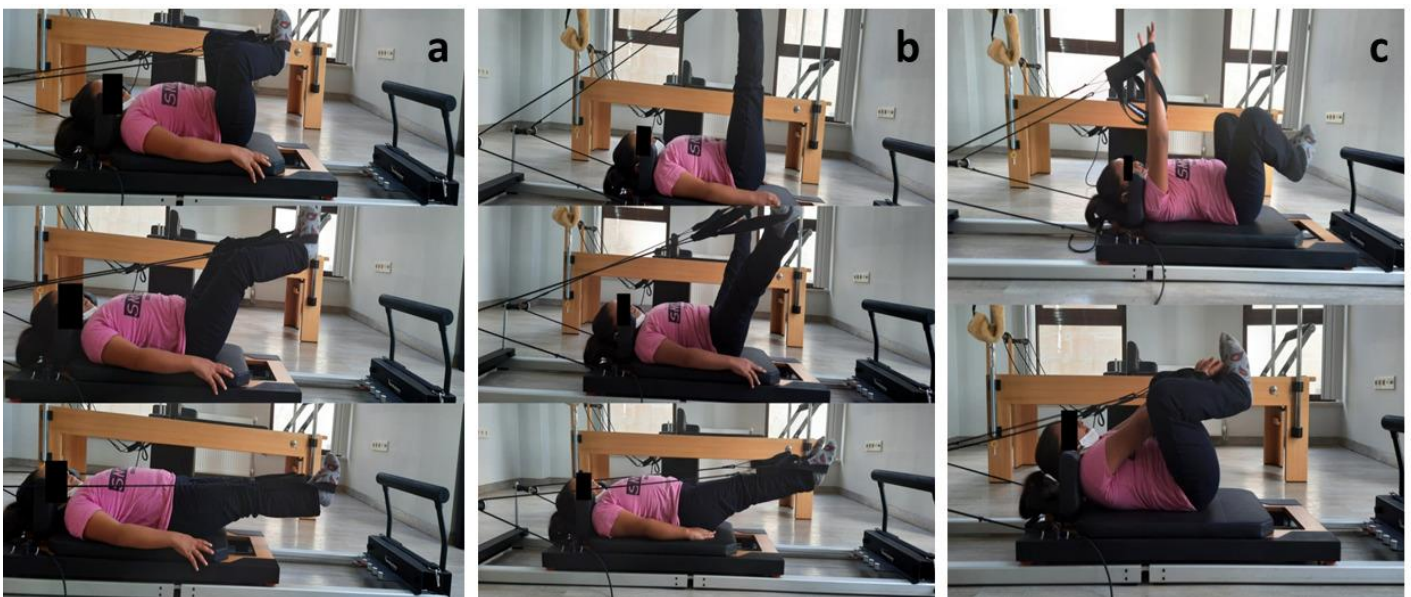


Table 1. Comparison of the physical characteristics of the groups

	Control Group (n=16)		Study Group (n=9)		p-value
	Median	(Min-Max)	Median	(Min-Max)	
Age (years)	10.5	5-17	8	6-12	0.332
Height (cm)	139	105-170	128	110-144	0.149
Weight (kg)	31	18-65	25	18-50	0.459
BMI (kg/m <sup>2</sup> )	17.59	13.01-24.20	15.39	14.64-27.40	0.865
	<b>Percent</b>	<b>Percent</b>	<b>Percent</b>	<b>Percent</b>	
Gender	43.8	56.3	33.3	66.7	
Birth Type	Normal	Cesarean	Normal	Cesarean	
Diaper Usage	Using	Not using	Using	Not Using	

P > 0.05 Mann Whitney U Test, cm; centimeters, kg; kilogram, BMI; body mass index, m<sup>2</sup>; square meters

Table 2. Intra- and intergroup comparison of VDSS, BBDS, and PinQ values

	Control Group (n=16)					Study Group (n=9)					Cohen d	Intra-groups	
	Pre-Test		Post-Test		p-value <sup>a</sup>	Pre-Test		Post-Test		p-value <sup>a</sup>		Pre-Test	Post-Test
	Median	Min-Max	Median	Min-Max		Median	Min-Max	Median	Min-Max			p-value <sup>b</sup>	p-value <sup>b</sup>
<b>VDSS</b>	19	6-36	15	2-27	0.001*	20	13-27	8	1-10	0.008*	0.388	0.932	0.001*
<b>BBDQ</b>	23	9-44	20	7-38	0.035*	19	16-36	12	8-24	0.007*	0.391	0.496	0.043*
<b>PinQ</b>	46.5	4-69	43	4-73	0.006*	33	27-60	31	10-53	0.024*	0.106	0.380	0.141

\*p > 0.05, SD; standard deviation, VDSS; voiding dysfunction symptom scoring, BBDS; bladder bowel dysfunction questionnaire, PinQ; pediatric incontinence questionnaire, p<sup>b</sup> Mann Whitney U test, p<sup>a</sup> Wilcoxon Signed Rank test results



## ПИЛАТЕСКЕ АРНАЛҒАН РЕФОРМЕРІН ҚОЛДАНАТЫН ЖАТТЫҒУЛАРДЫҢ ҚУЫҚ ПЕН ІШЕК ДИСФУНКЦИЯСЫ БАР БАЛАЛАРДЫҢ БЕЛГІЛЕРІ МЕН ӨМІР САПАСЫНА ӘСЕРІ

### Түйіндеме

**Мақсаты.** Пилатеске арналған реформерін қолданатын жаттығулардың қуық пен ішек дисфункциясы бар балалардың өмір сапасына және белгілерінің әсерін зерделеу үшін зерттеу жүргізу.

**Әдістері.** Зерттеуге қуық және ішек дисфункциясы диагнозы қойылған 5 пен 18 жас аралығындағы балалар жұмылдырылды. Олар екі топқа бөлінді: уротерапиялық тобы (бақылау) және пилатес тобы (зерттеу). Балалардан да, ата-аналардан да жазбаша келісім алынды. Екі топтағы балалар стандартталған уротерапияны алып отырды. Сондай-ақ, екінші топ та аптасына екі күн 30 минуттан пилатес реформерінде жұмыс жасады. Қуық пен ішек дисфункциясының белгілері зәр шығару бұзылыстарының белгілерін бағалау шкаласы (VDSS), қуық және ішек дисфункциясы сауалнамасы (BBDQ) арқылы бағаланды. Өмір сапасы педиатриялық зәр шығаруды ұстамау сауалнамасы (PinQ) арқылы бағаладық. Бағалау пилатес жаттығуларына дейін және 8 аптадан кейін жүргізілді.

**Нәтижелер.** Зерттеуге 25 бала (10 (40%) ұл және 15 (60%) қыз) жұмылдырылды, олардың орташа жасы 9-да, дене салмағының индексі 17,58 кг/м<sup>2</sup> болды. 16 бала табиғи босану арқылы дүниеге келді, олардың 9-ы кесарь тілігі арқылы дүниеге келді. Балалардың ешқайсысы күндіз жаялық қолданбады, бірақ олардың 10-ы түнде жаялықтарды пайдалануды жалғастырды. Топтар (бақылау – 16; негізгі – 9) физикалық көрсеткіштері бойынша ұқсас болды. VDSS, BBDQ және PinQ ұпайлары екі топта да айтарлықтай төмендеді ( $p < 0,05$ ). BBDQ және VDSS көрсеткіштерінің төмендеуі бақылау тобымен салыстырғанда негізгі топта айқынырақ болды. Бұл зерттеудің сынақ тіркеу нөмірі - NCT05779709, ClinicalTrials.gov.

**Қорытынды.** Пилатеске арналған реформерін қолданатын жаттығулар қуық пен ішек дисфункциясы бар балаларды емдеуде қосымша пайда әкелуі мүмкін, себебі олар BDD белгілерін азайтуда және өмір сапасын жақсартуда тиімді болды.

**Түйінді сөздер:** қуық пен ішек дисфункциясы, реформатор, пилатес, уротерапия, өмір сапасы.

**Дәйексөз үшін:** Эрчетин Ф.Н., Усгу С., Тиряки С., Якут Ю. Пилатеске арналған реформерін қолданатын жаттығулардың қуық пен ішек дисфункциясы бар балалардың белгілері мен өмір сапасына әсері. Central Asian Journal of Medical Hypotheses and Ethics 2023;4(2):67-76. <https://doi.org/10.47316/cajmhe.2023.4.2.01>

## ВОЗДЕЙСТВИЕ УПРАЖНЕНИЙ С ИСПОЛЬЗОВАНИЕМ РЕФОРМЕРА ДЛЯ ПИЛАТЕСА НА СИМПТОМЫ И КАЧЕСТВО ЖИЗНИ У ДЕТЕЙ С ДИСФУНКЦИЕЙ МОЧЕВОГО ПУЗЫРЯ И КИШЕЧНИКА

### Резюме

**Цель.** Исследование было проведено для изучения влияния упражнений с использованием реформера для пилатеса на качество жизни и симптомы у детей с дисфункцией мочевого пузыря и кишечника.

**Методы.** В исследование были включены дети в возрасте от 5 до 18 лет, у которых диагностированы дисфункция мочевого пузыря и кишечника. Они были разделены на две группы: группу уротерапии (контроль) и группу пилатеса (исследование). Письменное согласие было получено как от детей, так и от родителей. Дети обеих групп получали стандартизированную уротерапию. Вторая группа также два дня в неделю занималась на реформере для пилатеса по 30 минут. Симптомы дисфункции мочевого пузыря и кишечника оценивали с помощью шкалы оценки симптомов расстройства мочеиспускания (VDSS), опросника по дисфункции мочевого пузыря и кишечника (BBDQ). Качество жизни оценивали с помощью педиатрического опросника недержания мочи (PinQ). Оценки проводились до и через 8 недель после тренировок пилатеса.

**Результаты.** В исследование были включены 25 детей (10 (40%) мальчиков и 15 (60%) девочек), средний возраст которых составил 9 лет, а индекс массы тела – 17,58 кг/м<sup>2</sup>. 16 детей родились путем естественных родов, 9 из них родились путем кесарева сечения. Ни один из детей не пользовался подгузниками днем, но 10 из них продолжали пользоваться подгузниками ночью. Группы (контрольная – 16; основная – 9) были сходны по физическим показателям. Показатели VDSS, BBDQ и PinQ значительно снизились в обеих группах ( $p < 0,05$ ). Снижение показателей BBDQ и VDSS было более выраженным в основной группе по сравнению с контрольной группой.

Регистрационный номер клинического испытания для этого исследования: NCT05779709, ClinicalTrials.gov.

**Заключение.** Упражнения с использованием реформера для пилатеса могут принести дополнительную пользу при лечении детей с дисфункцией мочевого пузыря и кишечника, так как они оказались эффективными в уменьшении симптомов BDD и повышении качества жизни.

**Ключевые слова:** дисфункция мочевого пузыря и кишечника, реформатор, пилатес, уротерапия, качество жизни.

**Для цитирования:** Эрчетин Ф.Н., Усгу С., Тиряки С., Якут Ю. Воздействие упражнений с использованием реформера для пилатеса на симптомы и качество жизни у детей с дисфункцией мочевого пузыря и кишечника. Центральноеазиатский журнал медицинских гипотез и этики 2023;4(2):67-76. <https://doi.org/10.47316/cajme.2023.4.2.01>