ANNOTATION

of the dissertation by Veliyeva Ainura Teymurkyzy
on the topic **«Modern approaches to early diagnosis and management of urinary incontinence in women of reproductive age»**
submitted for the degree of Doctor of Philosophy (PhD)
in the specialty 8D10103 – «Medicine»

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Relevance of the problem

At the current stage of medical development, stress urinary incontinence (SUI) remains one of the most pressing problems in urogynecology. According to foreign authors, the incidence of stress urinary incontinence in women is 30%–50% (Ackah, M., 2022, Denisenko A.A., 2021). The prevalence of the disease increases with age: in the 25-34 age group, it is 8-10%, and in those aged 55 and older, it is 34% or more (Pizzol D., 2021, NICE, 2020). Stress urinary incontinence is a multifactorial disease, the basis of its etiopathogenesis has not yet been sufficiently studied.

In the Republic of Kazakhstan, the problem of urinary incontinence in women remains underestimated, despite its significant prevalence. According to epidemiological studies, about 5 million women in the country suffer from various forms of urinary incontinence, with up to 70% of women being of working age (Sakieva A.R., 2020).

Stress urinary incontinence is detected on average in every third woman over the age of 30. At the same time, only a small proportion seek medical help due to the social stigma associated with the problem (Rusina E.I., 2023).

One of the first pathophysiological theories proposed to explain the mechanisms of stress urinary incontinence was the transmission pressure theory. According to this theory, urine leakage occurs due to an increase in pressure in the bladder floor above the pressure inside the urethra (Denisenko A.A., 2021) . When the anatomical position of the urethra is disrupted due to its dislocation, the degree of pressure exerted decreases, which leads to a decrease in urethral resistance to intravesical pressure, causing the development of urinary incontinence (Steers W.D., 2023). Subsequently, as scientific research on the theory of the mechanism of urine retention deepened, the theory of sphincter insufficiency was formed. According to this theory, women suffering from SUI have disorders of the neuroreceptor apparatus of the bladder neck, leading to dysfunction of the sphincter apparatus (Milsom I., 2019). This disorder is accompanied by a decrease in the ability of the urethral sphincter to create the necessary resistance, which manifests itself mainly in situations of increased intra-abdominal pressure, such as coughing or physical exertion, thereby contributing to the development of symptoms of urinary incontinence. Today, it is widely accepted that pelvic floor dysfunction plays a key role in the pathogenesis of SUI (Hagen S., 2020). Disruption of the anatomical support of the pelvic organs, in particular pelvic organ prolapse, creates conditions for pathological mobility of the urethra and insufficiency of the sphincter apparatus of the bladder (Petros P.E.P, Richardsona

P.A. 2010).

Urinary incontinence during pregnancy is observed in 3-60% of women, and in the postpartum period – in 7.8%-40% of women. The detection of urinary incontinence symptoms in women during pregnancy is a cause for significant concern. Urinary incontinence during pregnancy is observed in 3-60% of women, and in the postpartum period – in 7.8%-40% of women. Thus, according to the results of recent studies, symptoms of urinary incontinence are observed in 31-41% of pregnant women, and the risk of their development increases significantly when carrying a large fetus (KP) (Kira K.E., 2020).

The influence of childbirth, especially through the natural birth canal with a large fetus, is of particular importance in the development of urinary retention disorders. The process of giving birth to a baby weighing 4000 grams or more, particularly during the pushing stage, is associated with an increased risk of damage to the fascia, ligaments, pelvic floor muscle structures, and pudendal nerve fibers (Glazer H.I., 2021). These injuries can be the basis for the development of both stress urinary incontinence and genital prolapse in the future.

The search for markers of bladder sphincter dysfunction continues today. New directions in the diagnosis of urinary disorders include comprehensive urodynamic study (UDS) and ultrasound methods, including in combination with elastography (Nagieva T.S., 2020).

Despite the growing interest in the problem of urinary incontinence in women in the postpartum period, the data published in the literature are extremely contradictory and limited by the number of patients studied, the lack of standardized approaches to the diagnosis of pathology, and the insufficient observation period to assess the long-term results of postpartum rehabilitation (Petrova O.A. 2021).

Therefore, we consider it necessary to conduct an in-depth study of methods for the early diagnosis and correction of stress urinary incontinence in women of reproductive age after childbirth. This is probably one of the ways to identify the triggers of pathological processes in the urinary system, which will ultimately bring us closer to understanding the causal relationships between vaginal delivery and stress urinary incontinence in women of reproductive age and allow us to develop rehabilitation measures that reduce the long-term consequences of urinary incontinence.

Purpose of the study - optimize early diagnostic criteria for stress urinary incontinence and its correction in primiparous women after delivery with macrosomia.

Research objectives:

1. To study the frequency of macrosomia and stress urinary incontinence in women of reproductive age after their first delivery, and their medical and social aspects.

2. Develop and implement criteria for the early diagnosis of stress urinary incontinence in primiparous women with macrosomia: questionnaires (ICIQ-SF, PISQ-12), perineometry, comprehensive urodynamic study (UDS), and pelvic floor ultrasound.

3. Identify the correlation between the clinical manifestations of stress urinary incontinence and certain parameters of UDS and perineometry in primiparous women with macrosomia.

4. Determine the quality of life of women of reproductive age with stress urinary incontinence after their first delivery of a macrosomia before and after correction of urinary incontinence.

Study methods: Questionnaires (ICIQ-SF, PISQ-12); perineometry; functional tests (cough, Valsalva); voiding diary, comprehensive urodynamic study; pelvic floor ultrasound; use of the «UroBalance» mobile app, Kegel exercises, and fractional CO_2 laser; statistical analysis. In order to increase the reliability of the data obtained and ensure the correct interpretation of the results, clinical and anamnestic examinations and instrumental examinations of patients were carried out, followed by statistical processing of the results on an IBM personal computer. Specialized software packages were used in the analysis: SPSS Statistics 26.0 (IBM corp. USA), StatTech v.2.7.1 (Russia), and Microsoft Office Excel (2016), which ensured high accuracy of calculations and minimized the risk of technical errors.

Objects of the study: 280 women of reproductive age after their first delivery at the «Maternity hospital №1», «Maternity hospital №5», and «Center of Perinatology and Pediatric Cardiac Surgery» in Almaty.

1. 95 women in the main group.

The criteria for inclusion in the main group were women after their first vaginal delivery with a newborn weight of 4000.0 grams or more.

2. 93 women in the control group.

The criteria for inclusion in the control group were women after their first vaginal delivery with a newborn weight of 2500.0 – 3999.0 grams.

3. 92 women in the comparison group.

The criteria for inclusion in the comparison group were women who had given birth by caesarean section with a newborn weight of 4000.0 grams or more and no intra- or postoperative complications.

Exclusion criteria: inability to complete the questionnaire, juvenile pregnancy, age younger than 18 and older than 45, multiparous women, women who had given birth multiple times, women who had undergone vaginal delivery procedures (forceps delivery, vacuum extraction, episiotomy, perineotomy), obstetric hemorrhage, history of surgical correction of urinary incontinence and/or prolapse of female genital organs, oncological, mental, endocrine, neurological diseases, including postpartum depression and neurogenic bladder dysfunction, infectious and inflammatory diseases of the urinary tract, preeclampsia, and the use of medications that affect lower urinary tract function and daily diuresis. All women gave their written informed consent to voluntarily participate in the study and to the publication of scientific materials.

Subject of the study: the functional state of the urinary system in women of reproductive age after giving birth with macrosomia, and the effectiveness of methods for early diagnosis and correction of stress urinary incontinence using clinical and instrumental approaches, conservative therapy, and digital

rehabilitation solutions.

The main provisions to be defended:

1. The incidence of stress urinary incontinence in women after their first natural birth with macrosomia is significantly higher than in groups of women with average birth weight and macrosomia after cesarean section. A number of risk factors for the development of SUI in primiparous women with macrosomia have been identified: women's age, BMI, social status, age at delivery, and somatic history.

2. Objectification of the results of the questionnaire, perineometry indicators, UDS, and pelvic ultrasound contribute to the early diagnosis of functional changes in the urinary system in women after their first delivery, which are most pronounced in women after natural delivery of a large fetus and negatively affect their quality of life.

3. The identified correlations between the weight of the newborn, the duration of labor, and the clinical indicators of SUI in primiparous women made it possible to substantiate and develop an algorithm for the early diagnosis and correction of stress urinary incontinence using the «UroBalance» mobile application.

4. Early diagnosis of stress urinary incontinence in primiparous women with macrosomia and timely correction of urinary disorders are aimed at improving quality of life and preventing complications in later life.

The main results of the study:

An analysis of epidemiological data for the study period showed that in the metropolis, there was a steady increase in the proportion of newborns with macrosomia between 2019 and 2023. In 2019, the frequency of macrosomia was 11.49%, reaching a maximum value in 2021 – 12.75%, followed by a slight decrease and an increase to 12.06% in 2023.

An assessment of the age composition of the study groups showed that the sample was representative of the reproductive period, with an age range of 18 to 45 years and a mean age of 26.02±5.17 years (95% CI: 25.41 – 26.63). No statistically significant differences in age between the groups were found ($p>0.05$). The most numerous categories were 18 – 24 and 25 – 29 years, which confirms the relevance of the study specifically for young mothers. At the same time, the proportion of women of late reproductive age (over 35 years) was significantly higher in the main and control groups compared to the comparison group ($p<0.05$).

Significant differences were found in marital status: the proportion of married women in the main and comparison groups was significantly higher than in the control group ($p<0.001$). At the same time, the structure of employment among respondents was comparable between groups ($p=0.989$), confirming their social homogeneity. The majority of women who had given birth were in the category of employees (over 50%). All groups were predominantly represented by city residents (over 91%), with differences in place of residence being statistically insignificant, confirming the territorial homogeneity of the sample.

When studying somatic status, obesity was the most prevalent condition in all study groups, detected in 49% of women in the main group and 54.3% in the

comparison group, which is 20 times higher than in the control group (3.2%; $p<0.05$). Diabetes mellitus was recorded in every fifth woman in the main and comparison groups (18.9% and 19.6%, respectively), with the lowest incidence in the control group (2.2%).

It was found that the duration of the first and second stages of labor was significantly longer in the main group compared to the control group: the first stage lasted 482.2±151.6 min versus 431.1±82.7 min, and the second stage lasted 69.0±45.3 min versus 56.9±20.2 min, respectively. A direct linear correlation between the duration of labor and the severity of stress urinary incontinence symptoms, according to the ICIQ-SF scale, was confirmed by regression models with high coefficients of determination ($r = 0.9989$ and $r = 0.9991$), which indicates a close pathogenetic link between prolonged compression of the pelvic floor and urethra during labor and the degree of their postpartum dysfunction.

Significant differences in the anthropometric parameters of newborns were identified, as the body weight of newborns in the main group (4268.5±239.1 g) significantly exceeded that of the control group (3402.7±257.7 g; $p<0.001$) and was comparable to the comparison group. A similar pattern was established for body length, head circumference, and chest circumference. More than half of the newborns in the main group weighed more than 4000.0 g, which confirms the correctness of stratification based on macrosomia. Correlation-regression analysis demonstrated a strong positive correlation between the weight and head circumference of the newborn and the severity of stress urinary incontinence symptoms in postpartum women ($r=0.9918$; $p<0.001$).

A comparative analysis of the frequency of stress urinary incontinence (SUI) in the antenatal and postpartum periods revealed statistically significant differences between the study groups. In the antenatal period, the highest incidence of SUI was found in the main group – 27.4%, which significantly exceeds the figures for the comparison group – 20.7% and the control group – 14.0%. In the postpartum period, the severity of symptoms increased significantly, reaching 77.9% in the main group, compared with 50.5% in the control group and 20.7% in the comparison group.

It was found that in the main group of postpartum women, the average degree of SUI after natural childbirth with macrosomia was significantly more frequent (10.5±0.3 points) than in the control and comparison groups ($p<0.05$) and persisted in every second woman after 12 months (6.2±0.2 points). Assessment of sexual function using the PISQ-12 scale showed more pronounced disorders in the main group at all stages of observation, while the best recovery dynamics were recorded in the comparison group ($p<0.05$).

It was found that in women in the main group on the third day after delivery, the average pelvic floor muscle strength was 1.8 ± 0.50 points, increasing to 6.0 ± 0.36 by the 12th month, which is significantly lower than in the control group (6.9 ± 0.37) and the comparison group (7.8 ± 0.34; $p<0.05$). According to ultrasound data, the height of the tendon center remained reduced (12.5 ± 0.6 mm vs. 13.6 ± 0.7 and 14.0 ± 0.5 mm), while urethral mobility was increased (9.0 ± 0.6 mm vs. 7.2 ± 0.6 and 6.2 ± 0.5 mm; $p<0.001$), indicating persistent pelvic floor

dysfunction after delivery of a with macrosomia.

According to UDS data, a gradual recovery of lower urinary tract function was observed in all groups. The maximum urine flow rate increased in all groups (up to 18.0–21.0 ml/s; $p<0.05$ within groups). The residual urine volume decreased significantly, amounting to 35.0 ± 4.2 ml, 25.0 ± 3.0 ml, and 18.2 ± 2.8 ml, respectively, by the 12th month ($p<0.05$ within groups).

Significant differences were found in a number of indicators of comprehensive urodynamic examination between the study groups. It was found that the maximum urethral pressure at 12 months in women in the main group was 46.5 ± 1.9 cm H_2O, which is significantly lower than in the control group (51.0 ± 1.5 cm H_2O) and the comparison group (52.5 ± 1.6 cm H_2O) ($p<0.05$). When analyzing the length of the functional urethra, the lowest values were recorded in the main group — 30.0 ± 1.3 mm versus 35.4 ± 1.2 mm and 36.5 ± 1.0 mm, respectively ($p<0.05$). Urethral closure pressure was also significantly lower in the main group of postpartum women — 33.2 ± 1.5 cm H_2O compared to the control group — 38.5 ± 1.4 cm H_2O and the comparison group - 40.0 ± 1.3 cm H_2O ($p<0.05$). A decrease in the amplitude of the pelvic floor EMG was found in the main group - 74.0 ± 2.4 μV, while in the control and comparison groups, the values reached 79.5 ± 2.0 μV and 83.2 ± 2.0 μV, respectively ($p<0.05$).

It was found that the introduction of an algorithm for the early diagnosis of stress urinary incontinence using the «UroBalance» mobile app and personalized rehabilitation (Kegel exercises, fractional CO_2 laser) significantly increased the clinical effectiveness of treatment. A threefold increase in pelvic floor muscle tone, a 3.8-fold decrease in the frequency of positive cough tests, and a twofold improvement in quality of life and sexual health were observed. The most pronounced therapeutic effect was achieved with the use of a CO_2 laser, which was confirmed by echography: a decrease in the angle of urethral rotation to 32°, a decrease in its mobility to 8.2 mm, an increase in cystometric capacity to 370.0 ml, and a decrease in residual urine to 25.0 ml ($p<0.05$).

Scientific novelty:

1. For the first time, predictive models have been used to facilitate early diagnosis of stress urinary incontinence in primiparous women with macrosomia in the postpartum period.

2. For the first time, risk factors for stress urinary incontinence in primiparous women in the postpartum period have been summarized depending on the method of delivery and fetal weight.

3. For the first time, a comprehensive approach to a diagnostic algorithm has been developed and implemented for women of reproductive age after their first delivery with macrosomia and symptoms of stress urinary incontinence.

4. For the first time, a comprehensive postpartum rehabilitation program for women with urinary incontinence has been developed and implemented, including the use of the «UroBalance» mobile app, pelvic floor muscle training, and CO_2 laser correction.

5. For the first time, a correlation was found between stress urinary incontinence and UDS parameters and perineometry in women of reproductive age

after their first delivery with macrosomia. For the first time, the quality of life was assessed in primiparous women with stress urinary incontinence after vaginal delivery of a large baby.

6. For the first time, the quality of life was assessed in primiparous women with stress urinary incontinence following vaginal delivery of a macrosomic infant.

Practical relevance:

1. A method for comprehensive examination and rehabilitation of primiparous women after delivery of a large fetus and stress urinary incontinence has been developed.

2. The practical significance lies in the development and implementation of an algorithm for the early diagnosis of stress urinary incontinence in primiparous women with macrosomia in the postpartum period, which will allow for the timely detection and treatment of this condition, minimizing its impact on the quality of life of women in the reproductive and subsequent periods of their lives.

3. Informative diagnostic criteria for urinary disorders after vaginal delivery with macrosomia in primiparous women have been identified: changes in psycho-emotional status, echostructural indicators of the urinary system for early diagnosis of the consequences of delivery with macrosomia and their rehabilitation.

4. The introduction of the developed algorithm for early diagnosis (questionnaire, perineometry, UDS, mobile application «UroBalance») into clinical practice will improve the accuracy and timeliness of diagnosis and correction of stress urinary incontinence in primiparous women after vaginal delivery of a large fetus, as well as improve their quality of life.

5. A comprehensive approach to early diagnosis will allow stress urinary incontinence to be detected at earlier stages and improve the prognosis of the disease. Pelvic floor muscle training using the «UroBalance» mobile app and CO_2 laser correction will allow for the timely relief of symptoms of stress urinary incontinence and sexual dysfunction after delivery with macrosomia, preserving the autonomy and mobility of patients of reproductive age.

6. The use of questionnaires, perineometry, and UDS in primiparous women with macrosomia in the postpartum period will enable early diagnosis and timely correction to prevent the progression of stress urinary incontinence and the occurrence of genital prolapse in the long term, thus avoiding surgical treatment.

Personal contribution of the doctoral student: All results presented in the dissertation and having scientific novelty were obtained by the author personally. The author conducted a comprehensive study aimed at improving methods for early diagnosis and personalized correction of stress urinary incontinence in primiparous women of reproductive age in the postpartum period, as well as statistical analysis of data. The author has developed an algorithm for the early diagnosis of stress urinary incontinence, which includes a combination of clinical, questionnaire, and instrumental research methods. The author is the developer of two clinical protocols of the Ministry of Health of the Republic of Kazakhstan: «Stress urinary incontinence in women» and «Prolapse of female genital organs», dedicated to the diagnosis and treatment of stress urinary incontinence in women. The author has created the «UroBalance» mobile app, aimed at correcting stress

urinary incontinence in women after childbirth. The following author's certificates have been developed and approved: «Author's certificate for the method of early diagnosis of stress urinary incontinence in postpartum women with macrosomia using perineometry», «UDS - as a method for the early diagnosis of stress urinary incontinence in women after childbirth with macrosomia», «UroBalance» - a mobile application to improve the effectiveness of pelvic floor muscle training in women with stress urinary incontinence after childbirth.

Conclusions:

1. In primiparous women, the incidence of macrosomia during vaginal delivery is 13.06%, and the incidence of stress urinary incontinence in postpartum women in the main group is 77.9%, in the control group – 51%, and in the comparison group – 20.7%. The reliable risk factors for SUI in primiparous women with macrosomia have been identified: active reproductive age (27.6 years), the presence of endocrine pathology, including thyroid disease in 39.8%, excess body weight in 40.0%, 48.4% with grade I–II obesity, 13.7% with gestational diabetes mellitus, 33.3% with chronic pyelonephritis, as well as a longer duration of the second stage of labor (69.0 minutes) compared to 56.9 minutes in the control group ($p<0.05$).

2. In primiparous women after natural delivery of a large fetus, the most pronounced functional changes in the urinary system are manifested by a significant increase in the frequency of urination (13.4 times per day versus 10.2 times in the group with macrosomia after cesarean section), a significant increase in positive functional tests: cough test - 77.9% in the main group versus 50.5% in the control group and 20.7% in the comparison group, Valsalva test - 75.8% in the main group versus 48.4% in the control group; 19.6% in the comparison group, significantly low pelvic floor muscle tone according to perineometry data (1.8 vs. 2.2 and 2.5 points, respectively), which led to a significant decrease in quality of life, most pronounced in the main group (10.5 vs. 9.0 and 7.8 points, $p>0.5$).

3. The established significant positive correlations between the weight of the newborn and SUI [$r=0.98$], the duration of labor and SUI [$r=0.99$] made it possible to develop a personalized, clinically oriented algorithm for the early detection and correction of stress urinary incontinence in women after their first natural birth with macrosomia using the «UroBalance» mobile application, including the stages of risk stratification, diagnosis, and selection of individual therapy, taking into account the patient's motivation.

4. The developed algorithm for early diagnosis of SUI using the «UroBalance» mobile application and individual rehabilitation of patients after their first natural birth with macrosomia (Kegel exercises, fractional CO_2 laser) significantly increased the effectiveness of treatment, which was manifested by a 3-fold increase in pelvic floor muscle tone, a 3.8-fold decrease in the frequency of cough tests, and a 2-fold improvement in sexual health and quality of life indicators.

5. During the rehabilitation of patients with SUI after their first natural birth with macrosomia, the most pronounced functional effect was achieved with the use of a fractional CO_2 laser, which was confirmed by anatomical and topographical

changes revealed by pelvic floor echography: a decrease in the rotation angle of the urethra to 32°, a decrease in urethral mobility to 8.2 mm, an increase in cystometric capacity to 370.0, and a decrease in residual urine to 25.0, which confirmed its high therapeutic efficacy relative to Kegel exercises ($p<0.05$).

Approbation of the dissertation results:

The main provisions and results of the dissertation were presented at:

– IV International Scientific and Educational Forum «Ana men bala», Almaty, Kazakhstan, May 20-21, 2021;

– V International Scientific and Educational Forum «Ana men bala», Almaty, Kazakhstan, May 19-20, 2022;

– Scientific and Practical Conference «International Approach to the Treatment of Urological Diseases» dedicated to the memory of Academician B.U. Dzharbusynov, Almaty, Kazakhstan, May 12, 2023;

– VI International Scientific and Educational Forum « Ana men bala», Almaty, Kazakhstan, May 19-20, 2023;

– II Central Asian Congress of Urologists CACU-23, Almaty, Kazakhstan, October 23, 2023;

– Scientific and Practical Conference «International Approach to the Treatment of Urological Diseases» dedicated to the memory of Academician B.U. Dzharbusynov, Almaty, Kazakhstan, May 17, 2024;

– III Central Asian Congress of Urologists CACU-24, Almaty, Kazakhstan, October 11-12, 2024;

– Extended meeting of the Department of Obstetrics and Gynecology with a course in clinical genetics at KazNMU named after S.D. Asfendiyarov. Protocol No. 8. Dated March 27, 2025.

Implementation details:

1. «The use of perineometry in the postpartum period for the early diagnosis of stress urinary incontinence» has been introduced into clinical practice at the City Maternity Hospital №1 in Almaty, Kazakhstan (introduction act №1 -2023);

2. Clinical protocol of the Ministry of Health of the Republic of Kazakhstan «Stress urinary incontinence in women», protocol №7 dated 21.05.2025.

3. Clinical protocol of the Ministry of Health of the Republic of Kazakhstan «Prolapse of female genital organs», protocol №7 dated 21.05.2025. **Publications:**

Eight scientific papers have been published on the topic of the dissertation, including:

− 1 article in a journal included in the international databases Scopus and Web of Science Core Collection (Clarivate Analytics);

− 3 articles in journals recommended by the Committee for Scientific and Technical Information of the Ministry of Education and Science of the Republic of Kazakhstan;

− 1 abstract in the proceedings of an international scientific and practical conference;

− 3 author's certificates

1. Veliyeva A.T., Omarova G.K., Amanzholova B.K. Stress incontinence in women at different ages (literature review) // Bulletin of KazNMU. – 2020. – №3.

– P. 27–32.

2. Veliyeva A.T., Omarova G.K. Medical and social characteristics of puerperal women with fetal macrosomia // Pharmacy of Kazakhstan. – 2022. – №3. – P. 35–39.

3. Veliyeva A.T., Omarova G.K. Comparative characteristics of the quality of life of postpartum women depending on the method of delivery and the weight of the newborn. Journal-collection «Obstetrics, Gynecology and Perinatology», Almaty 2022, №1(87). – P. 75.

4. Veliyeva A.T., Omarova G.K., Meirmanova A.O. Quality of life of women who have given birth with macrosomia and stress incontinence // Pharmacy of Kazakhstan. – 2023. – №3. – P. 16–23.

5. Veliyeva A.T., Omarova G., Mustafazade T., Magalov I., Ibragimov R. Risk factors for postpartum stress urinary incontinence: An updated systematic review and meta-analysis. Electronic Journal of General Medicine 2024, 21(1). doi.org/10.29333/ejgm/14780 (77th percentile - Scopus, Q3 -WoS).

6. Author's certificate №55226. Author's certificate for a method of early diagnosis of stress urinary incontinence in postpartum women with macrosomia using perineometry // Veliyeva A.T., Omarova G.K., Mukhamedzhanova Zh.A., Yuldasheva A.I., Meirmanova A.O. Published 26.02.2025.

7. Author's certificate No. 55640. UDS as a method for early diagnosis of stress urinary incontinence in women after delivery with macrosomia // Veliyeva A.T., Omarova G.K., Kusymzhanov S.M. Published on 12.03.2025.

8. Author's certificate № 57728. «UroBalance» - a mobile application to improve the effectiveness of pelvic floor muscle training in women with stress urinary incontinence after childbirth // Veliyeva A.T., Omarova G.K., Veliyeva M.B. Published on 06.05.2025.

Dissertation Structure:

The dissertation consists of an introduction, three sections presenting the author’s own research, a discussion of the obtained results, conclusions, practical recommendations, and a list of references and appendices. The work is presented on 136 pages of typed text and is illustrated with 32 tables, 5 figures, and 5 appendices. The reference list includes 169 sources, of which 41 are in Russian and 127 are in foreign languages.