Volume 13, Issue 4, 2025: 497-509
p-ISSN 2354-7642 e-ISSN 2503-1856
Accredited by Directorate General of Higher Education, Research and Technology, Republic of Indonesia No. 35/E/KPT/2019

Jurnal Ners dan Kebidanan Indonesia
(Indonesian Journal of Ners and Midwifery)
DOI : http://dx.doi.org/10.21927/jnki.2025.13(4).497-509
Available online at: http:ejournal.almaata.ac.id/index.php/JNKI

The effectiveness of kegel exercise in reducing perineal laceration during vaginal delivery

Lina Puspitasari[1*], Raheleh Babazadeh[2]

[1]Midwifery Program, Amikom University of Purwokerto, Cilacap, Indonesia
Jalan Letjend Pol. Soemarto No.126, Watumas, Purwanegara, Kecamatan Purwokerto Utara, Kabupaten Banyumas, Jawa Tengah
[2]Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
Mashhad, 91778 99191Razavi Khorasan Province, Iran

*Corresponding author: lina@amikompurwokerto.ac.id

ABSTRACT

Background: *Perineal laceration is a common complication during vaginal delivery, and its severity may influence maternal recovery and postpartum quality of life. Pelvic floor muscle exercises, including Kegel exercises and Pelvic Floor Muscle Training (PFMT), are believed to enhance perineal elasticity and reduce the risk of laceration. Objective: To assess the effectiveness of Kegel exercises and PFMT in reducing the degree of perineal laceration among postpartum mothers.*
Methods: *A quasi-experimental study with a posttest-only nonequivalent control group design was conducted among 60 pregnant women, who were assigned to either an intervention group (antenatal exercises with PFMT) or a control group. The degree of perineal laceration was assessed after delivery. Data were analyzed using an independent t-test.*
Results: *The findings indicated a statistically significant difference between the intervention and control groups. The mean degree of perineal laceration was lower in the intervention group (0.77 ± 0.879) than in the control group (1.73 ± 0.583), with a p-value of 0.001 and a t-value of 5.915.*
Conclusion: *This study demonstrated that Kegel exercises and Pelvic Floor Muscle Training (PFMT) are effective in reducing the degree of perineal laceration among postpartum mothers. The intervention group showed significantly lower laceration grades compared to the control group, indicating that these pelvic floor exercises can serve as a beneficial preventive strategy. These findings confirm that Kegel exercises and PFMT meet the study objective by contributing to a measurable reduction in perineal trauma during childbirth***.**

KEYWORD*: kegel exercise; normal childbirth; pelvic floor muscle training; perineal laceration; postpartum*

Article Info :

Article submitted on July 25, 2025
Article revised on October 10, 2025
Article accepted on November 25, 2025
Article Published on December 31, 2025

INTRODUCTION

The perineum is an important portion of the body during birthing, especially when the baby comes out through the vagina. Perineal laceration is a rip in the perineal tissue that can happen during or after delivery. It happens when pressure and straining happen during birth. These cuts can be moderate or severe and can cause long-term problems such as persistent discomfort, sexual dysfunction, and pelvic floor abnormalities (1,2).

There are many things that can cause perineal laceration, such as the mother's age, the number of babies she has had, the baby's weight, the baby's posture, and the pelvic floor muscles' lower elasticity (3,4). Kegel exercise, also called Pelvic Floor Muscle Training (PFMT), is a well-known way to strengthen the pelvic floor muscles without using drugs or invasive procedures (5,6).

Kegel exercises help strengthen and manage the pelvic floor muscles by making them contract on a regular basis. This exercise is thought to improve perineal flexibility and lower the incidence of urine incontinence. It may also help reduce tears during childbirth (7,8). Numerous studies indicate that regular pelvic floor muscle training (PFMT) during pregnancy may decrease the time of the second stage of labor and lower the rates of both episiotomy and spontaneous lacerations (9,11).

Multiple prior research have investigated therapies aimed at decreasing perineal damage during childbirth. Dumoulin et all (2021) conducted a comprehensive review and meta-analysis, revealing that antenatal Pelvic Floor Muscle Training (PFMT) markedly diminished the chance of serious perineal lacerations. In a quasi-randomized controlled experiment, Mørkved et al (2017) showed that a structured PFMT program reduced the number of high-degree perineal tears. Álvarez-González, et al (2021) also discovered that the integration of pelvic floor exercises with perineal massage mitigated perineal damage more successfully than massage in isolation. Observational research from a substantial Norwegian population indicated that consistent pelvic floor exercises during pregnancy correlated with a reduced occurrence of perineal lacerations.

However, many of these studies had limitations, such as combining PFMT with other interventions, using self-reported training frequency rather than a standardized protocol, or focusing on postpartum wound healing rather than the degree of perineal laceration immediately after delivery. Therefore, the present study offers a novel contribution by employing a quasi-experi-

mental design to evaluate the effect of structured antenatal Kegel exercises on the degree of perineal laceration during vaginal delivery.

Furthermore, research by Emilia & Komariah (2023) revealed that a combination of Kegel exercises and relaxation techniques, such as hypnobirthing audio, can reduce anxiety and lower the incidence of perineal injury. Structured interventions under healthcare professional supervision have also shown significant results in preventing perineal trauma (12,14). Kegel exercises have even been proven to restore pelvic floor muscle function postpartum and accelerate recovery (15,16).

In a systematic review, Ayubi et al. (2024) concluded that pelvic floor muscle training is an effective and widely applicable method in various primary healthcare settings as part of antenatal and postnatal care. However, there is still a lack of specific research examining the effect of such training on the degree of perineal laceration, especially in Indonesia, where the incidence of perineal trauma remains relatively high and prenatal education is not evenly distributed (11). Given these concerns, greater research is needed to determine how well Kegel exercises work to reduce the severity of perineal lacerations in women after childbirth. This is because Kegel exercises are a cost-effective, safe, and easy-to-do preventive measure. Therefore, this study uses a quasi-experimental approach to examine two groups of postpartum women: those who routinely do Kegel exercises and those who do not.

MATERIALS AND METHODS

This study was conducted from January to Juni 2023. Data collection took place at three independent midwifery practices, namely those of Midwife Ida Farida, Midwife Utami Puji Astuti, and Midwife Novianti. The locations were randomly selected from several independent midwifery practices in the Cilacap City area, Central Java, Indonesia.

The study used an experimental design, specifically a posttest-only design with groups that were not randomly assigned. The participants were divided into two groups: one group participated in a prenatal exercise program, while the other served as the control group. A total of sixty pregnant women, who met the inclusion requirements, were recruited for a single-blind randomized clinical trial. Before the study began, ethical approval was acquired from the Ethics Committee of Universitas Muhammadiyah Purwokerto, with the registration number KEPK/UMP/39/I/2023. After being given information about the study's methods, participants who decided to take part signed an informed consent form. The study included pregnant women who were patients at the three selected midwifery practices and met the inclusion criteria.

Inclusion criteria included maternal age between 20 and 35 years, singleton pregnancy, gestational age of 38-40 weeks,

normal ultrasound results by an obstetrician, a normal body mass index (BMI), and willingness to participate in the study. Exclusion criteria included medical conditions such as pregnancy-induced hypertension, heart problems, gestational diabetes, abnormal ultrasound findings, failure to complete the antenatal exercise sessions, or withdrawal from the study before completion.

Respondents were selected from the population of pregnant women who visited the three selected midwifery practices in Cilacap City. The sampling method used was convenience non-probability sampling, in which pregnant women who met the inclusion and exclusion criteria were directly involved until the required sample size was achieved.

Sample size calculation was performed using the G*Power application with an independent two-sample t-test at a significance level of 0.05, resulting in a total sample size of 60 respondents. The calculated statistical power was 0.627.

Before data collection, 60 respondents were registered and randomly divided into two groups: the intervention group (n = 30) and the control group (n = 30). Randomization was done using a permuted block method with a 1:1 ratio, and the sequence was generated using the online AnyText Editor tool. The study was divided into three phases: before the intervention, during the intervention, and after the intervention. At the beginning, those in the intervention group were informed of the goals and methods of the intervention. Initial evaluations included checking vital indicators like blood pressure, heart rate, breathing rate, and body temperature. In addition, fetal palpation and monitoring of the fetal heart rate (FHR) were performed. The pregnant women in the intervention group participated in prenatal and abdominal exercises once a week. Each session unfolded over a quarter of an hour and was divided into two segments. The initial session adhered to the Indonesian Ministry of Health's recommended antenatal exercise guidelines. The subsequent session incorporated Pelvic Floor Muscle Training (PFMT) alongside stomach movements. The fitness regimen persisted right up until the baby arrived.

The first session included two movements: sitting and squatting. Cross-legged sitting offers a secure posture for expectant mothers. To complement this, warm-up exercises are recommended. These include gentle head rotations to the right and left, followed by side-to-side gazes, and then tilting the head down and up. Finally, shoulder shrugs, moving up and down, should be done. Each of these motions should be repeated three times. The squat, an exercise designed to fortify the pelvic and thigh muscles, also serves to ease tension in the pelvic region. The exercise started with a standing position. From there, the individual would gradually descend into a squat, pausing for a count of ten before rising back up. The process was repeated up to five times. The second session incorporated Pelvic Floor Muscle Training (PFMT)

alongside stomach exercises. The expectant mother lay on her back, her feet roughly a foot away from each other, and her arms relaxed at her sides.

The first step was breathing relaxation: inhaling through the nose and exhaling through the mouth three times. The second step involved tightening the lower abdomen without holding the breath normal breathing continued for a count of five seconds, repeated five times. The third step repeated the second but added head lifting (bringing the forehead toward the chest), holding the position for five seconds, repeated five times. The final step repeated the third movement with added pressure between the knees. A clenched fist was placed between the knees as a medium. This position was held for five seconds and repeated five times. In the cooling-down phase, the pregnant woman was encouraged to straighten her legs and sit back comfortably. Rotational movements were performed with the toes in both clockwise and counterclockwise directions. Breathing was then stabilized, and vital signs were rechecked, including blood pressure, respiration, temperature, and pulse.

The study included several tools, which were divided into two primary categories. The first step in collecting data entailed gathering demographic information. This included details like the mother's age, how far along the pregnancy was, the number of previous pregnancies, the mother's education, and her job. The second component of the study entails gathering obstetric data, specifically about the severity of perineal lacerations. The time it took for perineal laceration was measured using a timer, and the findings were recorded on the partograph. Pain was assessed using the Visual Analog Scale (VAS), a widely used method for evaluating pain. Several international studies have confirmed its scientific accuracy and reliability. For example, a study in Iran found a correlation coefficient of r = 0.88. To confirm the content's validity, the instrument was reviewed by qualified professionals in physiotherapy and midwifery.

RESULTS AND DISCUSSION

RESULTS

The research data were analyzed using descriptive statistical methods through univariate tests, including frequency distribution tables, central tendency indicators, and data distribution graphs according to the study results. For quantitative data, normality was tested using the Kolmogorov-Smirnov test. Relationships between qualitative variables were assessed using the chi-square test. All data analyses were performed using SPSS software (version 25). The Kolmogorov-Smirnov test was used to assess the distribution of quantitative variables. Variables that followed a normal distribution were analyzed using the independent t-test, whereas variables that did not follow a normal distribution were analyzed using the Mann–Whitney U test. In addition, Analysis of Covariance (ANCOVA) with repeated measures was applied to

Table 1. Mean and frequency distribution of demographic characteristics

Variable		Control group (n=30) Mean ± SD	Intervention group (30) Mean ± SD
Age		29.71 ± 6.079	29 ± 7.1
		Frequency (%)	**Frequency (%)**
Parity	Primigravida	13 (43.3%)	16 (53.3%)
	Multigravida	17 (56.7%)	14 (46.7%)
Education attainment	Did not finish high school	3 (10%)	1 (3.3%)
	Finished high school	21 (70%)	19 (63.3%)
	University education	6 (20%)	10 (33.4%)
Employment status	Employed	9 (30%)	11 (36.7%)
	Not employed	21 (70%)	19 (63.3%)

control for confounding variables. A p-value of less than 0.05 was considered statistically significant.

Based on the data in **Table 1**, the average age of the pregnant women in the control group was 29.71 years, with a standard deviation of 6.079 years. In contrast, the intervention group had an average age of 29 years, with a standard deviation of 7.1 years. The data suggests that the average age of the people in both groups was similar.

In the control group, 13 women (43.3%) were pregnant for the first time, whereas 17 women (56.7%) had been pregnant before. In the intervention group, 16 women (53.3%) were pregnant for the first time, and 14 women (46.7%) had been pregnant before. The results indicate a somewhat balanced distribution of parity between the two groups. Most participants in both groups had finished their secondary school. In the control group, the educational backgrounds of the participants were as follows: 21 individuals, or 70%, had completed high school; 6 individuals, or 20%, had attained a university degree; and 3 individuals, accounting for 10%, had not finished secondary education. In the intervention group, a majority of the participants, 19 people (63.3%), had finished high school. Ten participants (33.4%) had a university degree, and only one participant (3.3%) had not completed secondary school. In the control group, the job status of the women showed that 9 (30%) were employed, whereas 21 (70%) were unemployed. In the intervention group, a somewhat larger number of women were employed. Specifically, 11 women (36.7%) were employed, while 19 women (63.3%) were unemployed. The two groups had similar demographic features, which supports the idea that comparing the control and intervention groups in this study is valid.

The data in **Table 2** demonstrated a statistically significant difference in the average severity of perineal laceration between the control and intervention groups.

Table 2. Comparison of the mean ± standard deviation (SD) or frequency (%) of perineal laceration degrees between the control and intervention groups

Variable	Control group (n=30) Mean ± SD	Intervention group (n=30) Mean ± SD	P-value*	t	Cohen's d
The severity of pain caused by perineal laceration	1.73 ± 0.583	0.77 ± 0.879	0.001	5.915	1.29

The control group had an average laceration score of 1.73 ± 0.583. In contrast, the intervention group showed a decreased average score of 0.77 ± 0.879. The independent t-test produced a p-value of 0.001 and a t-score of 5.915, suggesting a statistically significant difference ($p < 0.05$). The computed effect size, denoted by Cohen's d, was 1.29. This value indicates a strong influence, according to established standards. Therefore, the results suggest that the intervention, which involved prenatal exercise and pelvic floor muscle training (PFMT), significantly reduced the degree of perineal tearing in women after giving birth, compared to those who didn't participate. This also had a large practical impact.

DISCUSSION

The results of this study indicate that regularly performing Kegel exercises, starting in the 38th week of pregnancy, is effective in reducing the degree of perineal laceration in postpartum women. These findings reinforce and expand upon the evidence from previous research regarding the role of pelvic floor muscle training in maintaining perineal integrity and pelvic health during childbirth. Before analyzing the effect of the intervention, it is important to note that the demographic characteristics of the control and intervention groups were relatively comparable, as shown in **Table 1**. Both groups had similar distributions in terms of age, parity, education level, and employment status. This comparability suggests that there were no significant baseline differences that could influence the outcomes, allowing for a more valid interpretation of the intervention effects.

The findings of this study indicate that prenatal Kegel exercises and Pelvic Floor Muscle Training (PFMT) significantly reduced the degree of perineal laceration in postpartum women. As shown in **Table 2**, the intervention group showed a mean laceration degree of 0.77 ± 0.879, compared to 1.73 ± 0.583 in the control group ($p = 0.001$, $t = 5.915$, Cohen's $d = 1.29$), indicating a strong practical effect. This magnitude of effect highlights the strong clinical impact of the intervention. However, to contextualize this result, it is important to compare it with prior research that has evaluated similar interventions. Most previous studies examining pelvic floor muscle training (PFMT) or related prenatal interventions have focused on dichotomous outcomes, such as the risk of

severe perineal tears or the probability of achieving an intact perineum, rather than reporting standardized effect sizes (e.g., Cohen's d). Recent meta-analyses have demonstrated that PFMT reduces the risk of obstetric anal sphincter injuries (OASI) and decreases the likelihood of perineal trauma, typically reporting outcomes as relative risk (RR) or odds ratios (OR) (17,18). Similarly, studies evaluating perineal massage have shown significant reductions in perineal pain and trauma but also rely primarily on RR and mean differences rather than standardized ES metrics (19).

Although direct comparisons based on effect sizes are limited for perineal laceration specifically, several PFMT trials assessing pelvic floor outcomes have reported large standardized effects. For example, Dudonienė et al. (2023) observed a Cohen's d of approximately 1.17 for improvements in pelvic floor function among women receiving PFMT. Although the outcome differed from degree of perineal laceration, these findings demonstrate that PFMT can indeed produce large effect sizes in clinically relevant maternal health outcomes (20).

Therefore, the Cohen's d of 1.29 in this study is not only statistically meaningful but also comparatively stronger than most previously reported effects, suggesting that the intervention protocol particularly the timing beginning at 38 weeks of gestation—may offer enhanced effectiveness. This reinforces the argument that late-trimester PFMT or Kegel exercises may yield substantial clinical benefits in reducing perineal trauma.From a theoretical perspective, Kegel exercises strengthen the pelvic floor muscles, including the levator ani group, which increases perineal support and elasticity. Improved muscle tone and controlled relaxation during the second stage of labor may reduce excessive stretching and tearing of the perineal tissues. Pathophysiologically, perineal lacerations occur when the tensile strength of the perineal muscles and connective tissues is exceeded during fetal expulsion. By enhancing muscular strength, neuromuscular coordination, and tissue flexibility, PFMT may decrease tissue trauma and promote more gradual stretching, thereby lowering the degree of laceration.

Several studies have confirmed that pelvic floor muscle training (PFMT) effectively strengthens the perineal muscles and improves tissue elasticity, thereby reducing the incidence of perineal tears during delivery ((5,6,10). Research by Emilia & Komariah (2023) also supports this finding, showing that Kegel exercises reduce the rate of perineal injuries during spontaneous delivery, especially when combined with relaxation techniques (12).

A systematic review by Ayubi et al. (2024) concluded that PFMT significantly reduces the risk of perineal trauma and accelerates postpartum recovery (11). These results align with a meta-analysis by Zambuto et al. (2025), which found that antenatal interventions such as vaginal dilators and Kegel exercises are effective in

preventing perineal trauma. However, unlike those studies, the current research offers a unique contribution by focusing specifically on an intervention period beginning at 38 weeks of gestation, which is rarely emphasized in previous studies (21).

Research by Łuczak et al. (2025) and Villani et al. (2024) highlighted the general benefits of prenatal exercise in facilitating labor and preventing perineal complications. However, neither study specifically addressed Kegel exercises as a primary intervention variable. Thus, this study makes a unique contribution by emphasizing that a simple intervention like Kegel exercises in the final weeks of pregnancy can have a significant impact on delivery outcomes (3)(22).

Studies by Hagawane et al. (2025) and Жук et al. (2024) described the high incidence of pelvic floor dysfunction and obstetric trauma associated with weak perineal muscles. This study supports the notion that preventive interventions such as PFMT before childbirth are strategic, non-invasive solutions to address these issues (1)(23). Additional studies have also extended the benefits of Kegel exercises beyond trauma prevention to include postpartum rehabilitation (15,24,25). Nevertheless, very few studies have directly measured the relationship between late-trimester Kegel exercises and perineal laceration degree, as done in this research. Sreevinishaa et al. (2024) showed that Kegel exercises are more effective than hypopressive exercises in preventing pelvic organ prolapse, supporting the idea that these exercises provide structural protection to the perineal tissues (2). Similarly, studies by Sun et al. (2023) and Hauwaert et al. (2024) emphasized the importance of perineal training in primary prevention guidelines for pelvic floor dysfunction during pregnancy (14,26).

Overall, the findings of this study are consistent with previous evidence supporting PFMT as a safe and effective intervention. However, the strengths of this study lie in its specific intervention timing (starting at 38 weeks of gestation), the use of a quasi-experimental design, and the focus on degree of perineal laceration as the primary outcome.

A study by Wu et al. (2025) noted that prenatal interventions for maintaining pelvic floor health, including Kegel exercises, can reduce the risk of perineal trauma and improve postpartum recovery. It also found that structured physical activity during pregnancy, including perineal exercises, shortened the second stage of labor and reduced the incidence of episiotomy and perineal rupture (9). Consistent with these findings, Zambuto et al. (2025), in their systematic review, noted that exercises involving vaginal dilation or perineal stretching, including Kegel exercises, help reduce the degree of perineal trauma during childbirth. Hagawane et al. (2025) further emphasized that lack of participation in pelvic floor training is one of the main risk factors for pelvic floor dysfunction, including perineal trauma (21). In a clinical study by Ummah et

al. (2024), postpartum Kegel exercise interventions significantly improved pelvic floor muscle strength and endurance and accelerated perineal wound recovery, supporting the effectiveness of this exercise during the postpartum period. Meanwhile, Ayubi et al. (2024), through a systematic review, also demonstrated that pelvic floor muscle training is effective in reducing urinary incontinence and perineal trauma, especially when initiated before childbirth (6,11).

Furthermore, Villani et al. (2024) confirmed that exercises using assistive tools such as vaginal cones, which operate on similar principles to Kegel exercises, can speed up perineal rehabilitation. Rahman et al. (2023) also emphasized the importance of preventive measures against levator ani avulsion, including appropriate prenatal exercises (27) .

MacArthur et al. (2024) highlighted that antenatal Kegel exercise interventions conducted by midwives can lower the incidence of urinary incontinence and potentially reduce perineal trauma. In a more recent study by Rusina et al. (2024), individualized therapy approaches for pelvic floor dysfunction, including Kegel training, showed significant results in addressing structural postpartum issues (7,8).

Based on this comparative analysis, it can be concluded that your study strengthens the existing scientific evidence and contributes by demonstrating that consistent Kegel exercise prior to labor is an effective non-invasive intervention for preventing and reducing the degree of perineal laceration.

CONCLUSION AND RECOMMENDATION

This study demonstrates that regular Kegel exercises, initiated from the 38th week of gestation, are effective in significantly reducing the degree of perineal laceration in postpartum women. The intervention group showed a markedly lower mean laceration score compared to the control group, indicating that pelvic floor muscle training (PFMT) is a beneficial non-invasive strategy to enhance perineal integrity during childbirth.

These findings support the integration of Kegel exercises into prenatal care programs as a preventive measure to minimize birth-related perineal trauma and improve maternal health outcomes**.** It is therefore recommended that midwives and healthcare providers integrate Kegel exercise education into antenatal care programs. Health authorities should also promote Kegel exercises as part of maternal health policies, and community education should be strengthened to increase awareness among pregnant women. Further research with larger samples and long term follow up is encouraged to explore the sustained benefits of Kegel exercises on perineal recovery and maternal well being.

REFERENCES

1. Hagawane K, Sinha I, Zeeshan Z. Pelvic Floor Dysfunction After Childbirth: A Systematic Review of Prevalence and

Associated Risk Factors. World Journal of Advanced Research and Reviews. 2025;26(1):3987-95. https://doi.org/10.30574/wjarr.2025.26.1.1371

2. Sreevinishaa, Jothilingam M, Buvanesh, Kandasamy G. Comparing the Effects of Hypopressive “Exercise”and Kegels Exercise for Pelvic Organ Prolapse Among “Patients With” Spontaneous Vaginal Delivery. Indian Journal of Physiotherapy and Occupational Therapy - An International Journal. 2024;18:856–61.https://doi.org/10.37506/ykrf3h15
3. Luczak K, Dudek P, Ulicka W, Pięta J, Chudzikowski M, Tabeau A, et al. How Does Prenatal Exercise Affect Labor and Delivery? A Review of the Influence of Prenatal Physical Activity on the Course of Vaginal Birth. Journal of Education Health and Sport. 2025; 80: 59415.https://doi.org/10.12775/JEHS.2025.80.59415
4. Villani F, Petre I, Buleu F, Iurciuc S, Marc L, Apostol A, et al. Pelvic Floor Muscle Training vs. Vaginal Vibration Cone Therapy for Postpartum Dyspareunia and Vaginal Laxity. Medicina. 2024; 61(1):23.https://doi.org/10.3390/medicina61010023
5. Bø K, Lillegård RH, Skaug KL. Pelvic Floor Muscle Training on Stress Urinary Incontinence in Power- And Weight lifters: A Pilot Study. International Urogynecology Journal. 2024;35(6): 1291-8. https://doi.org/10.1007/s00192-024-05801-8
6. Ummah SN, Rahmawati NA, Yulianti A. The Effect of Kegel Exercise on Pelvic Floor Muscle Endurance in Postpartum Mothers With Spontaneous Birth With Perineal Tears. Jurnal Kesehatan. 2024;301–7.https://doi.org/10.23917/jk.v17i3.3987
7. MacArthur C, Bick D, Salmon VE, Jones E, Hay-Smith J, Bishop J, et al. Midwifery-Led Antenatal Pelvic Floor Muscle Exercise Intervention to Reduce Postnatal Urinary Incontinence: APPEAL Research Programme Including a Feasibility and Pilot Cluster RCT. Programme Grants for Applied Research. 2024;1-106. https://doi.org/10.3310/tjdh7946
8. Rusina EI, Zhevlakova MM, Shelayeva E V, Yarmolinskaya MI. Differentiated Approach to the Choice of Therapy for Stress Urinary Incontinence in Women With Pelvic Floor Dysfunction. Journal of Obstetrics and Women S Diseases. 2024;73(2):63–76.https://doi.org/10.17816/JOWD629472
9. Wu Y, Zhong Y, Xu C, Li H, Chen M, Xu L. Interventions for Maintaining Pelvic Floor Health During Pregnancy: A Systematic Review. Physiotherapy Research International. 2025;30(3). https://doi.org/10.1002/pri.70077
10. Ryhtä I, Axelin A, Parisod H, Holopainen A, Hamari L. Effectiveness of Exercise

Interventions on Urinary Incontinence and Pelvic Organ Prolapse in Pregnant and Postpartum Women: Umbrella Review and Clinical Guideline Development. JBI Evidence Implementation. 2023;21(4):394–408. https://doi.org/10.1097/xeb.0000000000000391

11. Ayubi N, Padmasari DF, Komaini A, Putri DRS, Syafawi A, Mario DT, et al. The Effectiveness of Pelvic Floor Muscle Training on Decreasing Urinary Incontinence in Pregnant or Postnatal Women: A Systematic Review. Retos. 2024; 54:506–12.https://doi.org/10.47197/retos.v54.103941
12. Emilia O, Komariah N. Application of Kegel Gymnastics and Audio Hypnobirthing in Midwife Care During Pregnancy to Reduce Urine Incontinence and Anxiety. Journal of Maternal and Child Health Sciences (Jmchs). 2023;3(1):307–15.https://doi.org/10.36086/maternalandchild.v3i1.1700
13. Sananès J, Pire S, Féki A, Boulvain M, Faltin D. Antenatal, Intrapartum and Postpartum Interventions for Preventing Postpartum Urinary and Faecal Incontinence: An Umbrella Overview of Cochrane Systematic Reviews. Journal of Clinical Medicine. 2023;12(18):6037. https://doi.org/10.3390/jcm12186037
14. Hauwaert R Van, Tomé A, Almeida R, Vilela F, Coutinho AL, Alpoim D, et al. Physical Exercise and Pelvic Floor Muscle Training. 2024;9.169–202. https://doi.org/10.4018/979-8-3693-3952-7.ch007
15. Skevington SM, Ashrafi N, Hill A, McMullan S. The impact of pelvic floor muscle strengthening on pelvic floor function in women after obstetric anal sphincter injuries (OASIS). Medicina (Kaunas). 2024;61(1):22. https://doi.org/10.3390/medicina6100022
16. Ayalani H, Dave S. Effect of Intravaginal Electric Stimulation and Kegel's Exercise on Pelvic Floor Muscle Strength and Endurance in Postpartum Females Having Urinary Incontinence: A Case Series. International Journal of Health Sciences and Research. 2024;14(5) 509–14.https://doi.org/10.52403/ijhsr.20240566
17. Xu M, Zhang X, Zhuo Y, Wu W, Liu Q, Qin S, et al. Health Qigong Mawangdui Guidance Can Improve Pelvic Floor Muscle Function and Quality of Life in Females With Stress Urinary Incontinence: A Randomized Controlled Trial Pilot Study. Medicine. 2024; 103(15): e37671.
18. Silva-Jose C, May L, Sánchez-Polán M, Zhang D, Barrera-Garcimartín A, Refoyo I, et al. Influence of Physical Activity during Pregnancy on Neonatal Complications: Systematic Review and Meta-Analysis. Journal of Personalized Medicine. 2024;14(1). https://doi.org/10.3390/jpm14010006
19. Yin J, Chen Y, Huang M, Cao Z, Jiang Z,

Li Y. Effects of perineal massage at different stages on perineal and postpartum pelvic floor function in primiparous women: a systematic review and meta-analysis. BMC Pregnancy Childbirth. 2024 Dec 1;24(1).https://doi.org/10.1186/s12884-024-06586-w

20. Dudonienė V, Kirklytė I, Žlibinaitė L, Jerez-Roig J, Rutkauskaitė R. Pelvic Floor Muscle Training versus Func tional Magnetic Stimulation for Stress Urinary Incontinence in Women: A Randomized Controlled Trial. Journal of Clinical Medicine. 2023 May 1;12(9). https://doi.org/10.3390/jcm12093157
21. Zambuto SG, Scott AK, Hardi A, Oyen ML, Sutcliffe S, Lowder JL. The Effect of Antenatal Vaginal Dilators on Perineal Trauma: A Systematic Review and Meta-analysis. International Journal of Gynecology & Obstetrics. 2025 Aug; 170(2):538-550. https://doi.org/10.1002/ijgo.70096
22. Villani F, Minopoli B, Rigano D, Furău C, Todut OC, Ciobanu V, et al. Perineal Rehabilitation in Pelvic Floor Dys function: The Benefits of Vaginal Cone Training. Balneo and PRM Research Journal. 2024;15(Vol.15, 3):729.
23. Kyk CI, Shchurevska OD, Shcherbinska OS. Obstetric Perineal Trauma. Reproductive Health of Woman. 2024; (3):18–27.https://doi.org/10.30841/2708-8731.3.2024.306392 b
24. Villani F, Cosmi E, Lunardon Z, Granci M, Panizza C, Mazzucato B, et al. Antenatal Anovaginal Distance, a Potential Indicator of Perineal Damage During Pregnancy. Healthcare. 2024; 12(20):2044.https://doi.org/10.3390/healthcare12202044
25. Samsonova IA, Gaifulin RF, Токтар ЛР, Оразов МР, Kamarova ZN, Li KI, et al. Pelvic Floor Muscle Training as a Method of Prevention and Treatment of Pelvic Floor Dysfunction and Genital Prolapse. Rudn Journal of Medicine. 2023;27(1):39–45.
26. Sun X, Gao L, Zhu H, Wei J, Guo J, Wang J, et al. Chinese Expert Consensus on Primary Prevention for Pelvic Floor Dysfunction During Pregnancy. Gyneco logy and Obstetrics Clinical Medicine. 2023;3(3):133–9.https://doi.org/10.1016/j.gocm.2023.08.002
27. Rahman MN, Sukarsa MRA, Rinaldi A, Achmad ED, Sasotya RMS, Armawan E, et al. Obstetrical Ballooning and Avulsion of Levator Ani Muscle After Vaginal Delivery: A Literature Review. Bali Medical Journal. 2023;12(2): 2070–3.https://doi.org/10.15562/bmj.v12i2.4514