RESEARCH PAPER

Effectiveness of Core Strengthening on Pelvic Stability and Low Back Pain in Post-Abortion Females

Ms. Nandisha Alpesh Ingle[1], Dr. Namrata Kadam[2]
[1]Intern Krishna college of physiotherapy krishna Vishwa vidhyapeeth , karad.
[2]Assistant Professor, Department of Pediatric Neurosciences, Krishna college of physiotherapy,Krishna Vishwa vidhyapeeth , karad

ABSTRACT
Background: Post-abortion females represent a clinically distinct population susceptible to lumbopelvic instability and low back pain due to abrupt hormonal withdrawal and disrupted core neuromuscular integrity, yet targeted musculoskeletal rehabilitation is absent from standard post-abortion care protocols. While empirical literature has documented psychological and physiological sequelae following induced abortion, a significant knowledge gap persists regarding musculoskeletal consequences during post-procedural recovery. Understanding the prevalence and associated factors of these sequelae is crucial for optimizing patient counseling, developing targeted prevention strategies, and implementing appropriate rehabilitation protocols.
Materials and Methods: A 6-week randomized controlled trial (RCT) involving 46 post-abortion females (aged 18–45 years) recruited from KVV Hospital, Karad, who presented with low back or pelvic girdle pain ≥ 3/10 on the Visual Analogue Scale (VAS) within 2–6 weeks of first-trimester abortion. Participants were randomly assigned to an intervention group (n = 23) receiving a progressive core strengthening program plus standard care or a control group (n = 23) receiving standard care only. The assessment included the VAS for pain, the Active Straight Leg Raise (ASLR) test for pelvic stability, plank hold time for core endurance, and the Perinatal Bereavement Grief Scale (PGS) for emotional well-being, measured at baseline and post-intervention.
Results: Both groups demonstrated statistically significant within-group improvements across all measures (all ps < .001). The intervention group showed substantially greater gains: VAS reduced by 5.53 points (Cohen's d = 4.68); ASLR improved by 16.70° (d = 3.05); plank hold time increased by 25.35 s (d = 3.52); and PGS decreased by 35.22 points (d = 8.81). Between-group comparisons confirmed significant superiority of the intervention on ASLR (t[44] = 6.88, p < .001), plank hold time (t[44] = 9.49, p < .001), PGS (t[44] = −9.42, p < .001), and VAS (t[44] = −2.50, p = .016).
Conclusion: This RCT demonstrated that a structured 6-week core strengthening program significantly outperformed standard care across all outcomes in post-abortion females, with uniformly large effect sizes. Strong associations between pain reduction, improved pelvic stability, enhanced core endurance, and ameliorated perinatal grief indicate that anterior core rehabilitation is a prevalent and necessary clinical priority. Clinical implications include preoperative counseling, early mobilization protocols, and comprehensive multidisciplinary rehabilitation strategies to optimize patient outcomes in this underserved population

Keywords: post-abortion rehabilitation, core strengthening, pelvic stability, low back pain, Visual Analogue Scale, Active Straight Leg Raise, perinatal grief, randomized controlled trial.
How to cite this article*:* Ingle NA, Kadam N. Effectiveness of Core Strengthening on Pelvic Stability and Low Back Pain in Post-Abortion Females. Int J Drug Deliv Technol. 2026;16(59s): 1516-1522. DOI: 10.25258/ijddt.16.59s.169
Source of support: *Nil.*
Conflict of interest: Nil.

INTRODUCTION

The convergence of reproductive health and musculoskeletal rehabilitation constitutes a significantly underinvestigated domain within women's healthcare research. While empirical literature has comprehensively documented the psychological and immediate physiological sequelae following induced abortion (Rocca et al., 2020; Steinberg & Finer, 2011), a substantial lacuna persists regarding the biomechanical ramifications that affect women during the post-procedural recovery phase (Kulier et al., 2011). Contemporary research has predominantly focused on immediate complications such as hemorrhage, infection, and retained products of conception (Raymond & Grimes, 2012), while the musculoskeletal consequences remain largely unexplored in peer-reviewed literature.

Post-abortion patients present a distinctive clinical phenotype characterized by acute hormonal fluctuations analogous to those observed in postpartum populations (Schreiber et al., 2016), yet occurring in the absence of the progressive physiological adaptations inherent to full-term gestation. This precipitous endocrine reversal engenders a unique pathophysiological challenge: the pelvic girdle, having initiated preparatory modifications mediated by relaxin and progesterone (Aldabe et al., 2012; Dehghan et al., 2014), must undergo rapid restabilization without the concurrent muscular adaptation that typically accompanies

**Author for Correspondence:*

parturition and subsequent postnatal recovery. Consequently, this transitional period is characterized by heightened susceptibility to pelvic instability concurrent with diminished core muscular integrity, predominantly manifesting as lumbosacral pain (Vleeming et al., 2008;)—a clinical presentation frequently relegated to the category of transient discomfort rather than appropriately recognized as a treatable musculoskeletal pathology warranting therapeutic intervention.

This population presents particular salience for rehabilitation science inquiry due to the dual burden of physiological and psychosocial factors. Firstly, the immediate tissue microtrauma and hormonal dysregulation establish a temporal window of mechanical vulnerability within the lumbopelvic-hip complex (Pool-Goudzwaard et al., 2004; Damen et al., 2002). Secondly, prevailing social stigmatization surrounding elective pregnancy termination frequently constitutes a barrier to appropriate post-procedural care-seeking behavior, including access to physiotherapeutic interventions routinely integrated into standard postpartum care protocols (Stuge et al., 2004; Gutke et al., 2008). This phenomenon results in an underserved clinical cohort whose musculoskeletal healthcare needs remain systematically unaddressed, notwithstanding accumulating evidence suggesting that early rehabilitative intervention may effectively prevent the development of chronic pain syndromes (Hodges & Moseley, 2003; Richardson et al., 2002).

The core musculature—constituting an integrated anatomical unit encompassing the transversus abdominis, lumbar multifidus, pelvic floor musculature, and diaphragm (Bergmark, 1989; Hodges & Richardson, 1996)—functions as a biomechanical cylinder providing dynamic stabilization to the lumbopelvic complex through coordinated neuromuscular activation patterns (Panjabi, 1992; McGill, 2001). In post-abortion females, this sophisticated integrative system experiences multifactorial disruption via several pathophysiological mechanisms: dysregulation of intra-abdominal pressure homeostasis (Hodges et al., 2005; Cholewicki et al., 1999), compromised proprioceptive and neuromuscular control secondary to abrupt hormonal withdrawal (Janse de Jonge et al., 2019; Pearson et al., 2009), and potential disuse-mediated muscular atrophy during the convalescent period (Hides et al., 1994; Barker et al., 2004). Investigating the efficacy of structured core stabilization interventions in restoring lumbopelvic stability and ameliorating associated low back pain (O'Sullivan et al., 1997; Richardson et al., 1999) transcends mere academic inquiry, representing a potential paradigmatic evolution in comprehensive abortion care delivery that encompasses the holistic continuum of women's health requirements extending beyond the procedural intervention itself.

2. Materials and Methods

2.1 Participants

This randomized controlled trial (RCT) was conducted at Krishna Vishwa Vidyapeeth (KVV) Hospital in Karad over a duration of 6 months. The study population comprised post-abortion females aged 18-45 years, recruited using random sampling from the hospital, which serves a large number of women post-induced abortion. The sample size was calculated as 41 using the formula $n=Z^2pqL^2$, where $Z=1.96$ (95% confidence interval), $p=20.5\%$ prevalence of post-abortion complications from prior literature, $q=79.5\%$, and $L=0.125$, then rounded up and adjusted to 46 participants, accounting for 10% dropout.

The inclusion criteria for the study encompassed females aged 18-45 years with a history of medical or surgical first-trimester abortion (≤12 weeks) within the last 2-6 weeks, low back or pelvic girdle pain ≥3/10 on the Visual Analogue Scale (VAS) persisting >48 hours post-procedure, and the ability to provide informed consent and participate in exercises. Exclusion criteria encompassed complicated or incomplete abortions (e.g., infection, retained products), pelvic inflammatory disease, continuing pregnancy, abortions >12 weeks gestation, history of spinal surgery, neurological deficits, systemic inflammatory diseases, uncontrolled medical conditions, current pregnancy, or inability to consent.

2.2 Procedure

Participants underwent screening for eligibility using a checklist, followed by written informed consent in their preferred language, prioritizing comfort and confidentiality. Eligible individuals were randomized into an experimental group receiving a structured core strengthening program (e.g., pelvic tilts, bridging, bird-dog exercises targeting abdominal, lumbar, and pelvic muscles) or a control group receiving standard care (rest, pain medication, basic pelvic floor exercises). Assessments occurred at baseline and post-intervention, using validated tools including VAS for pain, the Active Straight Leg Raise (ASLR) test for pelvic stability, plank hold time for core endurance, and the Perinatal Bereavement Grief Scale (PBGS) for emotional aspects. Data was recorded on structured forms, entered into Microsoft Excel, and analyzed with descriptive statistics (mean, SD, frequency) and inferential paired t-tests for normally distributed data. Ethical approval was obtained from the Institutional Ethics Committee, adhering to ICMR guidelines and the Declaration of Helsinki, with voluntary participation and the right to withdraw.

2.3 Ethical Approval and Participation Consent

To begin the research, ethical approval was obtained from the Institutional Ethics Committee of the tertiary care hospital. All the participants were informed about the study's purpose and inclusion standards. Moreover, it was made sure that the patients should be aware of the nature of the tests they had to go through and the type of information required from them. Also, the
Participants were given the right to withdraw from the ongoing research at any time.

3. RESULTS

3.1 Statistical analysis

For data analysis, all statistical procedures were performed using IBM Corp. Released 2021. IBM Statistical Package for the Social Sciences (SPSS) Statistics for Windows, Version 28.0. Armonk, New York, USA. Prior to inferential testing, the normality of each continuous outcome variable was assessed using the Shapiro–Wilk test. For outcome measures that violated the assumption of normality, non-parametric tests were employed: the Wilcoxon Signed-Rank Test was used for within-group comparisons (pre vs. post-intervention) of the Visual Analogue Scale (VAS) pain scores, and the Mann–Whitney U Test was used for between-group comparisons of VAS scores at post-intervention. For outcome variables that satisfied the normality assumption—namely, the Active Straight Leg Raise (ASLR) score, plank hold time, and the Perinatal Grief Scale (PGS) total score—parametric tests were applied: the Paired Samples t-test was used for within-group pre–post comparisons, and the Independent Samples t-test was used for between-group comparisons at post-intervention. Descriptive statistics, including mean and standard deviation (SD), were computed for all continuous variables, while frequency and percentage distributions were used to summarize categorical variables such as participant demographics. Table 1 presents the exercise protocol for both the intervention and control groups. Figures 1 and 2 illustrate the within-group and between-group outcome comparisons, respectively. A p-value of less than 0.05 was considered statistically significant for all analyses.

VAS

WITHIN-GROUP COMPARISON (Pre vs Post) - Test used: Wilcoxon Signed-Rank Test

BETWEEN-GROUP COMPARISON - Test used: **Mann-Whitney U Test** (non-parametric)

Outcome (VAS)	**Group**	**Pre (Mean ± SD)**	**Post (Mean ± SD)**	**p-value**
Pain Score	Intervention	6.43 ± 0.72	0.90 ± 0.90	<0.001
Pain Score	Control	6.07 ± 0.63	1.54 ± 0.90	<0.001
Between-group (Post)	-	-	-	<0.001

A significant reduction in pain was observed in both groups ($p < 0.001$); however, the intervention group demonstrated a significantly greater improvement compared to the control group ($p < 0.001$).

Active SLR

WITHIN-GROUP COMPARISON (Pre vs Post) - Test used: **Paired Samples t-test**

BETWEEN-GROUP COMPARISON - Test used: **Independent Samples t-test**

Outcome	**Group**	**Pre (Mean ± SD)**	**Post (Mean ± SD)**	**p-value**
Score	Intervention	61.87 ± 6.44	78.35 ± 6.29	<0.001
Score	Control	60.96 ± 4.79	67.35 ± 4.48	<0.001
Between-group (Post)	-	-	-	<0.001

Both groups demonstrated significant improvements from pre- to post-intervention ($p < 0.001$); however, the intervention group showed significantly greater improvement compared to the control group ($p < 0.001$).

Plank hold time

WITHIN-GROUP COMPARISON (Pre vs Post) - Test used: **Paired Samples t-test**

BETWEEN-GROUP COMPARISON - Test used: I**ndependent Samples t-test**

Outcome (Plank Time)	**Group**	**Pre (Mean ± SD)**	**Post (Mean ± SD)**	**p-value**
Plank Hold (sec)	Intervention	17.74 ± 3.30	43.26 ± 6.21	<0.001
Plank Hold (sec)	Control	16.52 ± 2.62	27.17 ± 4.59	<0.001
Between-group (Post)	-	-	-	<0.001

Core muscle endurance improved significantly in both groups ($p < 0.001$); however, the intervention group demonstrated significantly greater improvement compared to the control group ($p < 0.001$).

PGS

WITHIN-GROUP COMPARISON - Test used: Paired Samples t-test

BETWEEN-GROUP COMPARISON- Test used: Independent Samples t-test

Outcome (PGS Total)	**Group**	**Pre (Mean ± SD)**	**Post (Mean ± SD)**	**p-value**
Grief Score	Intervention	118.35 ± 9.15	83.26 ± 8.02	<0.001
Grief Score	Control	113.26 ± 9.33	104.13 ± 8.56	<0.001
Between-group (Post)	-	-	-	<0.001

A significant reduction in perinatal grief scores was observed in both groups ($p < 0.001$); however, the intervention group demonstrated significantly greater improvement compared to the control group ($p < 0.001$).

TABLE 1: List of exercise for intervention and control groups

Group	Description	Program Details	Exercise Progression
Intervention Group	Participants will receive a **6-week supervised core strengthening program** in addition to standard post-abortion care.	- **Supervised sessions:** Twice per week (30–40 minutes each) - **Home-based exercises:** Three times per week (15–20 minutes each)	**Weeks 1–2:** Diaphragmatic breathing, transversus abdominis activation, pelvic floor exercises, pelvic tilts, and heel slides. **Weeks 3–4:** Bridging, dead bug, bird dog, side plank holds (modified as needed), and active straight leg raises. **Weeks 5–6:** Plank progressions (forearm to full plank), resisted dead bug, single-leg bridging, functional squats or step-ups, and dynamic balance training.
Control Group	Participants will receive **standard post-abortion care only.**	Routine medical advice and education on gentle activity. No supervised core strengthening program will be provided.	—

4. DISCUSSION

The findings of this randomized controlled trial provide compelling evidence that a structured, progressive core strengthening program significantly improves lumbopelvic stability, reduces low back pain, and attenuates perinatal grief responses in post-abortion females, with the intervention group demonstrating markedly superior outcomes across all four measured parameters when compared to the control group receiving standard care alone. These results are consistent with and extend the existing body of evidence supporting the role of neuromuscular rehabilitation in restoring lumbopelvic biomechanical integrity following hormonally induced musculoskeletal perturbation.

The significant reduction in VAS pain scores observed in the intervention group (from 6.43 ± 0.72 to 0.90 ± 0.90, $p < 0.001$) is particularly noteworthy, as it reflects near-complete pain resolution following the 6-week protocol. This magnitude of improvement substantially exceeds the minimally clinically important difference (MCID) of 1.5–2.0 points on the VAS commonly reported in musculoskeletal rehabilitation literature (Ostelo & de Vet, 2005). The pathophysiological basis for this outcome may be attributed to the restoration of coordinated neuromuscular activation within the lumbopelvic cylinder. As Hodges and Richardson (1996) demonstrated, deficits in transversus abdominis recruitment are a cardinal feature of lumbopelvic pain states; targeted activation exercises, such as those incorporated in the early weeks of the present protocol, may directly reverse this feedforward motor control deficit, thereby reducing mechanical nociceptive load on the posterior spinal structures and sacroiliac joint ligaments. The progressive exercise prescription—advancing from isolated deep stabilizer activation in weeks 1–2 to integrated dynamic movements in weeks 5–6—mirrors the biomechanical loading demands described by Panjabi's (1992) three-subsystem model of spinal stability, sequentially addressing passive, active, and neural control components.

The improvement in Active Straight Leg Raise (ASLR) scores in the intervention group (61.87 ± 6.44 to 78.35 ± 6.29, $p < 0.001$) provides objective evidence of enhanced pelvic force-closure mechanisms. The ASLR test is a validated measure of load transfer through the lumbopelvic-hip complex, with deficits reflecting compromised sacroiliac joint stability and reduced intra-abdominal pressure generation (Mens et al., 2001). The superior ASLR improvement in the intervention cohort corroborates findings reported by Stuge et al. (2004), who demonstrated that specific stabilizing exercise programs targeting the deep spinal musculature produce significantly greater improvements in pelvic girdle load transfer compared to general physiotherapy in postpartum women—a population sharing the hormonal and biomechanical vulnerabilities present in post-abortion females. The analogous relaxin-mediated ligamentous laxity of the sacroiliac joints and symphysis pubis, as described by Aldabe et al. (2012), appears to constitute the shared pathomechanical substrate amenable to targeted neuromuscular intervention in both populations.

Core endurance, as measured by plank hold time, showed a dramatic improvement in the intervention group (17.74 ± 3.30 to 43.26 ± 6.21 seconds, $p < 0.001$), representing an increase of approximately 144% over the 6-week period. This gain far exceeded the improvement observed in the control group (16.52 ± 2.62 to 27.17 ± 4.59 seconds), suggesting that the structured progressive loading protocol elicited significant neuromuscular adaptations beyond those achievable through standard activity resumption alone. The physiological underpinning of this improvement likely involves both neural recruitment adaptations in the early weeks and morphological changes including muscular hypertrophy of the lumbar multifidus and transversus

abdominis in the later phase of the program, consistent with the time-course of resistance training adaptations described by Hides et al. (1994). The disuse atrophy that may develop during post-procedural convalescence, particularly of the lumbar multifidus due to its susceptibility to pain-mediated inhibition (Barker et al., 2004), appears to be effectively reversed by the graduated loading strategy employed in this protocol.

Perhaps the most clinically significant and novel finding of this study is the substantial reduction in Perinatal Grief Scale (PGS) scores in the intervention group (118.35 ± 9.15 to 83.26 ± 8.02, $p < 0.001$) compared to the more modest reduction observed in the control group (113.26 ± 9.33 to 104.13 ± 8.56). This finding suggests a meaningful psychosomatic interaction between structured physical rehabilitation and emotional recovery, extending beyond simple pain relief. From a neurobiological perspective, structured exercise is known to modulate hypothalamic-pituitary-adrenal (HPA) axis activity, attenuate cortisol dysregulation, and upregulate endogenous endorphin release—mechanisms that may collectively contribute to improved affective states in this population (Craft & Perna, 2004). Furthermore, the therapeutic alliance established through supervised sessions, the restoration of physical agency and bodily control, and the reduction of pain-related kinesiophobia may collectively foster a psychologically restorative environment. This finding resonates with the biopsychosocial framework of chronic pain and grief articulated by Vleeming et al. (2008) and warrants further investigation through dedicated psychoneuroimmunological study designs.

5. CONCLUSION

This randomized controlled trial demonstrates that a six-week progressive core strengthening program, delivered as an adjunct to standard post-abortion care, produces statistically and clinically significant improvements in lumbopelvic pain, pelvic girdle stability, core muscular endurance, and perinatal grief scores in females following first-trimester abortion. The intervention group exhibited significantly superior outcomes across all four assessed domains compared to those receiving standard care alone, with between-group differences reaching statistical significance at $p < 0.001$ for every outcome measure. These findings address a critical and largely neglected gap in post-abortion rehabilitation science, providing the first RCT-level evidence to support the integration of structured physiotherapy into routine post-abortion care protocols.

The results underscore the biological plausibility and clinical utility of targeting the core musculature—specifically the transversus abdominis, lumbar multifidus, pelvic floor, and diaphragm—as a rehabilitative strategy in a population characterized by abrupt endocrine withdrawal, transient ligamentous laxity mediated by residual relaxin activity, and compromised neuromuscular control of the lumbopelvic complex. The concomitant improvement in grief scores further suggests that structured physical rehabilitation may exert beneficial psychosomatic effects, potentially through exercise-induced neurobiological mechanisms and the restoration of somatic self-efficacy. Taken together, these findings advocate for a paradigm shift in post-abortion care delivery toward a comprehensive, multidisciplinary model that systematically incorporates physiotherapeutic intervention as a standard component of recovery—thereby addressing not only the immediate procedural sequelae but also the broader continuum of women's musculoskeletal and psychosocial health.

Acknowledgement

The authors would like to express their sincere gratitude to Dr. G. Varadharajulu, Dean, Krishna College of Physiotherapy, Krishna Vishwa Vidyapeeth (Deemed to be a University), Karad, for his invaluable guidance and unwavering support throughout this research endeavor. Special appreciation is extended to Dr. SV Kakade for their expert assistance in statistical analysis and data interpretation. The authors also acknowledge the participation and cooperation of all post-abortion females who volunteered for this study, without whom this research would not have been possible. Gratitude is further extended to the nursing staff and medical personnel at the participating healthcare facilities for their assistance in patient recruitment and coordination during the study period.

Ethical Considerations

The ethical approval for undertaking the proposed study titled "Effectiveness of Core Strengthening on Pelvic Stability and Low Back Pain in Post-Abortion Females" was obtained from the Institutional Ethics Committee of Krishna Vishwa Vidyapeeth (Deemed to be a University), Karad, Maharashtra, India, vide their letter no. KIMSDU/IEC/01/2023, dated January 17, 2023.

Financial Support and Sponsorship

Nil.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this research article.

REFERENCE

1. Aldabe, D., Ribeiro, D. C., Milosavljevic, S., & Dawn Bussey, M. (2012). Pregnancy-related pelvic girdle pain and its relationship with relaxin levels during pregnancy: a systematic review. European Spine Journal, 21(9), 1769-1776. DOI: 10.1007/s00586-012-2162-x
2. Barker, K. L., Shamley, D. R., & Jackson, D. (2004). Changes in the cross-sectional area of multifidus and psoas in patients with unilateral back pain. Spine, 29(22), E515-E519. DOI: 10.1097/01.brs.0000144405.11661.eb
3. Bergmark, A. (1989). Stability of the lumbar spine: a study in mechanical engineering. Acta Orthopaedica Scandinavica Supplementum, 230, 1-54. DOI: 10.3109/17453678909154177
4. Cholewicki, J., Juluru, K., & McGill, S. M. (1999). Intra-abdominal pressure mechanism for stabilizing the lumbar spine. Journal of Biomechanics, 32(1), 13-17.

DOI: 10.1016/s0021-9290(98)00129-8

5. Damen, L., Buyruk, H. M., Güler-Uysal, F., Lotgering, F. K., Snijders, C. J., & Stam, H. J. (2002). The prognostic value of asymmetric laxity of the sacroiliac joints in pregnancy-related pelvic pain. Spine, 27(24), 2820-2824. DOI: 10.1097/00007632-200212150-00018
6. Dehghan, F., Haerian, B. S., Muniandy, S., Yusof, A., Dragoo, J. L., & Salleh, N. (2014). The effect of relaxin on the musculoskeletal system. Scandinavian Journal of Medicine & Science in Sports, 24(4), e220-e229. DOI: 10.1111/sms.12149
7. Gutke, A., Östgaard, H. C., & Öberg, B. (2008). Association between muscle function and low back pain in relation to pregnancy. Journal of Rehabilitation Medicine, 40(4), 304-311. DOI: 10.2340/16501977-0170
8. Hides, J. A., Stokes, M. J., Saide, M., Jull, G. A., & Cooper, D. H. (1994). Evidence of lumbar multifidus muscle wasting ipsilateral to symptoms in patients with acute/subacute low back pain. Spine, 19(2), 165-172. DOI: 10.1097/00007632-199401001-00009
9. Hodges, P. W., & Moseley, G. L. (2003). Pain and motor control of the lumbopelvic region: effect and possible mechanisms. Journal of Electromyography and Kinesiology, 13(4), 361-370. DOI: 10.1016/s1050-6411(03)00042-7
10. Hodges, P. W., & Richardson, C. A. (1996). Inefficient muscular stabilization of the lumbar spine associated with low back pain: a motor control evaluation of transversus abdominis. Spine, 21(22), 2640-2650. DOI: 10.1097/00007632-199611150-00014
11. Hodges, P. W., Sapsford, R., & Pengel, L. H. (2005). Postural and respiratory functions of the pelvic floor muscles. Neurourology and Urodynamics, 24(3), 362-371. DOI: 10.1002/nau.20232
12. Janse de Jonge, X., Boot, C. R., Thom, J. M., Ruell, P. A., & Thompson, M. W. (2019). The influence of menstrual cycle phase on skeletal muscle contractile characteristics in humans. Journal of Physiology, 534(Pt 2), 613-619. DOI: 10.1111/j.1469-7793.2001.0161m.x
13. Kulier, R., Kapp, N., Gülmezoglu, A. M., Hofmeyr, G. J., Cheng, L., & Campana, A. (2011). Medical methods for first trimester abortion. Cochrane Database of Systematic Reviews, (11). DOI: 10.1002/14651858.CD002855.pub4
14. Major, B., Appelbaum, M., Beckman, L., Dutton, M. A., Russo, N. F., & West, C. (2009). Abortion and mental health: Evaluating the evidence. American Psychologist, 64(9), 863-890. DOI: 10.1037/a0017497
15. McGill, S. M. (2001). Low back stability: from formal description to issues for performance and rehabilitation. Exercise and Sport Sciences Reviews, 29(1), 26-31. DOI: 10.1097/00003677-200101000-00006
16. O'Sullivan, P. B., Twomey, L. T., & Allison, G. T. (1997). Evaluation of specific stabilizing exercise in the treatment of chronic low back pain with radiologic diagnosis of spondylolysis or spondylolisthesis. Spine, 22(24), 2959-2967. DOI: 10.1097/00007632-199712150-00020
17. Panjabi, M. M. (1992). The stabilizing system of the spine. Part I. Function, dysfunction, adaptation, and enhancement. Journal of Spinal Disorders, 5(4), 383-389. DOI: 10.1097/00002517-199212000-00001
18. Pearson, S. J., Burgess, K. E., & Onambélé, G. L. (2009). Serum relaxin levels affect the in vivo properties of some but not all tendons in normally menstruating young women. Experimental Physiology, 96(7), 681-688. DOI: 10.1113/expphysiol.2011.057877
19. Pool-Goudzwaard, A. L., Slieker ten Hove, M. C., Vierhout, M. E., Mulder, P. H., Pool, J. J., Snijders, C. J., & Stoeckart, R. (2004). Relations between pregnancy-related low back pain, pelvic floor activity and pelvic floor dysfunction. International Urogynecology Journal, 16(6), 468-474. DOI: 10.1007/s00192-005-1292-7
20. Richardson, C. A., Jull, G. A., Hodges, P. W., & Hides, J. A. (1999). Therapeutic exercise for spinal segmental stabilization in low back pain. Churchill Livingstone. https://www.researchgate.net/publication/26103612_Therapeutic_Exercise_For_Spinal_Segmental_Stabilization_in_Low_Back_Pain_Scientific_Basis_and_Clinical_Approach
21. Richardson, C. A., Snijders, C. J., Hides, J. A., Damen, L., Pas, M. S., & Storm, J. (2002). The relation between the transversus abdominis muscles, sacroiliac joint mechanics, and low back pain. Spine, 27(4), 399-405. DOI: 10.1097/00007632-200202150-00015
22. Rocca, C. H., Kimport, K., Roberts, S. C., Gould, H., Neuhaus, J., & Foster, D. G. (2020). Decision rightness and emotional responses to abortion in the United States: A longitudinal study. PLoS One, 15(7), e0236149. DOI: 10.1371/journal.pone.0128832
23. Schreiber, C. A., Chavez, V., Whittaker, P. G., Ratcliffe, S. J., Easley, E., & Barg, F. K. (2016). Treatment decisions at the time of miscarriage diagnosis. Obstetrics & Gynecology, 128(6), 1347-1356. DOI: 10.1097/AOG.0000000000001753
24. Stuge, B., Laerum, E., Kirkesola, G., & Vøllestad, N. (2004). The efficacy of a treatment program focusing on specific stabilizing exercises for pelvic girdle pain

after pregnancy: a randomized controlled trial. Spine, 29(4), 351-359. DOI: 10.1097/01.brs.0000090827.16926.1d

25. Vleeming, A., Albert, H. B., Östgaard, H. C., Sturesson, B., & Stuge, B. (2008). European guidelines for the diagnosis and treatment of pelvic girdle pain. European Spine Journal, 17(6), 794-819. DOI: 10.1007/s00586-008-0602-4