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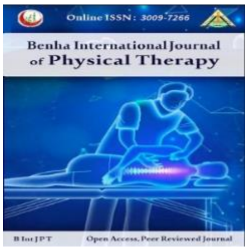

Original research

Effect of adding retro-walking to the tradional program on postpartum low back pain: A randomized controlled trial

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Abstract

Background: Postpartum low back pain (LBP) is a distressing complaint affecting about 75% of women after delivery, interfering with their daily activities and the new babies' care. **Purpose:** This study sought to examine retro-walking (RW) effectiveness on postpartum LBP. **Methods:** Thirty-six postpartum women suffering from LBP after cesarean section delivery (from 6 weeks to 6 months), with ages from 25 to 35 years, participated in the study. They were randomly allocated into two equal groups; the control group practiced postural correction exercises and back care advice only for 3 weeks, and the study group practiced a similar program as the control group plus a backward walking program on a treadmill for 15 minutes, three sessions/week for three weeks. Each woman in each group was assessed before and after the treatment through the visual analog scale (VAS), Modified Schober test, and Oswestry disability index (ODI) to evaluate the pain intensity, lumbar flexion, and extension range of motions (ROM), and functional disability, respectively**. Results:** Both groups exhibited significant improvements across all measured outcomes following treatment compared to baseline values ($p > 0.01$). Comparing both groups indicated that group B demonstrated superior results, with a significant reduction in VAS ($d = 0.86$) and ODI scores ($d = 2.37$) and increased lumbar flexion ($d = 0.87$) and extension ($d = 0.94$) ROM after treatment ($p < 0.01$)**.**
Conclusion: RW can be recommended as an effective adjunctive treatment protocol for postpartum females with LBP.

Keywords: Cesarean section,Low back pain,Postpartum, Retro-walking.

Introduction

Because of various well-known anatomical, hormonal, and mechanical changes related to pregnancy [1], approximately 25–90% of women have low back pain (LBP) during pregnancy and after giving birth [2]. Postpartum LBP is a prevalent and often severe issue for new mothers. Research reports that 75% of women who experience LBP during pregnancy continue to suffer from this

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discomfort after childbirth [3]. While most cases tend to improve within the first six months following delivery, 40% of affected women may endure persistent back pain beyond this timeframe [4]. Notably, the incidence of postpartum LBP is markedly higher among those who undergo cesarean sections (CS) compared to those who have vaginal deliveries [5]. Back pain following CS causes such disability, which seriously affects the quality of life of women so much that they cannot perform their routine activities [6].

LBP is common after a CS because the surgical procedure can lead to weaker abdominal and core musculature, which plays a vital role in spinal support and sustaining correct posture, in addition to its related surgical trauma and scar tissue formation, which may affect the surrounding muscles and tissues leading to LBP. Weak connective tissue causes inter-rectus distance (IRD)-associated abdominal weakness; this affects thoracic, abdominal, and pelvic dynamics and increases the risk factors for LBP [7.8].

Several treatments for LBP are reported, including medications, physical therapy, acupuncture, infiltration, or blockade [9]. Exercise therapy includes a wide range of methods, such as aerobics, stretching, strengthening, stabilization, coordination, balance, and other types of exercises [10].

Incorporating walking exercises into rehabilitation plans for individuals suffering from LBP has gained widespread popularity as an effective aerobic activity. This approach is particularly beneficial given the reduced stability between lumbar segments and the suboptimal coordination of lower back extensor muscles often observed in LBP patients [11]. Walking programs promote trunk stabilization while simultaneously facilitating limb movement control. This is achieved through the strengthening of core muscle groups, specifically those in the abdominal and waist regions, which play a crucial role in supporting the spine [12].

Research indicates that individuals with LBP adapt their walking patterns due to pain, which impacts physical, mechanical, and other gait-related parameters [13]. Some studies suggest that reduced walking speed and changes in muscle activity and recruitment patterns are indicative of the pain and fear experienced by the individual [14]. In the field of fitness and rehabilitation, retro-walking (RW), also known as reverse walking on a treadmill, is becoming increasingly popular nowadays and is commonly employed in physical therapy settings to enhance gait and lower limb mobility. This technique is commonly employed to enhance joint mobility in the lower extremities, particularly the knee, hip, and ankle. It's known to boost strength and refine gait-related biomechanics. It also promotes better muscle function, decreases joint stress, and challenges balance and coordination in unique ways [12]. Studies show that RW enhances hip extension and knee flexion while decompressing spinal discs, helping to alleviate LBP [15].

It was reported that the RW program led to a reduction in LBP by modifying lumbar angles and enhancing muscle strength. This finding underscores the promising role of RW in mitigating musculoskeletal discomfort and improving functional outcomes [16].

Despite the growing body of evidence supporting RW as a beneficial intervention for chronic and non-specific LBP in different populations [12,16,17], there is a notable gap in research regarding its impact on LBP during the postpartum period, which represents a unique challenge to maternal well-being and caring for babies. Thus, this research was conducted to investigate the impact of RW on pain, lumbar mobility, and functional abilities of postpartum women with LBP.

Methods

Study design

This is a prospective, randomized, pre-post-test, controlled trial.

Ethics

Ethical approval was granted by the institutional review board of the Faculty of Physical Therapy at Cairo University [REC/012/004491]. This trial was also registered at Clinical Trial.gov [NCT06600074]. The practical aspect of the study was carried out from September 202 4to December 2024, adhering strictly to the principles delineated in the Declaration of Helsinki for the ethical conduct of human research.

Settings

Participant recruitment and treatment procedures were conducted at the outpatient clinic at EL-Saffe Central Hospital, Giza, Egypt.

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Participants

Forty-four postpartum multiparous women suffering from LBP after CS delivery (from 6 weeks to 6 months after delivery) participated in the study. They aged between 25 and 35 years; their BMI was less than 30 kg/m^2; they had mild to moderate LBP (scores of 5-74 mm on the VAS) [18]. They were excluded if they had recent surgeries, trauma or fractures of the lower limb or in the back region, morbid cardiovascular disease, liver or kidney dysfunction, any neurological disorders involving balance problems or motor and sensory loss, any musculoskeletal disorders such as disc prolapse, lumbar canal stenosis, and spondylosis or severe knee osteoarthritis, taking an intra-articular injection for the knee in the previous 6 months prior to the study, and those with visual deficits or refractory errors not revised with glasses or contact lenses. A study's schedule of the enrollment, evaluation and interventions is summarized in Table 1.

Sample size calculation

The sample size was estimated utilizing G*Power software (version 3.0.10). Calculations were based on the coronal ROM as the main variable, referencing [30]. Parameters included 90% power, α = 0.05, two measurements, two groups, and an effect size of 0.614 for F-test MANOVA within-between interaction effects. The analysis indicated a minimum requirement of 30 participants, equally divided between two groups. Six participants (20%) were added to overcome dropouts that might occur. So, the total sample was 36 subjects, 18 participants in each group.

Randomization

All participating women enrolled in the study received a comprehensive clarification of the study protocol, and each signed an informed consent before participation. They were subsequently assigned to one of two groups through randomization. Group A (control group) practiced postural correction exercises and back care advice only, 3 sessions weekly for 3 weeks, and Group B (study group) practiced a similar program as group A plus a 15-minute RW, 3 sessions weekly for 3 weeks, utilizing a sealed envelope technique. Participant allocation was conducted by an independent researcher unfamiliar with the study protocols. This researcher chose cards from envelopes, each containing a designation of either 'group A' or 'group B', to assign participants to their groups.Until the statistical analysis was finished, the data analyst and an outcome assessor with ten years of expertise were blinded to the allocation randomization.

Table.1. Schedule of enrollment, intervention, and assessment (SPIRIT)

Time point	Enrollment	Allocation	T1	T2
Eligibility criteria	×			
Informed consent	×			
Allocation		×		
Interventions				
RW			●————	————●
Postural correction			●————	————●
Back care advice			●————	————●
Assessment				
VAS score			×	×
Modified shober score			×	×
ODI score			×	×

ODI- Oswestry Low Back Pain Disability Questionnaire, RW-Retro-walking, SPIRIT-Standard Protocol Item: Recommendations for Interventional Trials, T1-before treatment assessment, T2-after treatment assessment, VAS-Visual analog scale.

Interventions

Firstly, before starting the treatment procedures for both groups, participants were thoroughly briefed about the characteristics, objectives, and advantages of the treatment program to ensure their active cooperation and engagement throughout the entire treatment period.

- ***Postural correction exercises:***

  Participants in both groups were given instructions for postural correction exercises in various positions, including crook lying, supine lying, sitting, and standing. For instance, in the crook lying position, the physical therapist guided patients to perform a sequence: chin tuck, rib expansion through costal breathing, abdominal and gluteal muscle contraction. Each position was held for 10 seconds,

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followed by relaxation. This was repeated 10 times per session, with 3 sets daily, 3 sessions a week, for 3 weeks. Patients maintained a weekly exercise log and were monitored via WhatsApp to confirm their adherence to the prescribed program [19, 20].

- ***Back care advice:***

Participants in both groups (A and B) received the following advice: Maintain regular movement and avoid prolonged static postures [21], utilize proper lifting techniques: When lifting objects, bend the knees, maintain a straight back, and hold objects close to the body to minimize strain on the spine, as holding objects away from the body increases back stress [22], maintain a healthy body weight to reduce excessive spinal loading [21], implement good sitting habits by using lumbar support (e.g., a rolled towel) and distributing household duties throughout the week to avoid overexertion [21], and adopt proper breastfeeding posture: The infant should be cradled on the lap, facing the mother, with the baby's head and neck supported by the forearm. To avoid leaning forward, ensure the baby is aligned with the breast. Pillows can provide back support and elevate the arms, while a footstool helps maintain proper posture and prevent forward leaning [23].

- ***Retro-walking (RW) on the treadmill:***

All postpartum women in the group (B) practiced walking backward on a treadmill (Caroma Brand, 3.0 HP Motor, Model B09TZT7LT5, made in Taiwan). They commenced RW on the treadmill at a low intensity, determined based on individual comfort levels, and then the intensity was gradually increased over the intervention period by adjusting the treadmill speed or incline while ensuring participants maintained a comfortable and safe pace [17]. The treatment session was done under close supervision of the therapist.

Initially, the participants performed a 3-minute warm-up by walking on the treadmill at a self-selected speed at 0% inclination, and then they rested for 1 minute before starting the treatment session [17]. For the next 10 minutes of the treatment session, participants walked backward at a speed starting from 1.2 up to 1.6 m/s. As the patient progressed, the speed was increased; walking ended with a 2-minute deceleration phase, allowing participants to a gentle stop on the treadmill. Instructions were given to the patients to hold on the rail while walking if they felt uncomfortable or lost their balance. Retro walking session lasting 15 minutes, 3 times/week, for 3 weeks with rest days interspersed to allow for recovery and adaptation [12, 16, 24].

Assessment

- ***Assessment of low back pain intensity:***

To assess the intensity of LBP following CS, all participants in both groups were evaluated using the Visual Analog Scale (VAS) before and after the treatment regimen. This scale allows individuals to categorize their pain as absent, mild, moderate, or severe. The VAS uses a 100 mm line with specific ranges corresponding to pain levels: 0-4 mm denotes no pain, 5-44 mm suggests mild pain, 45-74 mm represents moderate pain, and 75-100 mm denotes severe pain [25]. Participants were guided to pinpoint the location on the line that they felt corresponded to their present pain intensity.

- ***Assessment of lumbar mobility:***

To assess the ROM in lumbar flexion and extension, all participants in both groups underwent evaluation using the Modified Schober test before and after the treatment protocol. This method is recognized for its reliability and validity in quantifying lumbar mobility [26]. The procedure involved the therapist positioning themselves behind the standing subject and locating the posterior superior iliac spines (PSISs) with their thumbs. A horizontal ink mark was then made along the lumbar spine's midline at the level of the PSISs. A second mark was placed 15 cm superior to this initial mark. The therapist then aligned a measuring tape between these two skin markings, ensuring firm contact with the subject's skin. While maintaining the tape's position with their fingertips, the distance between the upper and lower marks was measured in centimeters [27].

To evaluate lumbar flexion ROM, the therapist directed the participant to bend forward to their maximum capacity. Conversely, for assessing lumbar extension ROM, the subject was instructed to lean backward as far as possible. In both instances, the therapist measured the new distance between the previously marked superior and inferior points on the spine, using centimeters as the unit of measurement. The change in distance between these marks provided a quantitative

measure of lumbar flexion or extension, depending on the movement performed. This procedure was repeated three times consecutively, and the average of these measurements was recorded as the final value [26], [27].

- ***Assessment of functional disability:***

To evaluate functional disability, all participants in both groups (A and B) completed the Arabic version of the ODI before and after the treatment program. This instrument, also known as the Oswestry Low Back Pain Disability Questionnaire, is widely regarded as the gold standard for evaluating permanent functional disabilities in LBP patients. Its validity and reliability have been well-established in research and clinical practice [28]. It consists of 50 questions covering 10 sections (pain intensity, personal care, lifting, sitting, standing, walking, homemaking, sleeping, social life, and traveling). Each item is scored from 0-5, yielding a maximum possible score of 50; if one section isn't answered, the overall score will be 45, and then the score is converted into a percentage. Scores are classified according to severity into minimal disability (10-20%), moderate disability (21-40%), severe disability (41-60%), crippled (61-80%), and bedbound (81-100%) [29].

Statistical analysis

An unpaired t-test was employed to compare subject characteristics across groups. The Shapiro-Wilk test was employed to verify normal data distribution, while Levene's test assessed between-group homogeneity of variances. A mixed MANOVA was utilized to examine the treatment's impact on VAS, ODI, and flexion and extension ROM. For multiple comparisons, post-hoc analyses were done utilizing the Bonferroni correction. Statistical significance was set at $p < 0.05$ for all tests. Analyses were conducted using SPSS version 25 for Windows (IBM SPSS, Chicago, IL, USA).

Results

Forty-four women were initially checked for eligibility; only 36 of them met the inclusion criteria and a a randomized into two equal groups. No participants dropped out following randomization (Fig. 1).

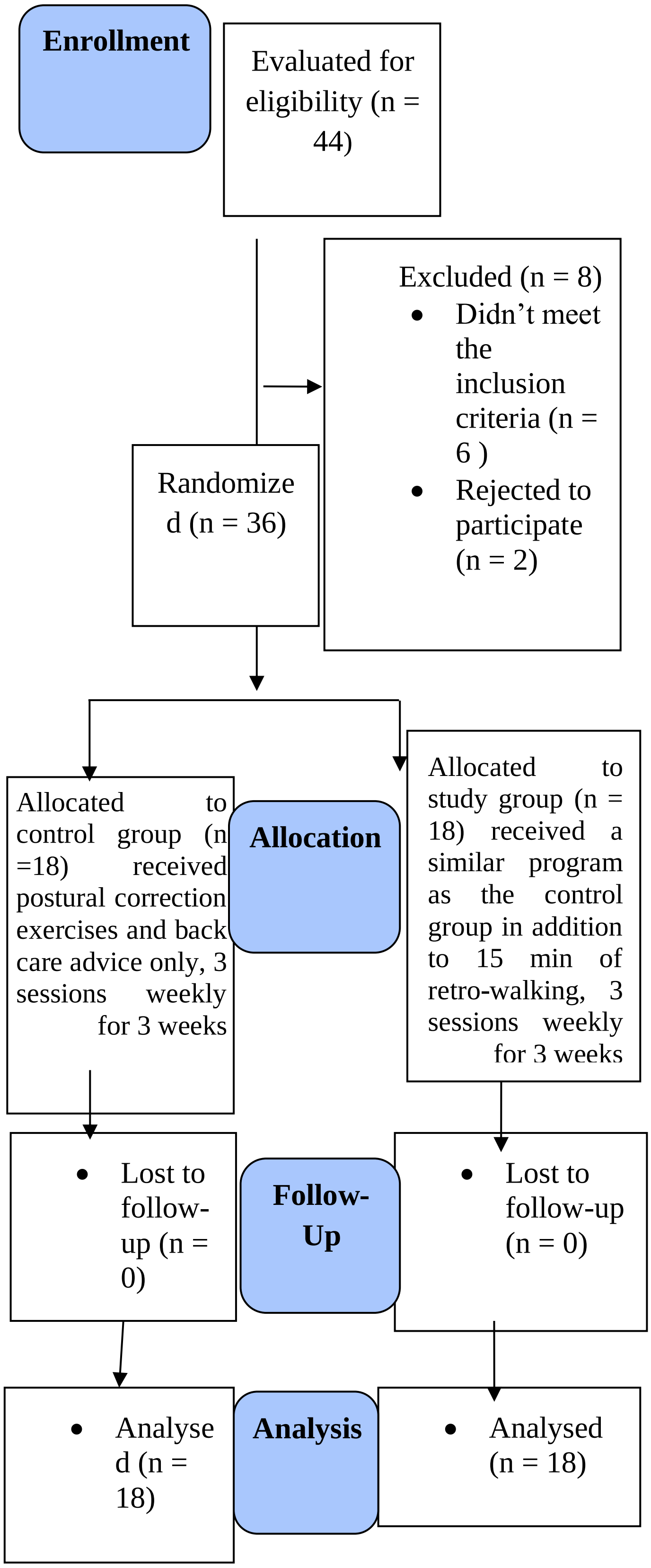

Fig.1. CONSORT flow chart of the study

Subject characteristics:

Table 2 presented the characteristics of participants in both groups, revealing no significant differences in age, weight, height, or BMI between the two groups (p > 0.05).

Tab.2. Comparison of subject characteristics between groups A and B:

	Group A	Group B			
	Mean ±SD	Mean ±SD	MD	t-value	p-value
Age (years)	29.83 ± 3.56	29.50 ± 3.62	0.33	0.27	0.78
Weight (kg)	69.91 ± 6.43	68.72 ± 5.20	1.19	0.61	0.54
Height (cm)	164.88 ± 4.78	166.11 ± 4.21	-1.23	-0.81	0.42
BMI (kg/m²)	25.77 ± 2.71	24.92 ± 1.87	0.85	1.10	0.27

MD, Mean difference; p-value, Probability value; SD, Standard deviation.

Effect of treatment on VAS, lumbar flexion and extension ROM and ODI:

The data were normally distributed and there was a homogeneity between groups (p > 0.05).

Mixed MANOVA indicated a significant interaction between treatment and time (F = 38.95, p = 0.001), along with significant main effects for both treatment (F = 7.17, p = 0.001) and time (F = 134.91, p = 0.001).

Within group comparison

Both groups showed a significant decrease in VAS and ODI scores after treatment compared to before treatment values (p < 0.01). The VAS and ODI scores for Group A changed by 22.01% and 6.8%, respectively, in contrast to Group B, which showed a change of 42.17% and 44.68%, respectively (Table 3).

Both groups demonstrated a significant increase in flexion and extension ROM following treatment compared to pre-treatment (p > 0.001). Group A recorded a 28.46% improvement in flexion and 32.76% in extension, while group B exhibited greater changes of 125.60% and 98.54%, respectively (Table 4).

Between-group comparison

After treatment, group B showed significantly lower VAS and ODI scores compared to group A (p < 0.01) (Table 3), along with a significantly greater improvement in flexion and extension ROM (p < 0.01) (Table 4).

Tab.3. Mean VAS and ODI pre- and post-treatment of both groups:

	Pre-treatment	Post-treatment			
	Mean ±SD	Mean ±SD	MD	% of change	p-value
VAS					
Group A	43.17 ± 13.97	33.67 ± 10.42	9.5	22.01	0.001
Group B	44.39 ± 14.37	25.67 ± 8.15	18.72	42.17	0.001
MD	-1.22	8			
	p = 0.79	***p = 0.01***			
		d = 0.86			
ODI					
Group A	45.44 ± 9.22	42.35 ± 8.14	3.09	6.80	0.01
Group B	43.06 ± 8.82	23.82 ± 7.45	19.24	44.68	0.001
MD	2.38	18.53			
	p = 0.43	***p = 0.001***			
		d = 2.37			

MD, Mean difference; p-value, Probability value; SD, Standard deviation

Tab.4. Mean flexion and extension ROM pre- and post-treatment of both groups:

	Pre-treatment	Post-treatment			
	Mean ±SD	Mean ±SD	MD	% of change	p-value
Flexion ROM (cm)					
Group A	2.60 ± 1.48	3.34 ± 1.46	-0.74	28.46	0.001
Group B	2.07 ± 0.98	4.67 ± 1.58	-2.6	125.60	0.001
MD	0.53	-1.33			
	p = 0.21	***p = 0.01***			
		d = 0.87			
Extension ROM (cm)					
Group A	2.32 ± 1.08	3.08 ± 0.86	-0.76	32.76	0.001
Group B	2.05 ± 0.90	4.07 ± 1.21	-2.02	98.54	0.001
MD	0.28	-0.99			
	p = 0.42	***p = 0.008***			
		d = 0.94			

MD, Mean difference; p-value, Probability value; SD, Standard deviation, d, Effect size

Discussion

Post-partum LBP is a complex issue for healthcare providers, with the most promising management strategies focusing on aligning treatments with the patient's particular symptoms. There is a higher incidence of lumbopelvic pain during pregnancy that persists in the postpartum period; it affects more than 50% of women after delivery and negatively impacts their quality of life [31]. RW has shown success in reducing LBP in different populations [12, 16, 17]. However, this study was the first one to scrutinize its effects on postpartum LBP, hypothesizing that RW has better results than posture correction exercises and back care advice alone.

Both groups demonstrated notable improvements across all variables after the treatment, but the study group exhibited more pronounced improvements than the control group.

The within-group improvement in VAS, ODI, and lumbar mobility in both groups can be attributed to the postural correction exercises and back care advice given to both groups that have emerged as potential strategies for reducing LBP severity and improving functional outcomes.

Postural correction exercises target specific muscle groups to promote spinal alignment and core stability, which decreases pressure on the facet joint, improving back pain, while back care advice educates individuals on proper lifting techniques, ergonomics, weight management, and lifestyle modifications to mitigate LBP risk factors. Previous research has provided evidence supporting the efficacy of postural correction exercises and back cares advice in reducing LBP intensity and improving functional status [32, 33].

These findings agreed with García-Moreno et al. [33], who highlighted the efficacy of physiotherapy interventions, including physical exercise, postural correction, and increased physical activity, in preventing non-specific LBP and enhancing back care. These strategies led to statistically significant improvements in five key areas, including elevated back care awareness, positive behavioral shifts, enhanced postural alignment, improved trunk extension endurance, and increased hamstring flexibility. Also, Chaudry et al. [19] explored the impact of postural correction exercises on postpartum back pain, reporting significant enhancements in pain relief and trunk mobility.

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The experimental group experienced a more significant reduction in pain, disability, and improvement in lumbar mobility than the control group, possibly attributed to the multifaceted effects of RW. Its beneficial effect has been documented in conditions like cerebral palsy and Parkinson's disease, with improvements in gait, balance, and overall performance being observed [34]. Likewise, in orthopedic conditions, RW has been shown to alleviate pain, enhance functional ability, strengthen quadriceps muscles, and boost physical performance in knee osteoarthritis patients [15].

RW has garnered significant attention in clinical practice due to its wide-ranging effects on various bodily structures. This form of locomotion has been subject to extensive research as a closed-chain exercise, gaining popularity in rehabilitation protocols for lower extremity injuries. Closed-chain exercises have demonstrated superior outcomes compared to traditional open-chain exercises in rehabilitation settings. The role of backward walking in improving rehabilitation outcomes is well-documented, with its effectiveness primarily attributed to increased muscular strength and reduced stress on joints [35].

This is because RW may increase lumbar multifidus and erector spinae muscle activation. Additionally, to achieve a higher extension of the lumbar spine, the toe-heel gait pattern in RW may have needed increased activity from the global and core extensors of the spine. Patients with LBP have reported that greater hip extension and lumbar spine extension increase the disc space and reduce compressive pressures on the intervertebral disc, which also reduces pain [36].

The more significant improvement of all outcome measures in the study group aligned with Ahmed et al. [24]. Their research demonstrated statistically significant enhancements in pain levels, functional disability, sleep quality, and general quality of life among LBP patients receiving RW compared to the conventional physical therapy group. These improvements may be due to the decrease in pain severity and the increase in hamstring flexibility, as RW involves unique mechanics characterized by increased hip flexion and reduced extension, which pre-stretches the hamstring muscles and extends the lumbar spine. This process changes loading on facet joints and opens disc spaces, thereby reducing compressive loads on intervertebral discs. Consequently, this mechanism directly contributes to decreased back pain and improved function. They concluded that RW is an efficient treatment technique that provides faster recovery for patients with LBP.

According to Dufek et al. [17], retro-walking improves lumbar muscular performance by triggering core stability regulation, which most likely necessitates increased activation of core muscles like multifidus. Moreover, Pandya [37] concluded that backward walking showed a significant decrease in pain and disability at the end of the intervention period when compared to core stability exercise. So, backward walking can be considered an effective tool in reducing pain and disability in patients with mechanical LBP.

Furthermore, these findings aligned with Raza et al. [16], who indicated that backward walking could enhance function, as evidenced by the ODI. This improvement may stem from reduced pain, normalization of joint kinematics and kinetics during activities, and better muscle activation patterns; also, it provides an appropriate stimulus to increase hamstring flexibility and improve lumbar ROM in chronic non-specific LBP patients.

However, the current study's result of the lumbar mobility improvement disagreed with Whitley and Dufek [38], who studied the impact of RW on hamstring flexibility and lower back ROM in 10 healthy female volunteers, reporting no significant changes in sagittal or coronal lumbar ROM as measured by an electro-goniometer. This difference may be attributed to the smaller sample size, various evaluative procedures, and different populations of their study.

This study had much strength including the sample size calculation, good randomization to avoid bias, and valid evaluative procedures. However, the study is limited by its short-term nature and the absence of patient follow-up. So, further studies with different evaluative procedures and longer treatment periods with patient follow-up are needed to confirm these findings.

Clinical implications

Implementing retro-walking in clinical practice is considered an integral part of the treatment protocol for postpartum women with LBP, aiming to reduce pain intensity, improve functional capacities, and expedite their recovery during this crucial period.

Conclusion

It was concluded that RW could be a beneficial adjunctive therapy to the conventional treatment protocol, helping to decrease pain and improve function and lumbar mobility in postpartum women with LBP.

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Conflict of interest

The authors have no conflict of interest.

References

1. Katonis P, Kampouroglou A, Aggelopoulos A, Kakavelakis K, Lykoudis S, Makrigiannakis A, et al. Pregnancy-related low back pain. Hippokratia. 2011 Jul; 15(3):205-210.
2. Kovacs FM, Garcia E, Royuela A, Gonzalez L, Abraira V. Prevalence and factors associated with low back and pelvic girdle pain during pregnancy: a multicentre study conducted in the Spanish National Health Service. Spine. 2012; 37: 1516–1533. doi: 10.1097/BRS.0b013e31824dcb74.
3. Gutke A, Lundberg M, Östgaard HC, Öberg B. Impact of postpartum lumbopelvic pain on disability, pain intensity, health-related quality of life, activity level, kinesiophobia, and depressive symptoms. Eur Spine J. 2011; 20: 440-448. doi: 10.1007/s00586-010-1487-6.
4. Mogren IM. Physical activity and persistent low back pain and pelvic pain postpartum. BMC Public Health. 2008 Dec 22; 8:417. doi: 10.1186/1471-2458-8-417.
5. Ingrid M , Anna P. Low Back Pain and Pelvic Pain during Pregnancy: Prevalence and Risk Factors. SPINE, 2005; 30(8):983-999. doi: 10.1097/01.brs.0000158957.42198.8e.
6. Rasheed N, Hassaan K, Naseem R. Comparison of Incidence of Low Back Pain in Women with Normal Vaginal Delivery and Cesarean Section, Journal of Pakistan Orthopaedic Association. 2018; 29(4):152–156.
7. Wang Q, Yu X, Chen G, Sun X, Wang J. Does diastasis recti abdominis weaken pelvic floor function? A cross-sectional study. Int. Urogynecol. J. 2020; 31: 277–283. doi: 10.1007/s00192-019-04005-9.
8. Sencan S, Ozcan-Eksi EE, Cuce I, Guzel S, Erdem, B. Pregnancy-related low back pain in women in Turkey: Prevalence and risk factors. Annals of Physical and Rehabilitation Medicine. 2018; 61(1): 33-37. doi: 10.1016/j.rehab.2017.09.005.
9. Saragiotto BT, Maher CG, Yamato TP, Costa LO, Menezes Costa LC, Ostelo RW, et al. Motor control exercise for chronic non-specific low-back pain. The Cochrane Database of Systematic Reviews. 2016; 1:CD012004. doi: 10.1002/14651858.
10. Searle A, Spink M, Ho A, Chuter V. Exercise interventions for the treatment of chronic low back pain: A systematic review and meta-analysis of randomized controlled trials. Clinical Rehabilitation. 2015; 29(12):1155-67. doi: 10.1177/0269215515570379.
11. Lamoth C, Daffertshofer A, Meijer O, Lorimer Moseley G, Wuisman P, Beek P. Effects of experimentally induced pain and fear of pain on trunk coordination and back muscle activity during walking. Clinical Biomechanics. 2004; 19(6): 551-563. doi: 10.1016/j.clinbiomech.2003.10.006
12. Ansari S, Raza S, Bhati P. Impact of retro-walking on pain, range of motion, muscle fatigability, and balance in collegiate athletes with chronic mechanical low back pain. Sport Sciences for Health. 2020; 17(2): 307-316. doi:10.1007/s11332-020-00682-y
13. Kim H, Min TJ, Kang SH, Kim DK, Seo KM, Lee SY. Association between walking and low back pain in the Korean population: A cross-sectional study. Ann Rehabil Med 2017; 41:786-92. doi: 10.5535/arm.2017.41.5.786.
14. Daigle F, Léonard G, Émond EM, Benoit-Piau J, Gaudreault N. Comparison of the Pressure Biofeedback Unit and Real-Time Ultrasound Imaging as Feedback Tools to Contract the Transversus Abdominis Muscle: A Randomized Controlled Trial in Healthy Older Adults. J Geriatr Phys Ther. 2022; 45:25-33. doi: 10.1519/JPT.0000000000000295.
15. Alghadir H, Anwer S, Sarkar B. Effect of 6-week retro or forward walking program on pain, functional disability, quadriceps muscle

strength, and performance in individuals with knee osteoarthritis: a randomized controlled trial (retro-walking trial). BMC Musculoskelet Disord. 2019; 20: 159-168. doi: 10.1186/s12891-019-2537-9.
16. Raza T, Riaz S, Ahmad F, Shehzadi I, Ijaz N, Ali S. Investigating the Effects of Retro Walking on Pain, Physical Function, and Flexibility in Chronic Non-specific Low Back Pain. Iranian Rehabilitation Journal. 2003; 21(2): 309-318. doi. 10.32598/irj.21.2.1880.1
17. Dufek S, House A, Mangus C, Melcher G, and Mercer A. Backward Walking: A Possible Active Exercise for Low Back Pain Reduction and Enhanced Function in Athletes. JEP online. 2011; 14(1):17-26.
18. Jensen P, Chen M, Brugger M. Interpretation of visual analog scale versus numeric pain scale what is different? J. Chirpr.Med. 2005; 4(1):43-44. doi: 10.1016/S0899-3467(07)60112-8.
19. Chaudry S, Rashid F, Shah S. Effectiveness of core stabilization exercises along with postural correction in postpartum back pain. Rawal Med J. 2013; 38(3):256-259.
20. El-Shafei MA, Abd Allah DS, Elmasry DM, Mohamed MF, Hamdy HA. Low-level laser therapy combined with postural correction exercises on postpartum sacroiliac joint pain: a randomised controlled trial. Physiotherapy Quarterly. 2024;32(2):92-99. https://doi.org/10.5114/pq/166400
21. Brämberg B, Bergström G, Jensen I. Effects of yoga, strength training and advice on back pain: a randomized controlled trial. BMC Musculoskelet Disord. 2017; 18:132. doi: 10.1186/s12891-017-1497-1.
22. McGill SM. Low Back Disorders: Evidence-Based Prevention and Rehabilitation. 3rd ed. Human Kinetics; 2016.
23. Eglash A, Leeper K. The Little Green Book of Breastfeeding Management for Physicians and Other Healthcare Providers,8th ed. Institute for the Advancement of Breastfeeding and Lactation Education; 2023.
24. Ahmad A, Aldabbas M, Tanwar T, Iram I, Veqar Z. Effect of retro-walking on pain, functional disability, quality of life and sleep problems in patients with chronic low back pain. Physiotherapy Quarterly. 2023; 31(3):86-93. doi:10.5114/pq.2023.117448
25. Weigl K, and Forstner T. Design of paper-based visual analogue scale items. Educ Psychol Meas. 2021 Jun; 81(3):595-611. doi: 10.1177/0013164420952118.
26. Chertman C, Dos Santos HMC, Pires L, Wajchenberg M, Martins DE, Puertas EB. A comparative study of lumbar range of movement in healthy athletes and non-athletes. Revista Brasileira de Ortopedia (English Edition), 2010; 45(4):389-394. doi: 10.1016/S2255-4971(15)30385-2.
27. Hilde R, and Anne M. Intertester reliability and concurrent validity of 2 commonly used clinical tests for the lumbar Range of motion. Spine. 2014; 39: E270-E275. doi: 10.1097/BRS.0000000000000131.
28. Ayoub C , Elias E, Khoury R, Skaf G , Nasser Z. Validation of a Lebanese Arabic version of the Oswestry Disability Index in Lebanon. Open Access J Neurol Neurosurg. 2019; 10(2):555783. doi: 10.19080/OAJNN.2019.10.555783.
29. Guermazi M, Mezghani M, Ghroubi S, Elleuch M, Med AO, Poiraudeau S, et al. Traduction en arabe et validation de l'indice d'Oswestry dans une population de lombalgiques Nord-Africains [The Oswestry index for low back pain translated into Arabic and validated in a Arab population]. Ann Readapt Med Phys. 2005 Feb;48(1):1-10. doi: 10.1016/j.annrmp.2004.06.055.
30. Dufek S, Hous A, Mangus B, Mercer J, Melcher G. Effect of backward walking as a modality for low back pain reduction in athletes. ISBS-Conference Proceeding Archive. 2010.
31. Vermelis J, Wassen M, Fiddelers A, Nijhuis J, Marcus M. Prevalence and predictors of chronic pain after labor and delivery. Current Opinion in Anaesthesiology. 2010; 23(3):295-299. doi: 10.1097/aco.0b013e32833853e8.
32. Kim D, Cho M, Park Y, Yang Y. Effect of an exercise program for posture correction on musculoskeletal pain. J Phys Ther Sci. 2015; 27:1791-1794. doi: 10.1589/jpts.27.1791.
33. García-Moreno JM, Calvo-Munoz I, Gómez-Conesa A, López-López JA. Effectiveness of physiotherapy interventions for back care and the prevention of non-

specific low back pain in children and adolescents: a systematic review and meta-analysis. BMC Musculoskeletal Disorders. 2022; 23(1): 314-319. doi: 10.1186/s12891-022-05270-4.

34. Daniele M, Anna S, Jacopo D, Angela M. Combined effects of backward treadmill training and botulinum toxin type A therapy on gait and balance in patients with chronic stroke: A pilot, single-blind, randomized controlled trial. Neuro Rehabilitation. 2020; 6: 1-10. doi: 10.3233/NRE-203067.
35. Joshi S, Vij JS, Singh SK. Retrowalking: A new concept in physiotherapy and rehabilitation. Med Sci. 2015; 4(10): 152-156. https://www.doi.org/10.36106/ijsr.
36. Ansari B, Bhati P, Singla D, Nazish N, Hussain ME. Lumbar Muscle Activation Pattern During Forward and Backward Walking in Participants With and Without Chronic Low Back Pain: An Electromyographic Study. J Chiropr Med. 2018 Dec;17(4):217-225. doi: 10.1016/j.jcm.2018.03.008.
37. Pandya R. Effect of Retro-walking Versus Core-stability Exercise on Pain and Function in Mechanical Low Back Pain: A Comparative Study. June2022. International Journal of Scientific Research & Growth; 10(6):2455-6211.
38. Whitley CR, Dufek JS. Effects of backward walking on hamstring flexibility and low back range of motion. International Journal of Exercise Science. 2011; 4(3):192-198. doi:10.70252/crzw7475.