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Association Between Infant-Lifting Ergonomics and Knee Pain Among Mothers Within Six Months Postpartum in Karachi: A Cross-Sectional Study

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Abstract

Objective:
To determine the association between infant-lifting ergonomics and knee pain among mothers within six months postpartum in Karachi.

Material and Methods:
A cross-sectional analytical study was conducted among mothers with infants aged 0–6 months attending public and private healthcare facilities in Karachi using snow ball sampling technique. Knee pain was assessed using a numeric pain rating scale. Infant-lifting ergonomics were evaluated using a structured questionnaire addressing lifting frequency, posture. Covariates included age, body mass index, parity, delivery mode, prior knee pain, infant weight, and physical activity level. Associations were examined using chi-square tests and multivariable logistic regression. Statistical significance was set at $p < 0.05$.

Results:
Among 320 participants, knee pain prevalence was 46.9%. Mothers reporting frequent trunk-flexed lifting with poor knee alignment had higher odds of knee pain (adjusted OR 2.41, 95% CI 1.48–3.92, $p < 0.001$). Increased daily lifting frequency and higher infant weight were independently associated with knee pain. Proper squat-based lifting showed a protective association.

Conclusion:
Suboptimal infant-lifting ergonomics are significantly associated with knee pain among early postpartum mothers. Ergonomic education may reduce musculoskeletal burden in this population.

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Introduction

The postpartum period is characterized by substantial biomechanical and physiological changes that may predispose women to musculoskeletal disorders[1]. Hormonal influences such as relaxin-mediated ligamentous laxity, residual weight gain, altered center of gravity, and reduced core stability contribute to joint loading abnormalities during early motherhood[2]. Globally, postpartum musculoskeletal pain is common, with reported prevalence ranging between 50% and 75% in the first six months after delivery[3]. Knee pain in women of reproductive age has multifactorial origins, including altered joint biomechanics, increased body mass index, and repetitive loading tasks[4]. Mothers who have been through delivery have to frequently lift babies from floor or transferring it from crib, carrying for a long time and walking through stairs[5]. Increased knee flexion has been noted when analyzed the biomechanics. Alignment of the lower limb alternation during trunk-dominant lifting patterns, subsequently increasing the patellofemoral joint stress[6]. Anterior knee loading may further increase due to improper lifting mechanics causing excessive trunk flexion[7]. Epidemiological studies conducted in South Asia document postpartum musculoskeletal pain prevalence exceeding 60%, yet a very few studies specifically measure knee pain or evaluate ergonomic determinants related to infant handling[8]. In Pakistan, there is a scarce data available about the postpartum lower extremity pain, and modifiable risk factors remain inadequately explored[9]. Given the high physical demands of infant care and limited local evidence, this study aims to determine the association between infant lifting ergonomics and knee pain among mothers within six months postpartum in Karachi.

Methods

This cross-sectional analytical study was conducted among mothers within six months postpartum attending public-sector maternal and child health centers and private clinics in Karachi, Pakistan. Snow ball sampling was used. Data collection was performed over a defined study period following institutional ethical approval. The target population included biological mothers aged 18–40 years with infants aged 0–6 months who were actively involved in routine infant handling and lifting. Participants were eligible if they had delivered a live infant within the preceding six months and were able to understand and respond to the study questionnaire. Mothers with a history of diagnosed knee osteoarthritis, inflammatory joint disease (e.g., rheumatoid arthritis), previous knee surgery, traumatic knee injury within the past year, neurological disorders affecting gait or balance, or known lower limb congenital deformities were excluded. Mothers with high-risk postpartum complications requiring prolonged immobilization

were also excluded. Consecutive sampling was used until the required sample size was achieved. Sample size was calculated using a single proportion formula assuming a 50% expected prevalence of postpartum knee pain, 95% confidence level (Z = 1.96), 5% margin of error, yielding a minimum sample of 384. Considering feasibility constraints, a final analytical sample exceeding 300 participants was targeted. Data were collected using a structured, interviewer-administered questionnaire. Knee pain was assessed using the Numeric Pain Rating Scale (0–10) and categorized as present (≥3/10) or absent. Infant-lifting ergonomics were evaluated using a structured tool assessing lifting posture (squat/hip hinge versus trunk-dominant), lifting frequency per day, surface height, carrying duration, and knee alignment during lifting. Covariates included age, body mass index, parity, delivery mode, prior knee pain history, infant weight, and physical activity level. Data were analyzed using SPSS version 26. Descriptive statistics were calculated. Associations were examined using chi-square tests and independent t-tests as appropriate. Multivariable logistic regression was performed to determine independent predictors of knee pain. Statistical significance was set at $p < 0.05$.

Results

A total of 336 postpartum mothers were included in the final analysis. The mean age was 28.7 ± 4.6 years, and the mean postpartum duration was 3.2 ± 1.4 months. The overall prevalence of knee pain (Numeric Pain Rating Scale ≥3) was 45.8% (154/336; 95% CI: 40.5%–51.1%). In Table 1, demographic and clinical characteristics of participants are presented according to the presence or absence of knee pain. Mothers reporting knee pain had significantly higher mean BMI and were more likely to report prior knee discomfort before pregnancy.

Table:1 *Demographic and Clinical Characteristics by Knee Pain Status*

Variable	Knee Pain	Knee Pain	p-value	Percentage (%)
Age (years), mean ± SD	29.1 ± 4.4	29.1 ± 4.4	0.12	48.0
BMI (kg/m²), mean ± SD	27.6 ± 3.9	27.6 ± 3.9	<0.001	52.0
Cesarean delivery, n (%)	78 (50.6%)	78 (50.6%)	0.26	57.0
Multiparity, n (%)	69 (44.8%)	69 (44.8%)	0.24	31.0
Prior knee pain history, n (%)	48 (31.2%)	48 (31.2%)	<0.001	12.0
Infant weight (kg), mean ± SD	6.2 ± 0.9	6.2 ± 0.9	0.002	46.0

In Table 2, ergonomic characteristics of infant lifting are compared between mothers with and without knee pain. Trunk-dominant lifting posture, higher lifting frequency, and prolonged carrying duration were significantly associated with knee pain.

Table 2: *Infant-Lifting Ergonomic Characteristics by Knee Pain Status*

Ergonomic Factor	Knee Pain	No Knee Pain	p-value
Trunk-dominant lifting, n (%)	102 (66.2%)	63 (34.6%)	<0.001
Squat/hip hinge lifting, n (%)	52 (33.8%)	119 (65.4%)	<0.001
≥15 lifts/day, n (%)	97 (63.0%)	71 (39.0%)	<0.001
Carrying >60 min/day, n (%)	84 (54.5%)	60 (33.0%)	<0.001
Lifting from floor level, n (%)	110 (71.4%)	96 (52.7%)	0.001

In Table 3, multivariable logistic regression analysis identifies independent predictors of knee pain. After adjustment for BMI, prior knee pain, parity, delivery mode, and infant weight, trunk-dominant lifting posture and higher lifting frequency remained significantly associated with knee pain.

Table:3 *Multivariable Logistic Regression for Predictors of Knee Pain*

Predictor	Adjusted OR	95% CI	p-value
Trunk-dominant lifting	2.37	1.46–3.85	<0.001
≥15 lifts/day	1.89	1.15–3.09	0.012
Carrying >60 min/day	1.54	0.96–2.48	0.07
BMI (per unit increase)	1.12	1.05–1.19	0.001
Prior knee pain history	2.11	1.18–3.77	0.011

Discussion

This cross-sectional study demonstrated that infant-lifting posture and higher daily lifting frequency were independently associated with knee pain. Prevalence of knee pain has been found to be consistent with Pakistani data reporting postpartum knee pain prevalence of 54.3% in a smaller local sample, suggesting that knee pain is common in postpartum females and may

represent a clinically relevant physiotherapy burden in the region[10,11,12]. The slightly lower prevalence observed in our study may reflect differences in sampling frame, postpartum timing distribution, and pain definition thresholds. The results align with the different musculoskeletal studies on pain experienced by more than half of the postpartum women in different regions[13,14]. The link between the trunk-dominant lifting posture and pain of knee has been biomechanically plausible[15]. The biomechanics of lifting an Infant includes the combined movement of trunk flexion, load handling, and repeated sit-to-stand or floor-to-stand transitions[16]. In an experimental biomechanical analysis of infant "lifting-up" motion using infant dummies of increasing weights, Kim et al. found that lumbar and hip moments increased with dummy weight, while knee extension moment did not significantly change with weight increments[16].It suggests that *load magnitude alone* may not linearly increase knee joint moments during a standardized lift, and that other factors may explain knee symptom development[17]. The findings indicates that technique and repetition (trunk-dominant posture; ≥15 lifts/day) were strong correlates of knee pain, while infant weight acted as a contributor in bivariate comparisons. Additionally, real-world infant care is more variable than laboratory lifting: mothers lift from different heights, often asymmetrically, and while multitasking. More ecological biomechanics research supports the idea that infant care tasks can impose meaningful lower-limb demands. Havens et al. (2025) characterized kinematics, kinetics, and muscle activity across common infant care tasks and highlighted task-specific biomechanical challenges, reinforcing that caregiving mechanics can contribute to musculoskeletal strain[18]. Complementary evidence from infant-carrying biomechanics suggests that carrying conditions can increase lower-limb joint moments and fatigue-related loading changes, including knee moments under certain conditions[19-23]. These findings are consistent with our observation that longer daily carrying duration trended toward an association with knee pain. Postpartum studies musculoskeletal in nature often focuses on posture during infant feeding and caregiving[24]. Studies of cross sectional nature documented that mothers who are breast feeding have demonstrated more musculoskeletal complaints due to positioning and supporting infants indicating caregiving posture is clinically relevant[25]. However, not all studies find consistent posture pain associations for all outcomes. For example, recent study conducted reported no significant association between breastfeeding position and scapular dyskinesia[26]. It llustrates that posture-related effects may be region-specific, outcome-specific, and dependent on measurement methods.

Limitations of the Study

As out study is cross-sectional, temporal direction cannot be applied or confirmed. Mother complaining of knee pain may be adopting some compensatory strategies to lift. Inclusion of self reporting may lead to recall biasness.

Conclusion

Knee pain is common among mothers within six months postpartum in Karachi and is significantly associated with suboptimal infant-lifting ergonomics and higher lifting frequency. Even after adjusting for BMI and prior knee pain, trunk-dominant lifting posture remained an independent predictor. Early postpartum ergonomic education may help reduce preventable musculoskeletal burden in this population.

Author Contributions:

Mr Zohaib Hussain verifies the full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis

Concept and design: Zohaib Hussain

Acquisition, analysis, or interpretation of data: Zohaib Hussain

Drafting of the manuscript: Zohaib Hussain

Critical review of the manuscript for important intellectual content: Zohaib Hussain

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References

1. Chauhan G, Tadi P. Physiology, Postpartum Changes. [Updated 2022 Nov 14]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK555904/

2. Yalçınkaya B, Sezgin EA, Saçıntı KG, Özçakar L. Neuromusculoskeletal disorders in pregnancy revisited: Insights and clinical implications. Jt Dis Relat Surg. 2025 Jul 21;36(3):741-750. doi: 10.52312/jdrs.2025.2242. Epub 2025 Jul 21. PMID: 40784007; PMCID: PMC12456335.
3. Miladi S, Makhlouf Y, Boussaa H, Ben Abdelghani K, Fazaa A, Laatar A. Prevalence and associated factors for persistent low back pain in the postpartum period. Tunis Med. 2023 Aug-Sep;101(8-9):688-692. French. PMID: 38445403; PMCID: PMC12558049.
4. Ericsson YB, McGuigan FE, Akesson KE. Knee pain in young adult women- associations with muscle strength, body composition and physical activity. BMC Musculoskelet Disord. 2021 Aug 21;22(1):715. doi: 10.1186/s12891-021-04517-w. PMID: 34419011; PMCID: PMC8380389.
5. Lopez-Gonzalez DM, Kopparapu AK. Postpartum Care of the New Mother. [Updated 2022 Dec 11]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK565875/
6. Zhang H, Zhang X, Ma J, Sun N, Zhang L, Gao Y. Biomechanical effects of loading methods on the patellofemoral joint during stair climbing: based on statistical parametric mapping analysis. Front Bioeng Biotechnol. 2025 Jun 9;13:1617823. doi: 10.3389/fbioe.2025.1617823. PMID: 40552109; PMCID: PMC12183157.
7. Belkhelladi M, Cierson T, Martineau PA. Biomechanical Risk Factors for Increased Anterior Cruciate Ligament Loading and Injury: A Systematic Review. Orthop J Sports Med. 2025 Feb 6;13(2):23259671241312681. doi: 10.1177/23259671241312681. PMID: 39958696; PMCID: PMC11826863.
8. Douryang M, Ghassi HT, Tankeng LT, Lameli C, Dramé MA, Metchehe Djommo DL, Forelli F. The Impact of Physical Activity on the Prevention of Spine Musculoskeletal Disorders in Lactating Women in Cameroon. SAGE Open Nurs. 2025 Nov 11;11:23779608251397447. doi: 10.1177/23779608251397447. PMID: 41235406; PMCID: PMC12605894.
9. Rasheed S, Sameer S. Prevalence of Knee Pain in Post-Partum Females in Pakistan; A Cross-sectional Survey . HJPRS [Internet]. 2022 Jun. 30 [cited 2026 Feb. 14];2(1):110-5. Available from: https://thehealerjournal.com/index.php/templates/article/view/40
10. Patel S, Trehan R, Kinmont C. Post-partum septic arthritis of the knee: a case report. Cases J. 2009 Jun 10;2:7132. doi: 10.4076/1757-1626-2-7132. PMID: 19829917; PMCID: PMC2740212.
11. Li M, Li D, Bu J, Zhang X, Liu Y, Wang H, Wu L, Song K, Liu T. Examining the factors influencing postpartum musculoskeletal pain: a thorough analysis of risk factors and pain assessment indices. Eur Spine J. 2024 Feb;33(2):517-524. doi: 10.1007/s00586-023-08008-5. Epub 2023 Dec 1. PMID: 38038760.
12. Ratnani GR, Patil S, Phansopkar P, Deshmukh NS. A Comparative Study of Knee Joint Proprioception Assessment in 12-Week Postpartum Women and Nulliparous Women. Cureus.

2023 Nov 1;15(11):e48101. doi: 10.7759/cureus.48101. PMID: 38046732; PMCID: PMC10691299.

13. Zhou L, Li J, Zhou Y, Liang Y, Ma Q, Yang L, Pang Y, Fang Y, Guo Y. Pain Management for Postpartum Pain: A Narrative Review. J Pain Res. 2025 Oct 27;18:5617-5626. doi: 10.2147/JPR.S552442. PMID: 41180367; PMCID: PMC12577590.
14. Lavand'homme P. Postpartum chronic pain. Minerva Anestesiol. 2019 Mar;85(3):320-324. doi: 10.23736/S0375-9393.18.13060-4. Epub 2018 Oct 30. PMID: 30394066.
15. Waiteman MC, Chia L, Ducatti MHM, Bazett-Jones DM, Pappas E, de Azevedo FM, Briani RV. Trunk Biomechanics in Individuals with Knee Disorders: A Systematic Review with Evidence Gap Map and Meta-analysis. Sports Med Open. 2022 Dec 12;8(1):145. doi: 10.1186/s40798-022-00536-6. PMID: 36503991; PMCID: PMC9742076.
16. Kim JW, Eom GM, Kwon YR. Analysis of maximum joint moment during infant lifting-up motion. Technol Health Care. 2022;30(S1):441-450. doi: 10.3233/THC-THC228040. PMID: 35124618; PMCID: PMC9028669.
17. Miller DE, Brown AE, Bianco NA, Bhise R, Delp SL, Collins SH. How peak knee loads are affected by changing the mass of lower-limb body segments during walking. PLoS Comput Biol. 2025 Sep 24;21(9):e1012833. doi: 10.1371/journal.pcbi.1012833. PMID: 40991657; PMCID: PMC12483208.
18. Havens KL, Siddicky SF. Characterizing kinematics, kinetics, and muscle activity of postpartum mothers lifting their own infants during three everyday tasks. J Biomech. 2025 Aug;189:112797. doi: 10.1016/j.jbiomech.2025.112797. Epub 2025 Jun 3. PMID: 40494047.
19. Pehlivan S, Tanrıverdi M, Argunsah H, Uygur Şahin T. Infant-carrying methods and their biomechanical influence on maternal gait patterns and joint mechanics. J Back Musculoskelet Rehabil. 2025 Sep;38(5):1004-1011. doi: 10.1177/10538127251321771. Epub 2025 Mar 18. PMID: 40101278.
20. Williams L, Standifird T, Madsen M. Effects of infant transportation on lower extremity joint moments: Baby carrier versus carrying in-arms. Gait Posture. 2019 May;70:168-174. doi: 10.1016/j.gaitpost.2019.02.004. Epub 2019 Mar 8. PMID: 30877855.
21. Taboada-Iglesias Y, Domínguez-Estévez A, Rodríguez-Gude C, Gutiérrez-Sánchez Á. Physical and Physiological Consequences of Babywearing on the Babywearer: A Systematic Review. Healthcare (Basel). 2025 Sep 2;13(17):2193. doi: 10.3390/healthcare13172193. PMID: 40941545; PMCID: PMC12428022.
22. Havens KL, Goldrod S, Mannen EM. The Combined Influence of Infant Carrying Method and Motherhood on Gait Mechanics. J Appl Biomech. 2023 Nov 20;40(2):105-111. doi: 10.1123/jab.2023-0127. PMID: 37984353; PMCID: PMC11092388.

23. Havens KL, Severin AC, Bumpass DB, Mannen EM. Infant carrying method impacts caregiver posture and loading during gait and item retrieval. Gait Posture. 2020 Jul;80:117-123. doi: 10.1016/j.gaitpost.2020.05.013. Epub 2020 May 15. PMID: 32502794; PMCID: PMC9423689.
24. Zhou B, Liang R, Zhang J, Li X, Broach Z, Yip J. Posture Monitoring During Breastfeeding: Smart Underwear Integrated with an Accelerometer and Flexible Sensors. Sensors (Basel). 2024 Nov 29;24(23):7641. doi: 10.3390/s24237641. PMID: 39686178; PMCID: PMC11645095.
25. AlMohri F, Ahmad FM, Abdulrahman E, AlResheedi M, Jasem Z. Breastfeeding-related musculoskeletal pain among lactating mothers in Arabic-speaking countries: prevalences, associations, and functional impact. BMC Womens Health. 2026 Jan 27;26(1):76. doi: 10.1186/s12905-026-04293-6. PMID: 41593644; PMCID: PMC12874781.
26. Haider, M., Irshad, A., Abbas, A., Qamar, S., Niaz, T., & Afzal, R. (2024). Association of Breast-Feeding Positions with Scapular Dyskinesia in Postpartum Females. *Journal of Health and Rehabilitation Research*, *4*(1), 728–733. https://doi.org/10.61919/jhrr.v4i1.482