

## ORIGINAL ARTICLE

# Association of Gravida, Maternal Asymmetrical Side, and Fetal Back Position on the Success of Fetal Repositioning in Breech Presentation Using Biomechanics Ball-Throwing Approach

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## ABSTRACT

**Introduction:** Labor with a breech presentation that is not properly managed can result in maternal and perinatal mortality. Maximizing supporting factors for successful intervention in the third trimester is crucial to improving the effectiveness and efficiency of managing pregnancies with breech presentation. The study aimed to analyze the association of fetal and maternal supporting factors with the outcome of fetal repositioning using the Biomechanics Ball-Throwing approach in pregnant women with breech presentation. **Methods:** This quasi-experimental study employed a pretest-posttest design. Thirty pregnant in their third trimester with breech presentation participated. Independent variables included maternal gravida, maternal asymmetrical side, and fetal back position; the dependent variable was fetal presentation. Data were analyzed using the Chi-Square test. **Results:** Of the 30 respondents, 23 fetuses (76.7%) successfully changed from breech to head presentation ( $p = 0.0001$ ). Multigravida status is a favorable factor for successful fetal repositioning ( $p = 0.007$ ). Maternal asymmetrical side and fetal back position showed no significant effect on fetal repositioning outcomes. **Conclusion:** Multigravida status is a favorable factor for successful fetal repositioning. Maternal asymmetrical side and fetal back position, whether right or left, are association with fetal repositioning outcomes. Future research with larger sample sizes is recommended for clinical trials.

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## INTRODUCTION

In full-term pregnancies, 3-4% result in breech deliveries (1, 2, 3). According to (3), breech presentation occurs due to suboptimal fixation of the fetal head, allowing the fetus to move freely. This condition is commonly found in pregnancies complicated by hydramnios, multiparity, twins, small fetus size, uterine abnormalities, myoma,

or fetal demise. Poorly managed breech delivery can lead to maternal and perinatal mortality (4,5, 6, 7). According to (8), the risk of infant death during breech delivery is between 1-2% or about 4 per 1000 live births (6). Breech deliveries pose a significant risk as infant mortality is four times higher compared to cephalic deliveries (3). Moreover, breech presentation is associated with 10-20% of infant mortality rates, often linked to prolonged and obstructed labor (3,8). The leading causes of death are hypoxia and intracranial hemorrhage (5). Vaginal breech delivery carries risks such as umbilical cord prolapse, difficult labor, and increased maternal and perinatal morbidity. Efforts to reduce morbidity and mortality in breech deliveries

include elective cesarean section, as recommended by the Term Breech Trial. However, cesarean sections increase maternal morbidity and mortality risk (1, 9). Therefore, effective and easily applied management methods that ensure comfort and high success rates for fetal repositioning are important. Fetal adaptation to the intrauterine environment affects its presentation. After 32 weeks of gestation, the chance of spontaneous rotation decreases due to increased fetal weight and decreased amniotic fluid volume (4). Biomechanics is the study of the mechanical aspects of human body movements (10). From a biomechanics perspective, the human body can be analyzed as a system of joints and connecting rods, with movements being fundamental to this analysis. Biomechanics measures elements such as force and velocity of body movement (10). Force applied to the body creates reaction forces, governed by physical principles (4, 11). The biomechanics Ball-Throwing technique involves a pushing force applied by the mother that must overcome the frictional force holding the fetus (4). Previous research conducted by (4) showed that this technique is association fetal repositioning from breech to head presentation. In this biomechanics examination, deviations will be seen in the right extremity, which is concluded as an asymmetrical body part (11, 12, 15). Pregnancy causes musculoskeletal changes, especially in the pelvic bones, affecting the uterus's mechanics (4). Proper body mechanics during pregnancy ensure efficient, safe, and coordinated movement to maintain balance and prevent injury (11, 13, 14, 15, 16, 17). Managing breech presentation before labor is essential. Common techniques like the knee-chest position are not sufficiently effective in repositioning the fetus, making Biomechanics Ball-Throwing a promising alternative by actively engaging maternal biomechanics. This study aimed to analyze maternal and fetal supporting factors and the association outcome fetal repositioning using the Biomechanics Ball-Throwing technique in breech pregnancies.

## MATERIALS AND METHODS

This quasi-experimental study used a pretest-posttest design without a comparison group. The sample consisted of 30 pregnant women with breech presentation selected by purposive sampling. A participant willing to take part visited an independent midwife practice for a pre-ultrasound examination. Ultrasound (USG) was performed by certified Obstetricians and Midwives trained in 2D and 4D USG. The Biomechanics Ball-Throwing intervention was conducted by therapists certified in PAZ Maryam training. Independent variables were maternal gravida, maternal asymmetrical side, and fetal back position; the dependent variable was fetal presentation. During the biomechanics assessment, the respondent sat on a mattress with both legs extended forward in a relaxed position. The Biomechanics

Ball-Throwing procedure involved standing with feet shoulder-width apart, moving the asymmetrical leg forward, holding a ball symmetrically with both hands, stomping the asymmetrical leg on the floor, and immediately throwing the ball forward while moving the asymmetrical leg forward. This movement was repeated 5-7 times. Respondents practiced under guidance until proficient, then continued at home 2-3 times per day for 10-15 minutes per session. The examiner assessed maternal asymmetry by pressing both knees while the respondent relaxed, observing which leg appeared longer or more extended. The asymmetrical side was noted. Fetal back position was determined via Leopold maneuvers and ultrasound as either right or left back. Data analysis was performed using the Chi-Square test.

## ETHICAL CLEARANCE

This study was approved by the Research Ethics Committee, the Health Polytechnic of the Palembang Ministry of Health Number: 0195/KEPK/Adm2/II/2022.

## RESULTS

From the 30 respondents, the majority were young adults aged 19-35 years, totaling 26 individuals (86.7%). Most of the mothers were unemployed (housewives), with 20 respondents (64.5%). The majority had normal blood pressure, reported in 28 respondents (93.3%). The most common gestational age was between 28-33 weeks (60%). Most respondents were multigravida, totaling 23 individuals (76.6%). Maternal asymmetry was most frequently observed on the right side in 16 respondents (53.3%). The most common fetal back position was right-sided in 19 respondents (63.3%). Regarding the amniotic fluid, most had sufficient volume is sufficient (21 respondents, 70%), while 9 (30%) had a reduced amount. A total of 23 fetuses (76.7%) were successfully repositioned into a cephalic (head-down) presentation (Table I). A statistically significant association was found between multigravida status and successful fetal repositioning, with 21 multigravida respondents (91.3%) experiencing success ( $p=0.007$ ; Table II). The odds ratio (OR) for successful repositioning in women with right-side asymmetry was 3.186, indicating they were approximately three times more likely to achieve success compared to those with left-side asymmetry. However, this association was not statistically significant ( $p = 0.675$ ), suggesting no clear relationship between the side of maternal asymmetry and the outcome (Table III). These findings suggest mition can be performed regardless of the side of maternal asymmetry, as both sides offer an equal chance of converting a breech presentation into a head-down position. The odds ratio indicates that applying the Biomechanics Ball-Throwing technique with the fetus's back on the right side yields a 1.283 times greater likelihood of successful repositioning (Table IV).

**Table I Characteristics of Respondents and Fetuses**

Variable	n (%)
Maternal Age	
Young	26 (86.7)
Old	4 (13.3)
Maternal Occupation	
Working	10 (33.3)
Unemployed	20 (66.7)
Blood Pressure	
Normal	28 (93.3)
High	2 (6.7)
Gestational Age	
28-33	18 (60.0)
34-38	12 (40.0)
Gravida	
Primigravida	7 (23.3)
Multigravida	23 (76.6)
Maternal Asymmetry	
Right	16 (53.3)
Left	14 (46.7)
Fetal back position	
Right	19 (63.3)
Left	11 (36.7)
Amniotic volume	
Sufficient	21 (70.0)
Less	9 (30.0)
The Success of Fetal Repositing	
Successful	23 (76.7)
Unsuccessful	7 (23.3)

**Table II Association between Parity and Outcome of Fetal repositioning**

Gravida	Successful	Unsuccessful	p-value
	n (%)	n (%)	
Primigravida	2 (28.6%)	5 (71.4%)	
Multigravida	21 (91.3%)	2 (8.7%)	
Total	23 (76.6%)	7 (23.3%)	0.0007 <sup>1</sup>

<sup>1</sup>Fisher's exact test was used to small, expected frequencies

**Table III Association between Maternal Asymmetrical Side and Outcome of Fetal Repositioning**

Asymmetrical Side	Successful	Unsuccessful	p-value	OR (95% CI)
	n (%)	N (%)		
Right	13 (81.3%)	3 (18.8%)		
Left	10 (71.4%)	4 (28.6%)		
Total	23 (76.6%)	7 (23.3%)	0.675 <sup>1</sup>	3.186

<sup>1</sup> Fisher's exact test used. OR = odds ratio, indicating the strength of association between asymmetry side and repositioning outcome

**Table IV Association between Fetal Back Position and Outcome of Fetal Repositioning**

Fetal back position	Successful	Unsuccessful	p-value	OR (95% CI)
	n (%)	n (%)		
Right	16 (84.2%)	3 (15.8%)		
Left	7 (63.6%)	4 (36.4%)		
Total	23 (76.6%)	7 (23.3%)	0.675 <sup>1</sup>	1.283

<sup>1</sup> Fisher's exact test used. OR = odds ratio, indicating the strength of association between fetal back position and repositioning outcome.

## DISCUSSION

In multigravida women, increased uterine relaxation tends to result in more compliant uterus compared to primigravida, allowing the fetus greater mobility and an increased ability to rotate into the correct position. The repositioning of fetal head from the fundus to the fundus to the upper pelvis inlet aligns with gravitational forces acting through the fetal center of gravity (4, 18). The Biomechanics involved in Ball-Throwing resemble linear motion-movement along a straight or curved path without rotation of the body (4). In this technique, respondent's body, including both upper and lower extremities, moves in the same direction and speed (4). While standing, the respondent's body weight is balanced by the ground reaction force exerted on the soles of the feet. When the respondent applies asymmetric force through foot stomping, a greater vertical force is generated (18). Effective movements are the result of complex coordination among various body systems, including the nervous, muscular, and skeletal systems, working together to produce efficient motor responses. These systems associate with one another and contribute to the overall quality of movement (4). The applications of Biomechanics aim to enhance movement efficiency and minimize injury risk by analyzing forces, body structure, and movement patterns. Understanding these principles allows pregnant women to perform physical activities more effectively, reduce excessive joint and muscle strain, and maintain body safety during movement (4, 18).

## CONCLUSION

The statistical analysis in this study demonstrates a significant association between gravida status and the success of fetal repositioning following the application of Biomechanics Ball-Throwing. However, no significant effect was found between the side of maternal asymmetry or fetal back position and the outcome of fetal repositioning. Future studies are recommended with larger sample sizes to validate these finding and support clinical application.

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## REFERENCES

1. Simxes R, De Deus VNJ, Bernardo WM, Salomro

- AJ, Baracat EC. Elective cesarean section for term breech delivery. *Rev Assoc Med Bras.* 2015;61(5):391–402. doi: 110.1590/1806-9282.61.05.391
2. Impey LWM, Murphy DJ, Griffiths M, Penna L. Management of Breech Presentation: Green-top Guideline No. 20b. *BJOG An Int J Obstet Gynaecol.* 2017;124(7):151–77. doi: 10.1111/1471-0528.14465
  3. Dinda N, Saleha S, Haruna N. Management of intranatal obstetric care for pathology with breech delivery. *J midwifery.* 2017;3(2):88–101. doi: 10.24252/jmw.v3i2.24345
  4. Asmalinda W, Komariah N. Fetal Reposition Using Ball Throwing Biomechanics and Body Mechanics For Pregnant Women. *J Aisyah J Ilmu Kesehatan.* 2023;28(1):85–100. doi: 10.30604/jika.v8i1.1893
  5. Fitri, Santoso EB. Effectiveness of Moxibustion and Knee Chest on the Success of Fetal Position Rotation with Breech Presentation in the Third Trimester of Pregnancy. *J Bina Ilm.* 2021;5(8):4959-64. doi: 10.33758/mbi.v15i8.1003
  6. Widia L. The Relationship between Parity and Breech Delivery. *J Midwifery and Nursing.* 2018;13(1):13-8. doi: <https://doi.org/10.31101/jkk.155>
  7. Harjanti AI, Miskiyah Z. Management of 34-week Pregnancy with Breech Presentation Using the Knee-Chest Method. *J Nursing and Midwifery.* 2017; 3(1);107-9.
  8. Ministry of Health of the Republic of Indonesia. *Riskesdas Report Ministry of Health of the Republic of Indonesia.* Vol. 53. National Riskesdas Report 2018. 2018. p. 154–65. Available from: [http://www.yankes.kemkes.go.id/assets/downloads/PMK No. 57 of 2013 on PTRM.pdf](http://www.yankes.kemkes.go.id/assets/downloads/PMK%20No.%2057%20of%202013%20on%20PTRM.pdf).
  9. Desseauve D, Pierre F, Fernandez A, Panjo H, Decatoire A, Lacouture P, et al. Assessment of Pelvic-Lumbar-Thigh Biomechanics to Optimize The Childbirth Position: An “In Vivo” Innovative Biomechanical Study. *Sci Rep.* 2019;9(1):1–7. doi: 10.1038/s41598-019-52338-8
  10. Alfandianto A, Putri MHED. Biomechanical analysis of the book lift operator’s posture and body movement to identify the risk of musculoskeletal disorders. *J Saintek.* 2017;1(2):95–105. doi: 10.32524/saintek.v1i2.128
  11. Wardhani UC. The Relationship between Body Mechanics and the Incidence of Lowback Pain in ICU and HCU Nurses at Awal Bros Hospital, Batam. *J Menara Ilmu,* 2018;12(7);105–10
  12. Suhartoyo T, Kusuma MNH, Budi DR, Listiandi AD. Biomechanical-Based Aerobic and Anaerobic Exercises. *J Learning Research.* 2020;6(1);145-56. doi:10.29407/js\_unpgri.v6i1.14001
  13. Wahyuni N, Juhana, IV, Winaya IMN, Dewi AANTN. *Biomechanics Study Guide Block. Physiology Study Program. Faculty of Medicine, Udayana University. Bali.* 2017 [cited 2022 June 22]. Available from: <https://www.scribd.com/document/445470441/162215-Study-Guide-Blok-Biomekanik-2020-Repaired>
  14. Wijaya A. *Badminton (A Review of Anatomy, Physiology, and Biomechanics).* *Indones Performance J.* 2017;1(2):106–11. doi: 10.17977/um077v1i22017p106-111
  15. Rahayu NAP, Rafika R, Suryani L, Hadriani H. Body Mechanics Techniques Reduce Lower Back Pain Levels in Pregnant Women in the Third Trimester. *J Smart Midwife.* 2020;2(3);139–46. doi: 10.33860/jbc.v2i3.89.
  16. Danang AS, Irwanto E. Biomechanics Analysis Study of Open Spike Footwork Step in Volleyball on Leg Muscle Power. *Journal of Achievement Sports.* 2018;14(1);81-9. doi: 10.21831/jorpres.v14i1.19985
  17. Dewi HN, Maryanto S., Puspita D, Riadini AY. The Correct Body Mechanic Principle and Low Back Pain in The Third Trimester Pregnant Women. 2nd International Conference on Applied Science and Health, ICASH-A042. 2019: 269-72.
  18. Zulaikha L I. The Relationship between Parity of Mothers Giving Birth and the Incidence of Breech Position in BPS Suhartatik, Talang Health Center Working Area. *Journal of Midwife.* 2017;1;1-7. doi: 10.31102/bidadari.2017.1.2.1-7