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The effectiveness of the KIANO (knees in, angkles out) position in the second stage of labor to reduce perineal tear

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ABSTRACT

The WHO estimates that perineal trauma rates are approximately 85% in vaginal deliveries, and most cases require perineal repair. Efforts to minimize the risk of perineum tear involve performing antenatal perineal massage alongside the use of warm perineal compresses during the second stage of childbirth, as well as various alternative birthing positions other than lithotomy. Conventional birthing positions, such as with the knees apart and feet parallel, are often unhelpful. Ideally, biomechanically during the second stage, the birthing position should optimize the diameter of the pelvic inlet to facilitate descent of the baby's head, such as with the knees together and the heels apart, which allows for sacral nutation and widening of the pelvic outlet. This study aims to determine the effectiveness of the KIANO (knees in, ankles out) maneuver in mothers in the second stage of labor in reducing perineal tears. A true experimental method with a post-test control group design was applied in this study. It was conducted at the Jetis and Tegalreo Community Health Centers, Tutik Purwani and Emi Narimawati TPMB, from July to October 2025. The subjects were primiparous women in their second stage of labor who met inclusion and exclusion criteria. The sampling technique used simple random sampling, with 60 women divided into two groups: 30 primiparous women with the KIANO intervention and 30 primiparous women as the control group. Statistical analysis was performed with JASP version 0.19.1.0. Due to non-normal data distribution, Mann–Whitney U test was selected. The findings revealed a significant difference in degree of perineal tearing between intervention and control groups, demonstrating a small to moderate effect size (r = –0.240). It can be concluded that the KIANO method is effective in reducing the degree of perineal tearing during labor compared to the conventional method.

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INTRODUCTION

Childbirth is a significant event for a woman and represents the highest function of her body. Ideally, labor should occur spontaneously and physiologically. However, in reality, the birth process is often marred by complications, one of which is perineal tears, which can cause maternal morbidity and affect a woman's quality of life physically, psychologically, and socially during the postpartum period (Teixeira et al., 2022, Opondo et al., 2023). The World Health Organization (WHO) estimates that perineal trauma rates are approximately 85% in vaginal deliveries, with most cases requiring perineal repair. (Pangastuti, 2016, Rodrigues et al., 2024)

Most perineal tears are first- and second- degree, severe perineal trauma involving the anal sphincter muscle, typically observed in third- and fourth-degree tears, poses a high risk of complications and exerts a considerable negative impact on women's quality of life. (Pangastuti, 2016, Lumy et al., 2022). WHO has recommended that health workers support mothers through childbirth with a positive experience, respecting maternal dignity and providing mother-centered care (WHO, 2018). Several studies have consistently shown that primiparity (first-time motherhood) is a significant risk factor for perineal trauma. (Faraz & Ali, 2022, Souza, 2020, Okeahialam et al., 2024, Jansson et al., 2020, Silva et al, 2023, Amelia et al., 2021). Perineal tears can result in persistent pain, pelvic floor dysfunction, psychological impacts, and long-term complications that significantly affect women's quality of life (Rodrigues et al., 2024)

To mitigate the occurrence of perineal tears, techniques including antenatal perineal massage and the use of warm perineal compresses during the second stage of childbirth have been explored (Maghalian et al., 2024) as well as various alternative birthing positions other than lithotomy (Arafah et al., 2017, Rodrigues et al., 2024, Sinaga, 2022). Midwives in Indonesia provide conventional assistance for normal delivery and have not considered the biomechanical aspects of pelvis, including during second stage with knees open (sacral counternutation), even though this position is more appropriately recommended to help the baby's head enter the pelvic inlet during the first stage. Biomechanically, the sacral counternutation position will cause the ilium to abduct and the ischium to adduct, thereby reducing the pelvic outlet space. Ideally, biomechanically, during second stage, delivery position should optimize diameter of the pelvic inlet to facilitate the descent of the baby's head, such as with the knees close together and the heels apart, which allows for sacral nutation and widening of the pelvic outlet (Rodrigues et al., 2024)

The knees-in angkles-out birthing position has the ability to alter the internal dimensions of the pelvis, particularly the pelvic outlet, through transverse biomechanical mechanisms by internally rotating the femur. This rotation causes the ischial tuberosities to move apart, as well as the sacrum and coccyx, thereby opening the pelvic floor. The "Knees-in, angkles-out" concept is a positional intervention designed to achieve this internal rotation of the femur by bringing the knees closer together and opening the ankles. When pelvic dimensions are optimized through the KIANO position, the baby's head can descend and pass through the birth canal more efficiently and smoothly. This directly reduces excessive pressure and uneven stretching on the perineal tissues.

This research deepens understanding of how maternal position directly influences pelvic mechanics and birth outcomes. This contribution supports a shift from conventional birth practices that may restrict pelvic movement to a more physiologically oriented approach, providing a scientific basis for midwives and health professionals to recommend KIANO as a simple, effective biomechanical intervention to protect the perineum. Midwives can promote interventions that enhance the maternal experience, in line with WHO recommendations to support woman-centered care and promote a positive birth experience.

A preliminary survey was conducted in January 2025 at inpatient community health centers in Yogyakarta, including Jetis and Tegalrejo, as well as at the Emi Narimawati TPMB and the Tutik Purwani TPMB, with an average monthly delivery coverage of 10-20 deliveries assisted by conventional normal delivery care. Based on this background, exploring alternative birthing positions, such as the "knees-in, ankles-out" position, is crucial to evaluate their impact on decreasing the frequency and intensity of perineal tears.

RESEARCH METHOD

The research was conducted a true experimental study featuring a post-test control group design was conducted over the period from July - October 2025. Subjects were all women giving birth at the Yogyakarta City Inpatient Health Centers (Jetis Health Center and Tegalrejo Health Center), the Tutik Purwani TPMB, and Emi Narimawati TPMB who satisfied the predefined inclusion and exclusion criteria. Sampling was conducted using a simple random technique.

All women delivering during the study period who satisfied inclusion criteria were selected as the sample and did not meet the exclusion criteria. To reduce the influence of chance, experimental studies require a sufficiently large sample size. The calculation of the number of subjects in this study used a "rule of thumb," namely a minimum of 30 subjects for each group (Murti, 2010)

In this study, 30 subjects were used for each treatment and control group, resulting in a total of 60 subjects. The simple random sampling technique used a lottery system from four research locations for two treatments. Inclusion criteria: 1) nullipara, gestational age 37-42 weeks, single fetus, cephalic presentation 2) Age 20-35 years 3) In partu second stage 4) Normal blood pressure ranges from 100/60-130/90 mmHg 5) Normal fetal heart rate (120-160x/minute) Exclusion criteria: 1) Having complications for the mother/fetus during pregnancy or childbirth. The independent in this study was the position of "KIANO" (knees in, ankles out). The dependent in this study was the perineal tear. Bivariable analysis was used to analyze the differences in the degree of perineal tear in the two groups using the non-parametric Mann–Whitney U Test with a 95% confidence interval.

RESULTS AND DISCUSSIONS

Results

Univariate analysis

Table 1. Frequency distribution of respondent characteristics based on age and education

Variable	Group			
	KIANO		control	
	(n=30)	%	(n=30)	%
Age				
20-25 years old	10	33.3	12	40
26-30 years old	16	53.3	15	50
31-35 years old	4	13.3	3	10
Education				
SLTA	19	63.33	22	73.33
S1	11	36.66	8	26.66

Table 1 shows that most respondents were aged 26–30 years, with the majority having a high school education. There was no difference in age or education level between the two groups (comparable). This indicates that respondent characteristics were not confounding variables for perineal tears.

Table 2. Descriptive statistics

							95% Confidence Interval Variance				
		Valid	Missing	Median	Mean	Std. Deviation	Upper	Lower	Range	Minimum	Maximum
Perineal Tear degree (1/2/3/4)	KIANO	30	0	2	1,733	0,521	0,392	0,162	2	1	3
Perineal Tear degre (1/2/3/4)	APN	30	0	2	2	0,455	0,345	0,064	2	1	3

In the KIANO group, the average perineal tear grade was 1.73 with a median of 2, while the APN group had an average of 2.00 with a median of 2. Both groups showed a range of scores between 1 and 3, indicating that most mothers experienced grade 1–2 tears.

Normality and Homogeneity Test

Table 3. Test of normality (shapiro-wilk)

		W	p
Perineal Tear Grade (1/2/3/4)	KIANO	0,687	< .001

Note. Significant results suggest a deviation from normality.

With a Shapiro–Wilk p-value < 0.05, the degree of perineal tear variable did not follow a normal distribution in either the KIANO or APN group. Therefore, group comparisons were conducted using the Mann–Whitney U test < 95% confidence level.

Table 4. Non-parametric test mann–whitney u test

	U	p	Rank-Biserial Correlation	SE Rank-Biserial Correlation
Degree of Perineal Tear (1/2/3/4)	342	0.04	-0.24	0,149

Note. For the Mann–Whitney test, the effect size is reported using the rank-biserial correlation.

Analysis demonstrated a meaningful difference between two groups in the degree of perineal tear, with a small-to-medium effect size (r = –0.240).

Diacussions

Statistically, the average degree of perineal tear in the KIANO group was 1.73, compared to 2.00 in the APN group. Descriptively, this indicates that the KIANO group experienced milder perineal tears than the APN group. Statistical test results confirmed this finding, with a p-value of 0.040 (p < 0.05), showing a significant statistical distinction between two groups groups. Therefore, it can be concluded that the KIANO method is effective in reducing the degree of perineal tearing during labor compared to the APN method.

The KIANO maneuver, which focuses on the knee-to-knee and heel-to-heel position, is believed to optimize the diameter of the pelvic inlet through the sacral nutation mechanism, thereby facilitating the descent of the baby's head and potentially reducing perineal trauma. (Santos et al., 2021). The observed reduction in perineal tear severity in the KIANO group suggests that this birthing position may help optimize the mechanics of birth and reduce excessive pressure on the perineal tissue, consistent with evidence that variations in birthing positions significantly influence the incidence of perineal trauma (Rocha et al., 2020)

The hands-and-knnes position was not used in this study. However, the hands-and-knees position, which has biomechanical similarities to crawling, has been associated with reduced low back pain during labor and improved pelvic floor relaxation, although direct evidence regarding perineal protection is still limited (Santos et al 2021). In the second stage of labor, KIANO position produces traction on the quadratus femoris muscle, which results in widening of the pelvic outlet. Flexibility in labor positions, including a relaxed sacrum position, may influence second-stage

duration and the incidence of perineal trauma, supporting better maternal outcomes. (Badi et al., 2022) . A study showed that the incidence of perineal tears in primiparas reached 60.9%, with a flexible sacrum position not correlating with spontaneous tears but associated with a lower rate of episiotomy (Al-dahiri & Thabet, 2023)

The lithotomy/supine position limits pelvic mechanics, concentrates pressure on the posterior perineum, and is associated with lower rates of episiotomy and perineal trauma higher in comparative studies and reviews. The hands-and-knees position may reduce risk by improving the geometry of the pelvic outlet, facilitating fetal rotation, and slowing or redistributing perineal distension. Other studies report that vertical positions such as squatting, semi-lateral, or lateral, although utilizing gravity to accelerate the baby's descent, may increase the risk of laceration due to increased pressure on the pelvic floor (Teixeira et al., 2022)

The KIANO position, with the knees directed toward the center and the heels positioned outward, allows for sacral nutation. Sacral nutation is a movement in which the sacrum moves downward and forward relative to the ilium, while the tip of the coccyx moves backward and away from the birth canal (Bajerová & Hubran 2024) (Yamada et al, 2022). This movement biomechanically expands the anteroposterior and transverse diameters of the pelvic inlet, facilitating a more efficient passage for the baby's head while alleviating compression on the soft tissues of the perineum (Berta et al., 2019) (Dai & Jin, 2025) (Huang et al., 2019).

Sacral nutation effectively increases the anteroposterior and transverse diameters of the pelvic inlet. This widening creates more space for the baby's head to pass through the birth canal (Bajerová & Hubran, 2024). Research suggests that positions that allow free movement of the sacral can widen the pelvic inlet (Borges et al., 2021). When sacral nutation occurs, the ilium abducts and the ischial tuberosities (the lower parts of the sitting bones) adduct. These changes further help optimize the shape of the pelvis for labor. With the widening of the pelvic inlet produced by sacral nutation, the ligaments and soft tissues surrounding the perineum experience a more controlled and evenly distributed stretch. This movement is essential to facilitate internal rotation of the fetal head and more controlled distension of the perineum, thus minimizing the risk of tearing (Bajerová & Hubran, 2024)

When the pelvic floor is wider, the baby's head can pass through the birth canal more gently, reducing the direct and sudden pressure on the perineum during the crowning phase (when the baby's head begins to appear). This minimizes the risk of excessive or uneven stretching of the perineal tissue, which can cause tearing. Thus, the KIANO maneuver, by promoting sacral nutation and optimizing pelvic dimensions, provides superior biomechanical conditions for delivery, particularly in preventing perineal trauma in primiparas (Bajerová & Hruban, 2024). Flexibility of birthing positions, such as flexible sacrum position, has been shown to influence mode of labor, second stage duration, and perineal trauma, thus demonstrating the relevance of these positions in supporting optimal maternal and neonatal outcomes (Zang et al., 2020)

Despite the growing body of evidence supporting the benefits of alternative birthing positions, midwives and obstetricians often continue to assist births in the horizontal position due to prevailing routines and cultural norms (Rodrigues et al., 2024). Nevertheless, increasing knowledge about the biomechanics of labor and the impact of position on maternal outcomes is crucial in driving changes in clinical practice (Rodrigues et al., 2024) (Yamada et al, 2022).

Research Limitations

This study has limitations in generalizing the results due to the relatively small sample size and homogeneity of the study subjects. Future research should include a larger and more heterogeneous sample to improve the external validity of the findings and incorporate confounding variables not examined in this study. Furthermore, an in-depth analysis of pelvic pressure dynamics in various birthing positions, including KIANO, could provide a more accurate quantitative understanding of perineal protection mechanisms. Computational biomechanical integration can scientifically validate the effectiveness of the KIANO position by predicting stress

distribution in the perineal tissue providing quantitative insight into the prevention of perineal tears.

CONCLUSION

Based on the results of this study, it can be concluded that applying the KIANO birthing position during the second stage of labor has significant potential to reduce the incidence of perineal tears in primiparas. This maneuver significantly facilitates widening of the birth canal through the sacral nutation mechanism, which is biomechanically optimal for mitigating perineal trauma. It is hoped that the KIANO position can be applied during second stage delivery assistance as an integral part of delivery care to reduce perineal tears.

Further research with more comprehensive methodology, including multicenter studies with larger sample sizes and rigorous control for confounding variables, is needed to confirm these findings and support the widespread implementation of KIANO in clinical practice. Furthermore, evaluating maternal satisfaction and acceptance of the KIANO position, as well as its lo ng-term impact on pelvic floor health, would provide a holistic perspective on the effectiveness of this intervention.

The strategic direction based on the positive short-term findings from KIANO is to conduct a prospective, longitudinal cohort study focusing on long-term maternal health outcomes. This will provide conclusive evidence of the benefits of KIANO in preventing long-term maternal morbidity and definitively position pelvic biomechanics as an integral part of preventing perineal tears and promoting labor preparation.

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