

The Effects of Engklek and Egrang Batok Games on Dynamic Balance in Children Aged 9–10

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ABSTRACT

Introduction: Dynamic balance is a crucial ability in children's motor development, especially at the elementary school age. Traditional games such as engklek (hopscotch), egrang batok kelapa (coconut shell stilts) are believed to provide effective stimuli for enhancing children's balance function. To determine the difference in effects between the traditional games engklek and egrang batok kelapa on improving dynamic balance in children aged 9–10 years. **Methods:** This study is a quasi-experiment with a pretest-posttest two-group design. The population consisted of 70 students, and the sample included 41 students from SDN Kuwonharjo, Magetan, aged 9–10 years, divided into two groups: a control group with standard training dosage and an intervention group with modified training dosage. Measurements were conducted using the Balance Beam Test (BBT) before and after the intervention. **Results:** There was a significant improvement in dynamic balance in both groups ($p < 0.05$). However, the difference test showed no significant difference between the two groups ($p = 0.416$), indicating relatively similar effectiveness between engklek and egrang batok kelapa. **Conclusion:** Both traditional games, engklek and egrang batok kelapa, are equally effective in improving dynamic balance in children aged 9–10 years. These games can serve as enjoyable, practical physiotherapy alternatives in school settings.

Keywords: Dynamic balance, Elementary school children, Hopscotch, Stilt

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INTRODUCTION

Childhood is a phase of rapid physical development. Significant growth occurs at the age of 9–10 years in girls and 11–12 years in boys. At this stage, it is essential to train physical components such as strength, endurance, agility, and balance(Agun et al. 2021). Balance is divided into two types: static (maintaining a stationary position) and dynamic (maintaining stability while moving). Dynamic balance is particularly important for children aged 9–10 years as it supports neural adaptation, muscle strength, flexibility, and injury prevention(Hastuti et al. 2020). Balance is influenced by several factors, including the Center of Gravity (COG), Line of Gravity (LOG), and Base of Support (BOS). Other contributing factors include flatfoot, leg length discrepancy, and foot structure abnormalities such as valgus and varus deformities. One of the tools commonly used to

assess dynamic balance is the Balance Beam Test (BBT).

Elementary school-aged children often experience dynamic balance issues. Studies show that the risk of falls in children ranges from 25% to 44%, increasing the potential for injury (Meliniawati et al. 2023). Optimal balance is achieved when the body's center of mass is aligned over the base of support(Budiman 2020). For children, stable posture during movement can be improved through traditional games such as engklek and egrang batok kelapa, which are appropriate for their age and developmental stage(Meliniawati et al. 2023). Play plays a vital role in stimulating children's growth and development through physical activities such as running, jumping, and movement (Hastuti et al. 2020). These activities support physical, motor, emotional, social, and cognitive development (Awanis et al. 2022).



Traditional games like engklek help train balance, dexterity, speed, and agility through one-legged hopping movements(Indriyani et al. 2021). Meanwhile, egrang batok kelapa trains the leg and arm muscles, as well as body balance and flexibility, through coordinated movement on an unstable medium (Awalanisah et al. 2022). Both games are effective in enhancing children's balance and motor coordination.

METHODS

This study used a Pretest-Posttest Two two-group design with an experimental research method. The study involved two groups that received modified doses of the intervention using traditional games *Engklek* and *Egrang Batok Kelapa*. The research was conducted from January 10, 2025 to February 9, 2025. The study was conducted at SDN Kuwonharjo, Takeran District, Magetan. The population in this study consisted of children aged 9–10 years at SDN Kuwonharjo, Takeran District, Magetan, totaling 70 students. Number Ethical Clearance 152/EC/KEPK/1/2025. The sample in this study included 41 children from SDN Kuwonharjo who met the inclusion criteria. Meanwhile, 25 children were excluded based on exclusion criteria, and 4 dropped out after passing the inclusion stage and during the study.

This study used a purposive sampling technique. The inclusion criteria were children with no history of disorders related to the musculoskeletal system (such as post-operative lower limb fractures) and children who were willing to participate as research subjects. The exclusion criteria included flat feet, leg length discrepancies, and foot deformities (valgus or varus). The dropout criteria were children who missed one training session or who took the pretest but did not take the posttest. The research procedure consisted of three stages: the preparation phase from January to November 2024, the implementation phase from December 2024 to February 2025, and the reporting phase from March to April 2025. For the data analysis technique, a prerequisite test was conducted before analyzing the data using a normality test. The Shapiro-Wilk test was used if the sample size was fewer than 50 participants, while the

Kolmogorov-Smirnov test was used if the sample size was more than 50. The data were considered normally distributed if the p-value was greater than 0.05 and not normally distributed if the p-value was less than 0.05. A comparative test was used to determine the differences in one or more variables between two or more different samples. The comparative test used to analyze the effect of the *Engklek* and *Egrang Batok Kelapa* games on dynamic balance among students at SDN Kuwonharjo, Takeran District, Magetan in both intervention and control groups was the paired sample t-test, if the data were normally distributed. The independent t-test was used to compare the difference in effects of the two traditional games on dynamic balance between the intervention and control groups, if the data were normally distributed.

RESULTS

This research is a quasi-experimental study using a two-groups pre-test post-test design, aimed at determining the effect of balance training doses given to the samples before and after the intervention. Two types of exercises were used in the study: *Engklek* and *Egrang Batok Kelapa*. The total number of samples in this study was 41.

Table 1. Description of the Sample Studied

Description	Number (n)	Percentage (%)
Total Population	70	100
Sample Studied	41	58
Excluded Sample	25	35
Dropout Sample	4	7

Based on the description of the sample studied (table 1), it can be seen that from the total students at SDN Kuwonharjo, Takeran District, Magetan, 100% of the population consisted of 70 children, and 58% of them amounting to 41 children were included in the study sample. Respondent Characteristics, This general data includes the children's age, gender, and Body Mass Index (BMI). The description of the respondents' data will be presented in the table below.



Table 2. Characteristic Sample by Age in the Group

Variable	Intervention Group	Control Group
9 Years	3 (12.5%)	18 (100%)
10 Years	20 (87.5%)	0 (0%)
TOTAL	23 (100%)	18 (100%)

Source: Primary Data, 2025

Based on the research description in the table 2, it can be seen that the majority of the samples were from the 10-year-old age group, totaling 20 children or 87.5% in the intervention group involving *Engklek* and *Egrang Batok Kelapa* games. Meanwhile, the control group was dominated by the 9-year-old age group, totaling 18 children or 100% of the sample in the control group using the same traditional games at SDN Kuwonharjo, Takeran District, Magetan.

Table 3. Characteristic Sample by Gender in the Group

Variable	Intervention Group	Control Group
Female	10 (43%)	6 (33%)
Male	13 (57%)	12 (67%)
TOTAL	23 (100%)	18 (100%)

Source: Primary Data, 2025

Based on the research description in the table 3, it can be seen that in the intervention group, the percentage of male respondents was higher, totaling 13 children or 57%. In the control group, male respondents also dominated, with 12 children or 33%.

Table 4. Characteristic Sample by Body Mass Index in the Group

Variable	Intervention Group	Control Group
Underweight (<18.5 kg)	15 (65)	13 (72)
Normal (18.5–24.9 kg)	7 (30)	3 (16)
Overweight (25–29.9 kg)	1 (5)	2 (12)
Obese (>30 kg)	0 (0)	0 (0)
TOTAL	23 (100)	18 (100)

Source: Primary Data, 2025

Based on the research description in the table 4, it can be seen that the intervention group was mostly categorized as underweight, with 15 children (65%). Likewise, in the control group, the majority were also underweight, totaling 13 children (72%).

Table 5. Balance Status

Mean \pm Standard Deviation			
Group	Pre-Test	Post-Test	Difference
Intervention	3.6 \pm 0.5	4.3 \pm 0.3	1.3
Control	3.8 \pm 0.5	4.4 \pm 0.3	1.4

Source: Primary Data, 2025

Based on the table 5, the average difference between the two groups intervention and control is 0.1, which indicates that both groups had a similar effect on improving balance.

Table 6. Results in the Intervention Group of Paired Sample T-Test

Pair	Mean	N	Std. Deviation	Sig.
Pre-test	3.6	23	0.5017	0.003*
Post-test	4.3	23	0.3930	

Source: Primary Data, 2025

* = 95% Significance level

The table 6 shows that the intervention group, which received balance training through *Engklek* and *Egrang Batok Kelapa* games, experienced an improvement in balance scores. This improvement is evident from the post-test average score of 4.3, with a significance value of 0.003, indicating a statistically significant difference between the initial (pre-test) and final (post-test) measurements.

Table 7. Results in the Control Group of Paired Sample T-Test

Pair	Mean	N	Std. Deviation	Sig.
Pre-test	3.6	23	.5017	0.003*
Post-test	4.3	23	.3930	



Source: Primary Data, 2025

* = 95% Significance level

Based on Table 7 the control group, which also received balance training using *Engklek* and *Egrang Batok Kelapa* games, showed an improvement in balance scores. This is evident from the increased post-test average score of 4.4, with a significance value of 0.001, indicating a significant difference between the initial and final measurements.

Table 8. Results of the Comparative Analysis Between Group by Independent Sample T-Test

Group	N	Mean	Std. Deviation	Sig.
Control Group	18	.544	0.3276	
Intervention Group	23	.687	0.4126	0.416*

Source: Primary Data, 2025

* = 95% Significance level

Based on table 8 the results are derived from the difference in pre-test and post-test scores in each group. The significance value obtained is 0.14 (> 0.05), which indicates that there is no significant difference between the control and intervention groups. This suggests that both the original and modified training doses were equally effective in improving balance.

DISCUSSION

In this study involved 41 children aged 9–10 years, a developmental stage characterized by ongoing maturation of motor coordination, trunk rotation, and pelvic stability. These factors influence dynamic balance during activities such as walking in a straight line, hopping, or maintaining single-leg stance (Mani et al. 2021). Furthermore, the study found that based on gender, a greater number of boys—25 children—experienced balance impairments compared to 16 girls. This is supported by previous research indicating that girls tend to have better balance than boys, and their balance abilities improve progressively with age (Li et al. 2020). Body Mass Index (BMI) also emerged as a relevant factor, with underweight children more frequently

experiencing balance difficulties. This aligns with earlier studies indicating that reduced muscle strength in underweight children compromises postural stability (Irsyada et al. 2018).

The effect of *engklek* on balance, In the traditional game *Engklek*, children play using only one foot, which helps to intensify the use of one side of the body, allowing the child to focus more on jumping (Indriyani et al. 2021). The mechanism of *Engklek* involves coordination between the muscles and the brain to produce stable movements. The quadriceps, gastrocnemius, and soleus muscles play a role in propulsion and stability during jumping and landing, while the core and gluteal muscles help maintain posture and balance. In the brain, the cerebellum regulates movement coordination, the vestibular system detects body position, and the frontal lobe plans movement. Visual perception assists with visual focus when throwing the *gaco* (marker) and determining the jumping position (Maria et al. 2024). Beyond physical benefits, *Engklek* fosters concentration, emotional regulation, and cooperative play, thereby contributing to holistic child development (Maudina and Khasanah 2023).

The Effect of *Egrang Batok Kelapa* on Balance, In this game, children stand on coconut shells with their feet gripping the ropes while holding the ropes with their hands for support (Awalunisah et al. 2022). This game requires two-foot balance on an unstable surface (coconut shells), helping to maintain overall coordination and stability. The *Egrang Batok Kelapa* game serves as an exercise that stimulates the proprioceptive system and muscle mechanoreceptors, thereby enhancing rapid muscle recruitment. This stimulation affects muscle contraction and kinesthetic awareness, and also triggers facilitation, inhibition, and modulation of both agonist and antagonist muscle activity. This process supports the enhancement of neuromuscular function and overall functional body strength. The game requires coordinated activation of agonist and antagonist muscles, promoting functional strength and balance control. (Mujtahidin and Anita Rachman 2022).

The comparative analysis revealed no statistically significant difference between the

intervention and control groups ($p = 0.416$). This suggests that both Engklek and Egrang Batok Kelapa provide comparable benefits for dynamic balance enhancement. Several factors may explain this outcome:

1. Functional Similarity of Activities

Both games involve physical movements that stimulate the vestibular and proprioceptive systems, as well as core muscle activation. Despite differences in movement patterns hopping versus balancing on unstable surfaces each activity effectively trains balance-related neuromuscular pathways. Firstly, traditional games such as *Engklek* and *Egrang Batok Kelapa* are generally functional physical activities that train body balance. This is achieved through movements such as hopping on one foot, walking on unstable surfaces (like coconut shells), and maintaining posture while shifting position. Such activities stimulate the vestibular and proprioceptive systems, as well as core muscles that play a role in body stabilization. Therefore, despite differences in implementation schedules, both groups still received significant benefits from the activities (Sudaryanti et al. 2024).

2. Physiological Adaptation

Children require sufficient time for physiological adaptation to training stimuli. Although the intervention group received a modified dosage, the cumulative training volume remained within an effective range, resulting in similar outcomes across groups (Aldapit et al. 2019).

3. Motivation and Engagement

Traditional games are inherently enjoyable and socially interactive, fostering high levels of participation and effort. This intrinsic motivation likely contributed to consistent improvements in both groups, regardless of dosage variations.

CONCLUSION

Based on the research results, there was no significant difference between the group that received the original dosage and the group that received the modified dosage in improving balance. Both dosages provided sufficient stimulation for the body to enhance balance, despite differences in the amount or method of delivery. The modified dosage, although

adjusted, remained within effective limits and produced similar effects to the original dosage. This indicates that minor changes in dosage do not significantly affect the outcome, as long as the given dosage is sufficient to achieve the desired maximum effect.

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