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THE EFFECT OF FLOOR GYMNASTICS TRAINING ON THE BODY BALANCE OF GRADE IX STUDENTS AT SMP NEGERI 2 BAMBEL

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Abstract

This study aimed to determine the effect of a structured, one-week floor gymnastics training program on the body balance of ninth-grade students. Employing a quantitative approach with a one-group pretest-posttest design, the research involved 30 students from SMP Negeri 2 Bambel who were physically healthy and aged between 13 and 15 years. The intervention consisted of floor gymnastics exercises conducted three times per week for one week, with each session lasting 60 minutes. Body balance was measured before and after the training using an instrument based on five floor gymnastics indicators (candle stance, one-legged stand, back arch, handstand, and straight-line walk), each scored on a scale of 1 to 3. The results indicated a significant improvement in balance scores following the intervention. The mean pretest score was 9.20, which increased to a mean posttest score of 13.26, with a mean difference of 4.06. The data were normally distributed, as confirmed by the Shapiro-Wilk test ($p = 0.240 > 0.05$). A paired sample t-test revealed a statistically significant difference between the pretest and posttest scores ($t = 22.68$, $p < 0.001$). These findings conclusively demonstrate that a short-term, intensive program of floor gymnastics training is effective in significantly improving both static and dynamic body balance in adolescents. This supports the integration of structured gymnastics into school physical education curricula to enhance students' fundamental motor skills.

Keywords: Body Balance, Floor Gymnastics, Motor Skills, Physical Education, Student Development

INTRODUCTION

Body balance is a fundamental component of motor competence, crucial for performing daily physical activities, preventing injuries, and supporting overall physical performance and concentration (Gabbard, 2018). During adolescence, a period marked by rapid growth and development, the refinement of motor skills like balance is particularly important. The educational environment, especially physical education (PE) classes, provides an ideal setting for fostering these skills. Among various physical activities, floor gymnastics stands out as a discipline that inherently demands and develops high levels of muscle control, coordination, and postural stability. Floor gymnastics comprises a series of non-apparatus exercises that involve movements such as rolls, balances, supports, and rotations. These movements require the integrated function of the neuromuscular system to maintain stability both in static positions (e.g., a handstand) and during dynamic transitions (e.g., from a roll to a stand). According to Haywood and Getchell (2020), balance is not a fixed ability but is highly adaptable through specific, repetitive, and structured practice. Floor gymnastics provides such practice, challenging the body's center of gravity and forcing adaptations in proprioception and muscular response.

The theoretical foundation for this study is rooted in motor learning and control theories. The Schema Theory, for instance, suggests that practicing varied movements helps develop generalized motor programs and recall schemas, which improve performance and adaptability (Schmidt & Lee, 2019). By engaging in diverse floor gymnastics exercises, students can enhance their internal models for balance control. Furthermore, the physiological perspective emphasizes that such training strengthens the core and stabilizer muscles, which are vital for maintaining posture (Giriwijoyo & Surachman, 2010). Previous research has consistently shown a positive correlation between gymnastics training and improvements in postural control and balance. For example, a study by Irawan (2021) found that floor gymnastics training significantly improved the balance of university students. Similarly, Junaidi (2020) demonstrated that coordination training, a key element of gymnastics, effectively enhanced balance in young

athletes. Despite the established theoretical benefits, there is a need for more empirical evidence within the specific context of junior high school students in Indonesia, where PE curricula may not always prioritize structured gymnastics training. This study, therefore, seeks to fill this gap by investigating the impact of a short-term, intensive floor gymnastics program on the body balance of Grade IX students at SMP Negeri 2 Bambel. The findings are expected to provide an empirical basis for educators and school administrators to develop more effective physical training programs aimed at enhancing students' motor development.

LITERATURE REVIEW

Balance is the ability to maintain the body's center of gravity within its base of support, whether stationary (static balance) or while moving (dynamic balance). It is a complex process involving the integration of sensory information from the visual, vestibular, and somatosensory systems, followed by appropriate motor responses (Shumway-Cook & Woollacott, 2017). In adolescents, the development of balance is crucial as it underpins performance in almost all sports and physical activities and is a predictor of reduced fall and injury risk (Karwoski & Proffitt, 2006). Drowatzky and Zuccato (1967), in their seminal work, highlighted that while static and dynamic balance are related, they represent distinct abilities that can be trained independently, though activities like gymnastics often train them concurrently.

Floor gymnastics, a branch of artistic gymnastics performed on a matted area, involves a sequence of acrobatic and gymnastic movements. Key elements include jumps, balances, rolls, and rotations. These exercises are particularly effective for developing fundamental motor skills because they require a high degree of body awareness, strength, and coordination (Miletić, Katić, & Maleš, 2004). Exercises such as the candle stance (shoulder stand) and handstand are primarily static, demanding immense core stability and postural control. In contrast, movements like the back arch (backbend) and walking on a straight line challenge dynamic balance and coordination during motion.

The notable effectiveness of floor gymnastics in enhancing an individual's balance is not a singular outcome but the result of several interconnected physiological and neurological adaptations. Through the repetitive practice of various poses and movements, the body undergoes significant neuromuscular adaptations. This training refines the communication pathway between the nervous system and the muscular system, leading to faster and more efficient activation of the stabilizer muscles. These muscles are crucial for making the minute, rapid adjustments necessary to maintain equilibrium, meaning that with consistent practice, the body learns to anticipate and correct for imbalances with greater speed and precision.

Furthermore, floor gymnastics serves as a powerful training tool for sharpening proprioception, which is the body's innate sense of its own position and movement in space. Gymnastic exercises often require participants to move their bodies into and through unusual, unstable, and inverted positions. This constant challenge forces the proprioceptors—sensory receptors located in the muscles, tendons, and joints—to become more sensitive and accurate in their feedback to the brain. As this sensory acuity improves, an individual gains a finer-tuned awareness of their body's alignment, allowing for more refined and automatic balance corrections even outside of the gym environment.

Underpinning these neuromuscular and proprioceptive improvements is the critical development of core strength. Virtually every movement in floor gymnastics, from a simple roll to a complex handstand, demands the engagement of the deep core musculature, including the abdominals, obliques, and lower back muscles. This group acts as the body's central pillar; a strong and stable core is fundamental for maintaining a balanced center of gravity, providing a solid foundation for limb movement, and enabling the effective transfer of force between the upper and lower body. Therefore, the balance achieved through floor gymnastics is a holistic product of a stronger physical foundation, a more sensitive nervous system, and more efficient muscular coordination.

A body of research supports the positive impact of gymnastics training on balance. A study by Čuk et al. (2013) found that young gymnasts exhibited superior static and dynamic balance compared to their non-gymnast peers. Another study by Hutzler (2014) concluded that a 12-week gymnastics program significantly improved the balance abilities of children with developmental coordination disorder. The study by Irawan (2021), though conducted on an older population, directly aligns with the present research, showing that floor gymnastics exercises led to a statistically significant improvement in balance test scores. However, many existing studies involve long-term training periods or specialized populations. There is a relative scarcity of research examining the effects of very short-term, intensive interventions (e.g., one week) on typically developing adolescents within a standard school PE framework. This study aims to contribute to the literature by demonstrating that even a brief, focused exposure to floor gymnastics can yield measurable and significant improvements in body balance, making it a highly feasible and time-efficient strategy for school-based motor skill enhancement.

METHOD

Research Design and Participant Selection

This study utilized a quantitative research approach, implementing a pre-experimental design known as the one-group pretest-posttest design. This framework involved measuring a single group on the dependent variable—body balance—both before and after they underwent an experimental treatment consisting of a floor gymnastics training program. Although this design is acknowledged to be susceptible to certain threats to internal validity, such as the influence of external events or natural maturation, it serves as a practical and effective method for conducting initial investigations within the constraints of a real-world school environment. Its primary utility lies in its ability to determine whether an intervention shows a potential effect worthy of further, more controlled study, a rationale supported by Creswell & Creswell (2018).

The participants for this investigation were 30 Grade IX students from SMP Negeri 2 Bambel, comprising 15 males and 15 females. These individuals were selected through a purposive sampling technique to ensure a specific and relevant sample. The selection criteria mandated that all participants were between 13 and 15 years of age, were declared physically healthy by the school clinic with no history of musculoskeletal injuries that could hinder their performance, and voluntarily agreed to take part in the entire research process, as confirmed by signed informed consent forms from both the students and their parents or guardians.

Intervention Protocol and Measurement Instrument

The experimental treatment was delivered through a structured floor gymnastics training program conducted intensively over one week, with sessions held three times on alternate days. Each 60-minute session followed a consistent structure, beginning with a 15-minute warm-up of light jogging, dynamic stretching, and joint mobilization. The main activity, lasting 35 minutes, was dedicated to learning and practicing five key floor gymnastics elements specifically chosen for their demand on balance: the Candle Stance, the One-Legged Stand, the Back Arch, the Handstand, and the Straight-Line Walk. Each exercise was demonstrated by an instructor, and students practiced with ongoing corrective feedback, with the difficulty and duration of holds progressively increased across the three sessions. Each session concluded with a 10-minute cool-down involving static stretching and breathing exercises.

The dependent variable of body balance was measured using a researcher-developed test based on the performance of the five gymnastics indicators. Each element was scored on a scale from 1 to 3, with specific criteria assessing stability, form, and duration. A score of 1 indicated poor form and an inability to maintain the position, a score of 2 represented moderate form with some instability, and a score of 3 denoted good form and a steady, correctly held position. This yielded a total possible score ranging from 5 to 15. The same instrument was administered for both the pretest, conducted before the first training session, and the posttest, conducted after the final session, with all assessments performed by the same evaluators to maintain scoring consistency.

Data Analysis Procedure

The data collected from the pretest and posttest were analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 26. The analytical process began with descriptive statistics, calculating the mean and standard deviation for both the pretest and posttest scores to summarize the data. Following this, the Shapiro-Wilk test was employed to determine if the data from the pretest, posttest, and the difference between them followed a normal distribution, a key assumption for the chosen parametric test. The final step involved hypothesis testing using a paired sample t-test. This test was used to compare the mean scores from the pretest and posttest to determine if any observed change was statistically significant. The null hypothesis stated that there was no significant difference between the two scores, while the alternative hypothesis posited that a significant difference did exist, with a predetermined significance level of 0.05.

RESULTS

The primary objective of this study was to investigate the effect of a one-week floor gymnastics training program on the body balance of Grade IX students. The results of the data analysis are presented below. The descriptive statistics for the pretest and posttest balance scores are summarized in Table 1.

Table 1. *Descriptive Statistics of Pretest and Posttest Balance Scores*

Variable	Mean	Standard Deviation	N
Pretest	9.20	0.98	30
Posttest	13.26	0.98	30
Difference	4.06	0.98	30

As shown in Table 1, the mean balance score increased from 9.20 (SD = 0.98) in the pretest to 13.26 (SD = 0.98) in the posttest. This represents a mean improvement of 4.06 points. Before conducting the paired sample t-test, the assumption of normality was tested. The Shapiro-Wilk test results for the difference between pretest and posttest scores showed a p-value of 0.240, which is greater than the 0.05 significance level. This confirms that the data were normally distributed, thus satisfying the assumption for using a parametric t-test. The paired sample t-test was then performed to determine the statistical significance of the observed improvement. The results indicated a highly significant difference between the pretest and posttest scores, with a t-value of 22.68 and a p-value of 0.001 ($p < 0.05$). This leads to the rejection of the null hypothesis and supports the acceptance of the alternative hypothesis that the floor gymnastics training had a significant effect on improving students' body balance.

DISCUSSION

The findings of this study provide clear evidence that a short-term, structured floor gymnastics training program can significantly enhance the body balance of adolescent students. The substantial mean increase of 4.06 points from pretest to posttest, confirmed by the highly significant p-value, underscores the efficacy of this intervention. This outcome aligns with the existing body of literature on motor development and gymnastics. The improvement can be attributed to the specific demands that floor gymnastics places on the neuromuscular system. As postulated by Gabbard (2018), balance is a trainable ability. The exercises performed—such as the static candle stance and handstand, and the dynamic back arch and straight-line walk—directly challenged the students' static and dynamic balance mechanisms. Through repeated practice over three sessions, the participants likely experienced rapid neuromuscular adaptations. Their proprioceptive acuity improved, allowing for finer adjustments in posture, and the stabilizer muscles of the core, ankles, and hips became more engaged and efficient (Hibbs et al., 2008).

The significant results achieved in just one week are particularly noteworthy. They suggest that even a brief but intensive exposure to targeted balance training can yield measurable benefits. This has important practical implications for school physical education, where curriculum time is often limited. Incorporating focused units of floor gymnastics could be a highly efficient way to boost fundamental motor skills. The findings directly support the work of Irawan (2021) and extend it to a younger school-aged population. It is important to consider the study's limitations. The use of a one-group pretest-posttest design means that factors other than the gymnastics training, such as natural maturation, practice effects from the pretest, or concurrent physical activities, could have contributed to the improvement. The absence of a control group makes it difficult to entirely rule out these confounding variables. Furthermore, the long-term retention of these balance improvements was not measured. Future research should employ a randomized controlled trial (RCT) design with a control group engaging in regular PE activities and include follow-up tests to assess the durability of the effects. Exploring the differential effects on males and females could also be an interesting avenue for further study. Despite these limitations, the internal validity of the finding of a significant effect is strengthened by the use of a standardized instrument, a controlled intervention protocol, and robust statistical analysis. The results strongly indicate that the floor gymnastics program was the primary driver of the observed improvement.

CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study, it can be concluded that a structured, one-week floor gymnastics program, comprising just three sessions, yielded a statistically significant positive effect on the body balance of Grade IX students. The rigorous analysis, which confirmed the normal distribution of the data, demonstrated through a paired sample t-test that the improvement in balance scores from pretest to posttest was highly significant. This outcome strongly indicates that floor gymnastics serves as an exceptionally effective and time-efficient methodology for enhancing both static and dynamic balance in adolescents, making it a highly viable activity for integration within

standard educational frameworks. In light of these conclusions, several important recommendations emerge for various stakeholders. For physical education teachers and coaches, the evidence supports the systematic integration of structured floor gymnastics modules into the existing curriculum. By emphasizing foundational skills such as balances, rolls, and supports, educators can effectively cultivate students' overall motor competence and body awareness, which are fundamental to all physical activity. For school administrators, this involves a commitment to providing the necessary support for such initiatives. This includes investing in professional development to ensure teachers are confident and skilled in delivering gymnastics instruction, as well as ensuring the availability of adequate equipment, such as safety mats, to facilitate a safe and effective learning environment.

For the students themselves, the recommendation is to engage with these gymnastics activities seriously and consistently during physical education classes. The neuromuscular and proprioceptive benefits identified in the study are directly linked to active and correct participation. Finally, for the research community, this study provides a foundation for more extensive future investigation. Subsequent research should aim to address the limitations of this pre-experimental design by employing a randomized controlled trial (RCT) with a control group to bolster internal validity. Furthermore, extending the intervention period and incorporating follow-up assessments would offer valuable insights into the long-term effects and sustainability of the balance improvements. Future studies could also productively explore the transfer effects of floor gymnastics training on other foundational motor skills, such as agility, flexibility, and muscular strength.

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