The Effectiveness of the Difference in the Playing Method of Stilt Batok and the Dingklik Relay on the Improvement of Gross Motor Skills and Balance in Deaf Children

La efectividad de la diferencia en el método de juego del stilt batok y el dingklik se basa en la mejora de las habilidades motoras gruesas y el equilibrio en niños sordos

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Abstract

Introduction: The problem in this study is the low Gross Motor skills and Balance in Deaf Children.
Objective: This research aims to analyze: (1) the effect of the batok stilt play method and the dingklik relay on the increase in gross motor and balance of deaf children, (2) the difference in the influence of the batok stilt play method and the dingklik relay on the increase in gross motor and balance of deaf children.
Methodology: This type of research is an experiment with two groups of pre-test and post-test. The sample in this study was 40 children taken using purposive sampling criteria.
Results: The results of the research prove that: There is a significant influence of the stilt batok and dingklik relay play methods on the improvement of gross motor skills and balance of deaf children with a significance value of less than 0.05 ($p<0.05$). 2) There was a significant difference in the influence between the group given the batok stilt play method and the dingklik relay on the improvement of gross motor skills and balance of deaf children, it was proven that the average gross motor value in the group of children given the stilt batok method was 13.8, while the average gross motor value in the dingklik relay group was 9.2 with an average post test difference of 4.6. Furthermore, the average balance value in the stilt batok play method group was 90.67 while the average value of equality in the dingklik relay method group was 72.15 with an average post-test difference of 18.52.
Conclusions: Therefore, it can be concluded that the group of deaf children who are given the stilt batok method treatment has better gross motor skills and balance compared to the dingklik relay method group.

Keywords

Stilts, dingklik relays, gross motor, balance, deaf

Resumen

Introducción: El problema en este estudio es la baja Motricidad Gruesa y Equilibrio en Niños Sordos.
Objetivo: Esta investigación tiene como objetivo analizar: (1) el efecto del método de juego del zanco batok y el relevo dingklik en el aumento de la motricidad gruesa y el equilibrio de los niños sordos, (2) la diferencia en la influencia del método de juego del zanco batok y el relevo dingklik en el aumento de la motricidad gruesa y el equilibrio de los niños sordos.
Metodología: Este tipo de investigación es un experimento con dos grupos de pre-test y post-test. La muestra de este estudio fue de 40 niños tomados mediante un criterio de muestreo intencional.
Resultados: Los resultados de la investigación demuestran que: 1) Existe una influencia significativa de los métodos de juego del zanco batok y el relevo dingklik en la mejora de la motricidad gruesa y el equilibrio de los niños sordos con un valor de significación inferior a 0,05 ($p<0,05$). 2) Hubo una diferencia significativa en la influencia entre el grupo al que se le dio el método de juego del zanco batok y el del relevo dingklik en la mejora de la motricidad gruesa y el equilibrio de los niños sordos, se comprobó que el valor medio de la motricidad gruesa en el grupo de niños al que se le dio el método del zanco batok fue de 13,8, mientras que el valor medio de la motricidad gruesa en el grupo del relevo dingklik fue de 9,2 con una diferencia media postest de 4,6. Además, el valor medio de equilibrio en el grupo del método de juego stilt batok fue de 90,67, mientras que el valor medio de igualdad en el grupo del método de relevo dingklik fue de 72,15, con una diferencia media postest de 18,52.
Conclusiones: Por lo tanto, se puede concluir que el grupo de niños sordos que recibe el tratamiento del método stilt batok tiene mejores habilidades motoras gruesas y equilibrio en comparación con el grupo del método de relevo dingklik.

Palabras clave

Zancos, relevos de bote, motricidad gruesa, equilibrio, sordos.

Introduction

Of the various types of children with special needs, deafness is one of the types of children's limitations that is very important to observe. (Veiskarami & Roozbahani, 2020) Stating that deafness can be referred to as the condition of a person who faces damage to the sense of hearing that causes the inability to capture various sound stimuli, or other stimuli through hearing. There are about 34 million children in the world who suffer from hearing loss, which often impacts their motor development (Singh et al., 2021). Deafness can affect sensory processing and motor coordination abilities in children (Drobac et al. 2024). Normally, every activity of human life is inseparable from movement. Humans carry out movement activities, be it gross movement (gross motor) or fine movement (fine motor) by the student's skills. Learning basic movements that are ideal is intertwined with the childhood phase (Moon et al., 2019; Wijaya et al., 2024).

Gross motor skills in deaf children need to be trained because, in children with special needs, this motor skill is the beginning of the development of other skills, such as sensory skills and thinking skills (Burns et al., 2017; Yesica, 2020). Not only that, gross motor development, namely the development of movement includes balancing and coordination between limbs, such as crawling, walking, and running. Until then, the balance component is needed for early childhood to maintain overall mobility (Sadri et al., 2021; Szabo, 2021).

Balance for deaf children is very meaningful in various activities that are tried by each child so that the balance that a person has is good until all the physical activities he does are also good. In line with the opinion above, the balance has various aspects that are very meaningful, so the balance aspect here wants to play a very big role in children carrying out various physical activities, both daily activities and branch activities according to their interests (Chatzopoulos et al., 2018). The components of balance control previously explained, such as sensory information systems, synergistic postural muscle responses, muscle strength, adaptive systems, and joint range of motion (Levin & Piscitelli, 2022). So it is very meaningful if we look at the development of a child from an early age, the skills that are fundamental to their development.

Balance control components include sensory information systems, synergistic postural muscle responses, muscle strength, adaptive systems, and joint range of motion (Kaur et al., 2015). Sensory information systems are concerned with visual, vestibular, and somatosensory senses. Visual input can affect human habituation to changes in the immediate environment. Information that enters through visual sensory is to be processed in the brain after which the musculoskeletal system wants to work synergistically to maintain the balance of the body (Latorre-rom et al., 2021). Balance in children needs to be improved so that children's balance skills can produce optimal motor movements. For children with hearing loss, there may be a greater reliance on visual input, as they might depend more on visual information than children without hearing impairments (Aljedaani et al., 2023). Therefore, any disruption in visual functioning or adaptation could directly impact their balance skills.

Sourced from the results of previous studies (Marcon, 2012) said that if the balance of early childhood in carrying out physical activities is still not natural, this is due to the lack of role of teachers in providing innovative movement programs in improving children's balance. This is in line with the study (Jiang et al., 2018) which said that the aspect that triggers the low balance ability of children is the lack of role of teachers to practice balance that is fun for children and inadequate school facilities. Having aggressive motor skills and a good balancer for children with special needs is very meaningful to support children's movements in carrying out movements into coordinated, controlled, and orderly reactions.

Research by Mehrem et al. (2023) revealed that children with hearing loss have difficulties in coordination of body movements and postural stability. Moreover, Zakeri and Taghian (2020) found that muscle strength and postural responses in deaf children are often less than optimal, which affects their ability to maintain body balance. However, based on the results of observations and early interviews with 5 teachers at SLB N 1 Yogyakarta which was tried on September 12, 2024, it was said that the average gross motor skills and balance of deaf children were still low. This is because the educational model used by these teachers is a classical education model so the results are still inefficient in improving the gross motor skills and balance of deaf children. The modules given by health education teachers are still in the form of providing methods such as jumping and jumping well, throwing and catching the ball, and protecting balance when climbing the walkway, not yet in the form of exciting play.

Related to the reality that takes place on the field and monotonous play activities, there is a new play activity that is more exciting for children. And these play activities are very rarely encountered by children.

Sourced from the initial observation of the motor skills of children with special needs and still not optimal, with students tending to move at will not paying attention, and not exploring the movements instructed by the teacher, so 40 students did not meet the KKM score. The standard value of KKM in schools is extraordinary at 80. Not only that, a balance test was tried using a stork stand test with an average score of 10 seconds, Regarding this, of course, it is listed into very few types. Children at school often face falling during morning gymnastics that are tried every Saturday, especially when playing on the field. This means that children are still not able to regulate their body balance during gymnastics and when playing on the field. Teachers in schools are extraordinarily facing difficulties in finding references that can help create modifications to games and learning models that are suitable for teaching, as well as the lack of teaching facilities and infrastructure is a consideration for teachers who cannot carry out modifications and modifications in teaching.

Until then, a suitable learning model is needed. One of the learning models that is thought to be able to improve gross motor skills and balance for deaf children is a game-based learning model. In physical learning education, a game can be tried that can increase learning goals so that they can be achieved (Gümüşdağ, 2019). The form of play activities that can improve gross motor skills and balancers must have activities such as running, walking, or jumping that require large muscles (Roach & Keats, 2018). Games are one of the facilities for improving gross motor skills and balance for deaf children.

One of the games to optimize children's gross motor skills and balance for deaf children is to play the dingklik relay. Playing the dingklik relay is Playing the dingklik relay is walking on a wooden stand that has 2 feet in the form of a rectangle whose weight is adjusted to the child with dimensions of 30 x 20 x 5 (centimeters). These sofas are generally made of wood. The activity is tried alternately by sharing a device made from a wooden stand that has 2 legs from one person to another person that makes the heart and feelings of happiness which the activity means for the development and growth of children (Arti, 2015). The relay game involves a child who passes 2 small benches in the relay, where each child must arrive at the bench to move forward until the last child ends (Sabillah et al., 2024).

Not only that, but other game models that can optimize gross motor skills and balance are the stilt method of batok. Playing stilt shell is a game that wearing coconut shells that have been split into 2 parts, after that the upper middle of the coconut shell is given a hole to hook the rope, and the bottom is given a board or plywood so that it is not easily damaged (Faizah et al., 2024). Next, the child stands on the coconut shell while holding the rope and then walks forward by lifting the rope at the same time as lifting the legs. When walking should not hold the ground, this stilt game can train, movement, balance, and seriousness. Not only that, when playing coconut shell stilts, there is a contraction of the muscles, especially the lower extremity and abdomen so that there is an increase in muscles, so that the coconut shell stilt game can be used as a balance and gross motor training program. Stemming from the problems that have been raised earlier, the researchers aim to analyze the comparative usefulness of the dingklik relay and stilt playing methods on the increase in gross motor skills and balance of deaf children.

Method

Research Design

This study uses a quasi-experimental design with a pre-test and post-test design of two groups. The quasi-experimental design was chosen because the random assignment of participants to experimental and control groups was not possible due to the characteristics of the school environment. To ensure the validity of the results, a group design was used that was paired based on age and gender.

Research Participants

The population in this study consisted of 80 students from Sekolah Extraordinary Negeri 1 Yogyakarta. The sampling technique used was purposive sampling to select 40 deaf children with the following criteria: (1) children aged 5-6 years, (2) active in school activities, (3) not sick, (4) boys and girls, (5) willing to participate in the learning process, and (6) able to participate in all learning model programs

provided. The participants were divided into two groups: Group 1 (20 children) received the method of playing stilts, and Group 2 (20 children) received the method of playing dingklik relay. To control for potential disruptor variables, the two groups were paired based on age and gender. In addition, there was no significant difference in basic motor skills scores and balance between the two groups before the intervention. The study met ethical standards, and consent was obtained from all participants and their guardians, who filled out a statement confirming their willingness to participate in the study.

Research Procedure

The data collection method in this study uses tests and measurements. The instruments used to measure the gross motor skills of deaf children include: (1) a 5-meter straight walking test, (2) a 15-meter running test to avoid five obstacles, (3) a test of standing on one leg for 10 seconds, (4) a test of jumping from a 15 cm high block, and (5) a test of jumping over a 15 cm high block. The instrument used to measure balance is the Stork Stand Test. The intervention, which involves playing stilts and playing dingklik relays, is carried out three times a week for four weeks. Rahmawati & Sulistyawan, (2020) said that the educational model through play media that was tried throughout 4 weeks was more efficient to improve children's psychomotor growth and movement balance. Intervention Protocol: Each session lasts for 30 minutes, which includes a warm-up, intervention activity, and a cool-down period. Specific activities include: Stilts play groups: Children use stilts to walk in different patterns to improve balance and coordination, and Dingklik relay groups: Children participate in relay races that involve sitting and standing while balancing on a small bench (dingklik), which aims to improve stability and motor control. At the end of the intervention, a post-test was performed to measure the participants' gross motor skills and balance after treatment.

Data Analysis

The data was analyzed using SPSS 24. Before hypothesis testing, normality tests and homogeneity tests are carried out to ensure that the data meet parametric assumptions. To compare the results of the pre-test and post-test in each group, a paired sample t-test was used, and to compare between the two groups, an independent sample t-test was used. Power analysis was performed to ensure the sample size was sufficient to detect significant differences with a size effect of 0.5 and power of 0.80.

Results

a. Normality Test

The normality test was carried out to test whether the data had a normal distribution or not. The calculation of data normality was carried out using the Shapiro-Wilk test. The results of the normality test are shown in the table below.

1) Batok Stilt Method Group

Table 1. Results of the normality test of pre-test and post-test data of the group of athletes of the stilt batok method

Data	Significance	P	Information
Pre-test gross motor	0,05	0,528	Usual
Post-test gross motor	0,05	0,631	Usual
Pre-test balance	0,05	0,419	Usual
Post-test balance	0,05	0,519	Usual

Based on the statistical analysis of the normality test that has been carried out using the Shapiro Wilik test, the pretest and post-test data of gross motor and the balance of the group of children playing on stilts of the shell was obtained from the results of the normality test of the data significance value p > 0.05, which means that the data is normally distributed, it can be concluded that all pre-test and post-test data in the group of children playing stilts are declared normal.

2) Dingklik Relay Playing Method Group

Table 2. The results of the normality test of the pre-test data of playing the dingklik relay

Data	Significance	*P*	Information
Pre-test gross motor	0,05	0,321	Usual
Post-test gross motor	0,05	0,438	Usual
Pre-test balance	0,05	0,308	Usual
Post-test balance	0,05	0,416	Usual

Based on the statistical analysis of the normality test that has been carried out using the Shapiro Wilik test, in the pretest and post-test data of the dingklik relay playing group, it was obtained from the results of the normality test of the significance value of p > 0.05, which means that the data is normally distributed, it can be concluded that all pre-test and post-test data in the dingklik relay playing group are declared normal.

b. Homogeneity Test

The homogeneity test was used to test the similarity of variance between the compared data. The results of the pre-test and post-test data homogeneity test between the stilt batok playing method group and the dingklik relay play method group in this study are as follows.

Table 3. Results of pre-test and post-test data homogeneity test results

Data	Group	F count	*P*	Information
Pre-test gross motor	Playing stilts Playing the dingklik relay	0,258	0,619	Homogeneous
Post-test gross motor	Playing stilts Playing the dingklik relay	0,319	0,418	Homogeneous
Pre-test balance	Playing stilts Playing the dingklik relay	0,216	0,709	Homogeneous
Post-test balance	Playing stilts Playing the dingklik relay	0,376	0,508	Homogeneous

The results of the homogeneity test were to test the similarity of the variance of the pre-test and post-test data between the stilt playing group and the dingklik relay playing group. Because the significance value is greater than 0.05 (p>0.05), it can be stated that the pre-test and post-test data between the stilt batok group and the dingklik relay group are homogeneous.

c. Effectiveness Test

1) *Independent Sample t-Test Results*

a) Pre Test

The results of the independent sample t-test in the pre-test data comparing the stilt playing group and the dingklik relay playing group are as follows:

Tabel 4. Hasil Independent Sample t-test Data Pre-Test

Data	Kelompok	Mean	t count	p	Information
Gross motor	Playing stilts Playing the dingklik relay	8,2 6,8	0,570	0,618	Significant
Balance	Playing stilts Playing the dingklik relay	70,12 61,10	1,429	0,710	Significant

Based on the results of the analysis of the Independent Sample t-test of gross motor data, a t-value of 0.570 was obtained with a significance value of p of 0.618, and in equilibrium, a t-value of 1.429 was obtained with a significance value of p.710. Because the significance value of p was greater than 0.05 (p>0.05), it can be concluded that there was no significant difference in gross motor between the stilt group and the dingklik relay group at the time of the pre-test. This means that both groups have the same gross motor skills and balance before being given the treatment.

Based on the results of the analysis, the average value of gross motor in the stilt group was 8.2 while the average value of gross motor in the dingklik relay training group was 6.8 Furthermore, the average

balance value in the stilt group was 70.12 while the average balance value in the dingklik relay group was 61.10. This means that the group of deaf children who are given to play stilts has a better average balance compared to the dingklik relay group.

b) Post Test

The results of the independent sample t-test in the post-test data comparing the batok stilt playing group with the dingklik relay training group are as follows.

Table 5. Results of Independent Sample t-Test Data Post-Test

Data	Group	*Mean*	t count	*p*	Information
Gross motor	Playing stilts	13,8	3,482	0,000	Significant
	Playing the dingklik relay	9,2			
Balance	Playing stilts	90,67	3,283	0,000	Significant
	Playing the dingklik relay	72,15			

Based on the results of the analysis of the Independent Sample t-test of gross motor data, a calculated t-value of 3.482 was obtained with a significance value of 0.000, while the balance was obtained with a t-calculated value of 3.283 with a significance value of 0.000. Because the significance value was less than 0.05 ($p<0.05$), it can be concluded that there was a significant difference in gross motor and balance between the batok stilt play method group and the dingklik relay group.

Based on the results of the analysis, the average gross motor value in the stilt playing group was 13.8 while the average gross motor value in the dingklik relay training group was 9.2. Furthermore, the average balance value in the stilt playing group was 90.67 while the average balance value in the dingklik relay playing group was 72.15. This means that the group of deaf children who are given to play stilts has a better average balance compared to the dingklik relay group.

2) *Results of Paired Sample t-Test*
a) Batok Stilt playgroup

Table 6. Results of Paired Sample T Test of the stilt playing group

Data	Group	*Mean*	t count	*P*	Information
Gross motor	Pre-test	8,2	3,281	0,000	Significant
	Post-test	13,8			
Balance	Pre-test	70,12	3,018	0,000	Significant
	Post-test	90,67			

Based on the results of the analysis of the Paired Sample t-test of gross motor data, a calculated t-value of 3.281 was obtained with a significance value of 0.000, and in the Balance data, a t-calculated value of 3.018 was obtained with a significance value of 0.000. Because the significance value was less than 0.05 ($p<0.05$), it can be concluded that there was a significant difference in gross motor and balance during the pre-test and post-test in the stilt batok group. This means that there is a significant improvement in gross motor and balance before and after treatment.

b) Dingklik Relay playgroup

Table 7. Results *Paired Sample T Test* Dingklik relay play group

Data	Group	*Mean*	t count	*P*	Information
Gross motor	Pre-test	6,8	4,769	0,000	Significant
	Post-test	9,2			
Balance	Pre-test	61,10	4,439	0,002	Significant
	Post-test	72,15			

Based on the results of the analysis of the Paired Sample t-test of gross motor data, a calculated t-value of 4.769 was obtained with a significance value of 0.000, and in equilibrium, a calculated t-value of 4.439 was obtained with a significance value of 0.002. Because the significance value was less than 0.05 ($p<0.05$), it can be concluded that there was a significant difference in gross motor power and balance

during the pre-test and post-test in the dingklik relay group. This means that there is a significant improvement in gross motor and balance before and after the treatment.

Discussion

The discussion of the results of this study provides a further interpretation of the results of the data analysis that has been submitted. The discussion of the results of the analysis can be further explained as follows.

The effect of playing stilts and dingklik relays on the improvement of gross motor and balance of deaf children

Based on hypothesis testing, it is known that there is a stilt and a dingklik relay on the improvement of gross motor and balance of deaf children. These findings are in line with some previous studies (Oktavia & Sutapa, 2020) stated that they produced a stilt play method that could improve children's motor skills. This finding does not change with some of the truth first (Rahmawati & Sulistyawan, 2020) explained that playing on stilts for 4 weeks is an effective playing method to improve balance skills. Regarding this, this is because when playing the stilt, the child must walk on a shell with a diameter of nearly 10 cm, so it takes a balanced response of the body to play it. Not only that, when playing stilts, the muscles are very contractile, the main exteriors of the lower and abdominal muscles so there is an increase in muscles so that the traditional game of coconut shell stilts can be used as a balance training program (Mujtahidin & Rachman, 2022).

Next Other research tried by (Wijayanti, 2018) proves that there is influence of playing with the dingklik relies on children's motor skills. By carrying out relay games, children indirectly want to improve skills, including running, coordination, agility, and cooperation. Play activities are closely related to children's gross motor skills. Children's bones and muscles continue to become stronger and children's lung capacity continues to become large so that students can carry out gross motor activities better and faster. According to (Andini et al., 2024) The researcher who researched playing the dingklik relay explained that playing the relay can significantly improve balance skills.

In guiding deaf children towards healthy psychological adjustment, it will rely heavily on exciting interactions, for example using a game-based learning model (Howerton-Fox & Falk, 2019). Opinion (Oskar & Caflisch, 2019) said that to improve children's motor skills, can be tried with motor learning development strategies with a play model.

The model of playing on stilts and playing the dingklik relay to improve gross motor skills and balance for deaf children is expected to be a teaching material for teachers in the learning process. The model of playing stilts and playing dingklik relays for physical learning education has been adapted to the development sessions of deaf children in extraordinary elementary schools.

The difference in the effects of playing stilts and dingklik relays to improve gross motor and balance in deaf children

The results of the analysis showed that there was a significant comparison of the influence between the stilt group and the dingklik relay group on the increase in gross motor skills and the balance of deaf children. The group of deaf children who were given the treatment of playing stilts was better than the group playing the dingklik relay on the increase in gross motor skills and balancing the deaf children. This is supported by previous research conducted by (Sari et al., 2022) explained that the procedure of playing stilts can improve gross motor skills in children with special needs compared to conventional learning. Other research information conducted by (Maryanti et al., 2021) said that there is a significant influence of the stilt play procedure on children's gross motor skills at an early age. The activity of playing stilts affects children's gross motor skills because, in the process of implementing stilt play activities, the basic components of motor skills are listed. Research results (Nugroho et al., 2023) What is convincing is that the stilt play procedure is better in improving gross motor skills in children aged 5-6 years.

The stilt is a form of traditional game equipment that is rounded from coconut shells. This stilt game equipment for early children can train the growth of children's balance and can stimulate children's

gross motor skills. By applying the rules of the game, it can improve children's gross motor skills according to the level of achievement of child development (Muhoozi et al., 2018). The benefits that can be taken from this game include sharing joy with children, honing children's creativity, and training children's fine motor and gross motor. Based on previous research, the administration of traditional game exercises of coconut shell stilts in the treatment group created 30 respondents (100%) who faced a very significant increase in static and dynamic balancers (Rahmawati & Sulistyawan, 2020). There is an influence of traditional stilt games on balancing early childhood.

The stilt game will also increase the strength of the muscles of the legs, legs, arms, and hands so that it can train balance and flexibility of the body. When playing on stilts, children are required to walk on coconut shells which have a surface area with a diameter of approximately 10 centimeters, so a balancer is needed to play this game. Balance in children needs to be improved so that children's balance skills want to create maximum motor movements. Furthermore, this research implies that teachers can practice playing stilts for deaf children to improve and improve gross motor skills and balance.

This study has several limitations that need to be considered. First, the sample size is limited, only 40 deaf children from one exceptional school, so the results cannot be generalized to the entire deaf child population. Second, the duration of the intervention of only four weeks with a frequency of three times a week may not be enough to see the long-term impact on motor skills and balance. In addition, the study did not detail the degree of hearing loss in each participant, which may have affected the outcome. Other external factors, such as the child's physical condition before the study and family support, were also not controlled. Finally, the use of traditional measuring instruments without modern measuring instruments is a limitation that can affect the accuracy of motor measurement results and balance.

Based on the results of this study, it is recommended to conduct a study with a larger sample and come from various extraordinary schools to improve the generalization of results. Longer intervention durations, such as 8-12 weeks, should also be considered to evaluate long-term effects on motor skills and balance in deaf children. In addition, further studies should categorize participants' hearing loss levels to understand their effect on the outcome of the intervention. It is also important to control external factors that can affect a child's motor development, such as physical habits outside of school and family support.

Conclusions

Based on the results of data analysis using the Independent Sample t-test and followed by the Paired Sample t-test, conclusions can be drawn from this research, namely: a) there was a significant increase between the method of playing stilts and playing the dingklik relay on the improvement of gross motor skills and balance before and after being treated with deaf children, b) the group of deaf children who were given the treatment of playing stilts had gross motor skills and better balance compared to the group of children who were given the dingklik relay play method. With the results of this study, it is recommended that teachers or teaching staff apply the stilt game for early childhood to improve the gross motor skills and balance of deaf children. However, future research may suggest developing a modern tool to improve children's motor and balance.

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Conflict of Interest

We as authors affirm that there is no conflict of interest in this publication and that the manuscript has been approved and submitted by all the authors mentioned above.

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