



The Effect of Jump Rope Training Program on Increase Dynamic Balance in Deaf Children SLB-B Yayasan Pendidikan Tunas Bangsa (YPTB) Malang City

Original Article

Salva Almayda Putri¹, Slamet Raharjo^{1*}, Olivia Andiana¹

¹Departement of Sport Science, Faculty Sport Science, State University of Malang

Correspondence:

Slamet Raharjo, Jl. Semarang No.5, Malang
Phone: 08121614814
Email: slamet.raharjo.fik@um.ac.id

Submitted : 04-Jan-2024
Revised : 03-Mar-2024
Accepted : 23-Mar-2024

Abstract

A deaf person is a person who has partial or total hearing disorders or imperfections caused by the failure of the hearing sense to function properly, so that it can affect their life. Most deaf children experience vestibular deficits which cause decreased balance function and discomfort in life. The development of visual, perceptual, and motor skills as well as sensory integration can all be impacted by balance issues. The purpose of this study is to look into the effects of missing training sessions both before and after therapy. This study used a one-group pretest-posttest research design and a quantitative, pre-experimental methodology. The population studied was 38 deaf children, and 30 deaf children were selected as research samples using a purposive sampling technique. This research shows the results that the skipping training program has a positive effect by increasing dynamic balance in deaf children from Yayasan Tunas Bangsa (YPTB) Malang City. The results of this research show a 0.000 significant level was obtained from the paired samples t-test statistical test findings. The conclusion is that the skipping program has an impact on improving dynamic balance in deaf children from the Yayasan Tunas Bangsa, as seen from the increase in scores on the post-test.

Keywords: *deaf children, skipping, dynamic balance*

© 2023 Universitas Negeri Semarang

INTRODUCTION

A deaf person is a person who has partial or total hearing disorders or imperfections caused by the failure of the hearing sense to function properly, so that it can affect their life, especially in speaking skills as the most important means of interaction (8) . According to the World Health Organization (2016) , states that when children are identified as having hearing loss, they are at risk of experiencing delays in speech language, socio-emotional development, difficulties in cognitive abilities, and low academic achievement (13).

Most deaf children experience *vestibular deficits* which cause decreased balance function and discomfort in life (1) . In general, balance can be interpreted as a group of reflexes that trigger balance centers in the visual, *vestibular* and somatosensory areas (12) . Damage to the *vestibular* nerve not only causes sensorineural hearing loss, but can also be associated with balance problems due to damage to the *vestibular nerve branches*. (10) . This may be one of the causes of children's balance problems with impaired hearing.

Previous research conducted by Fellingner et al. (3) , proves that children and adolescents with hearing loss have an increased risk of motor and balance problems due to damage to their

vestibular system. This is also supported in research by McPhillips (4) , showing that children with hearing impairments have worse dynamic balance scores than their static balance. Balance is a skill to maintain current body position move or stay in place. Balance is one of the things that every child must have able to carry out movement activities. well. This is because balance is a key component in maintaining human body posture to be able to stand upright and maintain it body position (6) . The capacity of keeping the body in a balanced position while moving or changing is known as balance (9) .

Rope jumping is a sport in which one or more participants jump over a rope that is swung so that it passes under the feet and above the head. Using a rope held in both hands and swung above the head until the feet jump, rope jumping, also known as skipping, is an exercise. Since each of the hundreds of jumps performed during a training session causes neuromuscular adaptation to imbalance, jumping rope helps improve dynamic balance. Dynamic balance in the body is improved by stimulating the sensory, nervous and ankle systems through repetitive actions (5) .

Based on this explanation, the researcher wants to develop body balance techniques by providing a designed training program. In this case, researchers used a jump rope training program as a research method entitled " The Effect of Jump Rope Training Program on Improving Dynamic Balance in Deaf Children at SLB-B Yayasan Pendidikan Tunas Bangsa Malang City " which is expected to add new methods related to the development of balance training for deaf children.

MATERIAL AND METHODS

In this research, a quantitative method was used which applied a pre-experimental approach and chose a One-Group Pretest-Post-test research design. The research was carried out at SLB-B Tunas Bangsa Foundation, Malang City. The research will take place over a period of 6 weeks, starting from October 03rd, 2023 to November 14th, 2023, with a training schedule 3 times a week. In that time, there were a total of 16 training sessions.

The research subjects consisted of the population studied, namely SLB-B members with a total of 38 individuals whose ages ranged from 8 to 12 years. The research sample of 30 deaf children was selected using a purposive sampling method, considering the specified inclusion and exclusion criteria. Inclusion criteria include membership in the Tunas Bangsa Foundation SLB-B Malang City as well as other relevant criteria. SLB-B members aged 8-12 years, have mild-moderate hearing loss, and are not injured, and are willing to take part in a training program jump rope for 6 weeks with 16 meetings.

The exclusion criteria are SLB-B Tunas Bangsa Foundation Malang City who have hearing loss classified as severe. Meanwhile, the drop out criteria are deaf children who do not take the pretest and post-test. The independent variable is the jump rope training program. Meanwhile, the dependent variable is dynamic balance. Dynamic balance data collection uses the y-balance test, to find out the dynamic balance composite value that is owned (Figure 1).



Figure 1. Y-Balance Test Movement (Source: Cook & Pilsky, 2015).

The data analysis stage involves processes such as checking the distribution for normality, tested using the Shapiro-Wilk method, then followed by carrying out hypothesis testing using the paired samples T-test to reveal the effect of the treatment after the intervention is carried out. The significance assessment is carried out based on the probability or Sig value. (2-tailed): if the value is below 0.05, it is known that there is a significant difference in the data; whereas if the value is more than 0.05, there is no difference in the data obtained.

RESULTS

Referring to the results of the jump rope training program to dynamic balance in deaf children at SLB-B Yayasan Pendidikan Tunas Bangsa (YPTB) Malang City which was carried out in October-November 2023, Table 1. Regarding the normality test using the Shapiro-Wilk technique, it shows that the Y Balance Test normality test obtained that the Y Balance Test pre-test and post-test data were normally distributed. This can be proven by significant data from the Y Balance Test, right leg reaches 0.260 pre-test and 0.551 post-test > 0.05, and left leg reach 0.440 pre-test and 0.532 post-test > 0.05.

Table 1. Normality Test Results

Variable		Sig.
Right Foot Reach	<i>Pre-Test</i>	0.260
	<i>Post Test</i>	0.551
Left Foot Reach	<i>Pre-Test</i>	0.440
	<i>Post Test</i>	0.532

This research uses data analysis with hypothesis testing with the aim of identifying whether there are differences in the average value between two or more variables within the framework of this research. This test was aimed at evaluating the effect of the jump rope training program given to deaf children at SLB-B Yayasan Pendidikan Tunas Bangsa, Malang City, on improving their dynamic balance significantly or not. This hypothesis testing was carried out using a significant level set at 0.05 (5%).

The results of the paired samples t-test analysis in Table 2. obtained from this test are 0.00 < - 0.05. The dynamic balance of the test height was interpreted based on a 2-tailed significance value of 0.00. As a result, repeated observation tests produce sig. (2-tailed) less than 0.05 from the t-test. In summary, the pre and post-test results showed significant changes, indicating that the jump rope training program had an impact on the balance dynamics of deaf children.

Table 2. Paired Sample T Test results

Paired Sample Test	Df	Sig.
<i>Pre-test Post-test</i>		
Right Foot Reach	14	0,000
<i>Pre-test Post-test</i>		
Left Foot Reach	14	0,000

DISCUSSION

The aim of the following research is to determine the impact of the jump rope training program for deaf children at SLB-B Yayasan Pendidikan Tunas Bangsa on improving their dynamic balance. The data collection method to determine the composite value of dynamic balance is using the y-balance test. The capacity to maintain control over one's body position and posture during activities such as walking and running is known as dynamic balance. Additionally, dynamic balance is required for movement or activity (2). Many kinds of training program methods to train dynamic balance have been created, one of which is using the jump rope method or known as skipping, which is training using a rope and jumping. in a repetitive way.

Exercises such as jumping or jumping rope require the cooperation of several muscles to maintain rhythmic and timely movements. Improving this coordination can improve a person's ability to maintain dynamic balance. The purpose of jumping or jumping rope is to improve body balance (7) . Due to the neuromuscular adaptations caused by hundreds of jumps performed during a training session, dynamic balance can be improved (Lee, 2017). Continuous jumping can impact leg muscle strength by increasing muscle tension as sensory information is transmitted to motor neurons and the brain out of the muscles, causing hamstring muscle strength, quadriceps and gastrocnemius increased. As muscle strength increases , balance also increases (7) . Leg muscle strength , body balance, endurance, and movement coordination are all part of skipping training (11) . Training is an exercise that requires careful planning of defensive movements according to time.

The benefits of jumping rope training, according to Keen Achroni (2012), include honing children's gross motor skills. Gross motor skills are important in building muscles, to form a healthy body, and kinesthetic intelligence in children. This is because with the exercises given and repetition, deaf children as respondents can adapt to the technique of how to jump with both feet together properly and this will indirectly stimulate the respondent's motor skills to form movement automation.

Increased ability due to additional actions when carried out repeatedly, the knowledge participants gain from previous meetings is strengthened with new information and connections. For six weeks, the fitness regimen consisted of three sessions per week. Each interaction must be repeated several times over six weeks for the nervous system to form physiological changes as sensory experiences.

In previous research according to Anita Rahim (7) with the title "The Effect of Single Foot Jumps Skipping Exercise On Dynamic Balance" states that jumping rope or skipping exercises have an influence on improving dynamic balance because the musculoskeletal system , namely the strength of the leg muscles, can be influenced by this constant jumping. Afferent (sensory) information from peripheral receptors is continuously skipped, which increases muscle tension and sends it to the central nervous system for processing. Golgi tendons and muscle spindles are stimulated by these receptors. Efferent information is transmitted to peripheral muscles after processing in the SPP. To coordinate motor responses these efferent signals pass through alpha and gamma motor neurons. The quadriceps, hamstrings, and gastrocnemius of the lower extremities contract because of these signals being conveyed to the motor units, which are collections of muscle fibers. The strength of the leg muscles is increased by hypertrophy in the muscles, which is triggered by properly functioning muscles. Since muscle strength is a factor in maintaining balance, increasing muscle strength also results in improved balance.

CONCLUSION

From the data analysis it can be concluded that jump rope training has an impact on dynamic balance in deaf children at SLB-B Yayasan Pendidikan Tunas Bangsa, Malang City. This is known from the increase in the composite score on the posttest which increased after being given treatment in the form of a jump rope training program.

ACKNOWLEDGMENT

The researcher would like to thank all those who have contributed to the preparation of this article.

CONFLICTS OF INTEREST

Conflict of interest : Authors state no conflict of interest.

Disclosure statement : No author has any financial interest or received any financial benefit from this research.

REFERENCES

1. Chang, Y.-C., Hsu, C.-T., Ho, W.-H., & Kuo, Y.-T. (2016). The Effect of Static Balance Enhancement by Table Tennis Training Intervening on Deaf Children. 10 (6).
2. Dunsky, A., Zeev, A., & Netz, Y. (2017). Balance Performance Is Task Specific in Older Adults. *BioMed Research International*, 2017, 1–7. <https://doi.org/10.1155/2017/6987017>
3. Fellingner, M. J., Holzinger, D., Aigner, M., Beitel, C., & Fellingner, J. (2015). Motor performance and correlates of mental health in children who are deaf or hard of hearing. *Developmental Medicine & Child Neurology*, 57(10), 942–947. <https://doi.org/10.1111/dmcn.12814>
4. McPhillips, M. (2015). Motor difficulties and mental health in children who are deaf. *Developmental Medicine & Child Neurology*, 57(10), 893–894. <https://doi.org/10.1111/dmcn.12831>
5. Nemček, D., & Mokušová, O. (2020). Position of sport in subjective quality of life of deaf people with different sport participation levels. *Physical Culture and Sport. Studies and Research*, 87 (1), 1–8. <https://doi.org/10.2478/pcssr-2020-0014>
6. Raharjo, S., Ridhoi, A., & Kinanti, RG (2020). Survey Of the Level of Static Balance of Deaf Students in SDLB in Malang City. *Journal of Sport Science*, 10 (1), 53. <https://doi.org/10.17977/um057v10i1p53-59>
7. Rahim, AF, Rahmanto, S., & Pentalia, KD (2021). The Effect of Skipping Single Foot Jumps on the Dynamic Balance of Basketball Players. *Journal of Sport Science*, 11 (1), 12. <https://doi.org/10.17977/um057v11i1p12-17>
8. Rahmah, F.N. (2018). Problems Of Deaf Children and How to Overcome Them. *QUALITY*, 6 (1), 1. <https://doi.org/10.21043/quality.v6i1.5744>
9. S, W., Agus, A., & Bafirman, B. (2019). The Effect of Walking on Wood Blocks on Dynamic Balance. *Journal Of Sport Education (JOPE)*, 2 (1), 34. <https://doi.org/10.31258/jope.2.1.34-39>
10. Soori, Z., Heyrani, A., & Rafie, F. (2019). Exercise effects on motor skills in hearing-impaired children. *Sport Sciences for Health*, 15 (3), 635–639. <https://doi.org/10.1007/s11332-019-00564-y>
11. Sumardi, R. D., Suherman, A., & Saptani, E. (n.d.). Pengaruh Latihan Skipping Terhadap Peningkatan Keterampilan Footwork Olahraga Bulutangkis.
12. Volery, S., Singh, N., De Bruin, E. D., List, R., Jaeggi, M. M., Mattli Baur, B., & Lorenzetti, S. (2017). Traditional balance and slackline training are associated with task-specific adaptations as assessed with sensorimotor tests. *European Journal of Sport Science*, 17(7), 838–846. <https://doi.org/10.1080/17461391.2017.1317833>
13. World Health Organization. (2016). Childhood hearing loss: Strategies for prevention and care. World Health Organization. <https://iris.who.int/handle/10665/204632>