

## **The Effect Proprioceptive Training on Ladder Drill Training Variation in Dynamic Balance of Futsal Players**

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### **ABSTRACT**

Futsal is a multidirectional sport requiring players to move dynamically, it needs dynamic balance to create good performance. The combination of proprioceptive training interventions to ladder drill variations can affect dynamic balance for futsal players. This research method uses a pretest-posttest two group design. The research sample consisted of 30 people with 15 people in each group. Group 1 was given proprioceptive training and ladder run training, while group 2 was given proprioceptive training and ladder jump training. Dynamic balance measurement with Y balance test. The results of average test on dynamic balance variable, the results of paired sample t test showed differences in pretest and posttest values, group 1 ( $95.8 \pm 4.4$ ) with ( $p = 0.00$ ) while group 2 ( $98.2 \pm 3.8$ ) with ( $p = 0.000$ ). The results of the independent t test with a value of ( $p = 0.127$ ). The conclusion of this study is the combination of proprioceptive training and ladder run training interventions is as well as proprioceptive training and ladder jump training for dynamic balance of futsal players.

**Keywords:** *proprioceptive training, dynamic balance, ladder drill training*

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## **1. INTRODUCTION**

Futsal is a dynamic sport, where in futsal sports, fast running ability is needed, the ability to make quick decisions in order to maintain and control the ball, in addition, in this sport there are many changes in direction while dribbling the ball with a relatively small ball and field size [26]. With high movement intensity, futsal requires good dynamic balance when moving. Dynamic balance is the body's ability to maintain the stability of the center of mass while moving. Dynamic balance is very important for sports that have high intensity, one of which is futsal players [7]. Based on research conducted by Muhammad et al. (2022) on futsal players, there was 1 person (3.4%) of players who had poor dynamic balance, there were 18 people (62.1%) who had sufficient balance, there were 8 people (27.6%) who had very good balance, there were 2 people (6.9%) who had very good balance. In futsal players, dynamic balance is very important in making movements on the field, such as passing and shooting at various distances, changing positions and directions suddenly, and avoiding instability and poor technique. Good balance can improve player performance on the field.

One of the exercises used to improve dynamic balance is ladder drill training. Ladder drill variation exercises can also improve dynamic balance. Ladder drill training is an exercise by moving the feet quickly in a direction that is always changing. This exercise can improve body control dynamically which aims to maintain dynamic balance (Chae et al., 2017). In addition, to improve dynamic balance, good body stabilization is also needed. Therefore, the addition of proprioceptive training interventions can affect sensory input to activate muscles to maintain postural stabilization so that it affects dynamic balance [1]. This proprioceptive training is carried out on an uneven surface, this intervention causes increased stimulation received by muscles and ligaments so that it affects the increase in sensory information received by the central nervous system and peripheral nervous system [19]. Training with uneven surfaces can increase recruitment at the neuromuscular junction which

affects the speed of nerve conductivity so that it can improve dynamic balance [20]. Dynamic balance is one of the important biomotor components for futsal, therefore this study was conducted to answer research questions about the addition of proprioceptive training interventions to ladder drill training variations and on increasing agility and dynamic balance in adolescent futsal players in Denpasar.

## 2. METHOD

This study is an experimental pretest- posttest two group design study on students of SMP Muhammadiyah 1 Denpasar. The inclusion criteria are students who actively participate in futsal extracurricular activities. Before participating in the study, respondents were given an explanation of the benefits and objectives of the study. The research sample was students who participated in futsal extracurricular activities, with the inclusion criteria of being active players aged 12-16 years, not currently or experiencing injuries to the inferior extremities, willing to follow the research procedure and not attending soccer school/training outside of futsal extracurricular activities. While the exclusion criteria are respondents who have just undergone inferior extremity surgery, have a history of fractures in the lower extremities in the past year.

This study used a sample of 30 people, then random allocation was carried out into 2 groups with respondents counting with numbers 1 and 2, respondents will be grouped based on the numbers mentioned by the respondents. While for the assessment of dynamic balance using the Y balance test. Respondents stand in the middle of the line that has been made. 1 foot maintains the position and 1 foot pushes the stoll as far as possible in 3 directions (Anterior, posterolateral, posteromedial). This study used 2 experimental groups, the first group was given a combination of proprioceptive training and ladder run training, while the second group was given proprioceptive training and ladder jump training. The intervention was carried out for 6 weeks, 3 times a week.

## 3. RESULTS AND CONCLUSION

### a. Research subject characteristic data

Characteristic data Muhammadiyah I Denpasar Middle School students consisting of from age and index mass body .

Table 1. Characteristics study

Sample Characteristics	Group	Group	<i>P</i>
	Treatment I n = 15	Treatment II n =15	
Age ( Years )	14.20 ± 0.8	14.33 ± 0.7	0.065
Body Mass Index (kg/m <sup>2</sup> )	19.43 ± 1.6	19.8 ± 1.8	0.210

Based on table 1. it is known that average age subject namely 14.26 incl category " Teenager " where in the second group own similar value marked with *p-value* above 0.05. On average BMI characteristics own value 19.61 ie including in "Normal" category , where in the second group own similar value marked with *p-value* above 0.05.

### b. Normality test and homogeneity test

Normality test used For know whether the data is normally distributed or No . On research This using *the Shapiro Wilk* test to test normality and use *Levene 's* test to test homogeneity . Following normality and homogeneity data results .

Table 2. Normality and Homogeneity Test of *Y Balance Test* Data

Data Normality	Homogeneity
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	Group Treatment I	Group Treatment II	Sig <i>p-value</i>
Pretest	0.388	0.523	0.146
Posttest	0.197	0.177	0.900

Based on data that has been tested with using the *Shapiro Wilk Test* , the second normality test was obtained group obtained  $p$  value  $> 0.05$ , with interpretation of normally distributed data . Homogeneity test results show that statistical test results second group with *Levene's test* nature homogeneous .

c. Hypothesis test

Paired *sample t-test* used for know difference average improvement agility and balance giving training

Table 3. Results of the Mean Difference Test for Improvement Balance Dynamic Before and after Giving Training Combination *Proprioceptive Training* and *Ladder Drill Variations*

		Group 1		Group II	
		Mean $\pm$ SD	<i>p</i>	Mean $\pm$ SD	<i>p</i>
Balance	Dynamic	84.5 $\pm$ 2.2	0,000	86.1 $\pm$ 1.7	0,000
Pretest					
Balance	Dynamic	95.8 $\pm$ 4.4		98.2 $\pm$ 3.8	
Posttest					

Based on data that has been presented in Table 3 where different test results average use *paired sample t-test* for know influence giving treatment obtained  $p$ - value  $< 0.05$ . that value can interpreted that there is significant influence between before and after given treatment . With exercise *proprioceptive training* and *ladder run training* with *proprioceptive training* and *ladder run training* can be done influence balance dynamic .

d. Comparative Test Results

*Independent sample T test* used For compare mark balance dynamic between the 2 groups after given intervention as following :

Table 4. Improvement Difference Test Results Balance Dynamic Between Group 1 and Group 2

YBT post test	N	Mean (%) $\pm$ SD	Difference (%)	<i>p -Value</i>
Posttest Group Treatment 1	15	95.85% $\pm$ 4.46	0.8 %	0.127
Posttest Group Treatment 2	15	98.23% $\pm$ 3.81		

Based on data that has been presented in Table 4 where *Independent sample T-test* test results obtained results form mark  $p > 0.05$ . Where can you? concluded No there is significant difference between group 1 and group 2 with conclusion intervention *proprioceptive training* and *ladder run training* or *proprioceptive training* and *ladder jump training* have an effect to balance dynamic However No different meaningful . Therefore matter the effect both of them The same in improvement balance dynamic . Variation exercise *ladder drill* can influence balance dynamic . According to research conducted by [4]. *Ladder drill training* influential to balance dynamic in children. Leg muscles play a role as muscle servant For guard stabilization somebody . *Ladder run training* can increase *flexibility* body , where in training This athlete led For do movement in a way fast Where muscles extremity lower will experience improvement elasticity as well as movement joints become more Good . This matter will cause improvement swing of the limbs

moment move, p This can increase balance dynamic, where somebody must control body moment do movement pass obstacle [4]. This exercise done Keep going continuous, p This will cause improvement strength muscle *ankle* and *hip* for help body guard stabilization posture with form affecting leg movements *base of support* [25].

*Ladder jump training* is combining exercises movement speed and strength for form explosive movement. [25] This exercise use body Alone as burden For increase strength and power, as well fast and purposeful movements For increase speed. This exercise done with jump pass stairs , where limbs will experience contraction *eccentric* and *cocentric* with burden body so that produce a number Big , fast explosive style [21 Practice with jump This will increase adaptation *neuromuscular* For increase control dynamic from center mass body (Popa & Oravițan, 2017). Addition intervention *proprioceptive* training carried out in uneven places causes improvement stimulation received by muscles and *ligaments* so that can influence information *sensory input* received by the nervous system central and nervous system edge (Panwar dkk., 2014). *Proprioceptive* training has effects at *the* central and *peripheral* levels. Effect *central* that is covers awareness position and movement influential position to posture, while in effect *peripheral* that is improvement *reflex* coordination between muscle *agonist* and muscle *antagonist*, that is in regulate fixation joints For increase stabilization body moment happen movement (Šalaj dkk., 2007).

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## CONCLUSION

Combination *proprioceptive training* and *ladder run training exercise* The same good with combination *proprioceptive training* and *ladder jump training exercise* to balance dynamic among teenage futsal players in Denpasar.

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