

## VARIES SHUTTLE RUN EXERCISE METHODS INCREASE AGILITY OF STUDENTS OF SMK NEGERI 2 TONDANO KABUPATEN MINAHASA

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### ABSTRACT

Achievement of Indonesian athletes at international level are only resting on badminton, archery, and weight lifting. Meanwhile, other sports do not exhibit encouraging achievement. Agility is one of the important factor on sports including group and individual sports. This is an experimental research with randomized pretest posttest control group design. Sample are 75 students recruited from SMK Negeri 2 Tondano Kabupaten Minahasa. Sample was grouped into 5 groups, each group composed of 15 students. The five groups observed were group 1 with treatment of 4 x 30 m shuttle run, group 2 treated with 8 x 15 m shuttle run, group 3 with 12 x 10 m shuttle run, group 4 within 16 x 7.5 m shuttle run, and the last is control group. Exercise was carried out for 6 weeks with a frequent of 3 time per week. Agility pre and posttest data were analysed using anova oneway followed by LSD Post Hoc Test at 5% significant level. This study obtained that there were a significant different among the five groups observed. Shuttle run exercise method with dose of 16x7.5 m increase the highest agility.

Keywords achievement, agility, shuttle run, exercise

### INTRODUCTION

Athletic is one of sport branch that has much more advantages to gain medal, since this branch almost has 30 number of game in either man or women, including 100 meter run. To gain high achievement, athletes should prepared their physical treatment for obtaining a better physical condition. Good physic trigger increase of circulation system and cardiac activity, as well as increase of power, agility, stamina, speed, and other physical components. In addition, good physic will also increase better effectivity and efficiency, faster recovery time, and faster responses.<sup>1</sup>

On 100 m short distance running, a dominant biomotoric ability is speed. Besides speed, agility exercise is also important for athletes of 100 m run, because to be the winner maximum speed is needed during the 100 m run competition. The fastest will become the winner.<sup>1,2,3</sup>

Agility component as one of important fundamental biomotoric component needs to be increased through special exercise, systematic, and programmed. These agility component and exercise type should be appropriate with a special movement on certain sport.<sup>4-6</sup> Until today, there is still a controversial of an appropriate exercise type that increase an agility and also varies exercises applied.<sup>7</sup> In addition, there is also no agreement between teacher

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and trainer with regards to which of the agility components exercises could increase agility. Type and exercise dose are important to be cared in order to determine exercise quality and quantity measured. Based on this idea, effort should be continually carried out to obtain efficient and effective exercise method to increase agility. Therefore, an idea to design some exercise methods to increase agility is important. One of them is shuttle run exercise for 120 m distance.<sup>1-4</sup>

Until recently, there is still a controversial regardless of appropriate exercise type that could improved agility, since there also application of varies exercise types.<sup>7</sup> In addition, there is also no agreement among teacher and trainer concerning to exercise type of agility components which one is effective to increase agility. Dose and exercise types are also important to mention in order to determine quality and quantity of exercise. Based on this controversial, effort need to be carried out to obtain effective and efficient exercise methods to improve agility and speed of 100 meter run. An idea to design varies exercise types for gaining good agility and high speed of 100 meter run is improved. The idea chosen is shuttle run exercise with 120 meter distance.<sup>2-7</sup>

### RESEARCH METHOD

This research is applying randomized pretest posttest control group design. Sample were 75

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students recruited from SMK Negeri 2 Tondano. Sample was divided into 5 groups, i.e. control group, group treated with shuttle run exercise with dose of 4x30 m, 8x15 m, 12x10 m and 16x7.5 m. Dependent variable is agility measure using stopwatch. Anova one way was applied to determine the different among groups and p value of 0.05 is consider as statistically significant.

## Procedure

### Before exercise

Before starting the exercise, place or field for exercise should be prepared, as well as measurement device, subject to be treated, body weights, height gauges.

### Exercise

#### Shuttle run with varies doses

Agility method is a treatment by shuttle run followed by touching start and finish pole. Traveled distance for each exercise are 4 x 30 m, 8 x 15 m, 12 x 10 m, and 16 x 7.5 m with total distance of 120 m of a shuttle. The body parts involve in this exercise are lower limb, quardicep, hamstring, calves, saelus muscle, and upper limb for balancing, and strength for agility.<sup>8</sup>

Exercise was carried out for 6 weeks and measurement was carried out once to determine increase agility of the subjects. Frequency of training is 3 time per week, i.e. Monday, Wednesday, and Friday at noon (16.00 till 17.00) to obtain maximum agility and 100 m run speed. Exercise was carried out in 3 set and resting was done until resting pulse rate become normal (<90 beat/minute). Exercise loads are shuttle run speed from starting pole to finish pole.

#### Increase agility determination

Agility time determination was measured before and after the subject gain treatment in either for control and treated subjects. Agility time was measured based on shuttle run test. The tested was applied by measuring travel distance of 10 m run using stop watch, in m/second.

## RESULTS AND DISCUSSION

### Subject Characteristic

Mean age of students in this study are 16.90 years for control group, 17.12 years for group treated with 4x30 m dose, 17.07 years for group treated with 8x15 m dose, 17.00 years for group treated with 12x10 m dose, and 16.85 years for group treated with 16x7.5 m dose. All of the mean age is in the range of appropriate age in which activity agility can be performed in the range aged of 16 – 18 years.<sup>8</sup> Mean height of students in this study are 165 cm for control group and 166 cm, 166 cm, and 166 cm respectively for the remaining groups. An athlete with higher

height has a great air protection that affect agility, meanwhile, a taller athlete has disadvantages in term of the longer step.<sup>9</sup> Mean body weight of subjects are 57.40 kg for control group, and 56.67 kg, 56.47 kg, 56.80 kg, and 56.80 kg for the remaining group, respectively. Body weight affect agility due to the higher the body weight the lower the speed. Athletes who have big bond and obes because of fat have an active tissue smaller compare to an athletes who have a same body weight but strong muscle, due to small basal metabolism.<sup>10</sup>

Mean body mass indexes for subjects are 20.950 kg/m<sup>2</sup> for control group and 20.548 kg/m<sup>2</sup>, 21.468 kg/m<sup>2</sup>, 20.102 kg/m<sup>2</sup>, and 20.109 kg/m<sup>2</sup> for the remain group, respectively. Body mass index is implementing nutrition status, and body mass index for all groups indicate that nutrition status of the subjects were in good condition or in normal condition.<sup>11</sup> Mean limb muscle strong of subjects are 69.120 kg for control group and 68.767 kg, 70.670 kg, 70.270 kg, 70.220 kg for the remaining groups, respectively. However, these values are in minimum category.<sup>12</sup> Mean body health of the subjects are 11.783 second for control group and 11.794 second, 11.593 second, 11.460 second, and 11.813 second for the remaining groups, respectively. These values are in the range of mild and good category of body health.<sup>5,8</sup> All parameters identified were comparable ( $p > 0.05$ ), base line data is comparable, therefore, treatment can be applied for all subjects on all groups.

### Increase Agility

Based on shuttle run test with 10 meter distance measured using stopwatch it was obtained that time for finishing the shuttle can be seen on Table 1. All data obtained were normally distributed and their variance were also homogenous ( $p > 0.05$ ).

Table 1  
Data of Agility Time Required for Pre and PostTest

Group	Agility Time (meter/second)			
	Pretest	$p^*$	Posttest	$p^*$
Group 0	8.252 ± 0.695	0.084	7.270 ± 0.571	0.147
Group 1	7.796 ± 0.969	0.214	6.097 ± 0.702	0.567
Group 2	7.640 ± 0.984	0.058	5.649 ± 0.734	0.771
Group 3	7.519 ± 0.808	0.076	5.215 ± 0.819	0.255
Group 4	7.623 ± 1.449	0.487	5.117 ± 1.016	0.062
$p^{**}$	0.079		0.133	

\*for distribution, \*\*for variances

Since the data were normal and homogenous, anova one way was applied to determine the treatment different and followed by LSD Post Hoc Test. In this study, it was obtained that there are a significant different among control group and treated groups, i.e group with 4x30 m shuttle run dose, group with 8x15 m shuttle run dose, group with 12x10 m shuttle run dose, and group with 16x7.5 m shuttle run dose within

$p < 0.05$ . Shuttle run exercise with 16x7.5 m dose indicates the highest agility compare to the others groups (2.162 second).

Bompa (1994), Harsono (1997), Nala (2002), and Fahmy (2009) stated that agility is one of important physical condition component to support movement aspect, especially in various sport branches.<sup>5,8,13,15</sup> This is an evidence that shuttle run exercise with a dose of 16 x 7.5 meter gives the highest increase of agility. This finding is in line with Ramel (1996) finding who stated that increase of agility is strongly related to muscle and sensoric nerve activities and also through repeated work component exercise.<sup>18</sup>

Percentage of increase agility for pre and posttest were 11.90% for control group, 21.79 % for group treated with shuttle run exercise with a dose of 4 x 30 m, 26.06% for group treated with shuttle run exercise with a dose of 8 x 15 m, 30.46 % for group treated with exercise shuttle run with a dose of 12 x 10 m, and 32.87 % for treated group with exercise shuttle run with a dose of 16 x 7.5 m. In conclusion, the highest percentage of agility increase was revealed on subjects treated with exercise shuttle run with a dose of 16 x 7.5 m. An athlete who has a good agility rate has an ability to improve speed, skills, and accuracy in motion.<sup>18</sup> Therefore, agility needs to be trained with high repetition and short distance.<sup>5,8</sup>

## CONCLUSIONS AND FUTURE WORK

### Conclusions

There were a significant different of agility increase among control group and treated group with shuttle run exercises dose of 4x30 m, 8x15 m, 12x10 m, and 16x7.5 m of students at SMK Negeri 2 Tondano Kabupaten Minahasa.

Shuttle run exercise method with a dose of 16x7.5 m increases the highest agility compare to shuttle run exercise method with doses of 4x30 m, 8x15 m, 12x10 m, for students at SMK Negeri 2 Tondano Kabupaten Minahasa.

### Future work

Students of SMK negeri 2 Manado was chosen as subject in this study, in the future the results of this study should be applied to the athletes who compete on 100 m run in either national, regional and international. Further research need to be carried out whether varies dose can improve speed of 200 m and 400 m run.

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