Influence of ladder drill exercises and shuttle run toward agility level among basketball players in Bosowa International School Makassar

Rendy Joan Anwar¹, Muliyadi¹, Erfan Sutono¹
¹Physiotherapy Study Program, Faculty of Medicine, Hasanuddin University, Makassar
rendyjoananwar@gmail.com

Abstract. Agility was an important component that must be owned by a basketball player. The study aims was to determine influence of ladder drill exercise and shuttle run toward agility level among basketball players in Bosowa International School. The study was experimental research design using two group pre-test and post-test. The independent variables such as ladder drill exercise and shuttle run and dependent variable was agility level. The samples were 30 male students who met the inclusion criteria. The samples were selected by using purposive sampling technique. The samples were divided into two groups by using random sampling techniques. The data was measured using Illinois Agility Test and conducted within 4 weeks. The Mann-Whitney test found there was no influence of ladder drill exercise and shuttle run toward agility level among basketball players, p=0.575<0.05. Meanwhile, Wilcoxon test and paired t-test found there was significant influence of ladder drill exercise and shuttle run toward agility level, p=0.001.

1. Introduction
The physical fitness can be obtained in several ways such as doing physical activity (sports) [1]. In additions, physical activity also known for benefit on the health such as decreased risk of chronic disease and improve the life quality [2,3,4]. Physical inactivity in the youth is increase in both developing and developed countries [5]. World Health Organization had recommended person aged less than 65 years need 150 moderate or 75 minutes vigorous activity per week [6].

Basketball is popular and interesting sport. Basketball is third most popular sport in the world and found in school, basketball clubs and other environment. In additions, basketball is usual sport that fatigue could affected performance [7]. In basketball games, many aspects can affect the basketball player performance. The basketball development become an epidemic among world community including Indonesia.

Agility is important quality in many sports that are played on the field [8]. The agility is basic thing that body involved functional activities, ability to exercise such as ability to move quickly and stop suddenly, change direction quickly, efficiently and adjust footwork on the body part when doing sport activities.
Physiotherapy is perfect for promoting, guiding, prescribing and striving and managing sport activities in providing training programs to improve players’ ability to exercise. The technique commonly used are ladder drill and shuttle run. The ladder drill is good exercise to increase foot speed, agility, coordination and overall speed. This exercise is good after warming up which the muscle are still working very well to ensure the movement quality. The shuttle run is an exercise to increase speed, coordination and ability to change direction with minimal lowdown. The main skill in the basketball is ability to quickly switch between forward, backward and sideway movement. The integrating agility in the basketball has a very good impact which increase the player speed and other specific movement in the basketball. The study aims was to determine influence of ladder drill exercise and shuttle run toward agility level among basketball players in Bosowa International School.

2. Methodology
The study was carried out in Bosowa International School, Makassar. The study was experimental research with two groups pre-test and post-test design. The study population was all basketball players in Bosowa International School. The samples were 30 male students who met the inclusion criteria. The samples were selected with purposive sampling method.

The data was collected by measurement before given ladder drill exercise and shuttle run. The samples were divided into two groups included 15 samples were given ladder drill exercises and 15 samples were given shuttle run. The agility level measurement is done using Illinois Agility Test. Each samples were given 12 times of the exercise with 3 times per week. The data was analysed with Shapiro Wilk test and Kolmogorov Smirnov test is performed for normal distribution data. Meanwhile, Whitney U test is performed on non-normal distribution data.

3. Result and Discussion

3.1. Result
Table 1 shows that 11 respondents (36.7%) were aged 15 years and 16 years and 2 respondents (6.6%) were aged 17 years. Meanwhile, 10 respondents (33.3%) had normal body mass index (BMI) and 5 respondents (16.7%) had overweight BMI. There also 9 respondents (30%) were in obesity and 6 respondents (20%) were in underweight BMI.

| Variable          | Frequency (n) | Percentage (%) |
|------------------|--------------|----------------|
| **Age**          |              |                |
| 14 years         | 6            | 20             |
| 15 years         | 11           | 36.7           |
| 16 years         | 11           | 36.7           |
| 17 years         | 2            | 6.6            |
| **Total**        | 30           | 100            |
| **Body mass index** |          |                |
| Underweight      | 6            | 20             |
| Normal           | 10           | 33.3           |
| Overweight       | 5            | 16.7           |
| Obesity          | 9            | 30             |
| **Total**        | 30           | 100            |

In ladder drill exercise, pre-test had mean and standard deviation of 17.57 and 0.94. The minimum and maximum were 16.20 and 20.27. Meanwhile, post-test had mean of 16.83 with standard deviation of 0.81, while minimum and maximum were 15.57 and 19.20.
The pre-test had mean and standard deviation of 17.92 and 1.67, while minimum and maximum were 15.29 and 21.19 in shuttle run. In post-test, mean was 17.26 with standard deviation of 1.61. The minimum and maximum were 15.20 and 20.03.

The statistical test showed there was significant difference between pre-test and post-test in ladder drill exercise with p=0.001<0.005. In additions, there was significant difference between pre-test and post-test in shuttle run, p=0.001<0.05. Meanwhile, Mann Whitney test showed there was no significant difference between ladder drill exercise and shuttle run with agility level among basketball players in Bosowa International School.

Table 2. Comparison of changes in pre-test and post-test of ladder drill exercise and shuttle run.

|                | Mean±SD | Minimum | Median | Maximum | p*   | p**   |
|----------------|---------|---------|--------|---------|------|-------|
| **Ladder drill** |         |         |        |         | 0.575|       |
| Pre-test       | 17.57±0.94 | 16.20   | 17.42  | 20.27   | 0.001|       |
| Post-test      | 16.83±0.81 | 15.57   | 16.76  | 19.20   |      |       |
| **Shuttle run** |         |         |        |         | 0.001|       |
| Pre-test       | 17.92±1.67 | 15.29   | 17.76  | 21.19   |      |       |
| Post-test      | 17.26±1.61 | 15.20   | 17.30  | 20.03   |      |       |

p*= Wilcoxon test and paired t-test
p**= Mann-Whitney test

3.2. Discussion

The result found highest respondents aged 15 years and 16 years with total of 11 respondents (36.7%) and lowest number of respondents were 2 respondents aged 17 years (6.6%). The age between 15 years and 16 years is rapid growth period that increased in the agility level and decreased when teenagers reached adulthood. The high agility level between 14 years and 17 years with regular exercise.

Ladder drill exercise was exercising that function to train the speed, agility and synchronization of motion in the balanced manner. The fast foot movement and quick reactions can be form of physical exercise whose function is to train speed and agility that affected the balanced coordination of motion.

The 12 times of ladder drill exercise applied progressive principle in which the muscles received more weight which their strength will increase. During exercise, the muscle, muscle flexibility will increase. The elastic muscle was not inhibited leg muscle movement which footsteps can be done quickly. The dynamic balance will also be trained since this exercise must able to control body state during making movements.

Another exercise improving agility level was shuttle run or run back and forth. The shuttle run need quickly run as possible started from one point to another point with certain distance. The element of motion in the shuttle run is running by changing body direction and position, speed, balance was component of agility motion. The benefit of shuttle run was oriented to footwork and speed.

The shuttle run methods applied many techniques oriented to footwork caused increment in the speed of muscle contraction and neutral adaptation is characterized by increase in the technique and skill level. The regular exercise provided positive effects on the muscles, even long-term adaptive changes can occur in muscle fibers which allows for more efficient response to various types of muscle needs. In additions, the occurrence of neutral adaptation was determined by ability to stimulate delivery in central nervous system until the signal occur in form of motion.

4. Conclusion

In conclusion, there was influence between ladder drill exercise and shuttle run toward agility level among basketball players. In additions, there was no difference found between ladder drill and shuttle run on the agility level. The study could be used as preventive effort to prevent injury and improved the sport skill.
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