Effect of ladder drill training toward agility level among basketball players

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Abstract. A basketball player must have good physical condition includes endurance, strength, speed, power, agility, coordination and flexibility. Agility has very important role among these physical conditions. Efforts to improve the basketball player’s agility through right training program are essential. The study aims to determine effect of ladder drill training toward agility level among basketball players. The study was quasi-experimental design study with time-series experimental research design approach. The study population was all basketball players in SMP Bosowa International School, Makassar. The samples were 25 male students who met the inclusion criteria. The sampling technique was non probability sampling using purposive sampling technique. The data was collected by gathering primary data through the measurement instrument such as Illinois Agility test. The study was conducted for 6 weeks with 16 times of training. The data was analysed using Wilcoxon test with SPSS program. The result found there was influence of ladder drill training toward agility level with significant value of p=0.001.

1. Introduction

Physical inactivity in young adults is increased in both developing and developed countries [1]. The physical active is negatively correlated with risk of death, cardiovascular diseases, cancer, diabetes mellitus, hypertension, obesity, osteoporosis and mental health problem [2,3,4]. In additions, physical activity and health related fitness improvement levels also contributed to cognitive functioning improvement and academic performance in the teenagers [5].

The sport is associated to the motion and not separated from human activity such as walking, running, jumping, punching, and stretching [6]. Basketball is popular sport and third most popular sport in the worlds. Basketball is sport that can be found in schools, basketball clubs and other environments. Basketball is one of team sports is clearly and positively associated by the advances in the different tools and devices in the sport field [7]. In basketball games, there is a lot body contact with other players or opposing players so good physical conditions are needed. The good physical condition must be possessed by basketball player are endurance, strength, speed, power, agility, coordination and flexibility.

A player who has good agility has several advantages including difficult movement ease, fall or injury and support the player technique. The ability to move in changes direction and position n depending on the situation and conditions faced in relatively short and fast time.
Efforts to improve the basketball players agility through right training program are needed. Various training programs can be used to improve agility level in basketball players such as ladder drill training. Ladder drills training is important part of many sport workouts which need the athletes to move the feet quickly in precise and specified motion [8]. Ladder drills can be used to increase agility, balance, coordination and speed. The study aims to determine effect of ladder drill training toward agility level among basketball players.

2. Methodology
The study was conducted in Bosowa International School, Makassar. The study was quasi-experimental design with time-series experimental design approach. The study population were all basketball players in Bosowa International School. The samples were 25 male students who met the inclusion criteria such as basketball players who followed training, male students and willing to be respondents. The samples were selected by using purposive sampling method.

The data was collected using measurement instrument and interview. Meanwhile, agility level was measured by the Illinois Agility test which conducted before given ladder drill training, post-test 1 after 4 times of ladder drill training, post-test 2 after 8 times of ladder drill training, post-test 3 after 12 times of ladder drill training and post-test 4 after 16 times of ladder drill training. The data was analysed using Wilcoxon test with SPSS program to determine the influence of ladder drill training toward agility level among basketball players. The data was represented in form of tables and narratives.

3. Result and Discussion
3.1. Result
Table 1 shows that mean of respondent age was 14.24 years old with median of 14 years old. The minimum and maximum of respondent age were 12 years old and 16 years old. Meanwhile, body mass index among respondents with mean and median of 20.28 kg/m² and 19.28 kg/m². The minimum and maximum of respondent BMI were 17.07 kg/m² and 27.07 kg/m².

| Category               | N  | Mean  | Minimum | Maximum | Median |
|------------------------|----|-------|---------|---------|--------|
| Age                    | 25 | 14.24 | 12      | 16      | 14     |
| Body mass index (BMI)  | 25 | 20.28 | 17.07   | 27.07   | 19.28  |

In additions, 2 respondents (8%) had scored very good of agility level and no respondent had scored very good agility level during pre-test, post-test 1, post-test 2 and post-test 3. There were 2 respondents (8%) had scored good agility level in post-test 1 and 2 respondents (8%) scored good agility level in the post-test 2. Furthermore, 14 respondents (56%) had scored good agility level in post-test 4. In post-test 4, 8 respondents (32%) had scored medium and 1 respondent (4%) had scored very poor in agility level. There were 21 respondents (84%) had scored medium agility level in pre-test and post-test 2. Besides, only 1 respondent (4%) had scored poor agility level and no respondent had scored poor agility level in post-test 1, post-test 2 and post-test 3. There also 3 respondents (12%) had scored very poor agility level in pre-test and post-test 1.
Table 2. Sample distribution based on agility level.

| Category | Pre-test | Post-test 1 | Post-test 2 | Post-test 3 | Post-test 4 |
|----------|----------|-------------|-------------|-------------|-------------|
|          | n | % | n | % | n | % | n | % | n | % |
| Very good | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 |
| Good | 0 | 0 | 2 | 8 | 2 | 8 | 5 | 20 | 14 | 56 |
| Medium | 21 | 84 | 20 | 80 | 21 | 84 | 18 | 72 | 8 | 32 |
| Poor | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Very poor | 3 | 12 | 3 | 12 | 2 | 8 | 2 | 8 | 1 | 4 |
| Total | 25 | 100 | 25 | 100 | 25 | 100 | 25 | 100 | 25 | 100 |

Table 3 shows that the statistical analysis showed there was significant differences between 4 times, 8 times, 12 times and 16 times of ladder drill training in agility level among basketball players. In post-test 1, minimum and maximum were 16.16 and 19.98 with median of 17.24. The statistical test obtained significant value of p=0.001<0.05 which showed there was significant changes between pre-test and post-test 1. Meanwhile, minimum and maximum of post-test were 15.82 and 19.70 with median of 17.06 in post-test 2. The statistical test showed there were significant changes between pre-test and post-test 2.

In post-test 3, minimum and maximum agility level were 15.51 and 19.20 with median of 16.72. The statistical test showed there was significant changes between pre-test and post-test 3 with p=0.001. In post-test 4, minimum and maximum were 15.08 and 18.61 with median of 16.15. The statistical test showed there was significant changes between pre-test and post-test 4 with p=0.001<0.05.

Table 3. Data analysis on pre-test and post-test of agility level.

|          | Variance | Range | Minimum | Median | Maximum | P* |
|----------|----------|-------|---------|--------|---------|----|
| Pre-test | 0.849    | 4.07  | 16.20   | 17.42  | 20.27   | 0.001 |
| Post-test 1 | 0.762    | 3.82  | 16.16   | 17.24  | 19.98   |     |
| Pre-test | 0.849    | 4.07  | 15.82   | 17.08  | 19.70   | 0.001 |
| Post-test 2 | 0.744    | 3.88  | 15.69   | 16.72  | 19.20   |     |
| Pre-test | 0.849    | 4.07  | 15.08   | 16.15  | 18.61   | 0.001 |
| Post-test 3 | 0.564    | 3.53  | 15.82   | 17.08  | 19.70   |     |
| Pre-test | 0.762    | 3.82  | 16.16   | 17.24  | 19.98   | 0.001 |
| Post-test 1 | 0.744    | 3.88  | 15.82   | 17.08  | 19.70   |     |
| Post-test 2 | 0.744    | 3.88  | 15.69   | 16.72  | 19.20   | 0.001 |
| Post-test 3 | 0.642    | 3.69  | 15.51   | 16.72  | 19.20   |     |
| Post-test 4 | 0.564    | 3.53  | 15.08   | 16.15  | 18.61   | 0.001 |

3.2. Discussion

Ladder drill is an exercise to increase the agility level which this training increased power, flexibility, speed and dynamic balance. These components had influenced agility level in the respondents. The ladder drill training such as running, jumping with fast movement had developed speed and agility level.
There was significant differences between ladder drill training frequency and 16 times of ladder drill training had more significant influence than 4 times, 8 times and 12 times of ladder drill training. The fast movement and quick reaction also part of physical exercise which affected balance motion coordination. Ladder drill training helped in direction changing from one position to different position at high speed with good motion coordination which will increase agility level.

During exercises, the muscle will become more elastic and joint will be improve causing the legs to swing in the steps. The muscle elasticity also increased muscle extension, stronger and faster muscles can be contract so that the footsteps can be done quickly. Dynamic balance will be also trained since this training helped in control body state during movements which increased agility level. The changes in agility enhancement also caused by the body adaptation to the training which the brain response toward movement. The changes in muscle fibers occur or fast twitch resulting in increment of muscle contraction speed.

The muscle fiber increased the muscle contraction speed leads increment of agility level. In additions, muscle strength, joint flexibility speed, muscle and joint elasticity and dynamic balance had experienced physiologically improvement changes from this training. Furthermore, there also an adaptation of innervation which is determined by the ability level ability to stimulate central nervous system to the muscles and muscles speed in receiving stimulation in form of motion.

Furthermore, important components in the rapid movement process was the proprioceptor. The proprioceptor form in muscle was muscle spindle that send the information to the central nervous system about muscle contraction and Golgi tendon that receives the command reduced muscle load or served as protective against possible injury due to strong stretching.

4. Conclusion
In conclusion, there was significant difference between pre-test and post-test of ladder drill training toward basketball players. In additions, 16 times of ladder drill training was more significant increase the agility level than 4 times, 8 times and 12 times of ladder drill training. This study is expected to be consideration for physiotherapist in an effort to increase agility level of basketball players.

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