Effect of flexibility exercise toward changes of body flexibility level on dance art student Hasanuddin University

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Abstract. Flexibility is considered as an important factor affecting the body flexibility. Good flexibility can form maximum body shape and improving the efficiency of all body activity. The flexibility exercises should be conducted to improve the body flexibility. The study aims to determine the effects of flexibility exercise toward changes in body flexibility level among Dance Art student Hasanuddin University. The study was an observational study with comparative analytic method. The study population was Dance Art students Hasanuddin University in 2016. The samples were 40 samples of Dance Art students Hasanuddin University with purposive sampling technique based on inclusion and exclusion criteria. The data was analysed using SPSS program. There was changes between body flexibility pre-test and post-test. The flexibility exercises influence on the body flexibility levels in Dance Art students Hasanuddin University, p=0.000<0.05.

1. Introduction
Flexibility is capability in movement performance in the body joints with suitable range of motions [1]. Nowadays flexibility is important for dancers since higher flexibility is need to meet the choreographic demands on the dancers [2]. Flexibility acts as support to improve the motion quality in exercises, dancing and gymnastics which highly planned and systematic. Flexibility is resiliency function of locomotor system in different unit and amplitude of movement magnitude is measured [3].

Flexibility exercise should be designed and performed well to improve the muscle work efficiency, reduce injury, maintained joint mobility and minimize the loss in flexibility and contraction formation. The flexibility importance to prepare organs and muscles to be ready in receive all the activities (dancing) to improve quality movement and aesthetic awareness in dancing lesson and enhance the performance.

In general, professional dancers are involved in classes with several hours of rehearsal or stage performances [4]. There are 2 factors that differentiate dance from sport included eloquence and high motion ranges at the hip joint and ankle [5,6]. Dancing need large amount of flexibility which need to achieve full range of major muscle groups [7]. Dancing is involved sports, science and art which feeling expression represented with moving body through physiological process [8]. The main motor skills are needed for dancers such as strength, flexibility, endurance and jumping ability [3].
The preliminary study found lack of flexibility lead to lack of accuracy in dance movement and injuries in the Dance Art students. The study aims to determine the effects of flexibility exercise toward changes in body flexibility level among Dance Art student Hasanuddin University.

2. Methodology
The study was qualitative research using comparative analytic method which aimed to determine the effect of flexibility exercise toward body flexibility level among Dance Art students Hasanuddin University.

The study was conducted in Dance Art student unit Hasanuddin University from 9th January 2017 to 18th February 2017.

The study population was all Dance Art students Hasanuddin University in 2016 consisted 64 students. The samples were 40 students who met the inclusion criteria. The samples were selected by using purposive sampling method. The data was collected by using sit and reach test as well as back reach test in obtain the initial test. There were 6 times of week training before post-test. The data was obtained through primary data based on flexibility measurement. The data was analysed with paired T test by using SPSS program. The data was represented in form of tables and narration.

3. Result and Discussion

3.1. Result
In pre-test, 31 respondents (77.5%) had scored average body flexibility level and 1 respondent (2.5%) had scored poor body flexibility level in the sit and reach test measurement. Meanwhile, 8 respondents (20%) were scored below average in body flexibility level in the sit and reach measurement in pre-test.

In post-test, 21 respondents (52.5%) were scored above average in body flexibility level and 13 respondents (32.5%) had scored excellent in body flexibility level in sit and reach test measurement. Meanwhile, 4 respondents (10%) had scored average in body flexibility level and 2 respondents (5%) had scored below average in body flexibility level for sit and reach test measurement.

In additions, 18 respondents (45%) were scored average in body flexibility level and 11 respondents (27.5%) had scored below average in body flexibility level in back reach measurement during pre-test. Besides, 6 respondents (15%) were scored excellent in body flexibility level and 2 respondents (5%) had scored poor in body flexibility level in back reach measurement during pre-test.

| Flexibility category | N  | %   |
|----------------------|----|-----|
| Pre-test             |    |     |
| Excellent            | 0  | 0   |
| Above average        | 0  | 0   |
| Average              | 31 | 77.5|
| Below average        | 8  | 20.0|
| Poor                 | 1  | 2.5 |
| Total                | 40 | 100 |
| Post-test            |    |     |
| Excellent            | 13 | 32.5|
| Above average        | 21 | 52.5|
| Average              | 4  | 10.0|
| Below average        | 2  | 5.0 |
| Poor                 | 0  | 0   |
| Total                | 40 | 40  |

Table 1. Body flexibility level in pre-test and post-test distribution on the sit and reach test measurement in Dance Art student Hasanuddin University.
In post-test, the improvement was observed on back reach measurement among dancer students. There were 37 respondents (92.5%) had scored excellent in body flexibility level and only 1 respondent was scored below average in body flexibility on back reach measurement among dancer students. No respondent had scored poor body flexibility level.

Table 2. Body flexibility level in pre-test and post-test distribution on back reach measurement in Dance Art student Hasanuddin University.

| Flexibility category | N   | %   |
|----------------------|-----|-----|
| **Pre-test**         |     |     |
| Excellent            | 6   | 15.0|
| Above average        | 3   | 7.5 |
| Average              | 18  | 45.0|
| Below average        | 11  | 27.5|
| Poor                 | 2   | 5.0 |
| **Total**            | 40  | 100 |
| **Post-test**        |     |     |
| Excellent            | 37  | 92.5|
| Above average        | 2   | 5.0 |
| Average              | 0   | 0   |
| Below average        | 1   | 2.5 |
| Poor                 | 0   | 0   |
| **Total**            | 40  | 100 |

For sit and reach test measurement, the minimum and maximum of pre-test were 2 and 11.0 with mean of 7.863. In post-test, minimum and maximum were 6 and 18 with mean of 13.893. The standard deviation for pre-test and post-test were 1.7548 and 2.6691.

Table 3. Mean, Minimum, Maximum and Deviation Standard (SD) description on sit and reach test measurement.

| Flexibility | Mean | Minimum | Maximum | SD    |
|-------------|------|---------|---------|-------|
| **Pre-test**| 7.863| 2.0     | 11.0    | 1.7548|
| **Post-test**| 13.893| 6.0     | 18.0    | 2.6691|

Meanwhile, minimum and maximum were 3 and 7 with mean of 9.288 during pre-test for back reach test measurement. In post-test, minimum and maximum were 17 and 25 with mean of 16.075. The standard deviations of pre-test and post-test were 3.0779 and 3.6920.

Table 4. Mean, Minimum, Maximum and Deviation Standard (SD) description on back reach test measurement.

| Flexibility | Mean | Minimum | Maximum | SD    |
|-------------|------|---------|---------|-------|
| **Pre-test**| 9.288| 3.0     | 7.0     | 3.0779|
| **Post-test**| 16.075| 17.0    | 25.0    | 3.6920|

3.2. Discussion
The flexibility is body ability to perform exercise with large or wide amplitude motion. The flexibility is referred to the motion range around the joints and wrist or joint ability in all direction movement.
with large and broad motion range accorded to the actuated joint function. The flexibility exercise helped in organized and systematic movement which contributed to expected and controlled results.

The relationship between flexibility exercises toward changes in body flexibility level among dancer students. Flexibility was ability to move the muscle together with drifted in all areas of movement. The body flexibility had been achieved by stretching exercises. The flexibility exercises was characterized by stretching latch and muscle group. The flexibility is affected by the joint type and structure, ligaments, tendons, muscle, age and gender as well as body and muscle temperatures.

The factors affected flexibility were age, gender, environmental conditions, psychological effects, space and physiological limitations. There was physiological factors affected flexibility such as joint, age, gender and exercise habits.

The tendon is tough band of fibrous connective tissues which connected muscle and bones. The ligament function was to support the joint and provide the joint stability or strengthen the joints. The proprioception was in the muscle, tendons, capsules, ligaments and other membranes and bony labyrinth. The good flexibility helped in elasticity and gave wide range of joint motion which provided convenience in body movement and daily activities.

The flexibility was maximum motion area in the joint without being influenced by a force or pressure. Flexibility affected by joint type, bone structure, muscles, tendons and ligaments. Meanwhile, women had high flexibility than men. This flexibility is very important in every movement because improve the muscle work efficiency. In additions, the body flexibility function is to reduce the injury. Therefore, flexibility increased might enhanced by the formulation exercise. The flexibility exercise was basic technique used to increase motion range.

Series Elastic Component (SEC) and Parallel Elastic Component (PEC) were elastic structures of the muscles. Tendon and connective tissue in contractile proteins, which is part of SEC. Meanwhile, PEC consisted fascia muscle, membrane, sarcolemma and sarcoplasm which are passive elastic structures of the muscles.

The stretching occurred on the tightness muscles (tense), tension was increased on the elastic components of SEC and PEC. The muscle cells stored energy in the eccentric contraction. This energy was released once the stretch is released depended on the velocity motions. More energy is stored during stretching in tensile muscles from the relaxed muscles. The stored energy is more evenly between SEC and PEC. Interconnected muscle parts were difficult to determine and relied on action and myosin positions which interconnected with each other.

The muscle was shortened when muscle were actively contracting. The PEC undergone minor changes, while tendons was stretched in the SEC. The stretch level depended on the contraction intensity and external load. The exercise intensity increased damping effect which mobility increased rapidly after the exercise. Active resistance toward stretching depended bridge number formed between actin and myosin.

The important of flexibility for dancers to ready organs and muscles for receive all the performance (dancing), improved movement quality and aesthetic awareness. Flexibility exercise was effectiveness of person in adjusting for any activity by body wrapping on joint area. Most of sports such as gymnastics, splendid fencing and wrestling required most join motion. Besides, flexibility among dancers needed organs to be ready in stable state (normal) changes to be unstable conditions.

4. Conclusion
In conclusion, there was change between body flexibility level between pre-test and post-test. In additions, there was influence between flexibility exercise and body flexibility level among Dance Art students in Hasanuddin University in 2016. The recommendation is Dance Art student unit should perform initial measurement of body flexibility level on the dancer students as an evaluation material for the students for every six months. The physiotherapist should enhance body flexibility by providing specific exercises to the dancer students.
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