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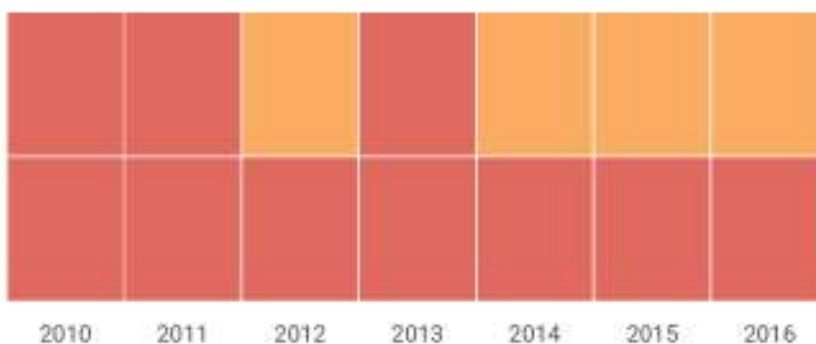
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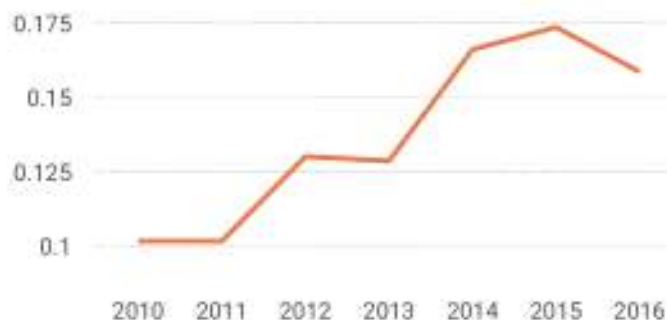
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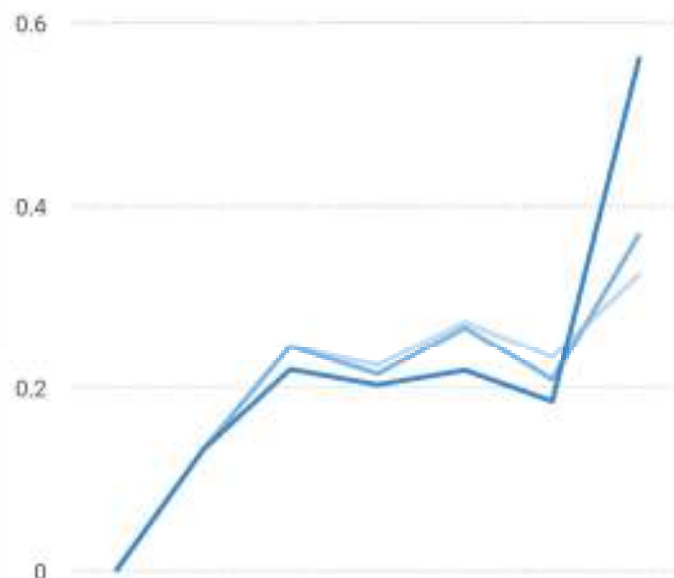
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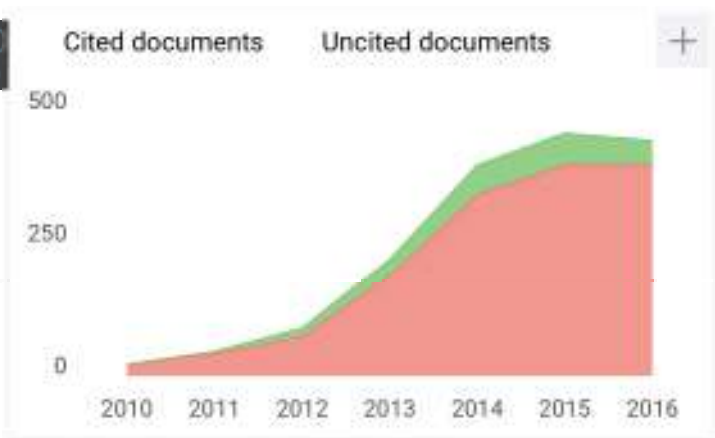
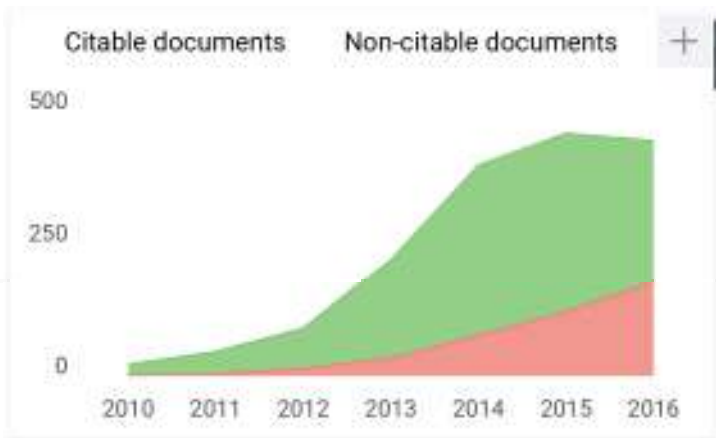
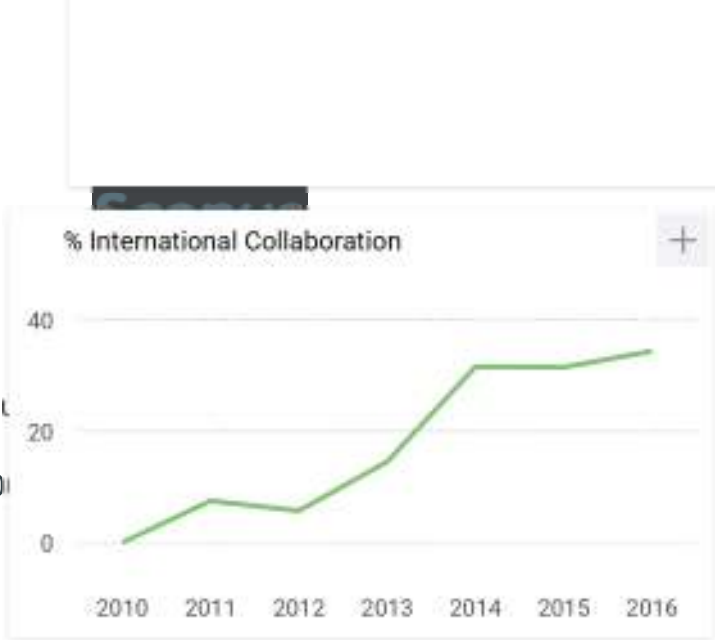
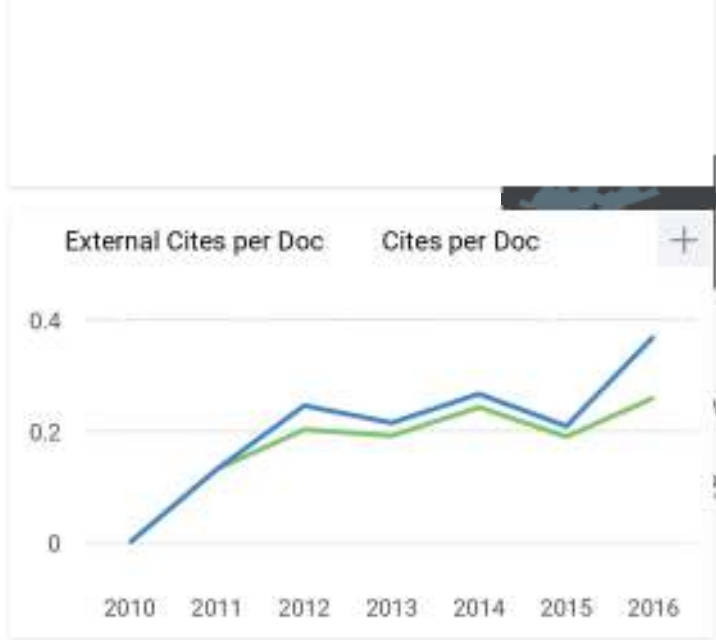
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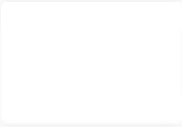

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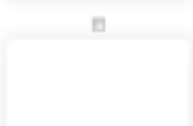
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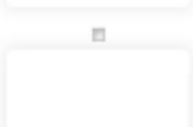
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CASE REPORT

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Increasing lung capacity and cardiovascular ability by Mosesahi gymnastics in Gorontalo State University students

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Abstract

Cardiovascular corroborate and salutary can be done by adolescents through physical exercises or gymnastics regularly. Aerobic exercise is included in the physi someone does aerobics regularly, it influences the body's health because aerobics is an exercise that needs oxygen to form its energy persistently and rhythmically the person who does several activities and be able to follow the movements combination that being systematically has good lungs, heart, and blood vessel. Further the problem of low capacity of lungs and low cardiovascular ability of the students, the solution is by doing MOSESAMI (Abbreviation: *Mo'o Sehati, Mo'o Sanangi H* health, happy and cheerful). This paper employed factorial program experimental, with a sample 72 students of the State University of Gorontalo. Data analysis use analysis of variance. The result concludes that the changing of lung capacity and cardiovascular ability caused by Mosesahi gymnastic exercise done twice a week intensity of 60%, 70%, and 80% is better than once and three times a week. By exercising three times a week with thirty minutes and 60%, 70%, 80% of intensity better than thirty minutes with frequency once and three times a week as well as in frequency three times a week with forty minutes duration, regularly 80% intensity better than at frequency once or twice a week

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Full Text

Introduction

Nearly 29% of the world's population consists of adolescents and 80% among them live in developing countries. As increasingly the adolescent, then it give attention changes which is bigger in adolescent group as the result of unhealthy life style, and able to give bad impact to the health status. The changing of living productive cause physical activities in term of gymnastics become decreasing in adolescent's life. Modern life with all the facilities that it provides such as the tele computer makes adolescents underproductive.

Underproductive life may cause cardiovascular disease, osteoporosis, diabetes, metabolic syndrome, and other ill risks. American research in 2008 indicated that cardiovascular disease and chronic bronchitis occurred more in young age in the range of 19-24 years. Obesity in adolescent is the most consistent predictor disease. According to Ignarro (2010), people with severe obesity are at greater risk of coronary than people of normal weight.[1],[2],[3],[4],[5] Apart from this, 14 research conclusions also explained that someone who irregularly exercised or did gymnastics.

Increasing aerobic gymnastic health degree is a type of gymnastic sport that consists of a combination of movements intentionally chosen by following musical rhythm certain rhythmic, continuity and duration with expected intensity at 60%, 70%, 80%. Aerobics is included in a type of gymnastic sports that was founded by Dr. I 1970. If someone regularly does aerobics, it will influence his/her health. Aerobics is an exercise that requires oxygen for the formation of energy which is conducted rhythmic, involving large muscle groups, especially the leg muscles on exercise intensity 60-90% of Maximal Heart Rate (MHR) and 50-85% of maximal oxygen minutes at a frequency of exercise three times a week.[6],[7],[8]

In order to support academic activities in the State University of Gorontalo, aerobics sessions are thoroughly conducted for all the students. Aerobics performed once a week every Friday, with duration of 25-35 minutes. However, in implementing this aerobic activity, many students have difficulty in completing aerobic movement. Some of the students are unable to follow aerobic movement combinations from the first to the last, particularly the high impact (high intensity) movements combination

The results of the test with the spirometer showed that the lung capacity for males was 2.520 mL on an average and for females, it was 2.080 mL on an average, the research of Budy Andriskanda, vital lung statistic of Indonesian, who not regularly performed training is 3.6 L, meanwhile, people with regularly doing training Indonesian about 4.2 L.[10],[11] Furthermore, Silverthorn et al. (2001) mentioned that the vital lung capacity for males was 4.800 mL and for females was 3.100 mL.[

A Cardiovascular ability test results measured by 1,200-m marathon (males) and 1,000-m (females), average time for males is 5.4 min and 5.57 min for females. If adjusted following normal table, the average cardiovascular ability of students for males is less and for females is enough.[13],[14],[15],[16],[17],[18]

It's assumed that the person who does several activities and be able to follow the movements' combination that being systematically has good lungs, heart, and blood vessel [21],[22],[23],[24],[25]

To prove this assumption, therefore, a solution brings for doing gymnastic exercise that determined the frequency, duration, and intensity to increase the cardiovascular capacity. Before carrying out the exercise, the students underwent a test by using the spirometer to measure the capacity of lungs and cardiovascular capacity 1,200-m marathon for males and 1,000-m marathon for females. Furthermore, a solution to the problem of low capacity of lungs and low cardiovascular capacity is (Mo'o Sehati, Mo'o Sanangi Hilawo) gymnastic exercise, which means that this gymnastics makes people healthy, happy, and cheerful.[26],[27],[28],[29] Gymnastics based on the basic principles of cardio respiratory exercise, it is adjusted to the opinion of Battenedi.[23] this gymnastic is done by two to three times a week with target arterial maximal pulse.[30],[31],[32],[33],[34],[35],[36] arterial maximum pulse. Based on this opinion, gymnastic implementation is determined exercise frequency by

in duration between 20 min - 40 min with intensity of exercise 60% - 80% of DNM.[37],[38],[39],[40],[41],[42],[43] During this time, the implementation of aerobic gy intensity, duration, as well as frequency with the result that not be observed whether the aerobic exercise may training the heart, lungs, blood circulation in ord effectively and efficiently, increasing certain muscles' strength until those stronger and raising body flexibility, furthermore the aerobic is able to increase I cardiovascular ability. [44],[45],[46],[47]

Methodology

This research used factorial experimental.[48],[49] In this research, there was an influencing variable called Mosesahi gymnastic that gave attention to the frequ exercise intensity and variable that could be affected the experiment, namely vital lungs VC and FEV1 capacity and cardiovascular abilities that artery frequency Apart from this, this research pays attention to confounding variables that consist of sex, age, anthropometric and physical activities, and nutrient.

The groups of the sample is presented in [Table 1] below.{Table 1}

According to the table, the sample can be divided into nine groups, which are:

The group of frequency once a week with 20-min duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the thirc of frequency once a week with 30-min duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the third m frequency once a week with 40-min duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the third month).The twice a week with 20-min duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the third month).The group o week with 30-min duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the third month).The group of frequenc; 40-min duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the third month).The group of frequency three tim min duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the third month).The group of frequency three times : duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the third month).The group of frequency three times a duration (periodically increasing intensity—60% in the first month, 70% in the second month, and 80% in the third month).

Research procedures

At all treatment is suggested to maintain diet as a habit and food system as usual by consuming food three times a day, no smoking and alcohol, because th quarantined.[51],[52],[53],[54],[55] This treatment is divided in 9 groups with 8 students in each group. It is appropriate with sample number, 72 students.

Gymnastic exercise implementation

Aerobic gymnastic exercise was done every week. Each group does the exercise once, twice, and three times frequency per week in 20 minutes, 30 minutes, and 4 with first month 60%, second month 70%, and third month 80% intensity.

Aerobic exercise implementation form

Aerobic movements are made and created on purpose. They are systemically in order consist of 27 movements repeated hence shaping posture, improving mov health standard, and as rehabilitation tools. For data analysis, since this research has two variable those are independent and dependent, lungs capacity and ca (will be increased by aerobic exercise). Therefore, data analysis used analysis of variance (ANOVA) statistic test to test whether each independent variable had a s on the dependent variable.[56],[57],[58],[59],[60],[61],[62],[63],[64],[65]

Result and Discussion

Changes of lung capacity in result of Mosesahi gymnastic exercise are able to be seen through two indicators, change of vital capacity (VC) and change of forced e the first second (FEV1). Changes of VC: The description of mean and standard deviation from the changes of VC is shown in [Table 2],[Table 2]

According to the [Table 6], be able to be explained that the changes value of vital capacity after 2 months ($P= 0,000$) and 3 months ($P= 0,000$) MOSASEHI gymn: minutes, 30 minutes, and 40 minutes with 1, 2, and 3 times in a week shows meaning value (P) less than $\alpha = 0,05$. This means there is an influence within Moses 20 min, 30 min, and 40 min at a frequency of one time, two times, and three times a week with changes of VC after 2 months and 3 months of exercising.

Changes of forced expiratory volume in the first second

Description of the mean and standard deviation from the changes of FEV1 is shown in [Table 3]. The table above, explained that the changes value of FEV1 after 2 and 3 months ($P= 0,000$) MOSASEHI gymnastic exercise in duration 20 minutes, 30 minutes, and 40 minutes with 1, 2, and 3 times in a week shows meaning val 0,05. This means there is an influence within MOSESAAHI in duration 20, 30, and 40 minutes with frequency 1, 2, and 3 times a week with changes of FEV1 2 and 3 [Table 3]

Changes of cardiovascular ability in result of Mosesahi gymnastic exercise

Changes of cardiovascular ability in the results of Mosesahi gymnastic exercise are able to be seen through two indicators, changes of lactate acid and artery pulse

Changes of lactate acid

Description of the mean and standard deviation from the changes of lactate acid is shown in [Table 4].{Table 4}

The table above showed that the changes value of lactate acid after 1 months ($P= 0,002$), 2 months ($P= 0,000$), and 3 months ($P= 0,000$) after regularly perf gymnastic exercise in duration 20 minutes, 30 minutes, and 40 minutes with frequency 1, 2, and 3 in a week has value (p) less than $\alpha = 0,05$. This means there is MOSESAAHI in duration 20, 30, and 40 minutes with frequency 1, 2, and 3 times a week with changes of lactate acid after 2 and 3 months exercising.

Changes of artery frequency

Description of the mean and standard deviation from the changes of artery frequency is shown in [Table 5] by using Harvard step test formula.{Table 5}

The table above explained that the changes of artery value after 1 months ($P= 0,000$), 2 months ($P= 0,000$), and 3 months ($P= 0,000$) by regularly doing MO exercise in duration 20 minutes, 30 minutes, and 40 minutes with frequency 1, 2, and 3 in a week shows meaning value (P) less than $\alpha = 0,05$. This means there is MOSESAAHI in duration 20, 30, and 40 minutes with frequency 1, 2, and 3 times a week with artery frequency after 2 and 3 months exercising.

To analyze whether there is an interactional influence within intensity, duration, and frequency of change in lung capacity and cardiovascular ability, the re multivariate analysis test. The significant degree in each test is 0,05 ($= 5\%$). The result of a brief multivariate analysis can be seen in [Table 6].{Table 6}

According to table above, be able to be explained that to know the influence of duration, frequency, and long of exercise towards vital capacity, FEV1, artery frec

acid can be seen based on intergroup effect and mutual subject effect

Based on the intergroup effect, be able to be explained that duration and frequency of applied MOSESAMI gymnastic have meaning treatment intergroup connectic of significant value (P) at duration (P=0,001) and frequency (P=0,000) inter group less than $\alpha = 0,05$. Based on mutual subject effect, be able to be explained that th intensity and duration also intensity and frequency have meaning treatment inter mutual subject connection.

This is because significant value (P) at intensity (p=0,001), intensity and intensity (P=0,000), intensity and duration (P=0,003), also intensity and frequency (P=0,00) than $\alpha = 0,05$.

To more specific intensity, duration, and frequency influence towards changes of lungs capacity (Vital Capacity and FEV1) and cardiovascular ability (Lacta Frequency), therefore has been done the following univariate analysis.

Intergroup

According to [Table 7], it can be explained that there is an influence towards intergroup within MOSASEHI gymnastic duration towards changes of vital capacity because significant value of changes of vital capacity (P= 0,001) and changes of FEV1 (P= 0,000) less than $\alpha = 0,05$ value. {Table 7}

Based on frequency variation of Mosesahi gymnastic, there is an influence on intergroup treatment within frequency with changed VC, changed FEV1, change changed artery pulse frequency. This is because changed significant value of VC (P = 0,0006), changed FEV1 (P = 0,0001), changed lactate acid (P = 0,001), a pulse (P = 0,000) values are less than $\alpha = 0,05$.

Whereas according to variation of duration and frequency in the table above, be able to be explained that significant value of the changed VC (0,026) and the cha less than $\alpha = 0,05$ value. This means that variation of duration and frequency of Mosesahi gymnastic influence the changes of VC and FEV1.

Mutual subject

According to the [Table 8], be able to be explained that treatment done to mutual subject showing that the intensity of Mosesahi gymnastic influences towards the ch FEV1, lactate acid, and artery pulse frequency. This is because significant values (P) at VC (P = 0,000), FEV1 (P = 0,000), lactate acid (P = 0,000), and artery pu 0,000) are less than = 0,05. {Table 8}

Based on variation of intensity and duration Mosasahi gymnastic, be able to be explained that significant value (P) at the changed VC value (P = 0,000), FEV1 (0,00) artery pulse frequency (P = 0,049) less than $\alpha = 0,05$. This means there is an influence within variation of intensity and Mosasahi gymnastic duration toward the ch and artery pulse frequency.

Based on variation of intensity and duration of Mosesahi gymnastics, be able to be explained that significant value (P) at the changes of FEV1 (0,043) and the char (P = 0,046) and the changes of artery pulse frequency (P = 0,000) less than $\alpha = 0,05$. This means there is an influence within variation of intensity and Mosesahi g; toward the changes value of VC, FEV1, and artery pulse frequency.

Based on variation of intensity, duration, and frequency Mosesahi gymnastic, be able to be explained that significant value (P) at the changed VC value (P = 0,007) than $\alpha = 0,05$. This means there is an influence within intensity, duration and Mosesahi gymnastic frequency toward the changes value of VC and FEV1.

Based on the explanation above, be able to be concluded that to know the changes of VC, FEV1, lactate acid, and artery frequency after implemented Mosesaf twice of three times in a week.

According to [Table 9], be able to be explained that occurs increasing changes value of VC, FEV1 at duration 20 min with frequency twice a week, whereas in dura occurs at exercise with frequency three times a week at the first, second, and third months of Mosesahi gymnastic during three times a week. On the other hand, for decreasing of lactate acid in blood as a result of Mosesahi gymnastics during three times a week at the first, second, and third months. Hence, apart from being su less than $\alpha = 0,05$, it can also can be seen that there is a meaningful change enough in frequency twice and three times a week at VC, FEV1, lactate acid and art consequence of Mosesahi gymnastic exercise. {Table 9}

The result of Mosesahi in this research is that Mosesahi gymnastics in a duration 20 min with a frequency of twice a week is able to increase lung capacity with \pm 70%, and 80%. Mosesahi gymnastics in a duration 20 min with a frequency of three times a week can increase cardiovascular ability with an intensity of 60' Mosesahi gymnastics in a duration 30 min and 40 min, an intensity of 60%, 70%, and 80%, and frequency of three times a week can increase lung capacity: VC- Vit Forced Expiration Volume after 1 second, and cardiovascular ability; Harvard test: Artery pulse, lactate acid.

20-min Mosesahi gymnastics with a frequency of twice a week, duration of 30 min or 40 min, and intensity of 60%, 70%, and 80% that implemented in freque recommended in order to increase lung capacity because the effect of Mosesahi gymnastics is seen in the change of tendons in the respiratory system. At this system can increase myoglobin and carbohydrate oxidation with the result tendon capacity can change glycogen become CO₂ and H₂O also ATP with oxygen help respiration tendons can develop well until the increase in lung capacity occurs. [66],[67],[68]

20 min, 30 min, or 40 min of Mosesahi gymnastics with an intensity of 60%, 70%, and 80% implemented with a frequency of three times is recommended in on cardiovascular capacity well because the size of the heart of someone who has exercised is better than one who has not exercised Mosesahi gymnastics with th frequency, and duration. It makes difference between Mosesahi gymnastic and other aerobics. Furthermore, it is able to be insist that Mosesahi gymna; recommended for someone who desires to increase lung capacity and cardiovascular capacity. [69]

Mosesahi gymnastics is an aerobic gymnastic sport that has been improved based on the movements of aerobics. They consist of warming-up, main movements, exercises. While doing Mosesahi gymnastics, consumption of O₂ and production of CO₂ are more than common activities; hence, it influence reparation and system of the person who does it. [70],[71],[72] From the result of this research, it was proven that by implementing Mosesahi gymnastics with a duration of 20 min, \pm frequency of once a week increases lung capacity and cardiovascular capacity of students.

1. Increasing Lung Capacity and Cardiovascular Capacity in 20 min in the Aerobic Gymnastic Group.

Students of 20 minutes aerobic gymnastic group increase their lungs capacity: VC- Vital Capacity, FEV1= Forced Expiration Volume after 1 second, and cardiovasci test: Artery pulse, lactate acid. However the increasing is better to be seen at 20 minutes group in frequency twice per week than three times or once per week with at interval exercise, those are: 60% at the first month, 70% at the second month and 80% at the third month.

The result of the research is supported by several other studies, which are as follows. Mc, Claran et al. (1999) compared 29 young healthy women with broad adj through progressive treadmill test. Based on that study, concluding that lungs volume and the maximal rapid of air current from common women and women wh level can cause increasing of prevalence limit expiration current during heavy physical exercise also the increasing of relative hyperinflation based on respiration f through spare ventilation. This causes ventilation and tidal volume to be limited during physical exercise. Normally healthy women with increasing lungs volume w of expiration current until through the maximum air current volume. Furthermore, Leith and Bradley in Raffoth (2001) examined the influence of physical exercise o capacity on five young volunteers before and after physical exercise. The researchers concluded that there was 4% increase in VC and total lung capacity and r ventilation increased 14%. [73],[74],[75],[6]

20-min Mosesahi gymnastics with a frequency of twice per week apart from increasing strength, flexibility, and muscle stamina, can increase enzyme activities in improves the density. Ligament and tendon will be denser and denser gristle in the body joints. Thus, health and fitness of the individual increases that can im; status. At 20 min Mosesahi gymnastics with frequency of twice per week shows lung capacity increasing optimally with changes of FEV1 that of 0,241 in the first r

second month, and 0,298 in the third month.

The increasing of lungs capacity: VC - Vital Capacity, FEV1= Forced Expiration Volume after 1 second, and cardiovascular ability; Harvard test: Artery pulse, lactat at the attachment of Lungs Capacity and Cardiovascular Ability Test Result based on Mosesahi Aerobic Gymnastic where there is mean and standard deviation in ; second month, and post-test from 20 minutes group in frequency three times per week, twice per week, as well as once per week.

The increasing lung capacity in 20 min aerobic group shows better result as well as frequency twice per week. Whereas, based on theory above more regularly g better result towards denser gristle in the body joints. as the result be shocked absorber, and bones and joints protector from the injury danger. It means gymnastics times a week should show a better increasing. However, in 20 min Mosesahi gymnastics shows a better increasing with a frequency of twice a week. It is caused du in the second month with a duration of three times a week coincided with Study Result revenue. Hence, it is more and less influenced to the psychology of the impacted less concentration when doing Mosesahi gymnastic exercise. It is caused the result is not optimal. Besides that, during collecting data of Mosesahi gyn trial students leave absence, so that the rest students show less enthusiastic during the exercise.

2. Increasing Lung Capacity and Cardiovascular Capacity in 30 min in the Aerobic Gymnastic Group.

Students of 30 min aerobic gymnastic group increase their lungs capacity: VC- Vital Capacity, FEV1= Forced Expiration Volume after 1 second, and cardiovascu test: Artery pulse, lactate acid. However, the increasing is seen better in the 30-min group with a frequency of three times per week than twice or once per week, ar a week group is better than the 30-min once a week group and 30 min three times per week treatment group is better than 20-min three times per week group with at intensity exercise, those are: 60% in the first month, 70% in the second month, and 80% in the third month.

The result of the research is supported by several other studies, which are as follows: Pellegrino, Villosio Milanese (1999) concluded that biking with a frequency week during 2 months with 31 min duration in for healthy people was able to increase functional residual capacity (FRC), tidal volume, and the frequency of respir (1987) examined swimming the influence of exercise on respiration tendons, as the result occurs the increasing of someone's vital lungs capacity.[25],[77],[78],[79]

3. Increasing Lung Capacity and Cardiovascular Capacity in the 30 min Group.

Students of 40 min group increase their lungs capacity: VC- Vital Capacity, FEV1= Forced Expiration Volume after 1 second, and cardiovascular ability; Harvarc lactate acid. However, the increasing is seen to be better in the 40-min group with a frequency of three times per week than twice or once per week, and the 4C group is better than the 40-min once a week group and 40-min three times per week treatment group is better than 30 min three times, twice and once per we frequency 20 minutes three times, twice, and once per week with interval periodic increased exercise, those are: 60% at the first month, 70% at the second month a month.

This is based on cardiovascular basic exercise principles founded by the American College of Sports Medicine in (Battenedi, 2009) that states that cardiovasci principles are frequency, intensity, duration, and specificity.[23],[80] Frequency is within 2, 3-5 exercises per week, intensity 50-60% until 90% of maximum arter; minutes or a minimum of 20-30 min exercise time.

The opinion is similar to Sherwood (2001-34) who had said that aerobic exercise (through oxygen) involving tendon groups and doing by low intensity and long ti resources are able to be changed become adenosine triphosphate (ATP) by using citrate acid cycles as predominance metabolism line. Aerobics can be done fo hours in an exercise.[7]

Conclusion

The significant changes of lungs capacity and cardiovascular ability that caused by implementing MOSESAMI gymnastic exercise with frequency twice a week in d and intensity 60%, 70%, and 80% is better than frequency once a week, and MOSASEHI that implemented with frequency three times a week and three times a we minutes and intensity 60%, 70%, and 80% the increasing is better than frequency once and twice a week, also MOSESAMI that implemented with frequency thr duration 40 minutes, periodically intensity 80% the increasing is better than duration 40 minutes in frequency once and twice a week

This study recommends that for the beginners who desire to be healthy and fit, it is better to do Mosesahi gymnastics with a duration of 20 min, frequency of twice a of 50-60%. For college students, employees, and public society to support daily activities, it is better if they do Mosesahi gymnastics with a duration of 30 min, frequ a week, and intensity of 60%, 70%, and 80%.

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Conflicts of interest

There are no conflicts of interest.

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