



800 METER X 2 RUNNING EXERCISE HAS GIVEN BETTER IMPACT COMPARED TO 400 METER X 4 IN IMPROVING PHYSICAL FITNESS OF THE OFFICER OF LOCAL DISASTER MANAGEMENT AGENCIES IN DENPASAR

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ABSTRACT

Denpasar is a city as a part of Indonesia which is located in Bali Province. Bali Province is very prone disaster due to the fact that its demography position, which is between two continents and two oceans. In creating safe and comfortable environment and minimize the risk of disasters, Local Disaster Management Agencies (BPBD) was formed. In carrying out the duty, the officer must have fit physical fitness. The purpose of this research is that it is expected to improve physical fitness of the field officer of Local Disaster Management Agencies in Denpasar. The design of research is randomized pre and posttest control group. The number of research subject is 24, which is divided into 3 groups that are Control Group, Group A and B. Each of group consists of 8 people as the number of sample. The sample is chosen randomly with different treatment. Control group was given daily activities, meanwhile Group A and B was 800 meter x 2 and 400 meter x 4 running exercise for 6 weeks consecutively. Physical fitness is measured by using Cooper Test in before and after treatment. After treatment, the average of time in control group is 15.14 ± 0.95 , Group A is 12.27 ± 1.21 and Group B is 13.65 ± 1.11 . The result ANOVA test shows significant difference between the groups with $p=0,000$ ($p<0,05$). It can be concluded that 800 meter x 2 running exercise improved physical fitness of field officer of Local Disaster Management Agencies compared to 400 meter x 4 running exercise as well as regular daily activity.

KEYWORDS : Physical Fitness, Exercise, 800 Meter X 2 Running, 400 Meter X 4, Cooper Test

INTRODUCTION

Indonesia is one of the countries which is very prone to disasters. Plate tectonics spread out in Indonesian archipelago which frequently experience seismic activity and cause Indonesia as one of the earthquake, landslide, tsunami and other disasters prone country.¹ Denpasar is a part of Indonesia and the capital city of Bali Province is also prone to natural, non-natural or man-made disasters. Demographically, the large number of population compared to its area has made Denpasar as a dense and heterogeneous city, so that it has a high risk victim if unpredicted and uncontrolled disaster is happened. This condition has made Local Disaster Management Agencies (BPBD) was formed in Denpasar as one of Regional Technical Agencies. They have a min duty that is to help the Mayor in Regional Government Administration in the field of Disaster Management.²

In carrying a duty, the field officers of disaster management is demanded to be spry and nimble to help and rescue disaster victims.³ They have to be highly skilled, fit, physically and mentally strong as well as has a good physical fitness to prevent them from exhaustion.^{4,5} As what is expected from Local Disaster Management Agencies (BPBD) in Denpasar, the result of evaluation and observation showed that their physical fitness are not optimal which one of the causes of their inadequate services of a disaster rescue officers.^{5,6} The physical fitness of field officers is not optimal and it can be caused by many factors, one of them is the lack of programmed and structured exercise to improve their physical fitness.⁶ In improving their physical fitness, an exercise program should be made and arranged which depends on their activity in the field.^{7,8} The choice of exercise type in this research is based on the duties of Local Disaster Management Agencies officers. Based on the observation, it takes ± 2 hours in tackling the fire, the officers must run and walk from one place to another. They are running and walking with distance up to ± 1000 meter. Based on that duty, aerobic interval running is chosen as a type of exercise that are type A interval running exercise (800 meter x 2) and type B interval

running exercise (400 meter x 4) to improve physical fitness of Local Disaster Management Agencies officers in Denpasar. Physical fitness is based on 2 major groups, those are organic fitness (static fitness) and dynamic fitness. Both of groups are important to determine the level of physical fitness.⁹ The components of physical fitness are strength, heart endurance, speed, dexterity, power, flexibility, balance and coordination. Muscle strength, muscle and heart endurance are three important elements in physical fitness.¹⁰ In obtaining the optimal physical fitness of Local Disaster Management Agencies officers in Denpasar, an exercise to improve that physical freshness is needed. The chosen exercise is easy, efficient and appropriate with the daily activity of Local Disaster Management Agencies officers that is running. The choice of running is 1600 meter of running with different interval. Due to that fact, the research is conducted toward the physical fitness of Local Disaster Management Agencies officers in Denpasar. For 6 weeks, interval running exercise 800 meter x 2 and interval running exercise 400 meter x 4 is conducted.

MATERIAL AND METHOD

The method used in this research is Randomized Pretest and Posttest Control Group Design. The sample was chosen after the fulfillment of inclusion criteria, those are male, range of age is 30-35 years old, in a healthy condition and active to carry out the duty as the field officer for the last 2 years. 24 people was randomly chosen and randomly divided into 3 group, Control Group, Group A and Group B. Each of groups consists of 8 people and was given different exercises. Control group was given regular daily activities without any exercise and play table tennis without any measure of action and raw intensity. Group A was given 2 times of 800 meter running interval exercise which was interspersed with 6 minutes of walking and started with 10 minutes of warming up and stretching. Then, the subject was running for 6 minutes in 800 meter with 6 minutes interval of waking for 420 meter. After the exercise was done, cooling down was conducted for ± 5 minutes.

The detail of type A with 2 times 800 meter running interval exercise with interspersed of 6 minutes of walking can be illustrated in the table below

Running	→ Walking	→ Running	Total
6 minutes	6 minutes	6 minutes	18 minutes
800 meter	420 meter	800 meter	2020 meter

The detail of type B with 4 times 400 meter running interval exercise with interspersed of 2 minutes walking can be illustrated in the following table

Running	→ Walking	→ Running	Walking	Running	Walking	→ Running	Total
3 mnt	2 mnt	3 mnt	2 mnt	3 mnt	2 mnt	3 mnt	18 mnt
400 mtr	140 mtr	400 mtr	140 mtr	400 mtr	140 mtr	400 mtr	2020 mtr

The exercise was conducted every evening at 16.00 – 17.30 WITA in Lapangan Puputan Renon Denpasar. Before and after exercise, each of participants' physical fitness was measured with Cooper Test with the categories, such as very less if the travelling time >18.57. less: 15.47-18.57. average: 12.57-15.46. good: 10.59-12.56 and very good if the travelling time < 10,59.¹¹The data was analyzed by descriptive analysis, normality test toward the groups with K-S Test, homogeneity test between group with Levene Test, t-paired test, ANOVA test and Post Hoc-LSD test.

RESULT

The result distribution of physical test by using Cooper test is shown in Table 1 which show the category of results in each of group.

Table 1. The Result of Physical Fitness Test with 2,4 Km of Running (Cooper Test) of Each Groups of Local Disaster Management Agencies Officers in Denpasar

Subject Number	Cooper Test		
	Average	Category	
Control	Before	15.86 ± 0.96	Less
	After	15.14 ± 0.95	Less
A	Before	15.88 ± 0.91	Less
	After	12.27 ± 1.21	Good
B	Before	15.87 ± 0.92	Less
	After	13.65 ± 1.11	Average

Table 2. Result Analysis of Physical Fitness T-Paired Test in Pre-Posttest with 2,4 Km of Running of Each Groups of Local Disaster Management Agencies Officers in Denpasar

Treatment Groups	N	Variable	Average of Travelling Time (minutes)	P-value
Control	8	Before	15.86+0.95	0.166
		After	15.44+0.95	
A	8	Before	15.88+0.90	0,000
		After	12.27+1.21	
B	8	Before	15.87+0.92	0.001
		After	13.65+1.11	

Significance p <0.05

The result of data analysis in before and after exercise of each of groups is shown in Table 2. The Control Group shows the insignificant result with p=0.166 (p>0.05). on the contrary Group A and B show significant results with p<0.001 and p=0.001 (p<0.05). This indicates that there is a significant difference between travelling time in running for 2,4 Km in before and after exercise.

It is followed with average analysis after treatment between groups. The comparison of results between Control Group, Group A and B has a significant difference with p <0.001 (p <0.05). The following is the result of ANOVA test in 3 groups.

Group B was given 4 times 400 meter of interval running exercise which was interspersed with 2 minutes walking and started with ± 10 minutes of warming up and stretching. It was continued with the subject to run for 2 minutes in 400 meter with 2 minutes walking interval for 140 meter. After that the exercise was concluded with cooling down for ± 5 minutes.

Table 3. ANOVA Test of Three Treatment Groups of Local Disaster Management Agencies Officers in Denpasar

No	Travelling Time	Control	A	B	ANOVA Test	
		Average (minutes)	Average (minutes)	Average (minutes)	F	p value
1	Pretest	15.86+0.95	15.88+0.90	15.87+0.92	0.001	0.999
2	Posttest	15.14+0.95	12.27+1.21	13.65+1.11	11.978	0.000

It was continued with Post Hoc-LSD test to determine the difference in the average of the physical fitness test result of Local Disaster Management Agencies officers between one treatments to another:

1. Group A was compared with Control Group, which has a significant difference (p=0.000).
2. Group B was compared with Control Group, which has a significant difference (p=0.020).
3. Group A was compared with Group B, which also has a significant difference (p=0.030).

DISCUSSION

The category of physical fitness is determined from the running speed with 2.4 Km of distance with the measurement is that the faster the travelling distance, the better the level of physical health will be.^{11,12} based on the result before exercise, physical health of firefighters in the three groups have low level of physical fitness. This explained the fact that the low average of physical fitness of Local Disaster Management Agencies officers must be improve so that they can carry out the duty optimally.

The analysis of physical fitness test result between pre-posttest in each group with t-paired test can be explained that, in Control Group which carried out the similar activity as the previous or without exercise showed there was only an improvement in travel time of 0.72 minutes. After it was analyzed, the result is not significant (p>0.05). Based on the categorization of physical health, it can be explained that the average of travel time during pretest is 15.86±0.95 minutes, which is categorized as 'Less', which is similar with the average of posttest that is categorized as 'Less' with 15.14±0.95 minutes. It proves that the line of march exercise which is conducted for ±10 (ten) minutes before morning parade has not had an effective exercise principle, especially to improve physical health. An exercise with the right system must be done to improve the function of body system and to fulfill the needs of body in the optimal way.¹²

Furthermore, the improvement of travel time in Group A after 6 weeks of exercise is 3.61 minutes. It is analyzed and there is a significant difference (p<0.05). It can be explained that based on the categorization of physical health, the average of travel time in posttest is 12.27± 1.21 minutes which belongs to 'Good'. Meanwhile, in Group B, the travel time after 6 weeks of exercise has improved to 2,21 minutes with significant analysis result (p<0.05). It is categorized as 'Average' based on the categorization of physical health with the average of travel time is 13.65± 1.11 minutes.

The result of this research is in relevance with the study of aerobic running exercise for 2.4 Km. After 6 weeks of exercise

inside the stadium, the travel time of subject has improved for about 24,81 % ($p < 0,05$) from 'Less' to 'Good' category, and outside of stadium is 9,35% ($p < 0,05$) from 'Less' to 'Average' category.¹¹ Based on that result, it can be stated that both exercises of type A and type B is the effective exercise models to improve physical health of Local Disaster Management Agencies officers. Both types of exercise has applied the principles of exercise, such as systematic, repetitive, right timeframe, progressive and based on the individual ability of the subject.^{13,14} Beside that, in order to make all the physical organs of the body are well conditioned, so it must be trained regularly and appropriately, so human can efficiently do their activities.

In Control Group where there is no measurement of the exercise intervention, it is found that the pulse during activity only 61.7% of the maximum pulse, which is a low intensity of exercise. It is lower compared to training sensitive zone which gives an effective effect 72-87% of the maximum pulse.¹⁵ However, Group A has 77.2% of intensity from the maximum pulse and that is the effective loading because it is during training sensitive zone. It is similar with Group B, the pulse during the activity is 76.7% from the maximum pulse that is an effective loading (it is categorized as training sensitive zone). Type and doze of the right exercise can give a positive effect that is a light and agile moves. That condition is caused as the effect of coordinated neural control towards muscle movement, with the increase capacity of contractile and the synchronization in the release of energy from elastic components in muscle cells.^{16,17}

CONCLUSION

It can be concluded that

1. The method of 800 meter x 2 interval running exercise and 400 meter x 4 for 6 weeks can improve the physical health of Local Disaster Management Agencies officers compared to longer activity that is an exercise without certain dose.
2. The method of 800 meter x 2 interval running exercise gives a better improvement than 400 meter x 4 interval running exercise.

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