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# Physical Activity and Recommendation for Heart Rate Recovery Treatment as an Endeavour in Community Health Education

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## Abstract

This research aim is to evaluate and educate people about the position selection in health recovery treatment for societies as well as athletes after doing physical activities. This is an experimental research design, these research activities are done through training, testing and evaluation of the heart rate on 16 teenagers (19 years old) who actively carry out physical activity at least 3-4 times a week, then divided into 4 groups each group will perform sub-maximum physical activities by using YMCA Step Test Protocol for three minutes. During physical activity, each group measured the heart rate exercise with different positions of standing, sitting, sleeping with feet above the heart (elevation) and sitting position while drinking water. In the next three minutes, after heart rate recovery treatment it found that the heart rate of exercise will decreased rapidly when using the sitting position while drinking water. With regard to this, it is imperative to consider health recovery position after having physical activity.

## How to Cite

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## INTRODUCTION

Physical activity will lead the changes of the normal heart rhythm. Habitual leisure-time physical activity (PA) improves cardiorespiratory and reduced health outcomes such as cardiovascular disease and mortality (Haskell et al., 2007; Kesaniemi et al., 2001) Habitual PA has also been shown to lower resting heart rate (HR), improve heart rate recovery (HRR) (Yaylali et al., 2015) and lower resting blood pressure (BP) (Murray, 2006). During having physical exercise, the sympathetic nervous system controls body function, but post-exercise there is a shift in the autonomic nervous system and the parasympathetic system reactivates to return the body to a resting state (Buchheit, 2007). The interaction between parasympathetic and sympathetic activity with regard to controlling the heart rate has been studied using drugs that cause a parasympathetic or sympathetic blockade and observing the effect on the heart rate (Borresen, 2008; Buchheit, 2007).

Physical training in athletes, requires the maximum ability of the heart to pump blood throughout the body to meet the nutritional needs. In sports physiology are known several indicators to see the physical condition of an athlete, such as: resting pulse, exercise pulse and recovery pulse. The American Heart Association [2009] recommends that a person does exercise that is vigorous enough to raise their heart rate to their target heart-rate zone 50% to 85% of their maximum heart rate, which is 220 beats per minute (bpm) minus their age for adults-for at least 30 minutes on most days, or about 150 minutes a week in total.

The result of previous studies suggests that autonomic adaptation to exercise varies depending on the training mode and type of exercise performed (Mcdonald, 2014). In general, people who has doing physical activity regularly are more likely have healthier hearts, faster heart-rate recovery times than people who do not regularly exercise. This research will evaluate and educate people about selection of position in health recovery treatment for societies as well as athletes after performing physical activity.

## METHODS

This is an experimental research design. This research is done to sixteen teenagers (19 yo) who actively carry out physical activity at least 3-4 times a week, which is divided into 4 groups.

Each group will receive training, and then proceed with testing and evaluating by performing sub-maximum physical activities by using YMCA Step Test Protocol (table 1) for three minutes. Followed by giving 4 different of heart rate recovery treatments through standing, sitting, sleeping with feet above the heart and sitting position while drinking water.

### YMCA Protocol Step Test

**A. Below are the essentials to perform the test on your own:**

1. 12-inch tall step, bench, or box (as close to 12 inches as you can find)
2. Stopwatch, timer, or clock with a secondhand
3. Metronome
4. Heart rate monitor (optional)
5. Partner to assist with cadence and form (optional)

**B. Procedures:**

1. Set the metronome to 96 beats per minute and turn the volume up loud enough that you can hear each beat.
2. Stand facing your step.
3. When ready to begin start the stopwatch or timer and begin stepping on and off the step to the metronome beat following a cadence of up, up, down, down.
4. Continue for 3 minutes.
5. As soon as you reach 3 minutes, stop immediately and sit down on your step.
6. Perform a manual pulse reading and count the number of beats for an entire 60 seconds.
7. Record your pulse when you have reached 1 minute and then locate your score on the rating scale

In elevation position, the participants' feet were placed on a platform in front of the chair while both legs were flexed at the knee at about 900. This way most of the body weight was concentrated on the seat. The arms were placed over the thighs.

Polar is used to measure and monitor pulse during, after, and on recovery period after physical activity at every minute. Furthermore, the measurement of heart rate recovery done after resting for 3 minutes. Next, for the liquid administration is done as an adjunct to know the effect of decreased heart rate after having three minutes of physical activities or exercise.

Data analysis was performed using SPSS software version 19. The distribution of each variable was examined with descriptive statistics are reported as mean (standard deviation (SD) to show the average level of heart rate during and after having physical activity. Next, we also ana-

lyzed the overall effect of decreased heart rate recovery through checking of body position data during and after having physical activity.

## RESULTS AND DISCUSSION

Generally, the average level and SD(±) of heart rate during physical activity and heart rate recovery in different body position are presented in **Table 2**. The average of heart rate during PA and SD as follow as: standing position 96±0.82; sitting position 114±0.96, elevation position 118±1.50; sitting while drinking position 131±0.82. Meanwhile, referring to statistical results on average heart rate recovery and SD based on standing, sitting, elevation and sitting while drinking as follow as: 81±1.50, 85±0.82, 85±0.82, 79±0.96.

**Tabel 2.** Heart rate description

| Treatment | Mean heart rate exercise (beat/minutes) and SD (±) | Mean heart rate recovery (beat/minutes) and SD (±) |
|---|---|---|
| Standing | 96±0.82 | 81±1.50 |
| Sitting | 114±0.96 | 85±0.82 |
| Elevation | 118±1.50 | 85±0.82 |
| Sitting while drinking water | 131±0.82 | 79±0.96 |

**Figure 1** shows that the different progress of heart rate change during physical activity and heart rate recovery in 4 position measurements. In standing position the heart rate recovery after three minutes dropped by 16 percent; sitting position down 26 percent; in the elevation position with the foot position higher than the heart of 28 percent and in the sitting position while drinking water decreased rapidly by 40 percent. It' means that there is a significant improvement of heart rate change during heart rate recovery period.

Physical activity in lifestyle has a considerable impact on cardiovascular fitness (Hattiwale, 2012). Changes in the cardiovascular system are directly related to changes in heart rhythm during physical activity. This change is due to an organ's need for nutrients, where the delivery of these nutrients depends on cardiac performance. When the sympathetic exercise of the sympathetic nerve provides a strong enough response to the heart to pump blood rapidly throughout the body, otherwise at rest the response of the parasympathetic nerve will control the heart's performance so as not to beat too hard (Kenney, 2015).

On stopping exercise this situation is suddenly reversed: inputs from central command are reduced or even abolished (depending on whether the recovery is active or passive) and an abrupt withdrawal of the stimuli arising from muscle metabolism and mechanoreceptors occurs (Antonio et al., 2014). This leads to a reduction in sympathetic nerve activity, while parasympathetic tone increases. As a result, HR, myocardial contractility, SV, CO, and MAP rapidly decline (Crisafulli et al., 2003, 2004, 2006., Arai et al., 1989., Goldberger et al., 2006).

Concerning the recovery phase, HR returns to the pre-exercise rate after several minutes to hours, however the maximum reduction occurs at the first few minutes. HRR indices are calculated by subtracting first, second and third minute

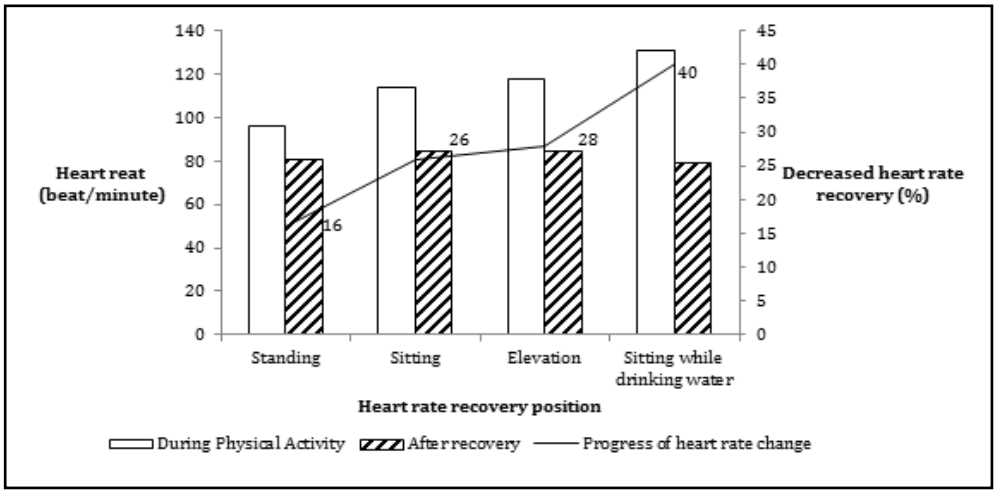


**Figure 1.** Progress of heart rate change during physical activity and heart rate recovery

HRs from the maximal HR obtained during stress testing (HRR1, HRR2 and HRR3 respectively). Activity (e.g., complete cessation of exercise or cool-down) and position (supine, sitting or standing) influence heart rate recovery (Shetler et al., 2001).

In this research all the participants performed a 3 minutes submaximal exercise followed by a recovery period of 3 minutes in different body positions. The results showed the same response at each position that is the decrease of the pulse rate. Differences occur in the percentage decrease in the pulse at each position that is in the sitting position with drinking water, sleeping, sitting and the percentage of the lowest decrease in standing position. Parekh and Lee examined cardiac autonomic modulation via HRV after exercise bouts at 50 and 80% of VO2 reserve. The HRV measures were examined in 5 minutes periods of a 30 minutes post-exercise supine recovery. They showed that vagal reactivation was delayed for a longer period after high intensity exercise bout (HF restored after 25 minutes) compared to low intensity (HF restored after 10 minutes) (Parekh and Lee, 2005).

Decreased heart rate is also affected by gravity, in a standing position; gravity significantly affects the distribution of the blood volume in the body. When the body is changed from upright to supine, parasympathetic nerve activity increases its affect on the heart, whereas sympathetic nerve activity decreases (Takahasi, 2000).

Hereinafter, elevation position in this study maximized in lowering heart rate for cardiac position is at the lowest point on earth. This position will make it easier to reduce the response of blood flow rate obstacles due to earth gravity forces.

Furthermore, sitting while drinking water, it is very petrified to lower body temperature due to increased metabolism during physical activity. Increased excessive body temperature causes the body to release more fluid. The amount of fluid that comes out potentially will make the blood flow becomes slower because the blood becomes more dense (Kenney, 2015). When the blood becomes denser, the heart would be difficult to distribute nutrients throughout the body that have an effect on the increase in heart rate.

## CONCLUSION

Physical activity is very important for human health. This is due to the notion that physical activity or exercise can improve your health and reduce the risk of developing several diseases like type 2 diabetes, cancer and cardiovascular disease, improve physical, and mental health. Physical activity can have immediate and long-term health benefits. Most importantly, regular activity nutrition and other lifestyle interventions greatly affect to hearts function and can improve quality of life (Mustar and Susanto, 2017). Based on this research can be concluded that, there is a significant improvement of heart rate change during heart rate recovery period based on different body position. The heart rate of exercise will decreased rapidly when using the sitting position while drinking water. For this reason, it is imperative to consider health recovery position after having physical activity.

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