The association between physical activity and basic fitness tests in female junior Reserve Officer Training Unit (ROTU), National Defence University Malaysia (NDUM)

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Abstract. The aim of this research is to determine the association between physical activity and basic fitness tests in female junior ROTU. This research is a descriptive quantitative research using IPAQ and it involves a 2.4 km run test, push-up and sit-up. A total of 103 respondents from ROTU, NDUM 2017 session were selected at random for this research. The findings showed that inactive physical activity led to failed basic fitness tests. There is an intention of investigating the association between physical activity and basic fitness tests in female senior and intermediate ROTU.

1. Background
The World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure. This includes activities undertaken while working, playing, carrying out household chores, travelling and engaging in recreational pursuits.

Physical inactivity has been identified as the fourth leading risk factor for global mortality (6% of deaths globally), after high blood pressure (13%), tobacco use (9%) and high blood glucose (6%). Insufficient physical activity is on the rise in many countries, adding to the burden of non-communicable diseases (NCDs) and affecting general health worldwide. People who are insufficiently active have a 20% to 30% increased risk of death compared to people who are sufficiently active.

2. Objectives
2.1 General Objective
2.1.1 To determine the association between physical activity and basic fitness tests in female junior ROTU, NDUM.

2.2 Specific Objectives
2.2.1 To determine the prevalence of overall physical activity by socio-demographic characteristics.
2.2.2 To determine the prevalence of different levels of physical activity [HEPA active (health enhancing physical activity; a highly active category), minimally active and inactive] by socio-demographic characteristics.

3. Target Population, Study Instrument And Definitions
Data on physical activity was obtained from 103 female junior ROTU, NDUM aged 19 years and above through self-administered questionnaires by using the short version of International Physical Activity Questionnaire (IPAQ) (Hagstromer, 2006). The IPAQ short form asks about three specific types of activity which include walking, moderate-intensity activities and vigorous intensity activities; frequency (measured in days per week) and duration (time per day) are collected separately for each specific type of activity.

Computation of physical activity level requires summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity and vigorous-intensity activities. Another measure of
volume of activity can be computed by weighting each type of activity by its energy requirements defined in METS (METs are multiples of the resting metabolic rate) to yield a score in MET-minutes. There are three levels of physical activity which are categorized as:

3.1 Inactive (CATEGORY 1)
This is the lowest level of physical activity. Those individuals who do not meet criteria for Categories 2 or 3 are considered insufficiently active.

3.2 Minimally Active (CATEGORY 2)
The minimum pattern of activity to be classified as sufficiently active is any one of the following 3 criteria:
- a) 3 or more days of vigorous activity of at least 20 minutes per day OR
- b) 5 or more days of moderate-intensity activity or walking of at least 30 minutes per day OR
- c) 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-min/week.

3.3 HEPA active (CATEGORY 3)
A separate category labeled HEPA level, which is a more active category can be computed for people who exceed the minimum public health physical activity recommendations. The two criteria for classification as HEPA active are:
- a) vigorous-intensity activity on at least 3 days achieving a minimum of at least 1500 MET minutes/week OR
- b) 7 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes/week

3.4 Basic fitness test
This test is to evaluate and improve the fitness level of ROTU's physical fitness. This test contains two fitness components divided into three types of tests:
The first component - strength, power and muscle testing. This test aims to measure the value of fitness and muscle strength:

3.4.1 Test 1 - sit up: this test to measure muscle endurance (abdominal muscular strength and endurance)

Procedure: Members should lie on the floor, knees bent 90 degrees or 18-inch heel from waist and arms crossed or bent. When the 'START' signal is given by the test manager, the members perform sit up correctly and the number is according to the age limit. The elbow should touch the knee interspersed with the right elbow touching the left elbows and on the other hand when the body rises. Another member should calculate the amount made. After each movement, the participant should return to the original position, lie back then rise. Both should touch the ground/floor while lying on the floor but the head does not have to touch the ground/floor. There is no time allocation for this test.

3.4.2 Test 2 - push up: this test to measure upper body muscular strength and endurance.

Procedure: The member takes the push-up position where the legs are parallel, the arms are placed parallel to the chest and the elbows are straightened. The next movement is the body part is lowered horizontally to the floor where the elbows are bent to allow this movement to take place. The elbows are slightly higher than the shoulders. Then push the body upward while straightening the elbows to the original position. For all movements down and above make sure the waist and legs are locked or not moved. This movement is calculated at 1 and repeated the number according to the member's age limit. There is no time allocation for this test.
3.4.3 The second component - test 3 (2.4km run): This test is to measure the capability of the cardiovascular system or stamina and lower muscular endurance as well as assess the aerobic ability and the ability to take and discharge individual oxygen via a 2.4 km run test (Mackenzie, 2005; Burger, 1990).

Procedure: When 'READY' is given, the member should take place at the starting line. Running starts with whistle blowing signal. During testing, test supervisors can hold a distance of 500 meters each as a guide to the tested member. Record achievement time when participants arrive at the finish line. Basic fitness test results will be classified as PASSED or FAILED only aimed at the outcome of other individual test results.

3.5 Basic fitness test classification

| Age group | Push-up | Sit-up | 2.4km run (minutes) |
|-----------|---------|--------|---------------------|
| 17-21     | 19      | 53     | 14.10               |
| 22-26     | 17      | 50     | 14.42               |

4. Findings

The overall prevalence of physically active female junior ROTU was 62.3%. The highest prevalence of physical activity was observed among Malays 61.2%, followed by Indian 1.0%. Out of 62.3% of physically active female junior ROTU, 10.7% were HEPA active and 51.6% were minimally active. Among the HEPA active female junior ROTU, those who were Malays aged 19 and 20 years, were significantly more active than their respective counterparts (Table 4.1). Only 40.8% passed the basic fitness test; comprises of 2.4km run test (43.7% run less than 14 minutes) while 39.8% did sit-up more than 50 counts.

5. Discussion

US department of health (2011) said that there is strong evidence that physically active people have physical fitness better health and less risk of getting the disease than people who are inactive. According to a study by Booth (2012) showed clear evidence that a lack of physical activity will affect almost every cell, organ and body system that causes loss of function and premature death. The best therapy approach to controlling the loss of bodily functions caused by a sedentary lifestyle is through primary prevention, namely by improving the practice of physical activity.

According Waldhelm & Li (2012), push-ups are a common health-related tests conducted to measure muscle strength. In this study, the push-up test is used to assess muscle strength in the lower body because this test happy to be implemented and evaluated. The findings from MANS 2014 suggested four out of ten Malaysian adults were physically inactive. The overall prevalence of physical inactivity was 36.9% in estimated 19.27 million Malaysian adults aged between 18 and 59 years old. Overall, physical inactivity was highest among females.

6. Conclusion

A majority of female junior ROTU were only minimally active. Programs to promote a better understanding of HEPA that benefits health and functional capacity without undue harm or risk are recommended, especially to achieve 100 percent passed results in basic fitness tests in the future.
Table 4.1: Prevalence of physically active by socio-demographic characteristics and basic fitness tests

| Sociodemographic Characteristics | Count (N=103) | Prevalence (%) | Count (HEPA) | Prevalence (%) | Count | Prevalence (%) | Count | Prevalence (%) |
|----------------------------------|--------------|----------------|--------------|----------------|-------|----------------|-------|----------------|
| **Age**                          |              |                |              |                |       |                |       |                |
| 19                               | 62           | 60.2           | 8            | 7.8            | 32    | 31.1           | 22    | 21.4           |
| 20                               | 29           | 28.2           | 3            | 2.9            | 14    | 13.6           | 12    | 11.7           |
| 21                               | 10           | 9.7            | 5            | 4.9            | 5     | 4.9            |       |                |
| 22                               | 1            | 1.0            | 1            | 1.0            | 1     | 1.0            |       |                |
| 23                               | 1            | 1.0            | 1            | 1.0            |       |                |       |                |
| **Ethnicity**                    |              |                |              |                |       |                |       |                |
| Malays                           | 101          | 98.1           | 11           | 10.7           | 52    | 50.5           | 38    | 36.9           |
| Indians                          | 1            | 1.0            | 1            | 1.0            |       |                |       |                |
| Others                           | 1            | 1.0            | 1            | 1.0            |       |                |       |                |
| **2.4km run test**               |              |                |              |                |       |                |       |                |
| <14.0                            | 45           | 43.7           |              |                |       |                |       |                |
| >15.0                            | 58           | 56.3           |              |                |       |                |       |                |
| **Push up**                      |              |                |              |                |       |                |       |                |
| <16                              | 17           | 16.5           |              |                |       |                |       |                |
| >17                              | 86           | 83.5           |              |                |       |                |       |                |
| **Sit up**                       |              |                |              |                |       |                |       |                |
| <49                              | 62           | 60.2           |              |                |       |                |       |                |
| >50                              | 41           | 39.8           |              |                |       |                |       |                |
| **Results**                      |              |                |              |                |       |                |       |                |
| Pass                             | 42           | 40.8           |              |                |       |                |       |                |
| Failed                           | 61           | 59.2           |              |                |       |                |       |                |
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