

# The Military Performance Laboratory

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## ABSTRACT

**BACKGROUND** Human performance assessment is crucial in military training in view to develop and enhance the combat strength and readiness of military personnel. Hence, the military performance laboratory will be the centre of research and development in human potential. The main aim is to optimize their performance from science-based approach program by empower human physiology which involves aerobic fitness, anaerobic capacity, muscle fitness, strength, endurance and power, flexibility, neuromotor and body composition, psychology, nutrition and biomechanics. The main purpose of this article is to review human performance aspect, outline and important features of military performance laboratory.

**KEYWORDS** Human performance, Military population

## INTRODUCTION

Human performance is defined as the physiological potential for each individual<sup>1</sup>. Factors that affect human performance include age, gender, genetic, individual cardiorespiratory system, muscle strength, biomechanics, environmental and psychological factors. Nutrition and environment also another factor that affects individual performance<sup>2-4</sup>. Human performance studied and research has been extensively done in the most developed country especially among military population. Most of the study has a similar objective which to examine the human performance among the military population and to identify the modification of training/exercise that is able to enhance the combat strength and readiness to fight among military personnel beyond their physiological potential<sup>5-7</sup>. However, in Malaysia Armed Forces there are no data of human performance among military personnel yet has been studied. To date there is no gold standard tool to assess human performance among our military personnel which can be objectively measured. For the time being military personnel, performance has been routinely examined using time performance depending on the specific training. The data has a limitation especially in terms of objective measurement of physiological potential of each personnel.

## MILITARY PERFORMANCE LABORATORY

Military Performance Laboratory will be the first military centre of research and development for military training and exercise in Malaysia. The main objective is to examine the physiological potential among our military personnel and identify their performance factors.

With this knowledge, each military personnel will be able to optimize their performance from science-based approach program that is developed to be empirically supported, scientifically driven and culturally specific until they can reach the tactical athletes potential.

In a developed country the most human performance lab has been set up in a university setting for purpose of research and main aim to optimize potential among professional athletes. In Malaysia, human performance lab has been established in National Sports Institute, University Malay Medical Centre and University Technology of MARA. These performance labs more focus on screening, identifying the physiological potential for athletes ranging from recreational to elite athletes and help them to optimize their performance.

The Military Performance Laboratory will be conducted by a dedicated multidisciplinary team involving a Sport and Exercise Physician, Sports Science Officer, Physiotherapist, Clinical Psychologist, Nutritionist, Physical Trainer and Occupational Medicine Specialist.

The component of human performance assessment includes human physiology which involves aerobic fitness, anaerobic capacity, muscle fitness, strength, endurance and power, flexibility, neuromotor and body composition, psychology, nutrition and biomechanics. All these assessments will be objectively measured using the gold standard tool of the lab.

The basic of equipment that will be needed in Military Performance Laboratory are stationary and portable metabolic cardiorespiratory machine, high-performance treadmill, exercise testing cycle ergometer, balance testing and training machine, body composition analyser and isokinetic machine. Both stationary and portable metabolic cardiorespiratory machine are used to measure the aerobic and anaerobic fitness either in a lab/static condition or at the real environment. VO<sub>2</sub> max is the maximum amount of oxygen the body can use, and it directly correlates to fitness capacity. It is one factor that may help determine an athlete's capacity to perform sustained exercise.

The high-performance treadmill is engineered to allow for faster running with longer strides that replicates outdoor running. The use mainly for research purpose and can measure the physiological potential of personnel before they are exposed to environmental factors that can affect their performance. Alternatively, for personnel who have orthopaedic, peripheral vascular, or neurological limitations that restrict weight bearing, the cycle ergometer testing machine can be used to evaluate their performance. It can also serve as a less expensive, portable substitute for testing.

Work intensity can be adjusted by variations in resistance and cycling rate.

Stronger, this simple description had been of interest to military personnel since long times ago. In this context, muscle fitness is an important tool to describe it. The American College of Sports Medicine (ACSM) has melded the terms muscular strength, endurance and power into a category termed "muscular fitness" and included it as an integral portion of total health-related fitness<sup>8</sup>. To measure muscle fitness, the isokinetic machine was used. It's able to measure, evaluate and increase the muscle fitness and range of motion of joints.

The balance testing and training machine is important to evaluate the proprioception and to enhance the neuromotor function. There is evidence that neuromotor training does reduce the risk of musculoskeletal injuries such as anterior cruciate ligament (ACL) tear and ankle sprain, but also that it alters biomechanical risk factor of injury and improves measures of performance. Effective neuromuscular training protocol has used a combination of plyometric power, balance, strength, biomechanical and technique, core stability training inducing neuromuscular changes and potential injury prevention<sup>9</sup>.

The fundamental of body composition analyser machine is to assess human body composition that has the potential of quantifying total body water, fluid volume, body cell mass and fat-free body mass via an electrical method. The scientific research was done by Kim Crawford et al.<sup>10</sup> mentioned that military personnel with less body fat will have improved physical fitness and increased muscular strength. It means that body composition is really important to establish fitness military personnel. However, there is a great debate over ideal standard body composition of military personnel, as requirement diverse in between mission, task scope and military training. Apart from that, nutrition status also needed to be monitors, and ergogenic supply is given to enhanced military performance.

The programme that is planned to be conducted in the Military Performance Laboratory once it is established are:

- a. To collect the baseline physiological potential data of all military personnel especially among elite forces. The data that has been collected allow us to know the level of our military fighting strength and combat potential in objective measurement. Hence, further developed training or exercise that specifically benefits this personnel to optimize their performance potential.
- b. To develop training for young recruits with aim to optimize their performance and body composition.

- c. To optimize performance among military athletes and monitor their physiological potential.

- d. Return to Work Programme (RWP) between injured military personnel by modification of exercise or training. The aim is to return to combat potential as far as possible.

## CONCLUSION

The Military Performance Laboratory is believed to benefits the Malaysia Armed Forces in terms of optimization of their military fighting strength, mitigation of injury and to help them to return to their physiological potential once injured. Thus, this laboratory not only will be the testing and training lab but also a research and development of exercise and training programme for Malaysia Armed Forces in future according to each personnel selected tactical task.

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