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Biochemical profile of Elite Army personnel

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ABSTRACT

The main purpose of this study was to determine biochemical profile of an elite army personnel post-participation in a 12-weeks physically demanding commando training. Thirty seven elite army personnel aged 22.3 ± 2.85 years old with 1.71 ± 0.03 m body height and 60.11±4.66 kg body weight had participated in this study. Post-training blood samples (3 ml of the blood for the EDTA tube. 1 ml of the blood for the Fluoride Oxalate tube, and 4 ml for the plain tube) via phlebotomy procedures were drawn from the participants. The blood samples withdrawn were then analysed by qualified pathology laboratory. Results indicated that average haemoglobin readings were 13.72 ± .920 g/dl, neutrophils 60.54 ± 7.48 %/mcL, sodium 137.16 ± 2.30 mmol/L, potassium 3.79 ± .089 mmol/L and creatinine 109.21 ± 11.63 µmol/L respectively. In conclusion the results indicated significant negative impact of the training on overall biochemical response, which indicated normal physical health were intact post-training. In practical, army physical trainer may benefitted from biochemical assessment especially post high volume and high intensity physical training performed in a quite longitudinal period of time.

Keywords: Biochemical profile, physical training, commando.

INTRODUCTION

Elite army personnel typically reffered to as ‘Special Forces’ or commando. The Malaysian Special Forces (Commandos) was established in the 1960s. It follows the 40th Royal Marines Commandos of Great Britain methods of training and initially was trained by them (Jeshurun, 1975). Commando units have a variety of specialist capabilities in which they can function that variety of operations, because of that, the ‘Commando Assessment and Selection’ is required for soldiers who aspire to become members of the Malaysian Army Commando. In Malaysia, three days of extreme physically and mentally demanding selection designed to determine whether or not the soldiers are eligible to enter the 12 weeks Basic Commando Course.

The 12 weeks Basic Commando Course for the Malaysian army was divided into five phases, which consisting of Camp training, Jungle training, Swamp training, Long-range march, Sea training, and Escape and Evasion phase for the period of three months. The training programs were designed to enhance the performance of the commando trainee candidates by way of developing excellent military skill and physical fitness such as power sources, increasing muscular structures, and improving neuromuscular skill patterns (Santtila, Pihlainen, Viskari & Kyröläinen, 2015). Suitability to be a commando is decided by assessing the soldier’s capability at some stage in the course on the attributes of intelligence, bodily fitness, motivation, trainability, understanding, influence and leadership. At the end of the program, the Army Commando Selection Committee meets to pick those soldiers who are most certified to become a commando. The physical training designed for commando trainee basically was based on the periodization theory and general adaptation syndrome (GAS) theory (Taylor, Sausen, Potterat, Mujica-Parodi, Reis, Markham & Taylor, 2007).

The classic understanding of periodization is attributed to Seyle's General Adaptation Syndrome (GAS), the template from which the first concept of periodization was derived (Selye, 1974). GAS effectively states that systems will adapt to any stressors they could experience in an effort to satisfy the stress of those stressors (Selye, 1974). Consistent with Selye (1974), this is often accomplished through a process of three phases: 1) Alarm reaction phase, initial reaction to the stressor, where the soldier/athlete may experience stiffness, soreness, or a little drop by performance, from fatigue after the training session. 2) The resistance phase, is where the body responds to the stressor by adapting to the new stress with less soreness, stiffness, more tolerance to activity, and improved performance. This is often considered to occur at a level greater than that demanded by the stressor and was termed "super-compensation". The ultimate phase, 3) exhaustion phase, occurs if the stressors continue longer than the athlete/soldier can adapt, leads to the sensation of staleness in training or affects symptoms of overtraining.

Throughout basic military training, commando trainees will faced strenuous and prolonged physical exercise, severe weather, extreme ambient temperature, psychological stress, sleep deprivation, insufficient energy intake and recovery times (Dimitriou, Lockey & Castell, 2017). According to Weeks, McAuliffe, DuRussel and Pasquina (2010), exposure to extreme condition that have been through in military training causing changes in the endocrine, cognitive and neurological systems that lead to fatigue indirectly may also possibly cause post-traumatic stress disorder traumatic brain injury, impair immune function, leading to increased illness and disease epidemics. In the understanding of commando training, its demands and effects on the body and mind, it is very important and helpful to further examine, and observe several different markers within the commando trainees. This might give some clarification or identification of the physical and physiological demands and effects of each phase of training.

Due to prolonged strenuous exercise may result in a series of biochemical changes that are of concern from a health point of view as stated by Warburton, Welsh, Haykowsky, Taylor and Humen (2002), it is very important to know biochemical changes in post participation of elite army training. However, there are no research that has been investigated on biomechemical profile among Malaysian elite army personnel. Therefore, the purpose of this study was to determine biochemical profile of an Malysian elite army personnel post-participation in a 12-weeks physically demanding commando training.

METHODOLOGY

Participant

A total thirty seven elite army personnel aged 22.3 ± 2.85 years old with 1.71 ± 0.03 m body height and 60.11±4.66 kg body weight had participated in this study.

Procedure

Post-training blood samples (3 ml of the blood for the EDTA tube. 1 ml of the blood for the Fluoride Oxalate tube, and 4 ml for the plain tube) via phlebotomy procedures were drawn from the participants. The blood samples withdrawn were then analysed by qualified pathology laboratory.

RESULT

Table 1. Anthropometric profile of the elite army personnel

	Minimum	Maximum	Mean±SD
Age (years)	19	35	22.3±2.85
Weight (Kg)	51.30	71.90	60.11±4.66
Height (cm)	1.65	1.78	1.71±0.03
BMI (kg/m²)	18.0	22.80	20.60±0.90

Table 1. showed anthropometric profile of the elite army personnel post-participation in a 12-weeks physically demanding commando training

Table 2. Biochemical profile of elite army personnel

	Biochemical profile (Mean ± SD)	Minimum	Maximum
Hemoglobin	13.72 ±.920 g/dl	10.40	15.10
Neutropils	60.54 ±7.48%/mcL	47.00	76.00
Sodium	137.16±2.30 mmol/L	132.00	143.00
Potassium	3.79 ±.089 mmol/L	3.10	4.70
Creatinine	109.21±11.63 µmol/L	87.00	140.00

Table 2. showed biochemical profile of elite army personnel post-participation in a 12-weeks physically demanding commando training. Hemoglobin (13.72±.920), Neutropils (60.54±7.48), Sodium (137.16±2.30), Potassium (3.79±.089) and Creatinine (109.21±11.63).

DISCUSSION

Based on the biochemical profile of post-participation in a 12-weeks physically demanding commando training, the results indicated significant negative impact of the training on overall biochemical response.

Hemoglobin result in this study indicated lowered hemoglobin values among elite army personnel, which is their may suffered anemia. The body makes use of iron to synthesize hemoglobin and to assist transport oxygen to the muscles. Low stages of iron are attributing of the varied diseases alongside iron-deficient anemia. As stated by Tsai, Lai, Hsieh, Lin, Lin, Tsai and Lin (2019), anemia defined as reduced hemoglobin levels of red blood cells may carry less oxygen to skeletal muscle and impair physical performance.

Next, higher level of Neutropils was showed in this study. An increase in the neutrophils was apparent with decreased lymphocytes which is consistent with an inflammatory reaction to tissue injury (Moorthy & Zimmerman, 1978)

Other than that, this study also showed low sodium level among elite army personnel in post participation commando training that can risk them to hyponatremia. This might be due to excessive sweating with the loss of sodium. Hyponatremia has been associated with several complications, including mild symptoms such as malaise, nausea, fatigue, and confusion (O'Brien, Montain, Corr, Sawka, Knapik & Craig, 2001). It is important to monitor symptom of hyponatremia to avoid commando candidate experienced severe symptoms of hyponatremia included seizures, respiratory arrest, increased intracranial pressure, coma, and death.

In addition result for potassium showed, elite army personnel may suffered hypokalaemia during their commando basic training, which is it might occur in the setting of the intense and strenuous running in a very humid and hot environment with a high rate of sweating. As stated by Kjeldsen and Schmidt (2019), potassium deficiencies can occur in soldiers under conditions of intense, prolonged training in hot weather. According to Kjeldsen & Schmidt (2019) hypokalaemia refer to low level of potassium in blood as a potassium level was <3.5 mmol/L.

While result for creatinine showed creatinine of elite army personnel were above the normal range. The increased values were probably due to the release of creatinine from the working muscles, dehydration or a reduction in renal flow and glomerular filtration rate. According to Clase (2011) high creatinine value of >180 micromol/L in men can expose a person to chronic renal failure.

Creatinine and urea are two waste products that are constantly being produced by the reworking of muscle tissues and thus the breakdown of proteins. A little amount of creatinine is typically being released also from the muscles. Both substances are filtered by the kidneys. An elevated blood urea nitrogen or creatinine may indicate that the kidneys are not functioning well or that another disease is present.

Due to negative impact on biochemical profile post-participation in a 12-weeks physically demanding commando training of elite army personnel it is suggested for doctors and commando trainees to be aware that in a prolonged endurance event, the performance of participants would be correlated with several biochemical changes in the blood and urine that lead to disease.

CONCLUSION

In conclusion the results indicated significant negative impact of the training on overall biochemical response, which indicated normal physical health were intact post-training. In practical, army physical trainer may benefitted from biochemical assessment especially post high volume and high intensity physical training performed in a quite longitudinal period of time.

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