UNIVERSITI SAINS MALAYSIA
GERAN PENYELIDIKAN UNIVERSITI
PENYELIDIKAN
LAPORAN AKHIR

THE EFFECTS OF EXERCISE-INDUCED DEHYDRATION ON PSYCHOMOTOR AND PHYSIOLOGICAL VARIABLES IN RELAXATION TRAINED ARMY RESERVED PERSONNELS DURING PROLONGED WALKING IN THE HEAT

PENYELIDIK

DR. HAIRUL ANUAR HASHIM

PENYELIDIK BERSAMA

DR. CHEN CHEE KEONG
PROF. MADYA ASOK KUMAR GHOSH
PROFESOR ZABIDI AZHAR MOHD HUSSIN

2013

UNIVERSITI SAINS MALAYSIA

UNIVERSITY RESEARCH GRANT FINAL REPORT
Geran Penyelidikan Universiti Laporan Akhir

A.	**PARTICULARS OF RESEARCH** / *MAKLUMAT PENYELIDIKAN:*
(i)	**Title of Research: The effects of exercise-induced dehydration on psychomotor and physiological variables in relaxation-trained army reserved personnels during prolonged walking in the heat** *Tajuk Penyelidikan:*
(ii)	**Account Number: 1001/PPSP/812025** *Nombor Akaun:*
B.	**PERSONAL PARTICULARS OF RESEARCHER** / *MAKLUMAT PENYELIDIK:*
(i)	**Name of Research Leader:** *Nama Ketua Penyelidik:* **DR HAIRUL ANUAR HASHIM**
	Name of Co-Researcher *Nama Penyelidik Bersama:* **DR CHEN CHEE KEONG** **ASSOC. PROF. ASOK KUMAR GHOSH** **PROFESSOR ZABIDI AZHAR MOHD HUSSIN**
(ii)	**School/Institute/Centre/Unit :** *Pusat Pengajian /Institut/Pusat/Unit :* PUSAT PENGAJIAN SAINS PERUBATAN
C.	**Research Platform (Please tick (/) the appropriate box):** *Pelantar Penyelidikan (Sila tanda (/) kotak berkenaan):*

[ ]	**A. Life Sciences** *Sains Hayat*
[ ]	**B. Fundamental** *Fundamental*
[ ]	**C. Engineering & Technology** *Kejuruteraan & Teknologi*
[ ]	**D. Social Transformation** *Transformasi Sosial*
[ ]	**E. Information & Communications Technology (ICT)** *Teknologi Maklumat & Komunikasi*
[X]	**F. Clinical Sciences** *Sains Klinikal*
[ ]	**G. Biomedical & Health Sciences** *Bioperubatan Sains Kesihatan*

D.	**Duration of this research :** *Tempoh masa penyelidikan ini :* ***Duration : 3 YEARS 6 MONTHS.** *Tempoh :* **From : 15 SEPTEMBER 2008 To : 14 MARCH 2012** *Dari: Ke :*
E.	**ABSTRACT OF RESEARCH** (An abstract of between 100 and 200 words must be prepared in **Bahasa Malaysia and in English**. This abstract will be included in the Annual Report of the Research and Innovation Section at a later date as a means of presenting the project findings of the researcher/s to the University and the community at large) ***Abstrak Penyelidikan*** (Perlu disediakan di antara 100 - 200 perkataan di dalam **Bahasa Malaysia dan juga Bahasa Inggeris**. Abstrak ini akan dimuatkan dalam Laporan Tahunan Bahagian Penyelidikan & Inovasi sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti & masyarakat luar). **-DILAMPIRKAN-**
F.	**SUMMARY OF RESEARCH FINDINGS** *Ringkasan dapatan Projek Penyelidikan* The results revealed a significantly higher percentage of body weight loss in the dehydrated group (2.3 ± 1.2%) compared to the hydrated group (1.1 ± 0.7%). These data demonstrated that consumption of sufficient fluid during prolonged walking among reserved army personnels is advisable to avoid the potential adverse effects of dehydration. Significant differences between the two groups were also found in heart rate and creatine kinase. No significant differences were found between the two groups in other parameters. However, there are positive physiological pattern of hydrated group compared to the dehydrated group. In relation to the relaxation response to dehydration, it was observed that relaxation training significantly slowed down the increase in CK value and lowered exercising heart rate. No other parameters were significant although positive indications of the benefits of relaxation were observed (eg., lower oxygen consumption). The findings partially support the notion of that relaxation training is beneficial to moderate the negative effects of dehydration in male military reserved personnels engaging in prolonged walking in the heat.

G. **COMPREHENSIVE TECHNICAL REPORT**

Laporan Teknikal Lengkap

Applicants are required to prepare a comprehensive technical report explaining the project.
(This report must be attached separately)
Sila sediakan laporan teknikal lengkap yang menerangkan keseluruhan projek ini.
[Laporan ini mesti dikepilkan]

-DILAMPIRKAN-

List the key words that reflectour research:
Senaraikan kata kunci yang mencerminkan penyelidikan anda:

English	Bahasa Malaysia
PROGRESSIVE MUSCLE RELAXATION	LATIHAN RELAKSASI OTOT
HEAT STRESS	TEKANAN HABA
MILITARY TRAINING	LATIHAN TENTERA

H. a) **Results/Benefits of this research**
Hasil Penyelidikan

No. *Bil:*	Category/Number: *Kategori/ Bilangan:*	Promised	Achieved
1.	**Research Publications (Specify target journals)** *Penerbitan Penyelidikan (Nyatakan sasaran jurnal)*	4	3
2.	**Human Capital Development**		
	a. Ph. D Students	-	-
	b. Masters Students	2	-
	c. Undergraduates (Final Year Project)	-	-
	d. Research Officers	-	-
	e. Research Assisstants	1	3
	f. Other: Please specify	-	-
3.	**Patents** *Paten*	-	-
4.	**Specific / Potential Applications** *Spesifik/Potensi aplikasin*	-	-
5.	**Networking & Linkages** *Jaringan & Jalinan*	-	-
6.	**Possible External Research Grants to be Acquired** *Jangkaan Geran Penyelidikan Luar Diperoleh*	-	-

- Kindly provide copies/evidence for Category 1 to 6.

b) Equipment used for this research.
Peralatan yang telah digunakan dalam penyelidikan ini.

Items *Perkara*	Approved Equipment	Approved Requested Equipment	Location
Specialized Equipment Peralatan khusus	-	-	-
Facility Kemudahan	-	-	-
Infrastructure Infrastruktur	-	-	-

- Please attach appendix if necessary.

I.	**BUDGET** / *BAJET*

Total Approved Budget : RM 93,277.00
Total Additional Budget : RM 0
Grand Total of Approved Budget : RM 93277.00

Yearly Budget Distributed

Year 1 : RM 42,477.00
Year 2 : RM 30,150.00
Year 3 : RM 20,650.00

Additional Budget Approved

Year 1 : RM0
Year 2 : RM0
Year 3 : RM0

Total Expenditure : RM 93,271.00
Balance : RM 6.00

- **Please attach final account statement from Treasury**

Signature of Researcher
Tandatangan Penyelidik

Date
Tarikh

H.	**COMMENTS OF PTJ'S RESEARCH COMMITTEE** *KOMEN JAWATANKUASA PENYELIDIKAN PERINGKAT PTJ*
	General Comments: *Ulasan Umum:* No manuscripts produced (only presentation abstracts) and no postgraduate or undergraduate students trained. Researcher has been advised to submit information on any manuscripts under preparation and/or other justifications.

ABSTRACT 1

Background. Prolonged engagement in the hot environment is common among military men and women. Inherently, it can lead to fluid losses reaching rates of 1 - 2 L per hour (Coyle, 1994), which can lead to dehydration. A number of studies have shown that dehydration could lead a drop in performance levels for various fundamental cognitive-motor abilities (Cian et al., 2000; Cian et al., 2001; Gopinathan et al., 1988; Nielsen *et al.*, 1990; Sharma et al., 1986) as well as physical performance (Terrados & Maughan, 1995). Although dehydration can be easily prevented by ensuring adequate fluid intake, in some circumstanes, such as an actual battle, fluid supply may not be readily available. Additional strategy to sustain mental and physical readiness in such conditions seem desirable. Relaxation has been used in numerous clinical and non clinical settings such as clinical, sports, and schools. However, to our knowledge, the effects of relaxation training on mental performance and physiological parameters in the dehydrated condition among military personnel have not been studied. Given that soldiers need to be in an optimal state of physical and mental readiness at all time, the benefits of relaxation training as a strategy to enhance their mental performance is worthy of further investigation.

Objectives. The aim of this study is twofold, first, we sought to examine the effects of dehydration on psychomotor and physiological variables in army reserved personel and second, to examine the effect of relaxation training in exercise-induced dehydrated army reserved personnel exercising in the heat.

Methods. Twenty six reserved army male participated in this study. they were matched into hydrated and dehydrated groups based on age, VO_{2max}, body mass index, and body fat percentage. Once familiriazed with the experimenal protocols, they were required to undergo two sessions of 3-hour walking in the lab-induced hot environment ($31^{o}C$). In between these two sessions, the subjects completed an eight sessions of 30-min progressive muscle relaxation training. Psychomotor performance and blood samples were collected at baseline, and after every 1 hour of walking in each session. Other parameters (heart rate, VO_2, ratings of perceived exertion, rectal temperature) were collected every 20 minutes interval.

Results and Conclusion. The results revealed a significantly higher percentage of body weight loss in the dehydrated group (2.3 ± 1.2%) compared to the hydrated group (1.1 ± 0.7%). These data demonstrated that consumption of sufficient fluid during prolonged walking among reserved army personnels is advisable to avoid the potential adverse effects of dehydration. Significant differences between the two groups were also found in heart rate and creatine kinase. No significant differences were found between the two groups in other parameters. However, there are positive physiological pattern of hydrated group compared to the dehydrated group. In relation to the relaxation response to dehydration, it was observed that relaxation training significantly slowed down the increase in CK value and lowered exercising heart rate. No other parameters were significant although positive indications of the benefits of relaxation were observed (eg., lower oxygen consumption). The findings partially support the notion of that relaxation training is beneficial to moderate the negative effects of dehydration in male military reserved personnels engaging in prolonged walking in the heat.