Energy and Nutrients Intake of Thai Active Duty Army Personnel at the Army Special Warfare Command Unit

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Objective: *To determine the daily energy and nutrient intake of the active duty army personnel at the Army Special Warfare Command (SWC) Unit during home stations.*

Material and Method: *A cross-sectional survey was carried out at the SWC unit in Lopburi province, Central region of Thailand. One hundred and eight personnel, who were at home stations, volunteered for participation in the present study. Three-day food records were used for evaluating nutrient intakes. Dietary data were analysed using the Nutritionist III programme and expressed as mean and standard deviation.*

Results: *All 108 active duty army personnel were men with the mean age of 37.0 years (SD 7.4). The mean actual energy intake was 2,304 kcal/day (SD 645), which accounted for 109% of Dietary Reference Intake for Thais (DRI). Most mean intakes of vitamins and minerals were above DRI levels, including vitamin A, vitamin B2, niacin, vitamin C, and iron. However, their average intakes of vitamin B1 and calcium were lower.*

Conclusion: *The present study demonstrated the undesirable intake patterns which may become significant when intakes occur routinely or extend to longer periods and can adversely affect military readiness as well as health. Further improvements in dietary intake for these personnel are needed.*

Keywords: *Dietary assessment, Nutrient intake, Healthy eating, Army personnel.*

J Med Assoc Thai 2005; 88(Suppl 3) S110-5
Full text. e-Journal: *http://www.medassocthai.org/journal*

Good health is a basic requirement for military personnel to be able to perform their military missions effectively. The health of these military personnel is dependent on food intake that provides sufficient energy and nutrients in relation to the physical activity and then leads to optimal or adequate state of nutrition. Therefore, the maintenance of an optimal or adequate nutritional status is essential in preserving the military readiness of military personnel[1]. This has been a major concern for the Royal Thai Army. Army Regulation in 1970 stated that individual military personnel

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must be served with nutritious meals, three meals a day, both in the fields and at home stations. The Army Regulation also suggested the quantity of food served based on the Recommendation for U.S. military personnel. During training or field operations, every personnel is provided with a nutritionally adequate ration range from hot meals to meal-ready-to-eat combat rations depending on the military operations. At home stations, the majority of Thai active duty army personnel have the option of consuming their meals away from the mess hall, such as at home or at public restaurants. When eating away from the army environment, the military personnel can pick and choose meals based on what is available and their food preferences. Therefore, a nutritional problem either undernutrition or overnutrition can arise when the foods they eat do not balance with their needs.

The national nutritional surveys regarding food intake of a Thai population were performed in civilian populations. These surveys reported the actual energy and micronutrients (i.e. thiamin, riboflavin and calcium) intakes being less than the Recommended Daily Allowance (RDA)[2]. Recent analyses from civilian population data described the high prevalence of overweight (28.3%) and obesity (6.8%) among Thai adults consequent upon the rapid changes in their lifestyle[3]. These diet-related problems are demonstrated to be associated with non-communicable chronic diseases such as cardiovascular disease and some cancers[4].

There has been no publication concerning the nutritional survey in a military setting, though one goal of the Royal Thai Army is the promotion of healthy practices. Lacking of baseline data for active duty army personnel, who are the majority of the army personnel, makes it difficult in setting or designing appropriate prevention and intervention programmes in promoting good health. Therefore, the present study was conducted to determine the daily energy and nutrient intake of the active duty army personnel at the Army Special Warfare Command (SWC) Unit during home stations.

Material and Method

A cross-sectional survey was carried out at the Army Special Warfare Command Unit; an army combat unit, which is located in Lopburi province, the Central region of Thailand. One hundred and eight personnel, who were at home stations, volunteered for participation in the present study and provided informed consent. They were asked to complete a self-administered questionnaire including demographic data e.g. age, weight and height. Three-day food records were prepared for the personnel to record types and amounts of all foods and drinks consumed during three days (two working days and one weekend day). Measuring cups and spoons were used to help assess dimensions and amount. The research team brought three-day food records and accessories to distribute to personnel and explained how to fill them out. Then, a date was set up for the research team to meet with all subjects to collect and check the data, and interview for further information if the answers were not clear.

Anthropometric measurements were also assessed by measuring weight and height.

In analysing the data, weight and height were expressed as body mass index (BMI):

$$BMI = \frac{\text{weight (kg)}}{\text{height (m)}^2}$$

The following criteria were used to identify nutritional status of the personnel[5]

Underweight	BMI less than 18.5 kg/ m^2
Normal or desirable weight	BMI between 18.5 - 24.9 kg/ m^2
Overweight	BMI range 25 - 29.9 kg/ m^2
Obesity	BMI greater than 30 kg/ m^2

Then the data were expressed as frequency, percentage, mean and standard deviation by using the Statistical Package for Social Science/Personal Computer (SPSS/PC$^+$).

Dietary assessment by three-day food records provided information on daily nutrient intake both macronutrients and micronutrients as well as alcohol intake. Three-day food records were analysed by using the Nutritionist III programme, N-Squared Computing, U.S.A. to determine energy and other nutrient intakes using Thai food composition tables[6,7] and expressed as mean and standard deviation. Then, the data were compared to Dietary Reference Intake for Thais (DRI)[8].

Results

General characteristics of SWC personnel

All 108 active duty army personnel, who volunteered to participate in the dietary survey were men, aged between 23 and 58 years with the mean of 37.0 years (SD 7.4). Of 108 personnel, the majority was non-commissioned officers (88%). The average duration of experience in working at SWC unit was 14.3 years (SD 7.5). Mean weight and height of the study personnel were 64.4 kg (SD 7.4) and 168.0 cm (SD 5.9), respectively, with the mean BMI of 22.8 kg/m^2 (SD 2.1). Up to 12.8% of the personnel were identified as overweight by BMI whereas 87.2% had normal or optimal nutritional status (Table 1).

Table 1. General characteristics of the study personnel

Characteristic	N = 108
Age (yrs, mean ± SD)	37.0 ± 7.4
Duration of work (yrs, mean ± SD)	14.3 ± 7.5
Weight (kg, mean ± SD)	64.4 ± 7.4
Height (cm, mean ± SD)	168.0 ± 5.9
BMI (kg/ m^2, mean ± SD)	22.8 ± 2.1
% Desirable weight	87.2
% Overweight	12.8
Rank	
% Commissioned officer	12.0
% Non-commissioned officer	88.0

Energy intake

During the study period, these active duty army personnel were at home stations and consumed meals on their own. From three-day food records, the mean actual energy intake by active duty army personnel was 2,304 kcal/day (SD 645). Compared to DRI, it was found that the mean energy intake of the study personnel was 109% of DRI. Sources of energy included carbohydrate, fat, protein and alcohol (Table 2).

Table 2. Daily energy intake (mean ± SD) of the study personnel (N = 108)

Nutrient	DRI*	Intake	% of DRI
Energy (kcal)	2110	2,304 ± 645	109
Protein (g)	57	80.9 ± 24.9	142
Carbohydrate (g)	316**	300.2 ± 92.1	95
Fat (g)	70**	78.4 ± 32.5	112
Alcohol (g)	-	10.7 ± 27.2	-
Energy distribution			
Protein (%)	10-15	14.3 ± 3.0	-
Carbohydrate (%)	55-60	52.7 ± 9.1	-
Fat (%)	25-30	30.3 ± 7.4	-
Alcohol (%)	-	2.8 ± 6.6	-

* Dietary Reference Intake, for adult men aged 19-70 yrs[8]

** Calculated by using the recommendation of 60% of total energy being from carbohydrate and 30% from fat and the factors of 4 kcal/g carbohydrate and 9 kcal/g fat

Macronutrient intake

Table 2 demonstrates that the mean intakes of macronutrients i.e. protein, carbohydrate and fat were 80.9 (SD 24.9), 300.2 (SD 92.1) and 78.4 (SD 32.5) g/ day, respectively. Furthermore, the mean alcohol intake was 10.7 (SD 27.2) g/ day. Intake of protein was considered to be higher when compared to DRI (142% of DRI). When the recommendation for energy distribution was used to calculate for carbohydrate and fat intakes (60% and 30% of total energy intake were from carbohydrate and fat, respectively), it was found that fat intake was higher (112%), whereas

carbohydrate intake was slightly lower than the recommendation (95%).

Regarding the energy or macronutrient distribution, only the energy distribution of protein was in an acceptable range (14.3%). The value of carbohydrates was below the recommendation (52.7%), whereas that of fat was at the maximal level of the recommendation (30.3%). Additionally, the energy contribution from alcohol accounted for 2.8% of the total energy intake (Table 2).

Vitamin and mineral intake

Table 3 shows the daily intake of vitamins and minerals. Most mean intakes of vitamins and minerals by these active duty army personnel were above DRI levels, including vitamin A (870 μg RE, SD 681 or 109% of DRI), vitamin B2 (1.37 mg, SD 0.62 or 105%), niacin (16.2 mg NE, SD 6.8 or 101%), vitamin C (93 mg, SD 79 or 103%) and iron (15.9 mg, SD 7.8 or 153%). However, their average intakes of vitamin B1 (0.97 mg, SD 0.40 or 81%) and calcium (475 mg, SD 260 or 54%) were lower than DRI, particularly the intake of calcium which was lower than two-thirds of DRI (67%) (Table 3).

Discussion

In the present study, nutrient intake of the active duty army men at SWC unit was determined by three-day food records. Among three days of dietary record, one day of weekend days also included to account for day-of-the-week effects on food and nutrient intakes since individual nutrient intakes may vary with the day of the week[9]. Adequacy of nutrient intake of these study personnel was assessed by comparing with DRI, the newly established recommendation for Thais[8], since there has not been nutritional standards for Thai military personnel and the study personnel were at home stations where work and life-style were similar to the general population.

Table 3. Daily vitamins and minerals intake (mean ± SD) of the study personnel

Nutrient	DRI*	Intake	% of DRI
Vitamin A (μg RE)	700	870 ± 681	109
Vitamin B1 (mg)	1.2	0.97 ± 0.40	81
Vitamin B2 (mg)	1.3	1.37 ± 0.62	105
Niacin (mg NE)	16	16.2 ± 6.8	101
Vitamin C (mg)	90	93 ± 79	103
Calcium (mg)	870	475 ± 260	54
Iron (mg)	10.4	15.9 ± 7.8	153

* Dietary Reference Intake, for adult men aged 19-70 yrs[8]

The findings here showed that energy and protein intakes of the active duty army men at home stations were higher than DRI (109% and 142%, respectively). Considering energy intake in terms of energy distribution, a balanced diet should provide energy distributed from carbohydrate 55-60%, from protein 10-15% and from fat 25-30% of total energy intake[8]. The results did not conform well to this recommendation. More fat and less carbohydrate were consumed. In contrast to the recent national nutrition survey in a civilian population, the results from this national survey showed that 64% of total energy intake came from carbohydrates and 22% was from fat[2]. Apart from macronutrients, alcohol also served as a source of energy for these active duty army men during home stations. Data from dietary assessment showed that mean alcohol intake by these personnel was 10.7 g/ day, which could add up to about 3% more to daily energy intake. Excessive intakes of energy or macronutrients can lead to overweight and then develop to obesity. The present study also revealed that 12.8% of the personnel were found to be overweight. Fortunately, no obese were found. Overweight and obesity is well recognized as one of the risk factors for dyslipidaemia, hypertension, type 2 diabetes and cardiovascular disease[4]. These health consequences may adversely affect military readiness and are likely to increase health care expenditures. The U.S. Navy estimated that obesity-

related inpatient hospitalization costs were expected to be $5,842,624 in 1998[10]. The costs for Thai military were not revealed.

Regarding micronutrient intake, the data showed that these personnel might encounter the problem of micronutrient deficiencies including vitamin B1 and calcium, since their intakes were low particularly calcium. This finding was similar to those faced by a Thai civilian population[2]. Low intake of these two micronutrients should be of concerns particularly for the army personnel. Low intake of vitamin B1 can affect physical performance through its role in energy metabolism[11]. Inadequate intake of calcium in men was shown to be associated with reduced bone mass and increased fracture risk, although at a lower frequency than women[12].

Findings from the present study suggested that nutrient intake patterns of these active duty army men at the SWC unit during home stations may become significant when intakes occur routinely or extend to longer periods. Overnutrition problem as well as specific nutrient deficiencies should be a concern for the Army. There is a need for improvement in eating practices of these personnel. Promotion of healthy eating habits and nutrition education is necessary and should be implemented along with the appropriate physical activity programme. A complete nutrition assessment such as biochemical tests, body composition and bone density is also needed to ascertain if the eating patterns of SWC personnel both in the field and at home stations affect their nutritional status and fitness.

In conclusion, the present study demonstrated the high level of intakes of energy and most macronutrients, vitamins and minerals compared to DRI, except vitamin B1 and calcium, which were considered very low. The active duty army personnel at the SWC unit may face nutritional problems if intakes occur routinely or extend to longer periods. Appropriate nutrition interventions should be implemented aiming at promoting healthy eating of army personnel. A complete nutritional assessment is needed to monitor their nutritional status.

Acknowledgements

The authors wish to thank all active duty army personnel at the Army Special Warfare Command Unit for participating in the present study and providing very useful information to the study. The authors also thank Ms. Rin Chareonsiri and Ms. Wanpen Petchson for helping in data collection and analysis.

This study was financially supported by the Royal Thai Army.

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ปริมาณพลังงานและสารอาหารที่ได้รับของกำลังพลหน่วยบัญชาการสงครามพิเศษ

นันทพร วีรวัฒน์, ประไพศรี ศิริจักรวาล

วัตถุประสงค์: *เพื่อประเมินปริมาณพลังงานและสารอาหารที่ได้รับของกำลังพลหน่วยบัญชาการสงครามพิเศษเมื่ออยู่ในที่ตั้งปกติ*

วัสดุและวิธีการ: *เป็นการศึกษาแบบตัดขวาง โดยการเก็บข้อมูลของกำลังพลที่หน่วยบัญชาการสงครามพิเศษ (นสศ.) จังหวัดลพบุรี ด้วยแบบบันทึกการบริโภคอาหาร 3 วัน และวิเคราะห์ข้อมูลด้วยโปรแกรม Nutritionist III.*

ผลการศึกษา: *กำลังพลชายทั้งหมด 108 นาย เป็นกำลังพลที่อยู่ประจำการ ณ ที่ตั้งปกติในขณะทำการศึกษา มีอายุเฉลี่ย 37.0 ± 7.4 ปี ปริมาณพลังงานที่ได้รับใน 1 วันคิดเป็น 2,304 ± 645 กิโลแคลอรี หรือคิดเป็นร้อยละ 109 ของปริมาณพลังงานอ้างอิงที่ควรได้รับประจำวันสำหรับคนไทย ปริมาณวิตามินและเกลือแร่ที่ได้รับส่วนใหญ่จะเกินปริมาณสารอาหารอ้างอิง ได้แก่ วิตามินเอ วิตามินบีสอง ไนอาซิน วิตามินซี และธาตุเหล็ก ยกเว้นวิตามินบี 1 และแคลเซียมที่ปริมาณที่ได้รับใน 1 วันจะต่ำกว่าค่าอ้างอิงมาก*

สรุป: *ผลการศึกษาชี้ให้เห็นว่าแบบแผนการบริโภคอาหารของกำลังพล นสศ. ที่เป็นอยู่ในขณะนี้อาจก่อให้เกิดปัญหาทุพโภชนาการได้ หากการปฏิบัติตนในลักษณะนี้ยังคงดำเนินต่อไปในระยะยาว ซึ่งจะส่งผลกระทบต่อความพร้อมและประสิทธิภาพในการปฏิบัติภารกิจและสุขภาพของกำลังพลได้ ดังนั้นการส่งเสริมการบริโภคอาหารที่เหมาะสมจึงเป็นสิ่งจำเป็นอย่างยิ่ง*