Comparison of Nutritional Status in Different Type of Exercises

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Background: *Nutritional evaluation is necessary in training program for the athletes and general people.*
Objective: *To determine the effect of different types of activities on nutritional status and to compare the nutritional status in people with four groups of activities: 1) national rowing athletes training using mixed aerobic and anaerobic exercises, 2) national bicycle athletes training using aerobic exercise, 3) regular exercise people, and 4) sedentary activities.*
Material and Method: *18 cases per group for a total of 72 participants were trained in techniques for accurately recorded dietary patterns by the interviewers. Dietary records were analyzed by using INMUCAL-N (WD 4.4) program. Body composition was measured.*
Results: *Mean age were 21.89±5.83, 20.71±3.62, 25.05±7.09, and 20.83±2.09 years respectively. The body mass index among groups was not significantly different (mean 21.87±3.56 kg/m^2). Sex was not different among groups. All participants had no known chronic or cardiovascular diseases. The athlete groups (Groups 1 and 2) had more total energy intake than the others. Group 2 had the highest percentage of fat contribution per day 37.99±6.06% of total energy per day, ($p<0.05$). The micro-nutrients by recommended daily allowance (RDA) was not adequate in all groups, including vitamin E (VE), Magnesium (Mg), and Selenium (Se), especially group 4 had not enough ferrous (Fe), vitamin B1 (B1), Niacin (B3), and vitamin C (VC).*
Conclusion: *Several micro-nutrients intakes in all groups did not reach the recommended daily allowance (RDA), especially in females of all group and both sex in the sedentary activities group. The implications of these results for widely propagated sport nutrition are to control the dietary fat intake and increase the intake of fruits and vegetables. We suggest that both education and management of optimum intensity aerobic exercise and controlled dietary fat intake are essential to prevent cardiovascular diseases for the entire population including the training athletes.*

Keywords: *Nutrition, Exercise, Comparison*

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Exercise is the practice that worldwide know to reduce obesity[1,2], promote the healthy life, and decrease chronic non-communicable diseases. Sedentary people are at risk to develop many chronic disease[3].

Athletic performance and recovery from exercise are enhanced by optimal nutrition. Both team and individualized nutrition strategies should promote performance and wellbeing. The goal is to achieve the appropriate nutrient timing and overall caloric intake to best support the daily metabolic, physical, and mental demands of an athlete's training and competition. An optimized body composition make an optimal balance of fat-free mass and fat mass that best promotes a state of health and performance for the individual athlete[4]. Energy and macronutrient needs, especially carbohydrate and protein, must be met during times of high physical activity to maintain body weight, replenish glycogen stores, and provide adequate protein to build and repair tissue. Fat intake should be

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sufficient to provide the essential fatty acids and fat-soluble vitamins and to contribute energy for weight maintenance. Adequate food and fluid should be consumed to maximize exercise performance, and improve recovery time. Vitamin and mineral supplements are not needed if adequate energy to maintain body weight is consumed from a variety of foods[1]. Different type of energy is used in anaerobic and aerobic exercise. Therefore, as the athletes have difference activities, they have different nutritional status. An example of aerobic exercise is bicycle exercises and an example of mixed anaerobic and aerobic exercise is rowing exercise[5]. Athletes and normal people have different body structure, body composition, and requirement for nutrients. The aim of this study was to study the different types of activities on nutritional status in training program for athletes and general people.

Material and Method

The subjects were divided into four groups[2,5,13] by the types of exercises in athletes and activities in general populations. Group 1 are the national Rowing athletes training with mixed aerobic and anaerobic exercises. Group 2 are the national Bicycle athletes training with aerobic exercise. Group 3 are the regular exercise people, who had at least 30 minutes of moderate to vigorous exercise on most days of the week. Finally, group 4 are the sedentary people who had exercise less than three times per week for the last three months. The Thailand National Rowing Athletes and bicycle athletes had an intensive training program during Suranaree University of Technology sports camp of 2011-2012. The period of data collection was between October 2011 and May 2013. Eighteen cases per group (equal male and female in all groups) for a total of 72 participants were included by ethical permission. Inclusion criteria were all athletes at the training camp and random sampling for 18 participants per group. All participants were trained in techniques for accurately recording three days dietary records by the training interviewers. RDAs Dietary records and dietary records were analyzed by INMUCAL-N (WD. 4.4) program in Food Quantity Conversion and INMUCAL Food Code by Institute of Nutrition, Mahidol University 2010, Thailand[6]. Recommended Dietary Allowance (RDAs) is the daily dietary intake level of a nutrient considered sufficient by the Food and Nutrition Board of the Institute of Medicine to meet the requirements of 97 to 98% of healthy individuals in each life-stage and sex group. It is calculated based on the Estimated Average Requirement (EAR) and is usually approximately 20% or 2 (standard deviation (SD)) higher than the EAR[7,8]. Body composition including basal metabolic age and percent of fat distribution were measured by bioelectrical impedance analyzer (TANITA). Data was analyzed by using t-test and one-way analysis of variance (ANOVA) with SPSS software version 12.0.

Results

Mean age were 21.89$\pm$5.83, 20.71$\pm$3.62, 25.05$\pm$7.09, and 20.83$\pm$2.09 years in group activities 1, 2, 3, and 4 respectively. The differences in body mass index (BMI), basal metabolic rate (BMR) between each group were not statistically significant (average BMI = 21.87$\pm$3.56 kg/m^2, BMR = 6,143.57$\pm$1,088.48 kcal/day). The percentage of fat in group 2 is higher than that of other groups significantly (36.76$\pm$5.39%, mean percentage of fat in all group = 30.80$\pm$6.71%). Male to female ratios were the same in each group. All participants had no known chronic or cardiovascular diseases (Table 1).

Athlete groups (Groups 1 and 2) had total energy intake more than the other groups. Group 2 had higher percentage of fat contribution per day than other groups (37.99$\pm$6.06% of total energy per day, $p<0.05$) (Table 2). When analyzing gender factor, the data showed significantly higher fat intake in female than male especially group 1 and 3 (Table 3).

The micro-nutrients by recommended daily allowance (RDA) was not adequate in all groups, including vitamin E (VE), Magnesium (Mg), and Selenium (Se). Especially group 4 had not enough ferrous (Fe), vitamin B1 (B1), Niacin (B3), and vitamin C (VC) (Table 4).

Discussion

Health practitioners working with athletes and the general population would be wise to remember the positive association of glycogen with performance and the negative association with fat loss. Both women and men with the physically active groups having approximately 10% less body fat than sedentary controls[9]. Endurance training has significant decrements in percentage of body fat and overall fat mass. Coaches of young athletes often focus on weight control and relative fatness or percentage of fat. The percentage of fat in female athletes is 18.4 to 21.9$\pm$2.3 to 3.9, and in male athletes is 7.3 to 11.2$\pm$1.3 to 1.4[11]. In this study, Body mass index was in normal range in all groups. Rowing athletes (group 1) had higher percentage of fat mass than acceptable. In detail, female

Table 1. Demographic data in each group of activities

	Rowing athlete n (%)	Bicycle athlete n (%)	Regular exercise people n (%)	Sedentary activities people n (%)	Total n (%)
1) Age					
<21 year	10 (55.5)	11 (61.1)	9 (50)	11 (61.1)	41 (56.9)
21-30 year	6 (33.3)	7 (38.9)	6 (33.3)	7 (38.9)	26 (36.1)
31-40 year	2 (11.2)	0	2 (11.2)	0	4 (5.5)
>40 year	0	0	1 (5.5)	0	1 (1.5)
Mean ± SD	21.89[a,b]±5.83	20.71[a]±3.62	25.05[b]±7.09	20.83[ab]±2.09	22.06±5.21
2) Body mass index (BMI)					
<18.49	1 (5.5)	2 (11.2)	2 (11.2)	4 (22.4)	9 (12.5)
18.5-22.99	12 (66.6)	10 (55.5)	13 (72.2)	9 (49.7)	44 (61.1)
>23	5 (27.9)	6 (33.3)	3 (16.6)	5 (27.9)	19 (26.4)
BMI (mean ± SD)	22.41±3.22	21.64±2.08	20.85±2.38	22.57±5.68	21.87±3.56
4) Basal metabolic rate (BMR)					
BMR (Mean ± SD)	6,266.12±998.27	6,303.5±940.68	5,962.44±1,290.02	6,042.22±1,124.95	6,143.57±1,088.48
5) %Fat[(12)]					
<12%	6 (33.3)	5 (27.9)	9 (49.7)	2 (11.2)	22 (30.56)
12-21.9%	5 (27.9)	7 (38.8)	4 (22.4)	9 (49.7)	25 (34.72)
>22.0%	7 (38.8)	6 (33.3)	5 (27.9)	7 (39.1)	25 (34.72)
Mean ± SD	29.20[b]±6.21	36.76[a]±5.39	27.54[b]±4.11	29.81[b]±7.16	30.80±6.71

[a, b] Significant at $p<0.05$

Table 2. Macronutrient distribution in each group of activities

Group	Rowing athlete	Bicycle athlete	Regular exercise people	Sedentary activities people	Mean ± SD
Energy (kcal/day)	2,969.10±2,160.52[a]	2,602.80±789.98[a]	2,013.10±650.56[a,b]	1,109.40±252.60[b]	2,184.48±1,389.90
Carbohydrate (% RDA/day)	55.63±8.06[a]	46.88±7.87[b]	57.33±6.20[a]	50.51±8.90[a,b]	52.63±8.71
Protein (% RDA/day)	15.16±2.73[b]	16.35±3.21[b]	15.12±3.67[b]	19.67±5.12[a]	16.55±4.14
Fat (% RDA/day)	29.20±6.21[b]	37.99±6.06[a]	27.91±4.47[b]	30.28±7.24[b]	31.32±7.14

[a,b] Significant at $p<0.05$

Table 3. Macronutrient distribution in each group of activities according to sex

Group	Nutrients	Male	Female
Rowing athlete	Energy (kcal/day)	3,824.50±2,480.25	2,199.20±1,573.94
	Carbohydrate (% RDA/day)	59.4328±7.48*	52.21±7.25
	Protein (% RDA/day)	14.54±2.45	15.71±2.98
	Fat (% RDA/day)	26.02±5.39	32.07±5.67*
Regular exercise people	Energy (kcal/day)	1,719.60±490.412	2,306.60±681.94
	Carbohydrate (% RDA/day)	60.2267±5.72*	54.44±5.49
	Protein (% RDA/day)	14.35±3.40	15.88±3.97
	Fat (% RDA/day)	25.41±3.81	30.42±3.73*
Bicycle athlete	Energy (kcal/day)	2,353.70±1,023.75	2,682.10±641.41
	Carbohydrate (% RDA/day)	44.9273±9.75	49.98±6.17
	Protein (% RDA/day)	17.77±3.71	15.29±2.11
	Fat (% RDA/day)	41.37±4.97*	34.71±4.98
Sedentary activities people	Energy (kcal/day)	1,174.40±198.11	1,046.60±303.89
	Carbohydrate (% RDA/day)	49.5265±5.94	50.29±11.15
	Protein (% RDA/day)	21.46±4.08	18.20±5.95
	Fat (% RDA/day)	28.54±6.58	31.26±8.13
Total	Energy (kcal/day)	2,299.20±1,661.90	2,074.78±1,094.18
	Carbohydrate (% RDA/day)	53.64±9.74	51.70±7.66
	Protein (% RDA/day)	16.91±4.37	16.23±3.95
	Fat (% RDA/day)	30.38±8.32	32.18±5.82

* Significant at $p<0.05$

athletes had higher percentage than males and some female athletes need weight control and need to decrease the percentage of fat in training camp. Bicycle athletes (group 2) had the highest percentage of fat mass, associated with high fat intake.

For rowing athletes, 2,000 m competitive rowing effort requires a high energy demanding activity. Achieving the appropriate combination of energy, macronutrient, micronutrient, and hydration needs will support the regulation of metabolism, maintenance of normal endocrine function, and provision of adequate fuel during exercise participation. In average, they require up to 3,100 to 4,000 and 2,400 to 3,000 kcal per day in male and female athletes respectively as suggested by Recommended Dietary Allowances (RDA). In this study, rowing athletes (group 1) had energy intake average of 3,824.50±2,480.25 kcal/day as the recommend energy[10,11]. Bicycle athletes had energy intake average of 2,353.70±1,023.75 kcal/day as the bicycle exercise recommended energy, which is 2,000 to 3,000 kcal/day. For general people, regular exercise people (group 3) had 2,013.10±650.56

Table 4. Micronutrient per day and % RDA per day in each group of activities

Micronutrients	Rowing athlete		Bicycle athlete		Regular exercise people		Sedentary activities people	
	Unit	% RDA/day	Unit	% RDA/day	Unit	RDA/day	Unit	% RDA/day
Calcium (Ca) (mg)	993.17±760.97 ^{a}	116.32±88.0^{a}	637.64±215.05^{b}	71.68±22.1^{b}	411.98±182.38^{b}	50.95±21.2^{b}	340.66±167.43^{b}	42.58±20.9^{b}
Ferrous (Fe) (mg)	16.05±11.26	97.34±80.7	15.52±5.29	87.01±40.8	13.99±6.66	96.39±73.7	7.84±3.43	54.68±25.1
Vitamin A (VA) (RE)	656.46±515.78	98.31±73.4	624.79±254.79	95.22±35.7	442.83±374.81	62.98±51.8	1720.19±3529.3	258.80±514.8
Vitamin B1 (B1) (mg)	2.93±3.21^{a}	249.22±266.60^{a}	3.15±1.73^{a}	270.56±153.82^{a}	1.15±0.62^{b}	88.62±52.13^{b}	0.82±0.61^{b}	72.04±55.62^{b}
Vitamin B2 (B2) (mg)	3.04±2.47^{a}	246.81±190.61^{a}	2.78±0.73^{a}	236.55±67.54^{a}	1.13±0.43^{b}	89.93±33.58^{b}	1.42±0.45^{b}	99.91±38.97^{b}
Vitamin C (VC) (mg)	135.01±163.65^{ab}	157.00±186.86^{ab}	268.34±309.12^{a}	307.82±387.98^{a}	40.17±30.39^{b}	43.31±33.25^{b}	24.16±22.36^{b}	29.01±27.09^{b}
Niacin (B3) (mg)	19.51±14.63^{a}	127.12±92.42^{a}	20.88±13.28^{a}	133.90±77.30^{a}	16.61±7.34^{ab}	98.81±43.76^{ab}	10.49±4.89^{b}	69.09±31.18^{b}
Vitamin E (VE) (mg)	0.94±1.09	6.29±7.27	1.42±0.76	9.51±5.11	2.27±3.19	15.15±21.29	1.70±6.46	11.45±43.09
Zinc (Zn) (mg)	8.29±3.85^{a}	99.26±42.96^{a}	4.69±2.30^{b}	50.58±21.33^{b}	5.44±3.12^{b}	51.25±30.60^{b}	3.53±1.90^{b}	37.29±23.18^{b}
Copper (Cu) (mg)	1.21±0.67^{a}	135.65±76.36^{a}	0.89±0.64^{ab}	100.29±72.60^{ab}	0.62±0.34^{b}	69.36±38.79^{b}	0.59±0.41^{b}	65.75±45.82^{b}
Magnesium (Mg)	93.89±40.17^{a}	34.45±13.62^{a}	36.25±43.47^{b}	12.38±14.20^{b}	23.31±24.48^{b}	8.14±8.21^{b}	14.60±18.48^{b}	5.42±7.38^{b}
Selenium (Se) (mcg)	1.18±2.05	2.14±3.73	1.47±2.05	2.68±3.74	0.19±0.33	0.36±0.61	1.74±7.21	3.18±13.12

^{a,b} Significant at $p<0.05$

kcal/day and sedentary activities people (group 4) had 1,109.40±252.60 kcal/day. The data showed normal energy intake in group 3 and lower energy intake in group 4 than recommended energy, which is 2,600 kcal/day for male and 1,900 kcal/day for female in America[7] whereas 2,000 kcal/day for male 1,600 kcal/day for female in Thailand[14]. This may be the reason for normal average BMI in group 4 who had less energy intake even though they had no activities.

Macronutrient distribution was significant different in all groups. Group 2 had the highest percentage of fat distribution (37.99±6.06% of total energy). It is quite a bit higher than recommendation (20-30% of total energy)[13]. The main reason is probably because the bicycle athletes do not need to control weight and need to increase muscle mass in training camp as the rowing athletes do.

Micronutrients play a specific role in facilitating energy transfer and tissue synthesis that are very important to the overall performance and recovery of athletes. In every group, male had inadequate VE, Zn, Mg, and Se. Group 2 and 3 also had inadequate calcium intake. Group 3 and 4, which are general peoples had significant low vitamin C and Zn intake, as seen from the mean values in Table 4. In support to these results, additional analysis of the number of subjects who meet the RDA for Vitamin C per day was 9, 7, 2, and 1 subjects from 18 subjects in group 1, 2, 3, and 4 respectively.

In Female, many micronutrients intake were lower than RDA including Ca, Fe, B3, VE, Zn, Cu, Mg, and Se. Only group 2 showed enough B1, B2, and VC intake (Table 5).

To compare the data by gender, female group had significant lower intake of Cu, Fe, B1, B2, B3, Zn, Cu, and Mg than male group.

Micronutrients intakes in general people were inadequate. The sedentary activity group (group 4) had the lowest intake of VC and B3. The number of subject in group 4 who meet the RDA in each all micronutrients is the lowest when compared with the other groups that related with the lowest energy intake.

In the training camp before racing, rowing athletes had adequate intake of VC and Ca probably because of VC and Ca supplementation in male athletes who used sport nutrition knowledge and individual experiences. The previous study about the nutrition in regular exercise usually adequate than non-exercise people[14].

Discussing about the effect of gender towards micronutrients intake, female group significantly have

Table 5. Micronutrient per day and % RDA per day in each group of activities people according to sex

Micronutrient	Group	Male (% RDA/day)	Female (% RDA/day)
Calcium	Rowing athlete	168.31±89.07*	69.53±57.70
	Regular exercise people	46.16±15.33	55.74±25.89
	Bicycle athlete	69.77±31.04	67.57±20.63
	Sedentary activities people	44.56±28.60	44.06±10.09
	Mean ± SD	83.28±70.69	59.71±34.44
Ferrous	Rowing athlete	155.05±78.98*	45.40±34.23
	Regular exercise people	156.29±53.59*	36.49±24.96
	Bicycle athlete	113.28±37.84*	59.71±22.58
	Sedentary activities people	67.88±28.71	43.41±17.27
	Mean ± SD	124.70±62.86**	46.59±26.12
Vitamin A	Rowing athlete	139.45±74.98*	61.29±50.75
	Regular exercise people	68.46±65.70	57.50±36.45
	Bicycle athlete	94.23±43.26	89.98±33.78
	Sedentary activities people	358.37±710.63	195.28±317.09
	Mean ± SD	159.60±345.66	99.68±161.28
Vitamin B1	Rowing athlete	412.14±303.95*	102.59±97.95
	Regular exercise people	120.67±48.83*	56.58±32.86
	Bicycle athlete	241.24±167.00	273.24±159.01
	Sedentary activities people	61.64±44.87	85.58±65.65
	Mean ± SD	213.13±218.24	132.57±131.08
Vitamin B2	Rowing athlete	356.14±182.09*	148.42±143.13
	Regular exercise people	89.69±36.80	90.18±32.28
	Bicycle athlete	197.74±68.81	254.95±74.58
	Sedentary activities people	89.06±48.64	112.74±27.41
	Mean ± SD	185.84±148.61	154.21±104.36
Vitamin C	Rowing athlete	242.88±201.26	79.70±140.76
	Regular exercise people	52.54±40.28	34.08±23.15
	Bicycle athlete	159.34±190.42	411.75±477.34
	Sedentary activities people	27.52±29.57	32.36±27.16
	Mean ± SD	123.23±161.98	145.06±294.92
Niacin (B3)	Rowing athlete	179.14±81.09*	80.31±78.11
	Regular exercise people	133.56±32.70*	64.07±16.87
	Bicycle athlete	160.61±91.61*	101.25±52.47
	Sedentary activities people	76.09±40.24	65.22±22.96
	Mean ± SD	139.09±74.80**	78.40±50.63
Vitamin E	Rowing athlete	8.23±9.02	4.13±4.16
	Regular exercise people	9.15±10.66	22.87±29.29
	Bicycle athlete	10.44±3.66	8.78±6.12
	Sedentary activities people	1.82±2.73	26.79±69.25
	Mean ± SD	7.07±7.94	14.49±34.62
Zinc	Rowing athlete	57.31±23.71**	43.10±16.49
	Regular exercise people	55.13±13.65*	46.25±45.17
	Bicycle athlete	104.33±64.94	95.31±16.04
	Sedentary activities people	37.29±17.17	56.18±18.70**
	Mean ± SD	57.14±41.49	61.33±32.99
Copper	Rowing athlete	140.67±75.86**	55.41±32.89
	Regular exercise people	93.52±28.84**	38.28±25.50
	Bicycle athlete	155.10±107.69	120.52±40.59
	Sedentary activities people	56.34±42.03	85.13±47.81
	Mean ± SD	108.03±75.76	76.48±48.07

* Significant at $p<0.05$

Table 5. Cont.

Micronutrient	Group	Male (% RDA/day)	Female (% RDA/day)
Mg	Rowing athlete	19.30±16.49*	4.70±4.66
	Regular exercise people	8.58±9.56	7.56±6.76
	Bicycle athlete	39.27±17.12	30.69±9.57
	Sedentary activities people	2.81±2.72	9.53±10.48
	Mean ± SD	16.00±17.78	13.69±13.38
Selenium	Rowing athlete	1.29±2.21	3.09±4.89
	Regular exercise people	0.15±0.27	0.62±0.83
	Bicycle athlete	3.68±5.26	1.91±1.98
	Sedentary activities people	0.06±0.11	8.06±21.02
	Mean ± SD	1.13±2.81	3.31±10.01

* Significant at $p<0.05$

low micronutrient intake. The main reason is probably that the women who restrict energy intake use severe weight-loss practices, eliminate one or more food groups from their diet, or consume unbalanced diets with low micronutrient density. Female rowing athletes needed to control weight in training program for the optimal weight for racing while bicycle athletes did not need to control weight in rules training program and had more fruits intake than the others that maybe the cause of high B1, B2, and VC intake.

It is important that the athlete take ownership of their health and eating habits to promote positive change. Assessing an athlete's importance and confidence to make health behavior change can help facilitate successful eating strategies. However, poor eating habits established in youth may affect health later in life. Generally, if an athlete meets overall energy needs and incorporates a wide variety of nutrient-dense foods, the amount of vitamin and mineral recommended can be met through the diet. Additionally, athletes tend to eat many highly fortified "sport" foods and drinks. However, athletes competing in lean (e.g., distance running, gymnastics, diving) or weight-restricted sports (e.g., wrestling, lightweight crew) are often at risk for low or marginal intakes of the micronutrients because of low overall food intakes. Following guideline of nutritional management and appropriate training program is necessary for these rowing athletes and it is needed to continue evaluation, educate and manage the national rowing team for the better outcome.

Better nutritional control of dietary fat and increasing the intake of grain, brown rice, low fat milk, red meats and fruits would benefit the athletes and general people in both energy and micronutrient requirements. There is no strong supporting evidence for micronutrient supplementation as disease prevention[15,22]. The implications of these results for widely propagated sport nutrition, control dietary fat and increase the intake of fruit and vegetables. A qualified sports dietitian should provide individualized nutrition direction and advice after a comprehensive nutrition assessment.

What is already known on this topic?

Nutritional evaluation is necessary in training program for the athletes and general people.

What this study adds?

Athlete had total energy intake more than general people groups. The micronutrients by recommended daily allowance (RDA) were not adequate in both athletes and general peoples, especially in females and in the sedentary activities group. Following guideline of nutritional management and appropriate training program is necessary for these athletes and it is needed to continue evaluation, educate and manage the national team for the better outcome. Promoting healthy and complete nutrients each day for general peoples are important.

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Potential conflicts of interest

None.

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การศึกษาเปรียบเทียบภาวะโภชนาการในการออกกำลังกายแต่ละประเภท

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ภูมิหลัง: การประเมินด้านโภชนาการเป็นสิ่งสำคัญในการเพิ่มประสิทธิภาพในการกีฬาและการดูแลสุขภาพทั่วไป

วัตถุประสงค์: เพื่อศึกษาและเปรียบเทียบภาวะโภชนาการและการรับประทานอาหารในประชากรที่ศึกษา 4 กลุ่ม ได้แก่ 1) นักกีฬาชนิดแอนแอโรบิคผสมแอโรบิค ได้แก่ นักกีฬาเรือพาย 2) นักกีฬาชนิดแอโรบิค เช่น นักปั่นจักรยาน 3) ประชาชนทั่วไปที่ออกกำลังกายเป็นประจำ 4) ประชาชนทั่วไปที่ไม่ได้ออกกำลังกายเป็นประจำ

วัสดุและวิธีการ: ประชากรกลุ่มละ 18 คน รวม 72 คน สอบถามความถี่การบริโภคอาหารและการได้รับผลิตภัณฑ์เสริมอาหารก่อนเข้าร่วมการศึกษาและวิเคราะห์โดยใช้โปรแกรม Immucal N (WD 4.4). ชั่งน้ำหนัก วัดส่วนสูง คำนวณ ระดับภาวะโภชนาการ และตรวจวิเคราะห์องค์ประกอบภายในร่างกาย ได้แก่ อัตราการเผาผลาญ (Basal Metabolic Rate) เปอร์เซ็นต์ไขมันในร่างกาย วิเคราะห์ข้อมูลด้วยสถิติ one-way analysis of variance (ANOVA)

ผลการศึกษา: อายุเฉลี่ยแต่ละกลุ่มคือ 21.89±5.83, 20.71±3.62, 25.05±7.09 and 20.83±2.09 ปี ในกลุ่ม 1-4 ตามลำดับ ไม่มีความแตกต่างกันทางสถิติในดัชนีมวลกาย (เฉลี่ย 21.87±3.56 กก./ม^2) อัตราการเผาผลาญ และเปอร์เซ็นไขมันในร่างกาย เพศชายเท่ากับเพศหญิงในแต่ละกลุ่ม ทุกคนไม่มีโรคเรื้อรังใด

สารอาหารกลุ่มหลักอันได้แก่ คาร์โบไฮเดรต โปรตีน และไขมัน พบว่าแต่ละกลุ่มประเภทกีฬามีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ ($p<0.05$) โดยเฉพาะกลุ่มจักรยานบริโภคอาหารประเภทไขมันสูงกว่า กลุ่มอื่น ๆ อย่างมีนัยสำคัญทางสถิติ ($p<0.05$) (37.99±6.06% ต่อพลังงานทั้งหมด)

เมื่อเปรียบเทียบสารอาหารกลุ่มรองแต่ละกลุ่มประเภทกีฬา โดยวิเคราะห์กลุ่มต่าง ๆ พบว่าในทุกกลุ่มรับประทานอาหารที่มีวิตามินอี แมกนีเซียม และซีรีเนียมไม่เพียงพอ โดยในกลุ่มประชาชนทั่วไปที่ไม่ออกกำลังกาย ได้รับธาตุเหล็ก วิตามินบี 1 ไนอาซิน และวิตามินซีไม่เพียงพอ

สรุป: การบริโภคอาหารของประชาชนและนักกีฬาได้รับสารอาหารรองไม่เพียงพอ โดยเฉพาะเพศหญิงได้รับสารอาหารกลุ่มรองน้อยกว่าเพศชายโดยประชาชนทั่วไปที่ไม่ออกกำลังกายได้รับสารอาหารกลุ่มรองไม่เพียงพอต่อวันหลายชนิดกว่ากลุ่มอื่น ๆ การประยุกต์ใช้ผลการศึกษานี้ใช้ในวิทยาศาสตร์การกีฬาเพื่อควบคุมปริมาณไขมัน และเพิ่มการรับประทานผัก ผลไม้โดยผสมผสานการให้ความรู้และการจัดการการออกกำลังกายที่เหมาะสมเพื่อป้องกันโรคหัวใจและหลอดเลือดรวมทั้งเพื่อสุขภาพดีของนักกีฬาและประชาชนทั่วไป