

Full Length Research Paper

Sport and nutrition education interaction on stress

Mehmet Ertugrul Ozturk

Department of Physical education and Sport Science, Kazim Karabekir Education Faculty, University of Ataturk (Erzurum), Turkey.

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The aim of the study was to determine sport and nutrition education interaction on stress. Three groups were selected for the study: control, single treatment and social treatment under nutrition treatment, too. The groups that were under nutrition treatments should have information about the nutrition resources. This experiment was done for two years, 2013-2014. Results showed that sport has significant effect at 5% probability level on weight loss. Also, sport has significant effect at 5% probability level on illness percent decreasing, and decreasing of illness percent under single sport treatment was more than other treatments. The results showed that by increasing the cortisol reactivity ratio, the cortisol concentration at the end measurement decreased. This study concluded that doing daily exercise and using of benefit nutrition resource can be a new natural technique for coping with stress.

Key words: Cortisol, hydrocarbon, vitamin C, single exercise, social exercise.

INTRODUCTION

In recent years, academic studies showed that sports is not only a game but also a life style, a social phenomenon and a need such as eating, drinking. Research also indicated social and individual benefits of sports activities and contributed the recognition of scientific branch which was necessary for whole society (Sari et al., 2012). The stress concept was first used by Dr. Hans Selve, Canadian physiology scholar and defined it as 'organisms non-specific (common) reaction to all kinds of change' (Sari et al., 2012). Stress is an inevitable reality of everyday life (Avsaroglu, 2007). Stress seems to trigger productivity and ability in society, but actually it has negative psychological effects on individual and it can even result such as death (Altungul, 2006; Avsaroglu and Tasgin., 2011). Stress identification is not easy, so a description is more preferred and it is a complicated

concept. There are many stress definitions. The term stress has long been widely used but there was not one and enough definition. Depending on that stress was used as a meaning of resistance against deterioration and distortion of form due to person and object power (Baltas and Baltas, 2000). Any factors can be source of stress in the surrounding environment (Kara, 2009). Then, individual must gain skills to struggle with stress factor and developer compliance (Ozdevecioglu and Yalcin, 2010). Stress can be found in the lives of all human beings and is an inevitable fact of life. Since stress caused emotional and physical pressures are undesirable and irritant, therefore, people are motivated to take actions to reduce their stress. Stress reactions are very different and this is because of the different types of coping. Coping is cognitive and behavioral efforts that is

E-mail: meozturk@atauni.edu.tr. Tel: 00905070381792.

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done to manage internal and external requirements that are considered as stressful and supra-personal resources and aims to eliminate, minimize or tolerate stress. These efforts are in the form of performing an activity or work, or in the form of mental activity. The results concluded that there is a significant relationship between the ways to deal with stress, social support and self-efficacy (Kerry, 2013). Coping with stress is necessary to protect psychological and physical health and to live a healthy, productive life. The most important psychological effects of stress are anxiety and depression (Dagdeviren, 2009). The study of stress has been and continues to be of heuristic value to the sports sciences. Indeed, from a psychosocial perspective, there has been considerable discussion and debate of how to investigate stress-related cognitions and behaviour (Hantom et al., 2005). The conception of stress aside, additional concerns exist regarding the research that has examined the stressors experienced by performers. Specifically, some investigators have not considered the origin of these demands – that is, whether they emanate from competitive or organizational sources (Fletcher et al., 2006). Primary appraisal is the process of assessing the impact of the event in relation to the individual's physical and psychological well-being. Females have been found to appraise a specific stressor more severely than males (Tamres et al., 2002). A variety of stressors tend to elicit self-grooming in the rat, but the time course, form and magnitude of grooming are different with the different stressors (Erp et al., 1994). Despite the theoretical idea that a model should reproduce all properties of the phenomenon under investigation, this is achieved, reflecting the complex manifestations of psychiatric disorders and the huge cognitive differences between humans and laboratory animals. Animal models of anxiety, so, do not intend to replicate all features and symptoms of a specific anxiety disorder but rather generate a state of anxiety that could be related to these disorders. Animal models that measure unconditioned conflicts are defined as ethological, since they are all based on unlearned fear/ avoidance behavior, whereas models that involve learned/punished responses are referred to as conditioned operant conflict tests (Campos et al., 2013). Exposure to stressors induces behavioral and neuroendocrine sequelae that are often used to experimentally mimic in animals the symptoms that characterize specific human psychiatric disorders. This is possible because animals of the same species, strain, sex, and age maintained in controlled environmental conditions show a sufficiently homogeneous response to stressful conditions that is proportional to the intensity of the stressor and the duration of the exposure (Willner, 1995).

In animal studies glucocorticoids stimulate pleasurable behaviors such as drug taking and palatable feeding (Goeders, 2003). Animal models of stress include stressors such as hunger, cold exposure, inescapable

food shock, tail pinch, physical restraint or exposure to a socially dominant member of the same species (Bhatnagar et al., 2000). Under conditions of acute stress, increases in brain serotonin may improve stress adaptation and thus may contribute to the initiation as well as termination of a cortisol response by way of different serotonergic pathways in the brain (Takeda et al., 2004). The potentially detrimental role of stress highlights the importance of examining and implementing healthcare interventions that control the impact of stress on health. A variety of practical interventions for stress management (to control physiological stress–reactivity) has been proposed including aerobic exercise. Exercise has been proposed to reduce sympathetic responses to stress thereby limiting exposure to repeated pathophysiological hypersympathetic arousal. Although there is a general consensus that chronic aerobic exercise (a physiological adaptation to exercise training) exerts a significant anti-hypertensive effect (Whelton et al., 2002) and acute exercise (the physiological response to one bout of exercise) results in post-exercise hypotension (Pescatello and Kulikowich, 2001), the relationship between chronic/acute exercise and stress related BP responses is less clear. Health and fitness are complex notions encompassing a variety of meanings, are influenced by a myriad of issues and having unique discourses. Discourses of health and fitness produce and rely on specific meanings of the 'body' which are themselves very much dependent upon specific cultural climates (Shea and Beausoleil, 2012). Health claims related to food products and the scientific elucidation process thereof will be the focus of our contribution to the discussion concerning appropriate methods of researching the relationship between food and human health and the scientific evaluation and grading of outcomes of primary research (Hanekamp et al., 2015). In modern societies, human nutrition science has made invaluable contributions to our knowledge of what constitutes a healthy diet (Sassi et al., 2009). Increasingly, the context in which food choice is made is recognised as complex and requiring a multi-disciplinary approach (Bestwick et al., 2013). Nutrition-focused interventions are frequently individualised and often designed to impart knowledge and/or skills for behaviour change (Foresight 2007). Public health nutrition is facing an ingenuity gap: that is, a schism between the quality of the evidence base, the spectrum of problems encountered, and the capacity of current thinking and practice to devise effective solutions (Homer-Dixon, 2006). The foods have three functions. The primary function is a nutritional function, which is essential to human survival. The secondary function is a sensory involving both flavour and texture to satisfy sensory needs. The tertiary function is physiological functions such as regulation of biorhythms, control of aging, the immune system and body defence. An increase in brain tryptophan levels, on the order of that produced by eating

a carbohydrate-rich, protein-poor meal, causes parallel increases in the amounts of serotonin released into synapses. The aim of this study is evaluation the decreasing factors of the stress, especially in the students that stress can be important factor to educate. Sport and physical activity and nutrition as factors that decrease stress are studied in this research; they influence student life and education progress.

Materials and Methods

Participants

To determine sport and nutrition education interaction on stress, was selected 500 students of university with 20-25 age range; 250 of them were females and 250 of them were males. The participants mean age was 20.5 ± 1.5 years. And mean weight for male was 72.25 ± 3.2 and for female was 62.42 ± 2.7 . All of the students were doing B.S. and M.S. of different fields in the university. All of the students live normally and do exercise less than 1 h per day. Their diet is normal and they use different kinds of nutrition resources with various percent of the nutrition resource. All participants volunteered to be involved in the study and were informed of the general purpose of the investigation.

Procedure

The participants were contacted via invited papers on board in the faculties. Participants were assured that the experiments and study did not have any damage for them and the treatments were natural without chemical materials. There were 3 groups in each year. The first group was control, the second group was single sport and the third group was the social group in first year. The second year had three groups too that included control, single sport and 20% more carbohydrate resource compared to normal diet and the third group was social group, with 20 and 15% more carbohydrate and vitamin C resource compared to the normal diet. The groups that were under sport treatments should be present at the sport salon of sport and physical education faculty at 5:30 in the evening for 2 hours. The sport included aerobic sport for the social treatment and single treatment. The groups that were under nutrition treatments learn nutrition sources and their effects. There are four groups of nutrition resources (Fat, Protein, Carbohydrate and Vitamin). The researchers gave them as notes or introduced some books and sites to them. The food includes carbohydrate: Bread, Corn (20% more than normal food) and Vitamin C: Natural orange fruit juice, grip fruit (15% more than normal food diet). This experiment was done for two years, 2013-2014. Every group (female and male) had three treatments (control: normal life, two hours single sport, two hours social sport) during the first year of the experiment and three treatments (control: normal life, two hour single sport and nutrition education and increasing 20% of carbohydrate resource of their daily nutrition, two hour social sports and nutrition education and increasing 20% of carbohydrate and 15% vitamin 'C' of resource their daily nutrition) during the second year of experiment. Some of properties were measured every 3 months during two years such as weight changing, illness percent (was measured as illness days number during every 3 months) and stress. Stress measurement was done by saliva samples.

Stress measurement

Cortisol measured in saliva reflects the fraction of cortisol that is free, the portion that crosses the blood-brain-barrier to affect different brain structures. This mechanism is believed to be at the

basis for alterations in higher-order cognitive function and behaviour. This free fraction of cortisol, after crossing the blood-brain-barrier, binds to receptors in brain structures that are known to be involved in learning, memory and emotional processing (Lupien et al., 2005). The most common technique used to collect saliva samples for cortisol assay is through the Salivette device, a cotton dental roll placed in a pierced tube, fitted in an external tube. To reduce bacterial growth, it is recommended to cool the sample in the refrigerator or the freezer, until the research team retrieves it. Using this device, saliva samples can be collected at home, by the participant and then mailed back to the laboratory setting without significantly affecting the quality of its assay (Clements and Parker, 1998). All of the samples were collected at afternoon in the starting day and the end day of the third month by the participant at home. In study designs when participants are instructed to collect saliva samples at home, it is important to remind the participants to respect the prescribed timing and conditions of saliva collection. We have evaluated an enzyme immunoassay (EIA) for salivary cortisol marketed by Salimetrics.

A micro titre plate is coated with monoclonal antibodies to cortisol. Cortisol in standards and unknowns competes with cortisol linked to horseradish peroxidase for the antibody binding sites. After incubation, unbound components are washed away. Bound cortisol peroxidase is measured by the reaction of the peroxidase enzyme on the substrate tetra methyl benzidine (TMB). This reaction produces a blue color. A yellow color is formed after stopping the reaction with sulfuric acid. Optical density is read on a standard plate reader at 450 nm. The amount of cortisol peroxidase detected, as measured by the intensity of color, is inversely proportional to the amount of cortisol present. The cortisol concentration was identified as $\mu\text{g/dL}$ unit but Cortisol reactivity was computed by ratio way.

Ratio = concentration of primary time / concentration of end time.

Statistics analysis

Statistical evaluation of the data was accomplished by a repeated measures analysis of variance. In addition, a comparison between the groups was analysed with a one-way analysis of variance. In the event of a significant F-ratio, LSD post hoc tests were used for pairwise comparisons. A criterion alpha level of $P \leq 0.05$ was used to determine statistical significance. Effect size (ES) calculations were used to determine the magnitude of treatment effects, and are reported with all statistically significant results as a measure of practical significance. All data are reported as means \pm standard deviation.

RESULTS

Analysis of variance results showed that the effects of sport, nutrition and their interaction effects were significant on the studied persons stress at 5% of probability level. The P amount for the control group, single sport group and social sport group for the first year was 1.000, 0.0001 and 0.001, respectively and F amount was 0.69, 4.53 and 3.96, respectively. The P amount for the control group, single sport group and social sport group for the second year was 0.98, 0.006 and 0.002, respectively and F amount was 0.61, 4.21 and 3.60, respectively.

Weight change

According to the means comparison of weight under

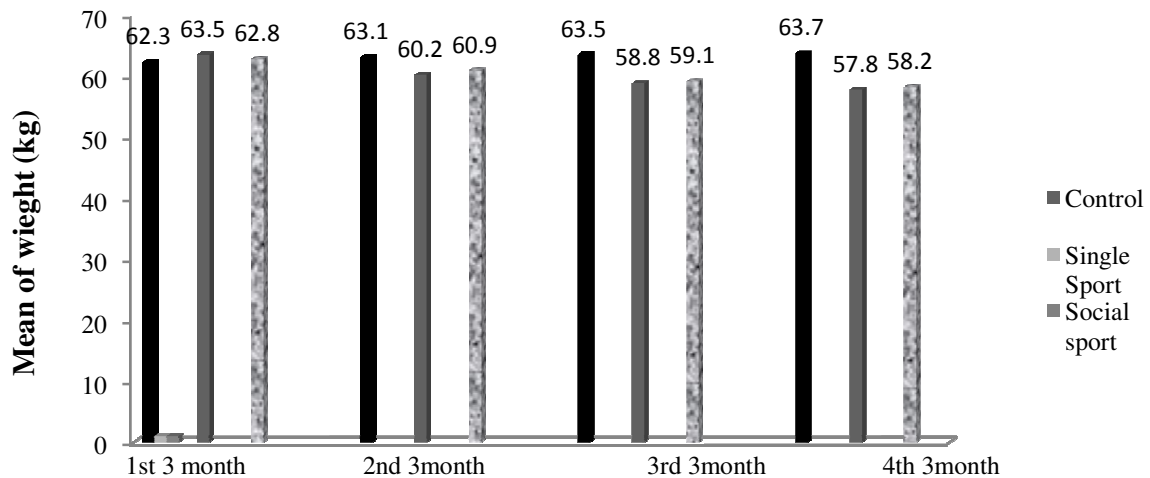


Figure 1. The weight mean of female group during the first year of study.

three groups of treatment (control, 2 h single sport and 2 h social sport) resulted that sport has significant effect at 5% probability level on the weight decreasing and its changing. Decreasing of weight under single sport treatment was more than other treatments. It can be as a result of the emotional factors and stress that had negative effects on the weight decreasing and decrease the weight of the social group by raising trend of weight decline. Although the result was shown the mean weight decreasing under social sport treatment but this decreasing was normal and as a result of sport and exercise. Also, in control group there was weight increasing and this group showed no decreasing change for the weight (Figure 1). According to the means comparison of weight under three group of treatment (control, 2 h single sport+20% carbohydrate increasing in nutrition resource and 2 h social sport+20% carbohydrate increasing in nutrition resource+15% vitamin increasing in nutrition resource) resulted that sport and nutrition had significant effect at 5% probability level on the weight changing trend and decreasing of weight under the second treatment (single sport) was the nearly similar to the third treatment (social sport). It showed that nutrition can be had positive effect to eliminate the emotional factors and stress and can be fixed the weight decreasing trend as normal. Under the third treatment the weight decreasing was a few less than the second treatment and it can be shown the vitamin C effect on the weight changing trend. Also, control group had weight increasing and the less positive changing for the weight (Figure 2).

According to the means comparison of weight under three group of treatment (control, 2 h single sport and 2 h social sport) resulted that sport has significant effect at 5% probability level on the weight decreasing and changing and decreasing of weight under single sport treatment and social group treatment did not have significant difference at 5% probability level. So, can be

said the emotional factors and stress did not have effects on the weight decreasing for the male group. Also, control treatment had weight increasing and the less positive changing for the weight (Figure 3).

According to the means comparison of weight under three group of treatment (control, 2 h single sport+20% carbohydrate increasing in nutrition resource and 2 h social sport+20% carbohydrate increasing in nutrition resource+15% vitamin increasing in nutrition resource) resulted that sport and nutrition has significant effect at 5% probability level on the weight changing trend and decreasing of weight under the second treatment was the nearly similar to the third treatment. Nutrition can modify the sport effects on the weight decreasing and fix the eight changing trend. Also, by the fixing the weight changing trend and improving the nutrition can be influenced on the stress that may be as a result of weight increasing or un-sufficient nutrition. The second and third treatment did not have significant difference at 5% probability level. Also, control treatment had weight increasing and the less positive changing for the weight (Figure 4).

Illness percent

According to the means comparison of illness percent under three group of treatment (control, 2 h single sport and 2 h social sport) resulted that sport has significant effect at 5% probability level on the illness percent decreasing and decreasing of illness percent under single sport treatment was the most than other treatments that it can be as a result of the emotional factors and stress and had negative effects on the illness percent decreasing. Also, for the control treatment there was not regular trend for the illness percent trend and did not show significant difference during the months (Figure 5). The other data of

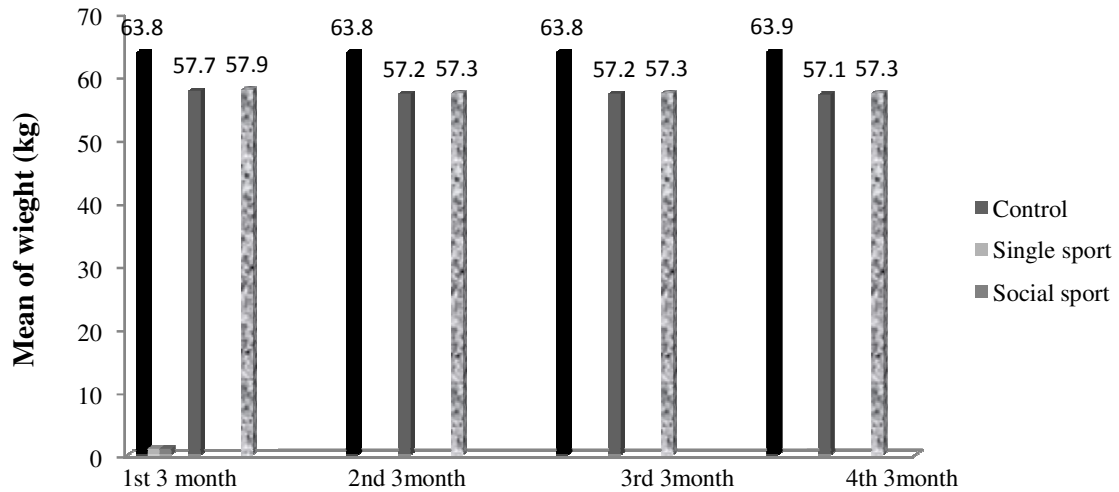


Figure 2. The weight mean of female group during the second year of study.

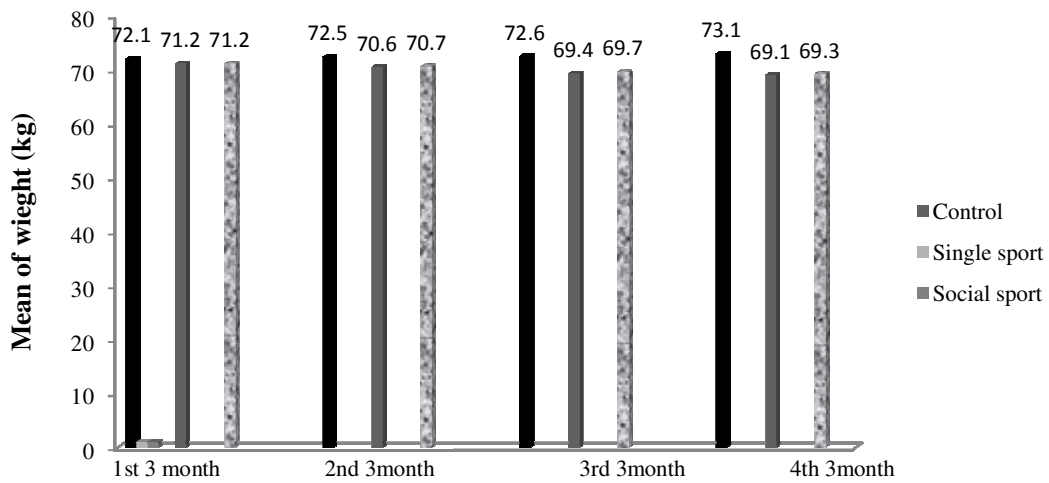


Figure 3. The weight mean of male group during the first year of study.

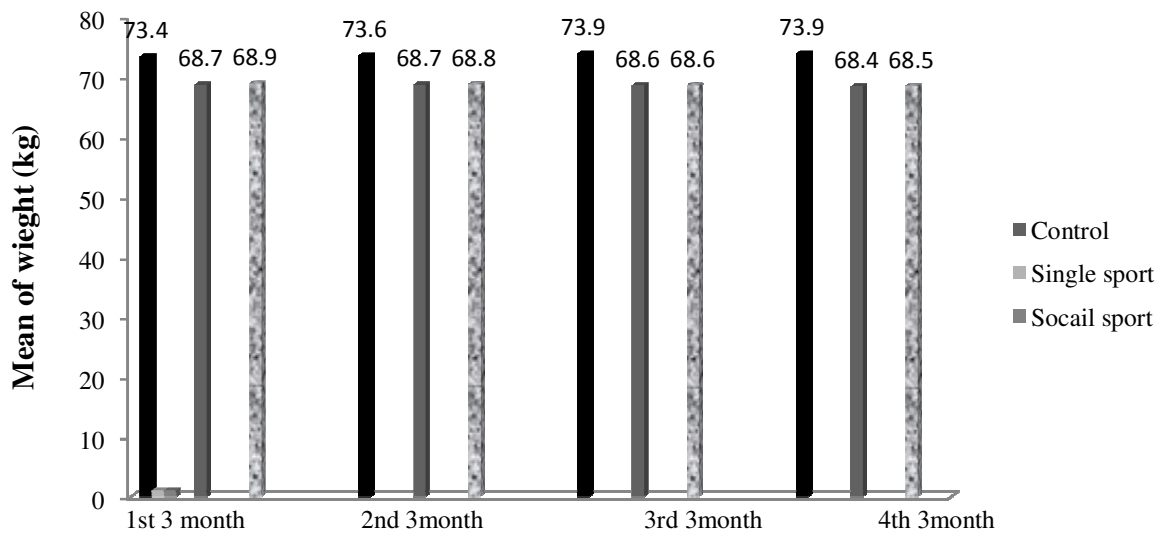


Figure 4. The weight mean of male group during the second year of study.

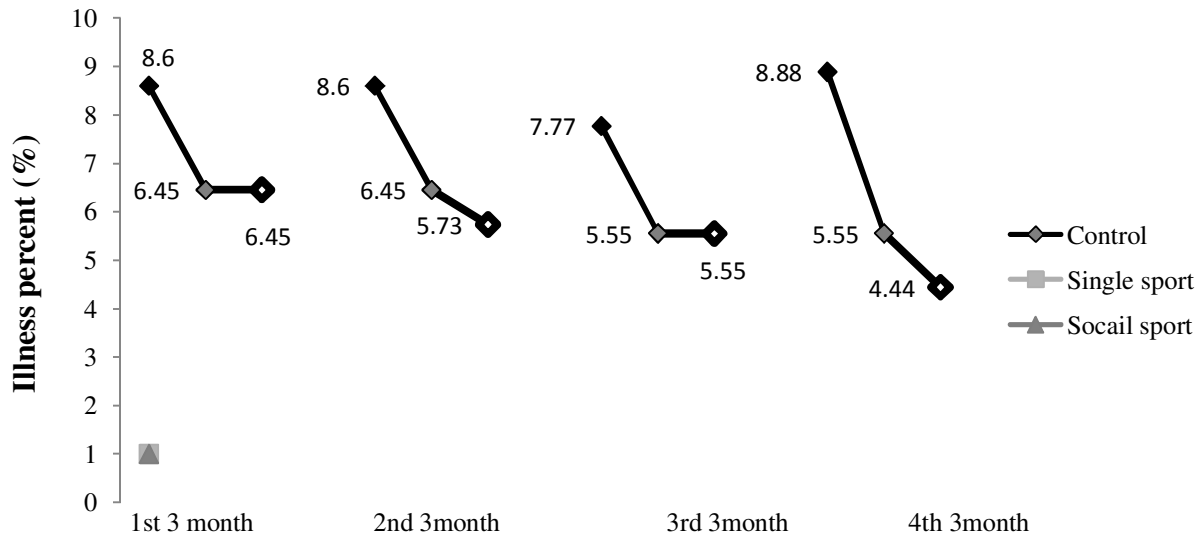


Figure 5. The illness percent mean of female group during the first year of study.

illness percent for the other months of female and male group during the years did not have significant difference and they were fiddling amounts so did not indicated their results. Also, the results showed that sport and nutrition diet had significant effects at 5 % probability level on the illness percent and caused to decrease the percent.

Stress

The results showed that by increasing the cortisol reactivity ratio, the cortisol concentration at the end measurement decreased so for the first year was indicated that the ratio was decreased for the second treatment (single sport) and indicated stress increasing in this treatment, but in the third treatment (social sport) the ratio increased and indicated the cortisol concentration decreasing at the end measurement and stress decline. Also, the results illustrated the more effects of stress on the female emotional and their life. In the second year the ration both for the second group and third group increased and showed the cortisol decreasing and stress decline and indicated the nutrition resource effects on the stress decline especially in the second treatment that influenced by stress more the third treatment. So the nutrition and sport interaction on the stress decline was significant at 5% probability level. The control treatment did not have significant difference between the months during two years (Figure 6).

The results showed that there were significant difference for the first year and second year at 5% probability level but between the months during one year there was not significant difference. Also ration increasing amount for the second year was more than first year that indicated the nutrition resource effects on the stress

that had significant decreasing for cortisol concentration for the second year. Also, between second treatment and third treatment there was significant difference at 5% probability level that illustrated the Vitamin C effect on the stress decline. Male group was influenced by the stressless than the female group (Figure 7).

DISCUSSION

The results illustrated positive correlation between stress levels and active coping and ego-orientation (Lyne and Roger, 2000). Students can securely gain psychological skills, which are generally acquired through sports events, if they subjectively practice activities for the primal purpose of sport activities, that is, "Enjoying sports as a challenge for techniques and records of higher level (the Ministry of Education, Culture, Sports, Science and Technology (Murakami et al., 2004). The results showed that male group had more stress management skill than the female group and can coping with the stress both under single and social group at 5% probability level both in the first and second year, but female under single group was influenced on the stress and emotional problems (Althaus, 2005). Despite the overwhelming evidence of the relation between diet and health as a general concept, it is an expression of the inadequacies of the nutritional sciences that the fundamental details thereof still elude us for the most part (Godfrey-Smith, 2003). Cognitive appraisal is recognized as a critical process in the stress and emotion process and reflects underlying beliefs related to personal well-being in important situations (Moors et al., 2013; Lazarus, 2000). Positive psychological adjustment in achievement settings like sport should be reflected by higher

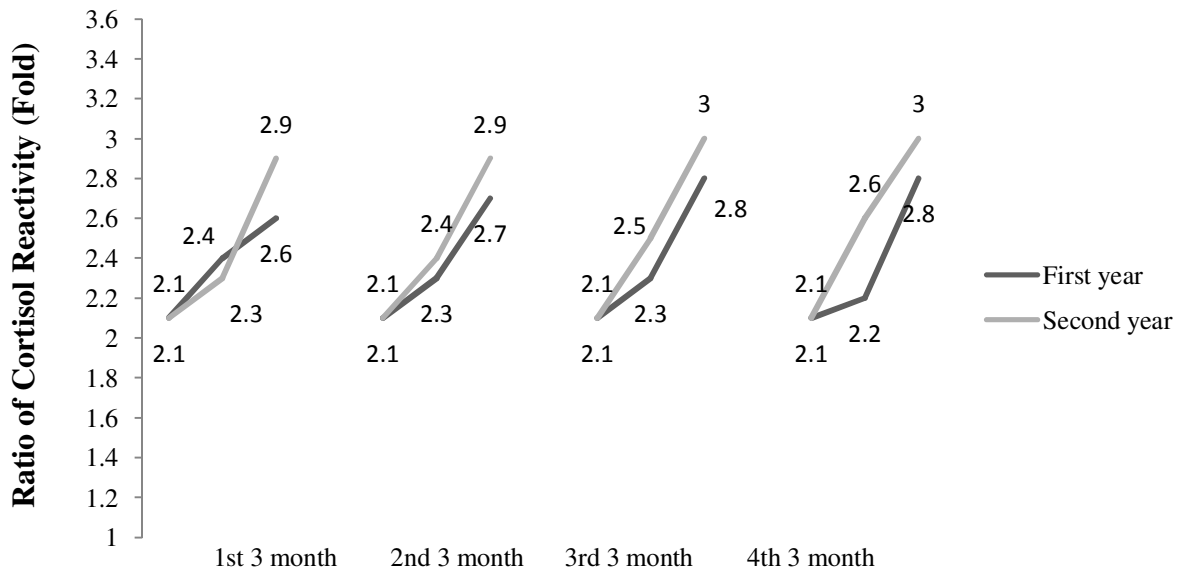


Figure 6. The ratio of Cortisol reactivity mean of female group during the first and second year of study.

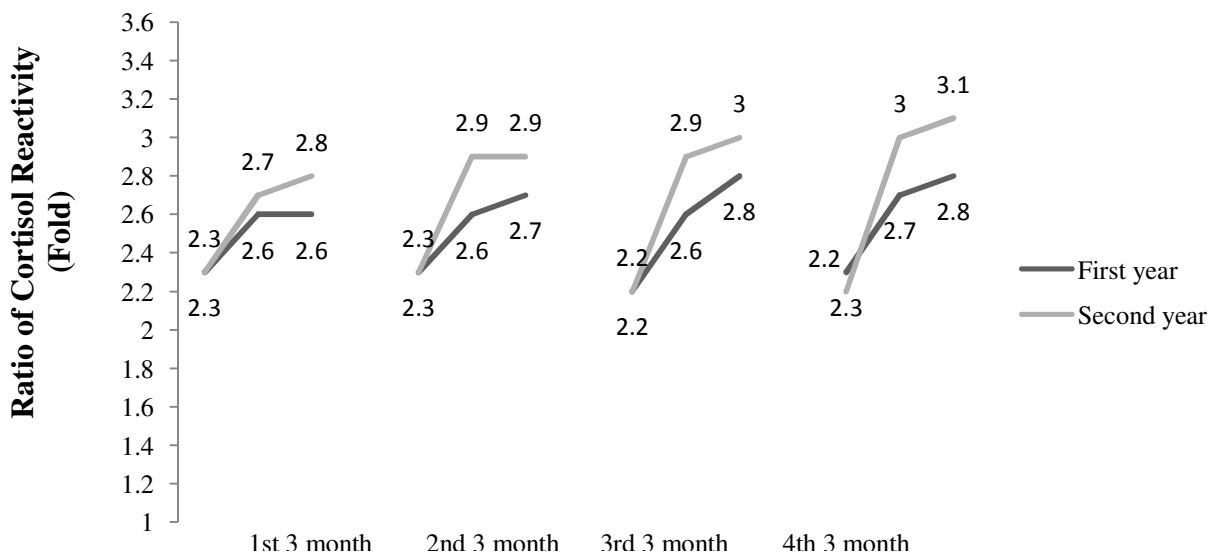


Figure 7. The ratio of Cortisol reactivity mean of male group during the first and second year of study.

perceptions of perceived control and challenge and lower perceptions of threat (Adie et al., 2008). There are many other different types of appraisals that could be assessed in sport achievement settings (Moors et al., 2013). The results suggest an acute bout of aerobic exercise (of moderate to high intensity) attenuates stress related BP responses. Interestingly, the findings from the present review are comparable to a previous meta-analysis of stress reactivity research (Crews and Landers, 1987) that focused on the effects of fitness (a chronic exercise adaptation). Crews and Landers (1987) reported that greater physical fitness reduced responses to psychological stressors (Hamer et al., 2006). Acute

stress does alter normal eating patterns as reported by Torres and Nowson (2007). Sweet foods, therefore, appear to provide comfort to the stressed individual and such comfort may be due to innate biological processes (Pecina et al., 2006). Pretreatment with corticosterone exaggerates the effect and is thought to mimic a condition of chronic stress (Mantsch et al., 1998). There is accumulating evidence that highly palatable food has properties that promote dependence. As with drugs of abuse, palatable food can activate the brain reward system, comprising opioid, dopamine and endocannabinoid (Cota et al., 2006). The results showed that the food with carbohydrate resource can decrease the

stress of persons by 11.8%, but this amount can be changed under different condition such as acute stress (Wallis and Hetherington, 2004). The researchers showed that the young persons that ingest more vitamin resources in their food are more happy than the persons have less consumption of vitamins as 26.7%. Also, this percent increases by vitamin C consumption compared to the other vitamins (Zellner et al., 2006). According to the results, vitamin C consumption by decreasing the illness percent can be effected on the happiness and stress decline. This matter showed more percent in female in compare to the male as 17.2% (Wardle et al., 2000).

Conclusion

This study extends previous research by researchers studying about different treatments about sport, nutrition education and information and used of the studying results for coping the stress. Doing daily exercise as single and social and using of benefit nutrition resource such as hydrocarbon and vitamin C can be a new natural technique for coping stress. We demonstrated that both male and female students. This study results showed that sport had positive effects on the stress decline, especially female reaction was more significant in compare to male. The result, however, did not support the tendency. Indeed, it was contradictory to the hypothesis that health-related life skills can be acquired through sport activities. This study indicated that social sport was more effective on the stress decline and illness percent than single sport, although for male this fact was not significant. Also, sport by decreasing the weight could had significant effect on the stress and decrease it. The result showed a significant primary effect in gender in each sub-scale scores of 'Physical Activities Skill,' 'Target Pursuing Skill,' 'Stress Management Skill,' and 'Interpersonal Relationship Skill,' and also in grade in each sub-scale scores of 'Physical Activities Skill,' 'Target Pursuing Skill,' 'Stress Management Skill,' 'Interpersonal Relationship Skill,' and 'Collective Behaviour Skill.' Especially, males were able to use exercises and sports more positively and have higher stress management skill than females. Nutrition education and use of carbohydrate and vitamin C resource affected weight decreasing, illness percent and stress significantly. Especially, for the female group under single exercise, using of the nutrition resource had significant effects in compare to the other treatments. Carbohydrate decreased stress but its reaction with vitamin C had significant difference at 5% probability level and caused decline in stress and illness percent compared to carbohydrate; it keeps weight under normal condition, decreases and controls it.

Conflict of Interests

The authors have not declared any conflict of interests.

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