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**THE EFFECTS OF 4-WEEK OF AEROBIC EXERCISE TRAINING ON NON-
ATHLETE MALE STUDENTS' SLEEP AND LIFE QUALITY**

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ABSTRACT

The purpose of this study was to survey the effects of 4-week of aerobic exercise training on non-athlete male students' sleep and life quality. 40 non-athlete male students ($M_{age}=21$) were tested by Pittsburgh Sleep Quality Index (PSQI) and Quality of Life Questionnaire (SF-36). The training program was weekly and it was lasted 45 to 65 minutes in 3 sessions. The trainings were a combination of hiking, jogging, Cooper running, Fartlek training, interval running and roping. Those were performed with 70 to 85% maximum heart rate intensity. The findings were measured and the data were examined for the natural assumption by Shapiro-Wilk. The hypotheses were analyzed by dependent T-test. The results of this study showed that the sleep quality and the quality of life were significantly increased in 4-week of aerobic exercise training ($P<0.05$). Also, there was a significant difference between the sleep quality, mental sleep quality, sleep latency, sleep efficiency, daytime dysfunction factors, the quality of life and physical and social functions ($P<0.05$). But the results showed that there was no significant difference between the sleep duration, sleep disturbances, and mental health factors ($P>0.05$). Therefore, the sleep quality factors were improved by physical activities that it would improve the quality of life as well.

Keywords: Aerobic exercise, sleep quality, quality of life, non-athlete students

INTRODUCTION

The World Health Organization defined health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Thus, it is not be considered the traditional indicators of health such as morality and morbidity and disease in the assessing of individuals' health. But it should be considered the individuals' perception of the quality of life too. The quality of life is a basic indicator of health. since the quality of life is included the several dimensions such as individuals' physical health, mental health, social relationships, family life, excitements, physical functions, spirituality and professional so Quality of life is important (Rajmil et al, 2012). Today students have constituted a large population of community (Gilbert & Weaver, 2010). The researchers believe students have a set of problems such as schoolwork, finances, marriage, personality, behavioral, and social problems. Some studies have introduced the student life and academic environment as a stressful environment and they have expressed that students' quality of life and health levels should be improved. Some studies have considered the prevalence and incidence of students mental and physical damages and they claim that common mental disorders

such as anxiety, depression, stress and physical disorders have a high prevalence in the students' life (Gilbert & Weaver, 2010). The sleep deprivation is one of the most common complaints in students. Most of students live with their family during high school. They experience the losing of sleep as one of the first changes of their daily programs in new their home in college where there is a low supervision (Gilbert & Weaver, 2010). Researchers consider always the sleep as a biological need but this kind of sleep is not well understood in comparison with other biological needs such as food, water, and shelter. In addition, the increasing of hostel activities in the instructional, industrial, service and commercial parts is leaded to the sleep disorders in more people. Thus, it is essential to consider this issue of life (Park et al, 2010). Sleep is a physiological behavior that constitutes a part of individuals' daily life and it is proposed as an appropriate process for the recovering and restoration of the function in neural system and physiological systems of body. Sleep is a physiological mechanism of body in the recycling of lost power and the fatigue of body and brain activities during life and it is an important criterion in the maintaining of human s physical and mental health (Gau et

al, 2007). The laboratory studies have shown that some sensory-perceptual and motor functions can change by insomnia and lack of sleep (Lamond et al, 2006). The insufficient sleep and insomnia are important factors in the quality of life. The individuals' sleep quality is primarily related to the quality of life. The researchers compared the effects of insomnia on quality of life in people without sleep with people with sleep efficiency. They found that people without sleep have worrying reports such as physical health, limitations, and problems, mental health problems, and excitement of social activities. They had lower public health than people with sleep efficiency (Brownlow, 2012). The quality of life is affected by insomnia and its disorders (Elavsky & Mcauley, 2007). Today, quality of life is more important issue due to the increasing of Longevity index and Life expectancy (Elavsky & Mcauley, 2007). The rate of individuals' enjoyment of their life and their satisfaction of being alive is more important their opportunity for a happy life and a physical and mental health (Shabani Bahar, 2007). Everyone tries to accomplish the different proceedings in the field of physical and mental health to achieve the quality standards of life at the individual level. The participation in the sports and recreational activities is one of these

proceedings due to individuals benefit from physical and mental advantages of these activities and they improve their quality of life (Vaez Mousavi SMK, 2000). One of health good habits or health improving behaviors is motor activities and regular sports trainings so that it will decrease the background of physical and psychological disorders and will increase mental health (Fuentes & Diaz, 2010). The sport and physical activities is leaded to the Biological and biochemical changes and improve mental health that it will improve the sleep quality as well (Dua et al, 2010). In this regards, the studies showed that the treatment of sleep disorders such as frequent waking increased patients' physical function and quality of life (Dua et al, 2010). Exercise is a drug-free solution that it can have useful effects on the sleep quality (Youngstedt, 2014). This issue is supported by epidemiological studies and reports the relationship between exercise and better sleep quality (Youngstedt, 2014). Fuentes and Diaz (2010) examined the relationship between the acquisition of tennis skills with sleep quality and quality of life. 33 subjects were tested by Pittsburgh Sleep Quality Index (PSQI), Quality of Life Questionnaire (SF-36), the Beck Depression Inventory, and the Thematic Apperception Test (TAT) in two hours per week (12

weeks). The results of this study showed that there is a significant relationship between sleep quality and quality of life but there is no significant relationship between tennis instruction and sleep quality and quality of life (Fuentes and Diaz, 2010). Imayama et al, (2011) studied the effects of 12-month exercise on health-related quality of life. Middle-aged women (n=100) and men (n=102) were randomly assigned to either exercise (360 minutes/week of moderate-to-vigorous aerobic exercise) or control in Seattle, WA from 2001–2004. Demographics, anthropometrics, exercise self-efficacy (5-item self-efficacy questionnaire) and HRQOL (SF-36) were assessed at baseline and 12 months. Analysis of covariance adjusting for baseline scores was used to compare HRQOL and exercise self-efficacy scores between the exercise and control groups. The results of this study showed that 12-month exercise improved the quality of life, self-efficacy, exhilaration, and mental health (Imayama et al, 2011). Moghadam et al, (2014) examined the effects of aerobic exercise on menopausal symptoms and non-athlete postmenopausal women's quality of life. The subjects were 50 women (45-60 years old). They performed 8 weeks of aerobic trainings. The results of this study showed that 8 weeks of aerobic trainings

decreased significantly the menopausal, physical, and mental symptoms, anxiety, and depression and increased non-athlete postmenopausal women's quality of life (Moghadam et al, 2014). According to these three studies that examined the effects of exercise on sleep and life quality, it seems that a more detailed study is needed to examine the simultaneous effects of physical activity on both sleep and life quality especially in college students that they have sensitive environmental conditions with respect to the high effects of physical activities factor on various physical and mental factors. This study can present more accurate and complete information. The student life is full of new and stressful challenges. The experience of independent life, the variable lifestyle, quick consequences, and residential life are examples of these challenges (Buboltz et al, 2001). So students change voluntarily the habits of their sleep to meet these requirements. This habits change is included the decreasing of sleep time, the changing of the sleep cycle, sleep latency, the delayed wake up, their sleep deprivation during a week, and the compensation of this lack of sleep on weekends (Buboltz et al, 2001). On the other hand, a poor sleep quality has destructive effects on health (Youngstedt,

2014). In addition, sports trainings can have positive effects on many important factors in a human's life such as the quality of life so that Kathryn 's (2011) study showed that aerobic activity can be effective on the exhilaration, social performance, the quality of life, and mental health in sedentary adults (Kathryn, 2011). Few studies have examined the relationship between sleep quality, quality of life and exercise with the regardless of obtained differences in the results of some of these studies, there is no a comprehensive and proprietary study in non-athlete students and in people who have not a regular training program with regardless of obtained differences in the results of some performed studies. Therefore, this study wants to examine the effects of 4-week of aerobic exercise training on non-athlete male students' sleep and life quality.

METHODOLOGY

Method

The method of research was semi empirical and design of it included pre-test, post test with control group.

Participants

The statistical population of this study was all non-athlete students of Islamic Azad University Islamic Azad University Lahijan Branch. 40 non-athlete students who had the conditions of this study were randomly

selected. The lack of regular sports activities on campus, out of campus, and clubs was one of selected sample conditions in this study.

Instruments and Tasks

The instruments of this study were Pittsburgh Sleep Quality Index (PSQI) and Quality of Life Questionnaire (SF-36). PSQI assesses the sleep quality by measuring seven domains: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep mental quality, and daytime dysfunction over the last month. Quality of Life Questionnaire (SF-36) was used to measure the rate of quality of life from both physical and mental state. It was included the general health, physical function, role limitations due to physical reasons, role limitations due to emotional reasons, bodily pain, social function, fatigue or vitality, and mental health.

Procedure

The subjects were divided control and experimental groups. The experimental group participated in a training program that it was weekly and it was lasted 45 to 65 minutes in 3 sessions. The trainings were a combination of hiking, jogging, Cooper running, Fartlek training, interval running and roping according to American college of sports medicine strategies (1986). Those were performed with 60 to 65% maximum heart

rate intensity in the first week and were performed with 70 to 85% maximum heart rate intensity to achieve aerobic fitness from the second week.

Data Analysis

The collected data were classified by descriptive statistical methods and were analyzed by dependent T-test. The SPSS software (version 19) was used for data analysis ($\alpha \leq 0.05$).

RESULTS

The results of table (1) show that the mean and standard deviation of the subjects' age and time of lack of sports history. The subjects' frequency and percent were presented based on marital status, employment status, and field of study in the table (2). The descriptive information of some sleep quality characteristics was presented on the pre-test and post-test in the table (3).

Table 1: The subjects' characteristics

Variable		Mean	SD	Minimum	Maximum
Age	Experimental Group	19.7	1.0311	18	22
	Control Group	20	1.45	18	23
Time of lack of sports history (month)	Experimental Group	24.6	9.91	12	36
	Control Group	20.4	10.13	6	36

Table 2: The frequency and percent of marital status, employment status, and field of study

Status Group	Single		Married		Student		Employee		Self-employed		Civil		Electric		Food industry		Business management	
	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N
Experimental Group	80%	16	20%	4	80%	16	20%	4	0%	0	35%	7	25%	5	40%	8	0%	0
Control Group	80%	16	20%	4	75%	15	20%	4	5%	1	20%	4	40%	8	10%	2	30%	6

Table 3: The descriptive information of variables on the pre-test and post-test

Group Variable		Experimental Group	Control Group
Sleep quality	Pre-test	8.1±3.24	6.3±3.39
	Post-test	6±2.45	6.7±3.45
Mental sleep quality	Pre-test	2.05±0.94	1.3±0.57
	Post-test	1.3±0.73	1.35±0.67
Sleep latency	Pre-test	1.45±0.89	1.2±0.52
	Post-test	1±0.73	1.35±0.75
Sleep duration	Pre-test	1.25±0.72	1.2±0.89
	Post-test	1.15±0.67	1.1±0.71
Sleep efficiency	Pre-test	1.2±0.69	0.65±0.81
	Post-test	0.7±0.65	0.65±0.74
sleep disturbances	Pre-test	1.05±0.76	0.95±0.83
	Post-test	1.05±0.69	1.1±0.79
Daytime dysfunction	Pre-test	1.25±0.64	1.05±0.51
	Post-test	0.75±0.55	1.15±0.59
The quality of life	Pre-test	78.63±7.74	83.65±8.27
	Post-test	81.733±6.67	83.1105±8.25
Mental health	Pre-test	75.2±7.74	81.4±8.34
	Post-test	76.4±6.97	80.2±8.049
Physical function	Pre-test	82.25±6.78	85.5±7.24
	Post-test	86.25±5.34	85±7.43
Social function	Pre-test	75.62±13.13	83.125±12.35
	Post-test	82.5±13.69	82.5±12.43

The results of table (3) show:

- The mean of sleep quality has decreased from 8.1 to 6 after the performing of aerobic exercise training in the experimental group (26% improvement) and it has increased from 6.3 to 6.7 after the performing of aerobic exercise training in the control group.
- The mean of mental sleep quality has decreased from 2.05 to 1.3 after the performing of aerobic exercise training in the experimental group (36% improvement) and there was no changing in the control group.
- The mean of sleep latency has decreased from 1.45 to 1 after the performing of aerobic exercise training in the experimental group (31% improvement) and it has increased 12.5% after the performing of aerobic exercise training in the control group.
- The mean of sleep duration has decreased from 1.25 to 1.15 after the performing of aerobic exercise training in the experimental group (8% improvement) and there was an 8% decreasing too.
- The mean of sleep efficiency has decreased from 1.2 to 0.7 after the performing of aerobic exercise training in the experimental group (41% improvement) and there was no changing in the control group.
- The mean of sleep disturbances has not changed decreased after the performing of aerobic exercise training in the experimental group and there was a 16% increasing in the control group.
- The mean of Daytime dysfunction has decreased from 1.25 to 0.75 after the performing of aerobic exercise training in the experimental group (40% improvement) and there was no changing in the control group.
- The mean of quality of life has increased from 78.63 to 81.73 after the performing of aerobic exercise training in the experimental group (4% improvement) and it has decreased from 83.65 to 83.11 (1% decrease) after the performing of aerobic exercise training in the control group.
- The mean of mental health has increased from 75.2 to 76.4 after the performing of aerobic exercise training in the experimental group (2% improvement) and it has decreased from 81.4 to 80.2 (1%

decrease) after the performing of aerobic exercise training in the control group.

- The mean of physical function has increased from 82.25 to 86.25 after the performing of aerobic exercise training in the experimental group (5% improvement) and there was no changing in the control group.
- The mean of social function has increased from 75.62 to 82.5 after the performing of aerobic exercise training in the experimental group (9% improvement) and there was no changing in the control group.

According to the results of Shapiro-Wilk test showed that sleep quality and quality of life data were normally distributed at the independent levels. But mental quality, sleep latency, sleep efficiency, daytime dysfunction, physical function, social function, and mental health data were not normally distributed at the independent levels.

According to the results of dependent T-test, there is a significant difference between before and after aerobic exercise training in non-athlete male students' sleep quality ($P=0.000$, $t=5.358$). Also, there is a significant difference between before and after aerobic exercise training in non-athlete

male students' quality of life ($P=0.000$, $t=-6.695$).

The results of Wilcoxon test showed:

- There is a significant difference between before and after aerobic exercise training in non-athlete male students' mental sleep quality ($P=0.000$, $Z=-3.873$).
- There is a significant difference between before and after aerobic exercise training in non-athlete male students' mental sleep latency ($P=0.007$, $Z=-2.714$).
- There is no significant difference between before and after aerobic exercise training in non-athlete male students' mental sleep duration ($P=0.480$, $Z=-0.707$).
- There is a significant difference between before and after aerobic exercise training in non-athlete male students' mental sleep efficacy ($P=0.002$, $Z=-3.162$).
- There is no significant difference between before and after aerobic exercise training in non-athlete male students' mental sleep disorders ($P=1.000$, $Z=0.000$).
- There is a significant difference between before and after aerobic exercise training in non-athlete

- male students' mental daytime dysfunction ($P=0.008$, $Z=-2.673$).
- There is a significant difference between before and after aerobic exercise training in non-athlete male students' mental physical function ($P=0.001$, $Z=-3.358$).
 - There is no significant difference between before and after aerobic exercise training in non-athlete male students' mental sleep quality ($P=0.199$, $Z=-1.285$).
 - There is a significant difference between before and after aerobic exercise training in non-athlete male students' mental sleep quality ($P=0.008$, $Z=-2.636$).

DISCUSSION AND CONCLUSION

The purpose of this study was to examine the effects of 4-week of aerobic exercise training on non-athlete male students' sleep and life quality. According to the results of this study, we can conclude that 4-week exercise training had been effective on non-athlete male students' sleep quality. According to the results of this study, we can conclude that 4-week exercise training had been effective on non-athlete male students' sleep quality. This finding is consistent with the results of Lang, et al, (2013); Wang and Youngstedt (2014); and Erlacher et al,'s (2014)

study. Lang et al, (2013) stated that both scientists and the general public assume that physical activity (PA) is an effective, non-pharmacological approach to improvement in sleep quality. However, objective and reliable data on this relationship are scarce, particularly for adolescents. Therefore, the aims of their study were to test the relationship by assessing both physical activity and sleep subjectively and objectively. A total of 56 adolescent vocational school students (Mean age=17.98, SD=1.36; 28 males, 28 females) participated in the study. Sleep and PA were subjectively assessed via questionnaires. Accelerometers objectively assessed PA, while sleep-EEG devices objectively assessed sleep. The data supported our prediction that adolescents with high PA levels would have longer TST, fewer wakening at night (WASO), fewer symptoms of insomnia, and higher sleep quality. However, gender influenced this pattern of results in that significant findings were only found between high self-reported PA levels and shorter perceived sleep onset latency (SOL). Though self-reported PA levels were a better predictor of good sleep than objectively assessed PA levels, gender was associated with sleep complaints; females reported more sleep complaints. Results indicate that among a non-clinical

sample of adolescents increased PA is favorably associated with restoring sleep. Therefore, PA seems beneficial not only for physical and mental health, but also for sleep restoration (Lang et al, 2013). Wang and Youngstedt (2014) examined the sleep quality improved following a single session of moderate-intensity aerobic exercise in older women. Fifteen healthy, non-obese (body mass index = 24.4 ± 2.1 kg/m², mean \pm SD), sedentary (<20 min of exercise on no more than 3 times/week) older women (66.1 ± 3.9 years) volunteered for the study. Subjects wore a wrist ActiGraph monitor (GT3X+; ActiGraph, Pensacola, FL, USA) 24 h each day for 7 days at baseline, and 48 h after each exercise session. This study showed that a single session of moderate-intensity exercise improved sleep quality in older women (Wang & Youngstedt, 2014). Erlacher et al, (2014) studied the effects of exercise on sleep in adults with chronic sleep complaints [21]. The present study reports supplementary analysis of an already described and published study. Data were provided by a nonclinical sample of 98 normal-active adults with chronic initiating and the maintaining of sleep complaints. The results indicate that the number of steps ($p = 0.02$) and the duration of physical activity ($p = 0.01$) is significantly related to the

improvement in subjective sleep measures and therefore reveal an independent effect within this combined sleep program. Sleep diary data (recuperation of sleep, number of awakenings after sleep onset, and wake time after sleep onset time) improved significant (all $p < 0.01$) over the intervention program (Erlacher et al, 2014). Since the results of this study are consistent with the results of above studies, it seems that the sleep is an active and complex experience and different factors are effective on the sleep quality and quantity (Shapiro, 1982). In this regards, we can imply to the reasons such as warm feet promote the rapid onset of sleep (Krauchi et al, 1999). The amount and concentration of melatonin that it is the sleep hormone is affected by exercise (Atkinson et al, 2003). According to body reconstruction theory, a high energy that is expended for physical activities should be provided in the rest state of body due to an appropriate balance of energy and the maintaining of body balanced condition so body will be more willing to rest (Driver & Taylor, 2000). On the other hand, the increasing of a stimulation of growth hormone stimulation is occurred in the NREM sleep state that all these will improve the regulation of sleep and will lead to maintain the energy of body (Montgomery & Dennis, 2002). The studies showed that

individuals' quality of life may be affected by insomnia symptoms such as the sleep latency in onset sleep and the sleep maintaining (Schubert et al, 2002). Insomnia is more common sleep disorder and the sleep disorder is an earliest symptom of mental disorders in most cases (Kaplan & Sodok, 2002). Chronic insomnia can affect the quality of life (Idzikowski, 1996). According to the above points, we can say that the scores of quality of life have increased significantly in the subjects. In addition, significant changes were not created in sleep disorders with referring to the low mean scores of sleep disorders factor in the subjects. According to the results of this study, we can conclude that 4-week exercise training had been effective on non-athlete male students' quality of life. This finding is consistent with the results of Fuentes and Diaz (2010); Moghadam et al, 2014; and Mir Ghafourvand et al,'s (2013) study. Fuentes and Diaz (2010) examined the relationship between the acquisition of tennis skills with sleep quality and quality of life. 33 subjects were tested by Pittsburgh Sleep Quality Index (PSQI), Quality of Life Questionnaire (SF-36), the Beck Depression Inventory, and the Thematic Apperception Test (TAT) in two hours per week (12 weeks). The results of this study showed that there is a

significant relationship between sleep quality and quality of life but there is no significant relationship between tennis instruction and sleep quality and quality of life (Fuentes and Diaz, 2010). Moghadam et al, (2014) examined the effects of aerobic exercise on menopausal symptoms and non-athlete postmenopausal women's quality of life. The subjects were 50 women (45-60 years old). They performed 8 weeks of aerobic trainings. The results of this study showed that 8 weeks of aerobic trainings decreased significantly the menopausal, physical, and mental symptoms, anxiety, and depression and increased non-athlete postmenopausal women's quality of life (Moghadam et al, 2014). Mir Ghafourvand et al, (2013) investigated the effects of aerobic exercise on married menopausal and postmenopausal women's quality of life. They concluded that aerobic activities improved menopausal and postmenopausal women's quality of life (Mir Ghafourvand et al, 2013).). Since the results of this study about quality of life are consistent with the results of above studies, researchers believe that most health problems such as limited physical activities, physical, mental, and social problems and overall individuals' general health have relationship with their sleep. The results of Zammit et al,'s (1999) study showed that mental health

and quality of life have relationship with good sleep (Zammit et al, 1999). According to the positive effects of exercise on the quality of life, we can conclude that this positive changing may be affected by the increasing of subjects' sleep quality. Since quality of life is more important components of health (Park, 2010). Thus it can be one of consequences of health assessment in physical and mental dimensions (Liu, 1976). As regards many studies about the relationship between exercise and quality of life have showed that how exercise can have positive effects on individuals' physical function so the significant of physical function factor and the decreasing of daytime dysfunction and social function factors can be affected by subjects' quality of life in this study (Seong, 2013). Since the sleep duration is a subscale of sleep quality and sleep quality was significant in this study but the sleep duration factor of falling sleep was not significant so sleep disturbances as a subscale of sleep quality was not significant too. Also mental health as a subscale of quality of life has not been a significant changes. Thus, the results of this study are consistent with the results of Souissi's (2003) study on this issue. Souissi's (2003) examined the effect of one night's sleep deprivation on anaerobic performance in the

morning and afternoon of the following day. The results of this study showed that the sleep deprivation reduced the difference between morning and afternoon in anaerobic power variables. Anaerobic performances were unaffected after 24 h of wakefulness (Souissi, 2003). In this regard the studies suggest that the problems and short sleep duration have irreversible effects on health so that sleep restrictions lead to negative effects on the health, quality of life, and function (Joseph et al, 2000). We can say about this issue that the sleep duration is affected by the gender and age (Groeger & Zijlstra, 2004). So it seems that the lack of changing in the scores mean of sleep duration is affected by gender and age in this study. In addition, the acquired scores in the pre-test and post-test were respectively 1.05 ± 0.75 and 1.05 ± 0.69 in the sleep disturbances and 75.2 ± 7.74 and 76.4 ± 6.97 in the mental health. According to the pre-test scores, it can be observed that there have not been a disorder in the sleep disturbance and mental health moreover the effects of age and gender so there was not a significant change in the sleep disturbance and mental health in this study.

According to the results of this study, we can conclude that the performing of aerobic exercise trainings have a positive effect on the sleep and life quality due to the

decreasing of scores mean in the sleep quality factor with mental sleep quality, sleep latency, sleep efficiency, and daytime dysfunction subscales in this study, the increasing of scores mean of quality life factor with physical and social function subscales and with attention to the maintaining body energy, body reconstruction theories, effects of growing and melatonin hormone on the sleep quality, and the improving of the quality of life as well. In addition, we can conclude that aerobic exercise trainings were unaffected on the sleep disturbances and mental health due to the distribution of scores was normal in the experimental group and subjects have not been sleep disorders on the pre-test. Also we can conclude that aerobic exercise trainings were unaffected on the sleep duration that it can be due to the subjects' gender (male) and Kripke et al's (2002) expressions (the effects of gender differences on the sleep quantity and quality). Therefore, we suggest that non-athlete students can participant in the physical activities to improve their sleep quality.

REFERENCES

1. Atkinson G, Drust B, Reilly T, Waterhouse J, 2003.Relevance of melatonin to sports medicine and science. *Sports Med.* 33: 809-831.

2. Brownlow F, 2012. Exercise as a Treatment to Enhance Sleep University student.*American Journal of Lifestyle Medicine.* 4(6): 500 -514.
3. Buboltz WC Jr, Brown F, Soper B, 2001. Sleep habits and patterns of college students: a preliminary study. *J Am Coll Health.* 50:131-5.
4. Driver HS, Taylor SR, 2000.Exercise and sleep.*Sleep Medicine Reviews.*4: 387-402.
5. Dua JS, Cooper AR, Fox KR., 2010. Exercise training in adults with congenital heart disease: feasibility and benefits. *Int J Cardiol,* 138 (2010), 196–205.
6. Elavsky S, Mcauley E, 2007.Lack of perceived sleep improvement after 4-month structured exercise programs.*J North American Menopause Society.* 14: 535-40.
7. Erlacher C, Erlacher D, Schredl, M, 2014.The effect of exercise on self-rated sleep among adults with chronic sleep complaints.*Journal of Sport and Health Science.* 1-10.
8. Fuentes J, Díaz C, 2010.Analysis of heart rate during a tennis training session and its relationship with heart-healthy index. *J Sport Health Res.* 2 (1): 26-34.

9. Gau SS, Kessler RC, Tseng WL, Wu YY, Chiu YN, Yeh CB, Hwu HG, 2007. Association between sleep problems and symptoms of attention-deficit/hyperactivity disorder in young adults. *Sleep*, 30(2): 195-201.
10. Gilbert SP, Weaver CC, 2010. Sleep quality and academic performance in university students: A wake-up call for college psychologists. *Journal of College Student Psychotherapy*. 24(4): 295-306.
11. Groeger J.A, Zijlstra FR, 2004. Sleep quantity, sleep difficulties and their perceived consequences in a representative sample of some 2000 British adults. *J Sleep Res*.13: 359-371.
12. Idzikowski C, 1996. Impact of insomnia on health-related quality of life. *Pharmacoeconomics*. 10(1): 5-24.
13. Imayama I, Alfano CM, Cadmus Bertram LA, Wang C, Xiao L, Duggan C, Campbell KL, Foster-Schubert KE, McTiernan A., 2011. Effects of 12-month exercise on health-related quality of life: A randomized controlled trial. *Preventive Medicine*. 52: 344-351.
14. Kaplan H, Sadok VA, 2002. Normal sleep and sleep disorder. In: Kaplan H, Sadok VA, Eds. *Synopsis of psychiatry*. 9th ed. Philadelphia: Lippincott Williams & Wilkins.
15. Kathryn J, 2011. Aerobic exercise improves self-reported sleep and quality of life in older adults with insomnia. *Sleep Med*.
16. Krauchi K, Cajochen C, Werth E, 1999. Physiology warm feet promote the rapid onset of sleep, *Nature*. 401: 36-37.
17. Kripke DF, Garfinkel L, Wingard DL, Klauber MR, and Marler MR, 2002. Mortality associated with sleep duration and insomnia. *59*:131-136.
18. Lang C, Brand S, Feldmeth AK, Holsboer-Trachsler E, 2013. Increased self-reported and objectively assessed physical activity predict sleep quality among adolescents. *Journal of Psychology & Behavior*. 46-53.
19. Lamond N, Jay SM, Dorrian J, Ferguson SA, Jones CB, Dawson D, 2006. The dynamics of neurobehavioral recovery following sleep loss. *J Sleep Res*. 16: 33-41.

20. Liu T, 1976. Quality of life. concepts and definition *Journal Aim Symptom manage.* 1976-25.
21. Mir Ghafourvand M, Alizadeh S, Nejat S, Asghari M, 2013. The effects of aerobic exercise program on quality life in per-menopausal and menopausal women. *Iranian Journal of Obstetrics Gynecology and Infertility.* 17(114): 19-26.
22. Moghadam Z, Bijeh N, Javaheri AA, 2014. The effects of aerobic exercise on menopausal Symptoms and non-athlete postmenopausal women's quality of life. *Bimonthly Journal of Urmia Nursing and Midwifery Faculty.* 13(3): 173-182.
23. Montgomery P, Dennis J, 2002. Physical exercise for sleep problems in adults aged 60+. *The Chchrane Database of Systematic Reviews.* 4, Cd003404.
24. Park YD, Patton LL, Kim HY, 2010. Clustering of oral and general health risk behaviors in Korean adolescents: A national representative sample. *J Adolesc Health.* 47 (3):277-81.
25. Rajmil L, Roizen M, Psy AU, 2012. Health related quality of life measurement in children and adolescents in Ibero-American countries, 2000 to 2010. *15 (2): 312-22.*
26. Schubert CR, Cruickshams KJ, Dalton DS, Klein BEK, Klein R, Nondahl DM, 2002. Prevalence of sleep problems and quality of life in an older population. *Sleep.* 25(8): 889-893.
27. Seong-Hi Park, 2013. Effects of exercise programs on depressive symptoms, quality of life and self-esteem in older people: A systematic review of randomized controlled trials. *Applied Nursing Research.*
28. Shabani bahar GR, Nazem F, Pouraghaee Z, 2007. The effects of special training programs on non-athlete menopausal women's quality of life. *Journal of Sport Sciences.* 12: 123-133.
29. Shapiro CM, 1982. Energy expenditure and restorative sleep. *Biological Psychology.* 15: 229-239.
30. Souissi N, Sesboue B, Gauthier A, Larue J, Davenne D, 2003. Effects of one night's sleep deprivation on anaerobic performance the following day. *European Journal of Applied Physiology.* 89: 359-366.

31. Vaez Mousavi SMK, 2000. The comparison of quality of life in individual and team athletes. *Research in Sport Sciences*.3: 83-93.
32. Wang SD, & Youngstedt SD, 2014. Sleep quality improved following a single session of moderate-intensity aerobic exercise in older women: Results from a pilot study, *Journal of Sport and Health Science*. 3(4): 338-342.
33. Youngstedt SD, 2014. Effects of exercise on sleep. *Clinics in Sports Medicine*. 24(2): 355-365.
34. Zammit GK, Weiner J, Damato N, Sillup JP, McMillan CA, 1999. Quality of life in people with insomnia. *Sleep*. 22: 379-385.