International Journal of Biological and Pharmaceutical Sciences Archive

ISSN: 0799-6616 (Online)

Journal homepage: https://ijbpsa.com/

(RESEARCH ARTICLE)

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Melatonin evaluation of obesity women during heavy aerobic exercise in Kirkuk university

Nasreen Kader Kamel *

Department of Pharmacology and Toxicology, College of Pharmacy, Kirkuk University, Iraq.

International Journal of Biological and Pharmaceutical Sciences Archive, 2022, 03(02), 026–033

Publication history: Received on 18 March 2022; revised on 20 April 2022; accepted on 22 April 2022

Article DOI: https://doi.org/10.53771/ijbpsa.2022.3.2.0039

Abstract

The impacted of heavy aerobic exercise on lipid peroxidation during determination the Malondialdehyde (MDA) level has been examined in young training obesity women under melatonin bellowing the free radical formation ;So this study aimed to objective the incurring role of melatonin for lipid peroxidation by regulation hepatic enzyme and lipid profile administration.

Methods: This study done faculty of physical Education, Kirkuk university at three months from January to march-2022.

Result: The study included healthy young women has body mass index(BMI) ranged more than30kg/m^2 ,age ranged between18-35years.Total includingat 50 healthy young women (25 trained and 25 non training healthy) performed an aerobic cycling exercise at threshold for about 2 hours daily untile40days. The venous blood sample was drawing (pre and post exercise finishing) and analyzing for measuring malondialdehyde(MDA) , glutathione(GSH) ,melatonin ,nitric oxide(NO) ,hepatic enzymes are(lactate dehydrogenase-LDH, aspartate-AST, alanine aminotransferase-ALT ,lipid profile which is low density lipoprotein-cholesterol(LDL-c),high density lipoprotein-cholesterol(HDL-c),triglyceride(TG) and glucose in the serum ,so the (MDA) level in obese women that aged more than25 years is(5.93+1.68) mmol/l than control groups(3.97+0.14) mmol/l, but maximum level of melatonin in women aged less than18years is(23.81+5.61) mmol/l than control groups(23.95+0.15)mmol/l; therefore,the level of Nitric oxide in women age ranged more than25years(127.67+7.85) mmol/l is highly than the control groups(12.75+2.24)mmol/l, because the level of hepatic enzyme(ALP)(97.11+4.22)IU/l in women aged more than25years,while the level of(ALT)in women aged less than25years is significantly decreased(35.61+9.91)IU/l ;therefore ,the level of LDL-c is(4.8+0.11)mmol/l after exercise less than control groups(4.97+0.11) mmol/l ,while the level of HDL-c in control groups is(2.32+0.11) mmol/l and gradually increased after exercise(1.93+0.12) mmol/l when the glucose concentration is(193+0.12) mmol/l before exercise.

Conclusion: The development of obesity lead to increased lipid peroxidation and elevation hepatic enzyme for controlling of oxidative stress in the tissue by melatonin attenuated reactive oxygen species that releasing in the obese healthy women after optimal time of heavy aerobic exercise.

Keywords: Melatonin; Heavy exercise; MDA; NO; HDL-c; Hepatic enzyme

1. Introduction

The aim of the study to investigation the importance of melatonin for reducing the lipid peroxidation for obesity women during heavy aerobic exercise. Melatonin (is N-acetyl consist from 5-metheloxytryptamine), and secretory production

*Corresponding author: Nasreen Kader Kamel
Department of Drugs and Toxicology, College of pharmac, Kirkuk University, Iraq.

from pineal gland (1), which has many functions in the human body relationship to number of physiological and pathological condition (2), such as exerts directly antioxidant substances effectiveness due to free radical scavenging and indirectly through stimulation the activity of antioxidant substances such as glutathione within nitric oxide and may be exerted an anti-inflammatory response by bellowing the action of the free radicals for inhibition the lipid peroxidation in the tissue response's(3) in the human. Some study suggest that about 20%–25% of the populations are obese" therefore, the percentage of oxidative radical and reactive oxygen species in the obese human may be about 95% depending onthe degree of the obesity(4), when the prevalence of obesity increased lead to elevation the prevalence of lipid peroxidation through the fat accumulation in the liver parenchyma cells and highly storage in it(5). Melatonin is a hormone and this secretion is controlling by light intensity degree ;therefore, themelatonin play an important role in many biological functions, acts as an antioxidant substances and anti-inflammatory signaling for regulation heart rate and supporting the human immunity responses due to anticancer characteristic's must be inducing in the human (6). Some study suggested that, the melatonin regulation of the lipid metabolism due to decreased insulin resistance and decrease body weight for human(7), while the dyslipidemia is an important risk factor of obesity subjects which is associated with a highly incidence of coronary heart diseases and vascular events when damaging with oxidative free radicals ;therefore, the weight loss achieved with diet within aerobic exercise has shown a reduction of triglycerides (TG)level and elevation of high density lipoprotein-cholesterol (HDL) level during an aerobic exercise without diet restriction within weight loss has been evidence improvement of blood lipid profiles and decreased fat mass in the tissue for obese women(8), which is the most efficient models of exercise lead to improvement the response on lipid profile in the tissue(9). Some studies examined the effectiveness of different exercise model endurance training aerobic heavy exercise within resistance training an aerobic exercise both lead to combination on serum lipid levels in previously sedentary healthy adults human engaging aerobic heavy exercise intervention when the finding effecting of different exercise models on blood lipid profile and has been same levels(10). Some researchers have been criticized for methodological flawing and design limitation that has been making the result somewhat questionable due to these flawing has been included the lacking of separated controlling groups in the obese human and no dietary controlling(11) ,so the result from different exercise model have been conflicting fat mobilization and the antioxidant effects of melatonin has been designed as a neuroaprotective factor in the obese human(12) ,because it has been therapeutic values and used for treatment of Alzheimer disease (AD), Parkinson disease (PD) in human, an amyotrophic lateral sclerosis (ALS) within stroke state the brain trauma(13), this neurodegenerative disorders most be happen due to free radical mediated damaging within lipid tissue and mitochondria dysfunction in the tissue has been common pathophysiological mechanism by leading to Increase physical activity when the taking apart in aerobic endurance actively within resistance training during flexibility exercises have been detection the decreasing of risk factors of several chronic diseases such as coronary heart disease and obesity with or without diabetes infection during low back pain and osteoporosis of sarcopenia when physical aerobic activity lead to increase the melatonin levels and decrease estrogen production in women for improved fat metabolism at obese women(14) . Melatonin is natural antioxidants could be crossed all barriers by reducing the oxidative damage in the body when the intensive exercises maybe caused abundant changes in immunity responses due to changing the carbohydrate and lipid metabolism that making the exercise subjects vulnerability has been infection in the aerobic heavy exercises by the melatonin protected the heart muscle cells and other body organs from heavy exercise and inflammation in obese subject because thestrenuous aerobic exercise during muscle injury leads to protein degradation and encouraged the muscle injury(15); however the aerobic exercise lead to extended the muscle injury and blunted due tothe melatonin is effective factor for muscle injury could be limited the muscle injury in the healthy obese human(16).

2. Material and methods

2.1. Subjects

In the Kirkuk university's at faculty of physical Education boarding approved the training aerobic exercise by Walking and Elliptical exercise apparatus for healthy obese women. A total of 50 (n=25 sedentary healthy non obese women control and n=25 trained healthy obese women, age ranged at 18-42years, BMI more than 35 kg/m^2) included in this study ,Table 1 indicates the basic features of the participation at the beginning of the study. Trained women and animations of regular training least four time each week untile40days and done in Kirkuk university at college of Sporting socialization from January to march-2022.

2.2. Biochemical analysis

Blood was taken from the jugular vein for all women and total of(10ml) for putting in the tubes and left for 10minand heparinized for plasma up taken during separated by centrifugation at 800 x g rpm for 10 min(17) ,while the aliquot was stored at -80oC for analysis to collection the serum and the biochemical parameters were measuring after 3weeks and finishing the exercise of obese women after40days by measuring the plasma AST, ALT, LDH, melatonin ,MDA ,GSH,

NO, Lipid profile and glucose level were determined in the serum after finishing exercise and at 3weeks by using routine colorimetric methods on a Roche modular autoanalysing kit (Roche modular autoanalysing machines Tokyo - Japan).melatonin obtained by Sigma Chemical Co. (St. Louis, USA) within reagent kits from Calbiochem origin (La Jolla, CA, USA)for OXIS (OXIS International Inc in the USA).MDA level was determined by using the fluorometric method Wasowich et based on thiobarbituric acid(TBA) reactivity(18). Hepatic enzyme levels was measuring according on the slope of the absorption curves set at 450 nm and the stand art curve of MPO activity was obtaining previously through the commercial enzymes batch (Sigma point),while the reducing glutathione substances was measuring by 5, 5-dithiobis-(2-nitro- benzoic acid) (DTNB) methods of Prims and Loos (1969) in plasma suspension and concentration in the test sample was calculating by employing's the molar extinction coefficient of DTNB-GSH and conjugate (ηmol/mg Hb), 13600/M/cm. (19). Result has been expressed as mmol MDA/L plasma, using the extinction coefficient of MDA-TBA complex reagent at 532 nm which is equals = 1.56 x 10−5 cm−1 M−1 solution(19). by depending on the slope of the absorption curve set at 450 nm. A stand at curve of MPO activation was obtained and previously with a commercial enzyme batch (Sigma unit)().Serum melatonin hormone was measuring quantitatively by using ELISA kit (CUSABIO from China) and GSH levels were measuring according to (20) method . Nitric oxide levels were determination depending on spectrophotometric ally according to Alamn Zeb (2016) methods (21).A total cholesterol was measuring by enzymatic reagent called(CHOD-PAP)and colorimetric for determination the triglyceride levelby3micro/l,Guarulhos at SP from Brazil and incubated for20 min(25c0) and good[PH=6.8,50MM0L/L]chlorophenol reagent[2mmol/l] lipoprotein lipase[>800U/L,GK(>500U/L] and triglyceride absorbance was determination by spectrophotometer [Spectra Max i3, molecular and Devoicing; SanJ OSE, CA, USA] at 505nm according on the kit guideline(22), but the glucose was measuring by the spectrophotometer[spectramaxi3,molecular devices, SanJose ,CA,USA]at 505nm depending on the kit guide lining(23).

2.3. Statistical analysis

Utilizing the results are shown as mean ± SEM and Significance was determination by unpaired Student's t test at p value less than 0.05 two groups of healthy women was considered significantly.

2.4. Dissection

Exercise has dilatation effectiveness on melatonin secretion depending on the duration and type of aerobic exercise through the time cycling daily within the fitness status, show the Table2 and this result agree with(24) ;but the age ranged has been known acts as intervening factors in the heavy aerobic exercise due to inducing the changes in the melatonin levels and this result agree with (25).Table 4 showing the fat accumulation represented by cholesterol within LDL-c levels and which lead to decrease in hepatic enzyme release ,show table2 and this result agree with(26). A bellowing down for melatonin level in obesity women as risk factors of oxidative stress and some study suggested that the melatonin supplementation was cause weight reduction and which could be elucidated the melatonin level when the action on body mass index has been therapeutic agent in obesity subjects tissue by decrease the mass of lipid and this study agree with(27).Melatonin has being an important role in the aerobic exercise by inducing metabolic adaptation due to acts as a mediator between environment situation and physiological design style(28), so the melatonin effects on the lipid profile and glucose regulation during acts on the GLUT 4 (glucose transporter) and lead to decrease the level of glucose ,show Table4 and this result agree with(29). In this study we show the aerobic heavy training exercise has accompany worker of melatonin levels in the obese exercise women during both of them stimulate TG uptake by hepatic cells within Insulin resistance and increase GLUT 4 protein activity and lead to decease the glucose levels in the plasma and this result agree with(30), some study was reported that women healthy obesityundergo aerobic training exercise did not diagnosing any metabolic evaluations in the different age ranged which is represented by MDA&LDL-c levels ,show Table5, therefore ,the melatonin hormone plays key role in metabolic adaptation in both adipose tissue and muscle cells in obese training exercise women and healthy control women, this result agree with(31), because melatonin has been circadian rhythm for regulates metabolic mechanism within imbalance energy metabolism during circadian timing for period of the activity and adaptation timing of adult healthy human during heavy exercise, and this result agree with(32).Some study showing the effective of melatonin supplying on the aerobic exercise obese human and inducing the adaptation were examined two groups which is sedentary healthy control within trained control and sedentary whose treatment of Glucose tolerance groups in human by depending on physical capacity status for citrate synthesis from phosphatidylinositol 3kinase (PI3K)enzyme in mitogen unit during activation of protein kinas(MAPK)within GLUT4 were examined(33). Following the 40days of aerobic exercise training women has been better result in this biochemical measuring and training create states is highly metabolic adaptation to improvement metabolism efficiency(34) , Therefore ,the combination of aerobic heavy exercise within melatonin are reducing in the exercise and inducing the free radical risk factors formation ;therefore the low to moderate levels of free radicals have been regulatory level of melatonin supplementation and lead to create a highly metabolic adaptation for improved the metabolism efficiency through the combination of aerobic heavy exercise ,show Table2 and this result agree with(35),while the melatonin elevation and melatonin supplementation in the aerobic training exercise could be decreased

the lipid oxidation and malondialdehyde which is lipid peroxidation most recurrently markers in obese women and this result agree with(36) ,so the long term aerobic training exercise could management the lipid profile of subjects combination within the melatonin protective effectiveness for aerobic training exercise for against the free radicals advancing due to the body antioxidant defense mechanism improvement and this result agree with(37); increase aerobic heavy exercise lead to energy expenditure by the nervous system controlling the melatonin secretion through the sympathetic nervous system activity increased lead to secretion norepinephrine neurotransmitter within catecholamine secretion maybe modulate melatonin secretion in obesity women whose training aerobically exercise after one week in present study which is agree with(38) . Melatonin acts as antioxidant agent , therefore could be increased LDL receptor signaling and inhibition cholesterol synthesis maybe useful for controlling obesity fat adsorption by depending on long term endurance training heavily exercise when the melatonin hormone reached in the steady state in obese women during heavy exercise and this result agree with(39)show table4 comparing with control groups non training exercise women ; there for, the direct positive correlation between melatonin levels and exercise duration daily lead to increase the level of melatonin gradually at last for 40 days of aerobic heavy exercise and this result agree with(40).This study was reported that, the low intensity aerobic training has better adaptation and lipid peroxidation prevention in obesity women during exercise ,when melatonin changed for about 3weeks lead to improved dyslipidemia states due to decreased the LDL-c level and cholesterol for improvement lipid metabolism ,show Table4 and this result agree with(41); However, the aerobic heavy exercise mediated responses of MDA levels in trained obesity women and control healthy women by the pact of aerobic exercise effectiveness on MDA level in obese women within highly fitness levels for exercise women in the normal fitness levels for control groups and agree with(42). The elevation in oxygen species in lipid peroxidation lead to MDA levels increased which agree with other report research's which represented that, the melatonin administrationfor30 min before the exercise impressively lead to decrease the triglyceride and MDA levels(43).Table (2)showing a significant decrease in melatonin hormone in both groups of obese women age ranged more than 25 years when compare to control group, and this result agree with(44)at (p> 0.05), while the mean level of GSH also significantly decrease in obese training exercise women when compared to healthy control women (p> 0.05). Both MDA and NO were significantly rises in the obese training women whose age ranged more than 25years, while MDA not showing difference between studied groups that age ranged less than25years,show table2 and this result agree with(45).The range of weight in obese women when compared to control healthy groups is highly ranged ,show Table5 and this result agree(46)which lead to elevated the level of cholesterol in obese women(47)and the melatonin hormone act as controlling factor for glucose metabolism action during insulin releasing and food intake for obese training exercise women, which is limitation of body weight and could be lead to a decline of adipose tissue and fat accumulation in the body then lead to decreased in the hepatic statuses represented in the hepatic enzyme level in the obese women whose training heavy exercise, show Table1 has been age ranged more 25years,and this result agree(48),but a decrement states for controlled oxidative markers in obese women has been age ranged more than25years,this study agree with(49). Some study suggest that, the melatonin treatment was cause weight reduction and could be elucidated the melatonin action on body mass index and reduced glutathione level(GSH) has been decreased reactive oxygen species such as Nitric oxide (NO) but the increasing of the NO levelslead to induce Anti-inflammatory signpost was associated with tissue damaged has major role for inducing reactive oxygen species evaluation by melatonin secretions and this result agree with(50)shoe table5.,so the NO was found to be significantly elevation in the advance form of obese subjects and the NO has been a major role in the process of fibrosis in the obese women and therefore significantly decreased in the obese women ,this result agree with(51).

3. Results and discussion

Table 1 level of hepatic enzyme ALT, AST, ALP in aerobic heavy exercise(n=25) p value>0.05

Obese women aged	ALT(IU/l)	AST(IU/l)	ALP(IU/l)
More than 25 years	49.41±5.22	54.56±5.93	97.11±4.22
Less than 25 years	35.61±9.91	40.45±6.85	45.11±4.64
Less than18 years	35.83±5.63	41.23±4.7	93.17+±5.47

The present study showing that, there was a significant difference in both ALT(49.41±5.22, 35.61±9.91) and AST(54.56±5.93, 40.45±6.85mmol/l) in women age ranged more than25 and less than25years respectively when compared to groups age ranged less than18years(35.83±5.63 , 41.23±4.7) ,but ALP increased at age ranged more than25years(97.11±4.22)compared with groups age ranged less than18years(93.17+±5.47) show table1,so the melatonin at age ranged more than25years(17.42±5.45)decreased significantly than at age ranged less

than18years(23.81±5.61)Show table2. But the level of GSH increased significantly at groups age ranged less than18years88.63±4.35 than groups age ranged more than25years(56.57±1.79mmol/l)when the level of MDA in groups at age ranged more than25years(5.93±1.68)significantly increased than that age ranged less18years(4.35±1.49mmol/l);therefore the level of NO at age ranged more than25years(127.67±7.85)significantly increased than that age ranged less than25years(44.25±8.36mmol/l). However, the level of lipid profile significantly changed after exercise especially LDL-c has been decreased significantly after exercise(4.68±0.11)than before exercise(4.74±0.11mmol/l),and HDL-c increased significantly after exercise(1.98±0.21mmol/l),while the TG not significantly changed(2.13±0.16mmol/l) after training complete ,show table4according on level of cholesterol(5.44±1.11mmol/l) and BMI decreased significantly after exercise complete(26.91±1.74kgm^2)when prompted positively changed and blowing in the level of glucose after exercise finishing(119.6±1.37mmol/l).

Table 2 level of melatonin, GSH, MDA, NO in aerobic heavy exercise(n=25) p value>0.05 after3weeks of exercise

Obese women aged	Melatonin(mmol/l)	GSH(mmol/l)	MDA(mmol/l)	NO(mm0l/l)
More than 25 years	17.42±5.45	56.57±1.79	5.93±1.68	127.67±7.85
Less than 25 years	16.63±4.94	71.43±1.55	5.86±1.46	44.25±8.36
Less than 18 years	23.81±5.61	88.63±4.35	4.35±1.49	72.67±4.51

Table 4 MDA,lipid profile before& after heavy aerobic exercise (n=25)Time exercise 40days

Parameters	Before exercise	After exercise
Cholesterol(mmol/l)	6.66±1.54	5.44±1.11
TG (mmol/l)	2.11±0.13	2.13±0.16
HDL-c (mmol/l)	1.96±0.13	1.98±0.21
LDL-c (mm0l/l)	4.74±0.11	4.68±0.11
MDA(mmol/l)	3.92±0.15	3.56±0.14
BMI (Kg/m^2)	30.22±1.34	26.91±1.74
GSH (mmol/l)	19.55±0.15	37.9±0.29
Glucose (mmol/l)	193±0.12	119.6±1.37

Table 5 level of MDA, GSH, NO, lipid profile in control &exercise women(n=25)

Parameters	Control women	Exercise women after optimal time
Age(years)	32.18±1.89	26.87±1.14
BMI(Kg/m^2)	23.9±1.31	29.22±0.43
Cholesterol(mmol/l)	4.43±0.11	6.44±0.11
TG(mmol/l)	1.45±0.12	2.37±0.34
HDL-c(mmol/l)	2.32±0.11	1.93±0.12
LDL-c(mm0l/l)	4.97±0.11	4.81±0.11
MDA(mmol/l)	3.97±0.14	3.94±0.11
GSH(mmol/l)	12.19±0.43	19.79±0.29
NO(mmol/l)	12.75±2.24	3.79±0.15
Melatonin(mm0l/l)	23.95±0.15	16.69±0.90

The table 5 detection the significantly decreased in the level of melatonin(16.69±0.90mmol/l) and NO(3.79±0.15mmol/l) in the exercise women after3 weeks compared to control groups (23.95±0.15, 12.75±2.24mmol/l)according on the level of MDA and LDL-c in the exercise women(3.94±0.11 , 4.8±0.11mmol/l) whileincreased the level of GSH in the exercise women(19.79±0.29mmol/l)and cholesterol(6.44±0.11mmol/l)after3 weeks compared to control groups(12.19±0.43 , 4.43±0.11mmol/l).

4. Conclusion

The study concluded that ,the melatonin level bellowing in the Obese healthy women when compared to healthy non obese women , and the oxidative stress markers effected in them by elevation MDA levels, the depletion of plasma glutathione level and antioxidant substances activity has been acts as a state of the management Of the systemic oxidative stress damaged for responsiveness and the aggravation of the pathophysiological processes in obese healthy women during restricting the lipid peroxidation within modulatory effects on the immunity responses, So the present study are showing the diurnal variations in the heavy aerobic exercise responses and adaptation for comprehensively identification recording on an optimum exercise time and coincided duration were existed as the individual's healthily obese women and fitness status absence in the chronic and acute risk factors of any inflammation markers in healthy obese women.

Compliance with ethical standards

Acknowledgments

We are highly thankful toCollege of pharmacy and Veterinary of the Kirkuk University forProviding me the necessary facilities and measuring all biochemical parameters and we hope to premising thankful everyone who help me to complete this research's in Kirkuk city especially Kirkuk hospitals.

Statement of informed consent

A written informed consent was obtained from all participants.

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