

# Relationship between melatonin hormone and lipid profile of patients with myocardial infarction in Thi-Qar Governorate

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**Abstract**— The present study was designed to detect the relationship between melatonin hormone and lipid profile in patients with myocardial infarction (MI). The results showed that there was no significant difference in the level of melatonin in all MI patients, men and women patients compared with the control group. Additionally the results indicated that there was no significant difference of melatonin in men patients compared with women patients. Moreover, results indicated that there was a significant increase in levels of TG and LDL in patients compared with the control group. The results showed that there was no significant difference in level of TC, HDL and VLDL in MI patients compared with control group. Meanwhile, the results indicated that there was no significant difference in level of TC, HDL, TG, LDL and VLDL in women patients and men patients compared with control group. Furthermore the results showed that there was no significant difference in the level of TC, TG, VLDL and HDL in men and women patients when they compared between them, while showed significant increase in the level of LDL in women patients compared with men patients.

## I. INTRODUCTION

Myocardial Infarction (MI) is a term used to describe the necrosis of the heart muscle because of the absence of the myocardium oxygen that cannot be gave by the coronaries. It is characterized by pains in the chest or discomfort which may mobile into the shoulder, arm, back, neck and jaw (Bęćkowski, 2015; Ugwu *et al.*, 2016). Approximately 90% of myocardial infarction results from an acute thrombus that blocks an atherosclerotic coronary artery (Domma and Gamal, 2015). The pathogenesis of atherosclerosis contains lipid deposition, inflammation, thrombosis, smooth muscle cell cloning, endothelial dysfunction and other processes (Nofe *et al.*, 2010; Zhou *et al.*, 2018; Zhao *et al.*, 2019). Melatonin is known as a hormone of night which, is an indole amine with the chemical name (N-acetyl-5-methoxytryptamine), the melatonin formula  $C_{13}H_{16}N_2O_2$ . Circulating plasma concentrations are stashed by the pineal gland, in mammals (Simonneaux and Ribelayga, 2003). Melatonin brings

around vasoconstriction through the MT1 and vasodilation through the MT2 receptors (Masana *et al.*, 2002). Some of the biological effects of melatonin are related to its gift to effectively scavenge free radicals and enhance the activity of antioxidant enzymes (Galano *et al.*, 2013).

## II. MATERIALS AND METHODS I

### A. Study population

Target population of this study was 70 patients (35 men) and (35 women) who are already diagnosed as MI patients by the consultant medical staff in the Heart-Center, Thi-Qar Governorate, Iraq. The study was during the period from December 2019 to April 2020. A control group is composed of 35 healthy people (19 men) and (16 women) with the same age range.

The melatonin hormone measured by ELISA method, and lipid profile of cholesterol. Triglyceride and high density of lipoproteins were measured by using colorimetric methods while low density lipoprotein and very low density lipoprotein were detected by using equation.

### B. Blood sample

The blood samples were obtained by venipuncture, from patients and the control group. The blood samples were collected in a gel tube, and left for 15 minutes at room temperature to clot. Then, it was centrifuged at 3000 rpm for 10 minutes to collect serum and kept in the freezer (-20°C) until use unless used immediately to analyze biochemical parameters.

### C. Melatonin assay

The melatonin levels were analyzed in duplicate using commercially available Human MT ELISA kit. This ELISA kit applies to quantitative determination of human MT concentrations in serum and the minimum detectable dose defined as the lowest protein concentration that could be differentiated from zero.

#### D. Determination of lipid profile level

The lipid profile of cholesterol, triglyceride and high density of lipoproteins were measured by using colorimetric method described by (Allain *et al.*, 1974). While low density lipoprotein and very low density lipoprotein was detected by using equation.

#### E. Statistical analysis

The statistical analysis proceeded in all groups of study, descriptive statistics analyzed by (using Chi-square) and independent sample t- test were performed using mean and standard deviations (SDs) for continuous variables (p-value < 0.05) was considered to be significant. All analyses were performed with statistical Package for the social science SPSS for windows (version 23.0 SPSS Inc, Chicago, 111).

### III. RESULTS AND DISCUSSION

#### A. Melatonin level in MI patients and control group

The results of the present study showed that there was no significant difference of melatonin level in all MI patients, men, and women compared with the control group described in (Table 1).

Table (1): Melatonin Level in MI patients and control group

Parameter	Groups	N	Mean	S.D	T-value	p-value
Melatonin	Control	35	123.98	66.0	0.99	0.32
	patients	70	107.16	88.96		
Parameter	Men	N	Mean	Std. Deviation	T-value	p-value
Melatonin	Control	19	145.07	79.04	1.80	0.52
	patients	36	105.64	76.07		
Parameters	Women	N	Mean	Std. Deviation	T-value	p-value
Melatonin	Control	16	98.93	33.81	0.37	0.11
	patients	34	108.76	101.99		
*P-value less than 0.05 consider significant						

The melatonin secretion in the pineal gland increased rapidly in response to the MI supporting an important part for endogenous melatonin in protecting the heart after MI, ( Sallinen *et al.*, 2007). Mitochondrial dysfunction aggravates cell injury which then becomes a vicious cycle, melatonin breaks this vicious cycle by virtue of its potent free radical scavenging facility and antioxidant effects, thus play a protective role in myocardium such as ischemia--reperfusion injury (Reina and Martínez, 2018).

The results indicated no significant difference in melatonin level in men patients compared with women described at (Table 2)

Table (2): Level of melatonin in men patients and women patients

Parameter	patient	N	Mean	S.D	T-value	p-value
Melatonin	Men	36	105.64	76.07	0.14	0.88
	Women	34	108.76	101.99		
*P-value less than 0.05 consider significant						

There are also age-related and sex-dependent modifications in circadian rhythms which include decline in the amplitude of the circadian rhythm of sleep and waking, and a phase advance of numerous circadian behavioral rhythms in older subjects (Duffy and Dijk, 2002).

#### B. Level of lipid profile in MI patients and control group

The results indicated that there was no significant increase in the level of TC in MI patients compared with control group. On the other hand, the results showed a significant increase in level of TG and LDL in MI patients compared with control group, and the result indicated no significant difference in level of HDL and VLDL in MI patients compared with control group, ( Table 3). Also, showed no significant difference in level of TC, TG, HDL, LDL and VLDL in men patients and women patients compared with men control group (Tables 4-5). The results showed no significant difference in level of TC, TG, VLDL and HDL in men and women patients when they compared between them while showed a significant increase in level of LDL in women patients compared with men patients (Table 6).

Table (3): Level of lipid profile in MI patients and control

Parameter	Groups	N	Mean	S.D	T-value	p-value
TC	control	35	168.45	36.65	1.95	0.05
	Patients	70	185.20	43.64		
TG	Control	35	134.51	44.85	0.32*	0.009
	patients	70	164.47	58.31		
HDL	control	35	59.94	18.66	0.77	0.44
	Patients	70	57.35	14.813		
LDL	control	35	108.54	28.05	0.45*	0.005
	Patients	70	127.25	33.14		
VLDL	control	35	26.62	8.97	2.44	0.16
	Patients	70	32.05	11.50		
*P-value less than 0.05 consider significant						

Table (4): Level of lipid profile in men patients and control

Parameter	Men	N	Mean	Std. Deviation	T-value	p-value
TC	Control	19	173.78	48.07	0.47	0.47
	patients	36	179.83	38.78		
TG	control	19	131.57	46.97	2.22	0.52
	Patients	36	166.86	59.84		
HDL	Patient	19	56.26	17.37	0.83	0.70
	Control	36	60.05	15.36		
LDL	Patient	19	117.05	25.07	0.27	0.09
	Control	36	119.75	38.08		
VLDL	Patient	19	26.05	9.37	1.83	0.65
	Control	36	31.83	11.92		

\*P-value less than 0.05 consider significant

Table (5) Level of lipid profile in women patients and control

Parameters	Women	N	Mean	Std. Deviation	T-value	p-value
TC	control	16	162.12	34.07	2.56	0.74
	Patients	34	190.88	38.28		
TG	control	16	138.00	43.45	1.47	0.37
	Patients	34	161.94	57.43		
HDL	control	16	64.31	19.74	2.03	0.20
	Patients	34	54.50	13.86		
LDL	control	16	98.43	28.77	4.607	0.49
	Patients	34	135.20	25.13		
VLDL	control	16	27.31	8.72	1.56	0.40
	Patients	34	32.29	11.20		

\*P-value less than 0.05 consider significant

Hyperlipidemia is one of the chief risk factors which causes cardiovascular diseases, in particular for acute myocardial infarction (Navar *et al.*, 2015). Level of low density lipoprotein (LDL) is the strongest part of risk factor for (CAD), (Chapman *et al.*, 2011). In our study that patients with elevated LDL also have lower HDL and elevated TG blood levels which maybe cause of atherosclerosis.

Table (6): Level of lipid profile in men patients and women patients

Parameter	patient	N	Mean	S.D	T-value	p-value
TC	Men	36	179.83	48.07	1.06	0.29
	Women	34	190.88	38.28		
TG	Men	36	166.86	59.84	0.35	0.72
	Women	34	161.94	57.43		
HDL	Men	36	60.05	15.36	1.58	0.11
	Women	34	54.50	13.86		
LDL	Men	36	119.75	38.08	2.01*	0.04
	Women	34	135.20	25.13		
VLDL	Men	36	31.83	11.92	0.16	0.86
	Women	34	32.29	11.20		

\*P-value less than 0.05 consider significant

HDL cholesterol levels were also higher in women than in men, but remained relatively endless across the studied age range (wallace and Colsher, 1992). Physiologically low estrogen levels associated with menopause was proved to minimize LDL sanction by-liver and hence increase LDL-cholesterol in postmenopausal women (Granfone *et al.*,

1992).

### C. Correlation between melatonin and lipid profile

Results indicated that there were a reverse correlation between melatonin with cholesterol, triglyceride and very low density of lipoprotein, Meanwhile. The result indicated that there was a very week correlation between melatonin with high density of lipoprotein and low density of lipoprotein Table (7) .

Table (7) Correlation between level of melatonin and lipid profile

		TC	TGs	HDL	LDL	VLDL
Melatonin	Correlation (R)	-0.019	-0.046	0.058	0.083	-0.045
	Sig. (2tailed)	0.879	0.708	0.636	0.493	0.712

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