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Study Relationship between LDH, TROPININ, AST and ALT Enzymes with Myocardial Infarction

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Abstract: By collecting laboratory samples from patients with heart attacks and doing them in educational laboratories for the above-mentioned tests, it was found that tests for liver enzymes (AST, ALT) are more effective in myocardial infarction, and that the rise of these enzymes along with the enzyme (LDH) are more warning of clots before they occur, whether after they occur or during them. Knowing the recovery rate is the increase in the enzyme (Troponin, CK-MB) and its decrease after the stroke and the patient's recovery

It was found that the most sensitive enzymes are AST at a rate of 93.3%, ALT at a rate of 93.3%, TROPONIN at a rate of 100%, and LDH at a rate of 83.3%. These are the enzymes and tests required in the analysis to determine the effect of myocardial infarction on the human body.

The lipid profile Comparison tests of total body fat concentrations and the rate of their increase in the body for people with blood clots and healthy people, and it was found in this table that Triglycerides and cholesterol are more influential and an indicator of blood clots before they occur, and triglycerides are the most common cause of blood clots in the body, and cholesterol are the second cause of their occurrence, as the arteries shrink and allow blood to pass to the heart in a good manner, which leads to myocardial infarction due to the effort caused by them.

1. Introduction

The World Health Report, (2004) defined acute myocardial infarction (AMI or MI), commonly known as a heart attack, is a disease state that occurs when the blood supply to a part of the heart is interrupted. The resulting ischemia or oxygen shortage causes damage and potential death of heart tissue [1]

Acute myocardial infarction is a type of acute coronary syndrome, which is most frequently (but not always) a manifestation of coronary artery disease. The most common triggering event is the disruption of an atherosclerotic plaque in an epicardial coronary artery, which leads to a clotting cascade, sometimes resulting in total occlusion of the artery

Atherosclerosis is the gradual buildup of cholesterol and fibrous tissue in plaques in the wall of arteries (in this case, the coronary arteries), typically over decades. Blood stream column irregularities visible on angiographies reflect artery lumen narrowing as a result of decades of advancing atherosclerosis. Plaques can become unstable, rupture, and additionally promote a thrombus (blood clot) that occludes the artery; this can occur in minutes. When a severe enough plaque rupture occurs in the coronary vasculature, it leads to myocardial infarction (necrosis of downstream myocardium) [2]

If impaired blood flow to the heart lasts long enough, it triggers a process called the ischemic cascade; the heart cells die (chiefly through necrosis) and do not grow back. A collagen scar forms in its place. Recent studies indicate that another form of cell death called apoptosis also plays a role in the process of tissue damage subsequent to myocardial infarction [3].

Risk factors

Many people have multiple risk factors and that these factors exponentially increase the risk for CAD. Intervention Trial data showed that approximately 85% of excess risk for premature coronary artery disease(CAD) and myocardial infarction (MI) is due to one or more of the following major risk factors [4].

Material and method

Sample collection

Blood samples (4 ml) were collected immediately after hospital admission from each patients as well as control using disposable syringes for estimation of cardiac enzymes and lipid profile.

All blood samples were allowed to clot at room temperature and then centrifuged at 4000 RPM to obtain the serum.

The clear serum was taken immediately for analysis or stored at 2 - 8 C^0 for 24 hrs. for further use.

Method of tests

The chemistry tests We used the Full Auto device by placing the serum in the device and determining the test to be performed using German-made kits and the BS-120 device from Mindray, using the optical spectral absorption process by adding 1 ml of reagent and 10 microliters of serum and incubating for 10 minutes at low temperature. 37 Celsius, then reading and calculations by optical absorption spectrum for analyzes (AST), (ALT) LDH, cholesterol, Triglyceride, HDL.The troponin and CK-MB We used a device from the German company Roche and the Japanese company Hitachi, and the name of the device is Cobas E411. The method of work is physical chemistry by using magnetic rings to connect the bonds and determine the concentration of troponin and CKMP in the serum and the extent of its high and low levels. This device is considered one of the best devices in laboratories.

Instruments

Dives	Origin	Company
Mindray Bs-120 Full Auto	Germany	mindray
Cobas e411 Full Auto	Germany	Roche ,Hitachi

Normal Range of tests:

Tests	Normal Range
AST	< 35 U/L
ALT	< 45 U/L
LDH	< 245 U/L
Cholesterol	< 200 mg/dl
Triglyceride	< 180 mg/dl
HDL	25 – 50 mg/dl
LDL	70 – 160 mg/dl
VLDL	20 mg/dl
Troponin	< 0.1 ng/ml
CK-MB	< 0.3 ng/ml

Result

Table 1: Comparative anthropometric features of participants calculated by chi-square test.

			Groups		Total	*P* value
			Patients (30)	Healthy (10)		
Sex	Males	n	20	5	25	> 0.05
		%	66.6 %	50 %	62.5 %	
	Females	n	10	5	15	
		%	33.3 %	50 %	37.5 %	
Age groups	21-30	n	3	8	11	> 0.05
		%	10 %	80 %	27.5 %	
	31-40	n	4	1	5	
		%	13.3 %	1 %	12.5 %	
	41-50	n	9	0	9	
		%	30 %	0 %	22.5 %	
	51-60	n	7	1	8	
		%	23.3 %	1 %	20 %	
	>60	n	7	0	7	
		%	23.3 %	0 %	17.5 %	

The Chi-square test is a statistical test that shows the difference in stroke incidence between age and gender and its percentage for the total samples that we have, which were examined laboratory-wise. It was found that men are affected 62.5% of those in the fourth decade of life and above, and women are affected 37.5% of those in the fourth decade and above, as the results showed that In the fourth decade of life, men are infected at a rate of 13.3% and women are 12.5%, while in the fifth decade of life, men are infected at a rate of 30% and women are 22.5%, and in the sixth decade of life, men are infected at a rate of 23.3% and women are 20%, out of the total number of samples monitored, which numbered 30 samples, including 20. One infected person: men, women, and 10 normal young people.

Table 2: Comparative lipid profile parameter between study groups were calculated by student t test.

Groups		N	Mean	SD	SE	*P* value
Cholesterol	Patients	30	172.0	74.76	13.65	< 0.05*
	Healthy	10	140.6	19.65	6.215	
Triglycerides	Patients	30	208.0	81.59	14.89	< 0.001***
	Healthy	10	138.6	10.69	3.380	
HDL	Patients	30	46.03	9.718	1.774	> 0.05
	Healthy	10	42.00	7.659	2.422	

Comparison tests of total body fat concentrations and the rate of their increase in the body for people with blood clots and healthy people, and it was found in this table that Triglycerides and cholesterol are more influential and an indicator of blood clots before they occur, and triglycerides are the most common cause of blood clots in the body, and cholesterol are the second cause of their occurrence, as the arteries shrink and allow blood to pass to the heart in a good manner, which leads to myocardial infarction due to the effort caused by them.

Table 3: Comparative LDH, AST, ALT, Troponin, CKMB and Testosterone parameters between study groups were calculated by student test.

Groups		N	Mean	SD	SE	*P* value
LDH	Patients	30	547.3	701.0	127.9	< 0.01**
	Healthy	10	148.0	41.15	13.01	
AST	Patients	30	249.1	455.7	83.20	< 0.05*

	Healthy	10	19.90	5.953	1.882	
ALT	Patients	30	179.4	256.7	46.87	< 0.01**
	Healthy	10	24.80	12.62	3.991	
Troponin	Patients	30	1.479	3.662	0.668	< 0.05*
	Healthy	10	0.029	0.022	0.007	
CKMB	Patients	30	0.866	1.797	0.328	< 0.05*
	Healthy	10	0.0577	0.039	0.012	
	Healthy	10	2.521	2.322	0.734	

By collecting laboratory samples from patients with heart attacks and doing them in educational laboratories for the above-mentioned tests, it was found that tests for liver enzymes (AST, ALT) are more effective in myocardial infarction, and that the rise of these enzymes along with the enzyme (LDH) are more warning of clots before they occur, whether after they occur or during them. Knowing the recovery rate is the increase in the enzyme (Troponin, CK-MB) and its decrease after the stroke and the patient's recovery.

Table 4: Correlation relationship between parameters were calculated by Pearson correlation

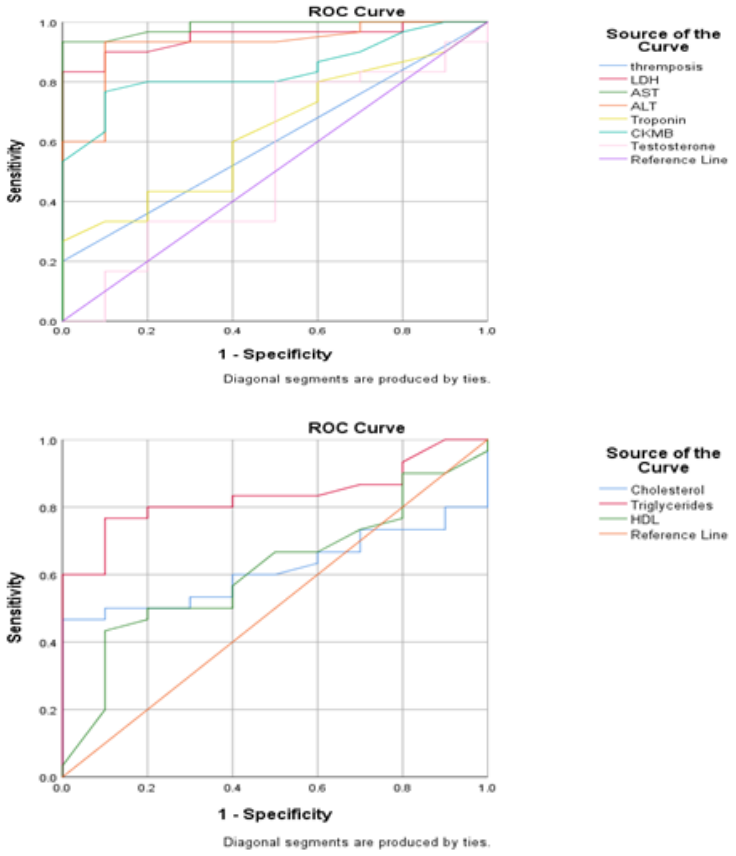
Correlations												
		Sex	Age	thrombosis	Chol	TG	HDL	LDH	AST	ALT	Troponin	CKMB	Testosterone
Sex	Pearson Correlation	1	-.093	.000	-.006	.023	-.076	.282	.182	.352	.327	.323	-.867**
	Sig. (2-tailed)		.623	1.000	.976	.903	.688	.132	.336	.056	.078	.082	.000
	N	30	30	30	30	30	30	30	30	30	30	30	30
Age	Pearson Correlation	-.093	1	.382*	.136	.245	.121	.136	-.177	.024	.131	.115	.174
	Sig. (2-tailed)	.623		.037	.474	.191	.523	.473	.348	.900	.489	.546	.357
	N	30	30	30	30	30	30	30	30	30	30	30	30
thrombosis	Pearson Correlation	.000	.382*	1	.176	.066	-.037	.466**	.117	.364*	.545**	.546**	-.095
	Sig. (2-tailed)	1.000	.037		.353	.729	.848	.009	.538	.048	.002	.002	.618
	N	30	30	30	30	30	30	30	30	30	30	30	30
Cholesterol	Pearson Correlation	-.006	.136	.176	1	.734**	.217	.153	.377*	.246	.299	.330	-.001
	Sig. (2-tailed)	.976	.474	.353		.000	.250	.420	.040	.190	.108	.075	.997
	N	30	30	30	30	30	30	30	30	30	30	30	30
Triglycerides	Pearson Correlation	.023	.245	.066	.734**	1	.057	-.045	.095	-.016	.040	.077	.047
	Sig. (2-tailed)	.903	.191	.729	.000		.767	.813	.619	.934	.833	.687	.805
	N	30	30	30	30	30	30	30	30	30	30	30	30
HDL	Pearson Correlation	-.076	.121	-.037	.217	.057	1	.060	-.064	-.079	-.011	-.013	.102
	Sig. (2-tailed)	.688	.523	.848	.250	.767		.754	.737	.678	.953	.945	.592
	N	30	30	30	30	30	30	30	30	30	30	30	30
LDH	Pearson Correlation	.282	.136	.466**	.153	-.045	.060	1	.357	.773**	.884**	.845**	-.206
	Sig. (2-tailed)	.132	.473	.009	.420	.813	.754		.053	.000	.000	.000	.275
	N	30	30	30	30	30	30	30	30	30	30	30	30
AST	Pearson Correlation	.182	-.177	.117	.377*	.095	-.064	.357	1	.763**	.587**	.625**	-.189
	Sig. (2-tailed)	.336	.348	.538	.040	.619	.737	.053		.000	.001	.000	.317
	N	30	30	30	30	30	30	30	30	30	30	30	30
ALT	Pearson Correlation	.352	.024	.364*	.246	-.016	-.079	.773**	.763**	1	.911**	.904**	-.299

	n												
	Sig. (2-tailed)	.056	.900	.048	.190	.934	.678	.000	.000		.000	.000	.109
	N	30	30	30	30	30	30	30	30	30	30	30	30
Troponin	Pearson Correlation	.327	.131	.545**	.299	.040	-.011	.884**	.587**	.911**	1	.995**	-.304
	Sig. (2-tailed)	.078	.489	.002	.108	.833	.953	.000	.001	.000		.000	.102
	N	30	30	30	30	30	30	30	30	30	30	30	30
CKMB	Pearson Correlation	.323	.115	.546**	.330	.077	-.013	.845**	.625**	.904**	.995**	1	-.313
	Sig. (2-tailed)	.082	.546	.002	.075	.687	.945	.000	.000	.000	.000		.092
	N	30	30	30	30	30	30	30	30	30	30	30	30
**. Correlation is significant at the 0.01 level (2-tailed).													
*. Correlation is significant at the 0.05 level (2-tailed).													

Correlation of laboratory tests and the extent to which enzymes and hormones are affected by the presence of myocardial infarction. The most affected enzymes were LDH, TROPONIN, AST, ALT.

Table 5: ROC curve, sensitivity, and specificity of variables under study

Variables	AUC	Std. Error[a]	*P* value	Sensitivity %	Specificity %
Cholesterol	0.615	0.085	> 0.05	46.7 %	100 %
Triglycerides	0.832	0.064	< 0.01	76.7 %	90 %
HDL	0.613	0.096	> 0.05	43.3 %	90 %
Thrombosis	0.600	0.096	> 0.05	20 %	100 %
LDH	0.948	0.034	< 0.001	83.3 %	100 %
AST	0.985	0.015	< 0.001	93.3 %	100 %
ALT	0.923	0.047	< 0.001	93.3 %	90 %
Troponin	0.633	0.095	> 0.05	100 %	0 %
CKMB	0.838	0.063	< 0.01	76.7 %	90 %



Specificity and sensitivity of enzymes affecting myocardial infarction.

It was found that the most sensitive enzymes are AST at a rate of 93.3%, ALT at a rate of 93.3%, TROPONIN at a rate of 100%, and LDH at a rate of 83.3%. These are the enzymes and tests required in the analysis to determine the effect of myocardial infarction on the human body.

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