Evaluation of Lactate dehydrogenase and Amino-trasferase Activating for Victims of Terror Attack

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Abstract:

Victims of terror attacks was risen in Iraq in recent years. Victims of terror attacks, whether or not physically injured, sometimes suffer from traumatic symptoms, lead to generation of oxygen free radicals and reactive oxygen species which cause oxidative stress and different diseases related with stress such as psychosomatic diseases. The propose of this study is determined of Lactate dehydrogenase(LDH), Alanine aminotransferase (ALT) and Aspartate aminotransferase(AST) activities for victims of terror attacks compared with volunteers who are non affected in terror attacks and considers as a control group, to explain the effect of trauma on enzymes activity for these patients due to the terrorism attack. 35 victims of terror attacks aged 12-50 years compared with 20 donator as a control group, The victims are infected by in different terrorism attacks in Babylon city, the sample collected from patients after they attack terror. The study shown a significantly increased of LDH activity and no significant increase of AST and ALT for victims group compared with control group.

الخلا صة:

ازداد عدد ضحايا الحوادث الإرهابية في السنوات الاخيره في العراق, سواء اكان هؤلاء الضحايا أصيبوا أثناء الهجوم ام تعرضوا للصدمات جراء هذه الحوادث الإرهابية حيث يتولد في أجسامهم جذور حرة تسبب لهم الكثير من المضاعفات والأمراض وخاصة الأمراض النفسجسمية مثل تهيج القولون,قرحة الاثني عشر، ارتفاع الضغط وأمراض القلب وغيرها. يهدف هذا البحث الى تقديرفعالية كل من اللاكتيت ديهيدروجينيز والألنين امينوترانسفيريز والأسبارتيت امينوترانسفيريز في مصل ضحايا العمليات الارهابية بعد الحادث وإيجاد العلاقة بين فعالية هذه الانزيمات وتأثير الصدمة والحالة النفسيه على هؤلاء الاشخاص وذلك لقلة البحوث في هذا الجانب.

شملت الدراسة 35 شخص تعرضوا لحوادث ارهابية في محافظة بابل اصيبوا خلالها جسديا بأصابات مختلفه، حدثت في عام 2009 تتراوح اعمارهم بين 12-50 سنة، سحبت العينات بعد الحادث وتم قياس فعالية اللاكتيت ديهايدروجينيز والألنين امينوترانسفيريز والأسبارتيت امينوترانسفيريز ومقارنته بـ 20 شخص لم يتعرضوا لأي حادث إرهابي(كمجموعة السيطرة). حيث وجد ان فعالية انزيم LDH ترتفع ارتفاعا معنويا لدى الضحايا مقارنة بمحموعة السيطرة، بينما ترتفع فعالية كل من ALT وAST ارتفاعا غير معنويا.

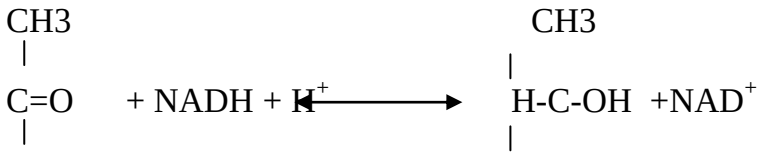
Introduction:

In any types of injury to the body via physical, chemical, inflammatory or aging lead to generation of oxygen free radicals, that are involved in cell injury, cell death and multiple organ dysfunction syndrome(1).

Victims of terror attacks, whether or not physically injured, sometimes suffer from traumatic symptoms, although the intensity of symptoms differs among individuals, additional traumatic symptoms and emotional distress are evident, together with difficulty in readjusting to a normal life. (2, 3). As well as infecting of different diseases such as hypertension, irritable bowel, heart disease, etc.

The incidence of terror attacks has since risen. However, the rise in the incidence of victims for terror was proportionate to the rise in the incidence of terrorism trauma victims.

Lactate Dehydrogenase(LDH EC 1.1.1.27) is a hydrogen enzyme which catalyzes the oxidation of Lactate to Pyruvate with the mediation of NAD+ as hydrogen acceptor(4). The reaction reduction of pyruvate to lactate.



Pyruvate D- Lactate

The enzyme does not act on D-lactate and only NAD+ will serve as coenzyme. The enzyme has a molecular mass 134,000 and is composed of four peptide chains of two types, M and H. LDH found in virtually all animal tissues, functions primarily in the metabolism of glucose, catalyzing the reduction of free pyruvate to lactate during the last step of glycolysis, as well as the conversion of lactate to pyruvate in gluconeogenesis(5, 6).

Aminotransferase is an enzyme which catalyzes transition of the amino group between the amino acid and α- keto acid, and in vivo, adjusts transition of the amino groups between the metabolite of tricarboxylic acid cycle and amino acid. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) are used for a pathological index for the clinical testing(7).

Glutamate Oxaloacetate Transaminase (GOT) catalyzes the transfer of an amino group from glutamate to an 2-keto-acid to generate a new amino acid and the residual 2-keto-acid of the donor amino acid, Asp (an amino acid) as the donor of the amino group which will be transferred to the acceptor 2-keto group of the 2-ketoglutarate, which we sometimes call α-keto-glutarate, the official name of GOT is actually Aspartate Transaminase, AST, (EC 2.6.1.1).

It is worth noting that the name "transaminase" can be replaced by "aminotransferase". Alanine transaminase or ALT is a transaminase enzyme (EC 2.6.1.2). It is also called glutamic pyruvic transaminase (GPT), It catalyzes the transfer of an amino group from alanine to α-ketoglutarate, the products of this reversible transamination reaction being pyruvate and glutamate (6, 8).

Alanine aminotranferease (ALT) and aspartate aminotransferase (AST) are enzymes located in liver cells that leak out into the general circulation when liver cells are injured. These two transaminase enzymes may be reported on lab slips with both their new names and previous names or by their newer names only. ALT and AST are present in highest concentrations in cells from the liver, heart, skeletal muscles, and red blood cells(9).

ALT is found predominately in the liver, with lesser quantities found in the kidneys, heart, and skeletal muscle. As a result, the ALT is a more specific indicator of liver inflammation than the AST, as the AST may also be elevated in diseases affecting other organs, such as the heart or muscles. The AST is also elevated after a myocardial infarction, and during acute pancreatitis, acute hemolytic anemia, severe burns, acute renal disease, musculoskeletal diseases, and trauma(10, 11).

Patients:

35 victims of trauma in terrorism attack in jerif al-sakhar, and victims in accident of animals market in Babylon city, aged 12-50, and 20 apparently healthy subjects aged 12-50 years, as a control group were recruited for this study. Blood samples were collected from patients after 3 hours of the terrorism accidents. Then after clotting, sera was separated by centrifugation(3000 rpm), the analytical determinations described below were either performed immediately, or stored at -5°C and used within 72 hours.

Methods:

LDH is determined by using commercially available kit (Randox - U.K.) and the glutamic transaminase enzymes, serum glutamic oxalacetic (AST) and serum glutamic pyruvic (ALT), catalyse the transfers of the amino group of glutamic acid to oxalacetic acid and pyruvic acid in reversible reactions. The transaminase activity is proportional to the amount of oxalate or pyruvate formed over a definite period of time and is measured by a reaction with 2,4-dinitrophenylhydrazine (DNPH) in alkaline solution(12).

Statistical analysis.

All results are expressed as a mean ± SD(standard deviation), comparison between patients and controls were preformed by the student's t- test. Person's correlations. A value of $p \leq 0.05$ was considered statistically significant.

Results and Discussion:

The high levels of LDH activity of victims compared with volunteers who are non affected in terror attack and considers as a control group shown in Table 1.

Table 1: LDH activity (IU/L) in Sera of Victims of terror attacks and controls group.

	N	Mean	±SD	SE	P Value
Control	20	233.25	60.23	17.38	------
Victims	35	396.44	177.36	23.47	0.00 Sign

The shock associated with an accident or physical injury causes an immediate disruption of the metabolic balance between tissues. This is caused by the stimulation of the sympathetic nervous system which causes a massive release of adrenaline and increased heart rate and blood pressure, as well as increases glucagon release and inhibits the secretion of insulin, for that, the blood glucose concentration will be a rise. In addition, the release of noradrenaline stimulates the release of fatty acids from adipose tissue.(13)

The overall initial metabolic effect of the trauma is to mobilize glucose and fatty acids from the liver and adipose tissues which can converted to lactate in muscle leads to increasing in LDH activity and leakage of intracellular LDH is indicative of local tissue damage induced by free radicals or oxygen lack or trauma(14).

The change in LDH level in serum will reflect the severity of the insult to that tissue or organ. However, frequently it is not possible to determine clinically which organ is contributing to the rise in LDH, particularly in the early stage of a disease process, when the LDH may be only marginally elevated(4).

Increased cellular LDH activity reflected a shift towards anaerobic metabolism and increased glycolysis in the cytoplasm of patients cell accompanied by a high turnover rate. In conditions with tissue damage and rapid cell turnover, the serum LDH may rise, and the isoenzyme distribution usually reflects that of the damage organ and cell (15). These data may be suggest that LDH elevation are marker of increasing oxidative stress associated with victims of trauma

A significant increase(P=0.00, 0.01 respectively) of AST and ALT activities in victims with trauma compared with controls are shown in Table 2.

Table 2: AST and ALT activities (IU/L) in Sera of Victims of terror attacks and controls group.

AST					
	N	**Mean**	**±SD**	**SE**	**P Value**
Control	**20**	**13.77**	**6.73**	**1.51**	**------**
Victims	**35**	**19.67**	**7.59**	**1.28**	**0.00 Sign**
ALT					
	N	**Mean**	**±SD**	**SE**	**P Value**
Control	**20**	**7.7**	**3.8**	**0.84**	**---------**
Victims	**35**	**10.18**	**4.7**	**0.78**	**0.01 Sign**

The increased protein catabolism in muscle caused by cortisol will release amino acids for metabolism and may be due to increasing of GOT and GPT activities. And an elevated serum AST in relation to serum ALT has been proposed as an indicator that trauma has induced damage in tissues due to released of free radicals. GPT and GOT are very active enzyme exists in mitochondrial and cytosolic variants.

It escapes in large amounts from dead or dying tissues and they may be measured in blood samples for medical diagnostic purposes even in the absence of hepatic injury(11, 16). We suggest that liver function tests may be used as screening tests in victims of trauma.

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