Sex Differences in the Level of Some Liver Parameters of Patients with Myocardial Infarction

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Abstract

The present study was conducted to verify the changes of some liver parameters in male and female patients of myocardial infarction (MI) and determine the differences between male and female. To achieve this aim, 40 male patients of MI,20 female patients of MI, 35 healthy subjects (control group) were subjected to the study. The results showed significant ($p< 0.005$) increase of AST activity in male patients of MI and somewhat less ($p <0.05$) in female patients of MI when compared with those of the healthy individuals. The measurement of serum bilirubin concentration indicated significant ($p< 0.05$) rise of total and unconjugated fractions in male patients of MI, while in female patients total and unconjugated bilirubin were didn't show any significant when compared with those of the healthy subjects, but conjugated bilirubin was significant increase ($p<0.01$). The estimation of serum albumin concentration pointed out significant ($p< 0.05$) decrease in male patients of MI and somewhat less ($p< 0.01$) in female patients of MI in comparison with those of the healthy individuals.

Conclusion: From this study we obtained the sex has effect on the alteration of liver parameters level in patients with myocardial infarction.

Keywords: Heart disease, Myocardial infarction, Liver function tests.

الخلاصة

هذه الدراسة أجريت على المرضى المصابين بالاحتشاء القلبي من النساء والرجال و تم التحقق من تأثير اختلاف الجنس في تغيرات فحوصات بعض كشوفات الكبد في المرضى المصابين بالاحتشاء القلبي للنساء والرجال . و لتحقيق هذا الهدف, تمت الدراسة على40 مريض مصاب بالأحتشاء القلبي من الرجال, و20 مريض مصاب بالأحتشاء القلبي من النساء, بالإضافة لمجموعتي السيطرة, وقد دلت النتائج على زيادة ملحوظه ($p< 0.005$) في فعالية أنزيم AST لدى المرضى الرجال عند مقارنتهم بمجموعة الاصحاء الرجال واقل منها($p<0.05$) عند النساء عند مقارنتهن بمجموعة الاصحاء النساء. كما اظهر تقدير تركيز البيليروبن زيادة ملحوظه ($p< 0.05$) في تركيزي البيليروبن الكلي والغير المقترن لدى المصابين بالأحتشاء القلبي من الرجال عند مقارنتهم بمجموعة السيطرة. بينما كانت النتائج عند النساء هي زيادة ملحوظه ($p< 0.01$) في تركيز البيليروبن الغير المقترن فقط, كما دل تقدير تركيز الألبومين على نقصان معنوي ($p< 0.05$) في المرضى المصابين بالأحتشاء القلبي من الرجال واقل منه ($p<0.01$) لدى المرضى النساء عند مقارنتهم بمجموعة السيطرة.

Introduction

A myocardial infarction (MI) is an area of necrosis of heart muscle resulting from a sudden, absolute or relative, reduction in the coronary blood supply.) [1]. Coronary heart diseases were caused by a lack of nutrient and oxygen supplies to the heart muscle and results in myocardial ischemia. The latter is a reduction in the blood supply to one area of the heart often due to atherosclerosis, thrombosis, spasms, of embolisms but may also be a result of anemia,

carboxyhemoglobinemia, or hypotension, which causes reduced blood flow to the heart [2].

Elevated level of aspartate aminotransferase (AST) activity was considered the first marker used for laboratory diagnosis of MI [3]. Mildly increased serum bilirubin has been suggested as protective against coronary artery disease (CHD) by acting as an antioxidant [4]. Serum bilirubin acts as a natural antioxidant in several in vitro systems [5-7]. Individuals with Gilbert syndrome were found to have an IHD prevalence rate of 2% compared with 12% in the general population [8]. The mechanism for the reduction of albumin is distinct from other early markers with ischemia [3]. The slightly increased urinary albumin excretion may increase the risk for subsequent development of ischemia [9, 10]. Even a small myocardial infarct causes hepatic congestion due to right sided heart dysfunction abnormalities [11]. Aspartate aminotransferase (AST respectively). The enzymes are widely distributed in human tissue, i.e., liver, heart, skeletal muscle and kidney. Transaminations play a key role in intermediary metabolism as it provides a mean for the synthesis and degradation of amino acids in living cells. The process involves the intramolecular transfer of an amino group from a donor alpha-amino acid to an acceptor alpha-keto acid without intermediate formation of ammonia [12].

The liver produces about 12 g of albumin per day. The synthesis of albumin is depressed in a variety of diseases, particularly those of the liver. The plasma albumin concentration is decreased in chronic liver disease, but tends to be normal in the early stages of acute hepatitis due to its long half-life which is about 20 days [13, 14].B
lirubin is the end product of heme metabolism. About 80% of bilirubin is derived from the breakdown of red blood cells within the reticuloendothial system at the end of their life span of approximately 120 days. The remaining amount arises from other sources including break down of immature red cells in the bone marrow and of compounds chemically related to haemoglobin such as myoglobin, cytochroms and peroxidase [15]. Bilirubin is transported in the blood bound to albumin; the binding process is the first step in bilirubin catabolism. It is transported across the hepatocyte by four
steps, hepatic uptake of bilirubin, binding of bilirubin to intracellular binding proteins (ligandin), conjugated of bilirubin with glucuronic acid, and secretion of bilirubin glucuronides into bile. In the gut, bilirubin is converted by bacterial action into urobilinogen. Some of the later compound is absorbed from the gut into the portal blood, hepatic uptake of urobilinogen is incomplete, and a small quantity reaches the systemic circulation and is excreted in the urine. Most of the urobilinogen in the gut is oxidized in the colon to the brown pigment urobilin, which is excreted in the stool [16, 14].

Myocardial infarction (MI) is the term used to describe irreversible cellular injury and necrosis accruing as secondary to coronary occlusion, major reduction in blood flow to certain regions of heart muscle, or an insufficient increase in coronary blood flow relative to regional oxygen demand during period of severe stress [17]

Materials and Methods

aspartate aminotransferase activity were measured in sera of all subjects according to the method of Reitman and Frankel [18], using Randox kit.

Albumin concentration was estimated according to the method of Robkey (Bromocresol green) [19].

Total and conjugated serum bilirubin

concentrations were estimated according to the method of Van den Bergh [20].
The results were expressed as mean ± SD and analyzed statistically. The differences between the results of patients and healthy individuals were assessed by student's t test. Significant variation was considered when the P value was less than 0.05.

Results and Discussion

To evaluate the influence of sex on some parameters levels of myocardial infarction patients, the individuals were classified into males and females. There were 40 male myocardial infarction patients and 20 male healthy individuals, while the number of female patients was 20 and 15 female healthy subjects. Male patients of ages between 30 and up to 70 years , Female patients were 20 patients of ages 30-61 years.

The determination of serum AST activity stated significant elevation in male patients of myocardial infarction ($p < 0.005$) and somewhat less in female patients ($p < 0.05$) when compared with those of the healthy subjects. A sex difference was obtained in AST activity of the patients. (Tables 1,2).

The estimation of serum bilirubin concentration indicated significant ($p < 0.05$) elevations of total bilirubin and the unconjugated fractions in male and female patients of myocardial infarction and with respect to those of the healthy subjects (Table 1, 2). The determination of albumin concentration pointed out significant ($p < 0.01$) decrease in male and female patients of myocardial infarction when compared with those of the healthy subjects .

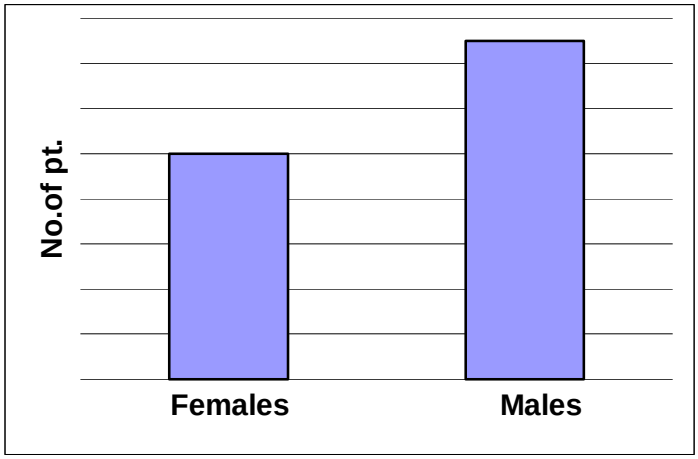
Table1. Serum AST enzyme activity and serum bilirubin , albumin concentrations in male patients of myocardial infarction and control group.

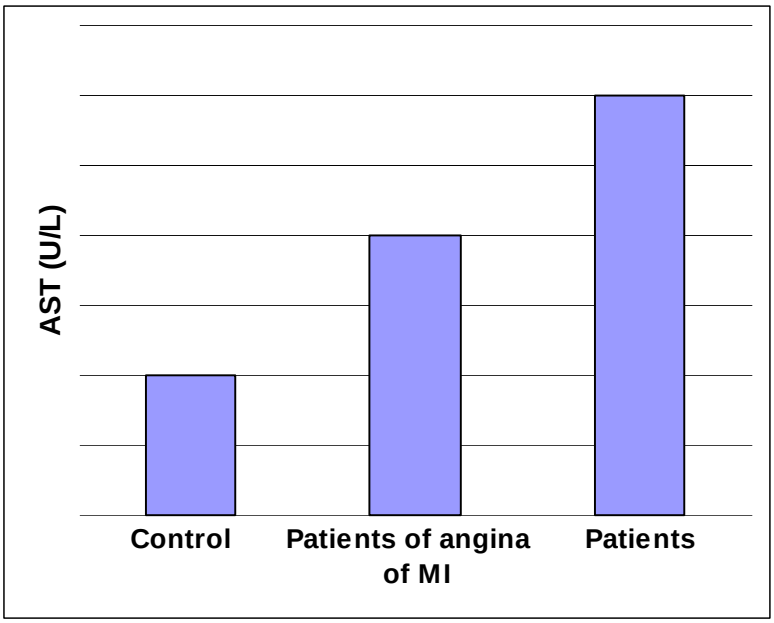
Parameter	Subject	Mean ± SD	P value
AST (U/L)	Patients	80.07 ± 19.30	
	Control	15.97 ± 5.75	0.005
Total bilirubin (mg/dl)	Patients	0.82 ± 0.17	
	Control	0.64 ± 0.22	0.05
Conjugated bilirubin (mg/dl	Patients	0.076 ± 0.025	
	Control	0.071 ± 0.023	N.S
Unconjugated bilirubin (mg/dl)	Patients	0.73 ± 0.16	
	Control	0.59 ± 0.23	0.05
Albumin (g/dl)	Patients	3.31 ± 0.62	
	Control	4.02 ± 0.59	0.05

Table2. Serum AST enzyme activity and serum bilirubin , albumin concentrations in female patients of myocardial infarction and control group.

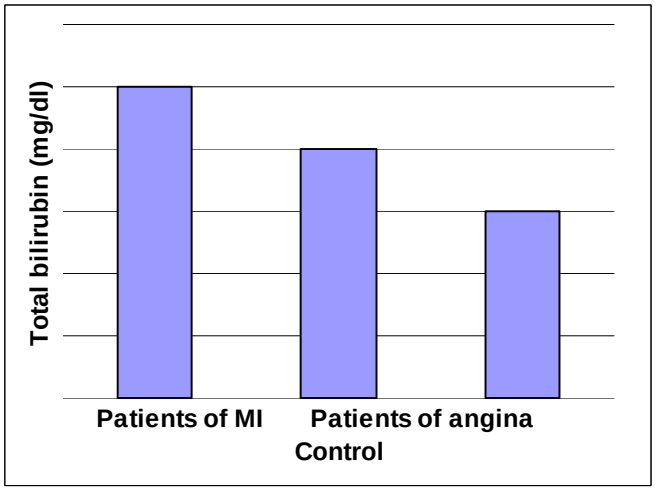
Parameter	Subject	Mean ± SD	P value
AST (U/L)	Patients	46.78 ± 17.02	
	Control	14.57 ± 4.15	0.05
Total bilirubin (mg/dl)	Patients	0.80 ± 0.14	
	Control	0.78 ± 0.13	N.S
Conjugated bilirubin (mg/dl)	Patients	0.075 ± 0.013	
	Control	0.071 ± 0.012	N.S
Unconjugated bilirubin (mg/dl)	Patients	0.71± 0.15	
	Control	0.62 ± 0.17	0.01
Albumin (g/dl)	Patients	3.58 ± 0.38	
	Control	4.06 ± 0.54	0.01

In the current study, a sex difference was obtained for AST activity in males complained from MI when compared with those of females. The higher activity of enzymes originating from skeletal muscle in men is related to their greater muscle mass, after menopause, the activity of ALP increases until it is higher in women than in men [21]. Studies have shown that males tend to be more affected by atherosclerosis than pemenopausal females. After menopause, women become similarly affected as men. It is thought that females are protected by higher levels of high density lipoproteins (HDL) until estrogen levels drop at menopause [11]. The incidence of atherosclerosis and MI in males was higher than that of women in all age groups, however, the difference for MI narrows with advanced age [22], therefore we find the number of patients who complained of MI in males more than females.(as shown in this fig).

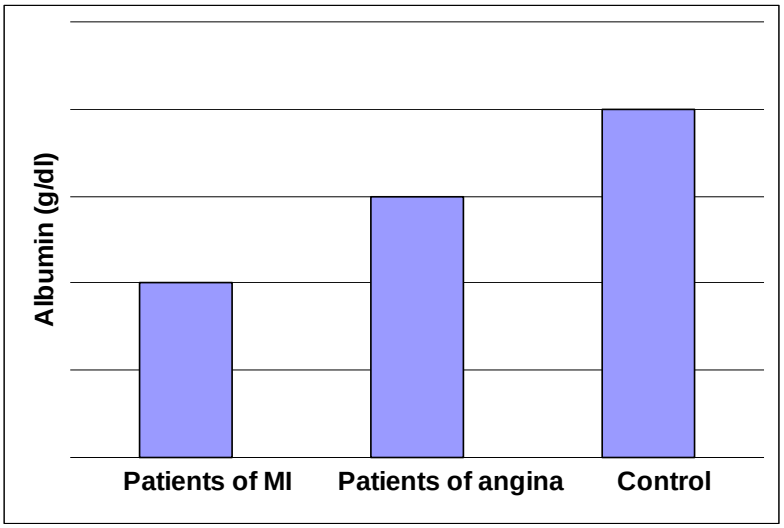




In this study the total bilirubin measurement of the male patients (0.82 ± 0.15) significantly increased when compared with control group. While female patients (0.80 ± 0.13)found to be nonsignificantly when compared with control group. Unconjugated bilirubin for male and female respectively at the level of significantly ($P<0.05$). Male patients has significant higher concentration albumin when compared with female patients, by student's T test. (As shown in this fig.)



Male patients has significant higher concentration albumin when compared with female patients, by student's T test. (As shown in this fig.) In this study the serum albumin concentration measurement of the male patients (3.31 ± 0.51) and female patients (3.58 ± 0.34)found to be significantly low when compared with control group respectively at the level of significantly ($P<0.05$) for male, ($p<0.01$) was significant of serum albumin concentration in female patients, by student T test as shown in the following figure



In healthy individuals, several biochemical constituents are manipulated by gender. The difference between males and females may be due to the physiological changes and adaptation to physical and chemical stresses [23]. Serum iron, triglycerides, uric acid, and hormone levels are different in males from females. Hemoglobin, albumin, calcium, and magnesium levels are higher in males than females [24].

After puberty, serum ALP, ALT, AST, creatine kinase and aldolase activities are greater in men than in women. The higher activity of enzymes originating from skeletal muscle in men is related to their greater muscle mass, after menopause, the activity of ALP increases until it is higher in women than in men [21]. Studies have shown that males tend to be more affected by atherosclerosis than pemenopausal females. After menopause, women become similarly affected as men. It is thought that females are protected by higher levels of high density lipoproteins (HDL) until estrogen levels drop at menopause [11]. The incidence of atherosclerosis and MI in males was higher than that of women in all age groups, however, the difference for MI narrows with advanced age [22].

The protective mechanism of albumin against IHD is not fully understood.
Albumin has anti-oxidant properties. At normal concentration albumin can inhibit copper stimulate per oxidation [25]. It also inhibits production of free hydroxyl radicals from systems, containing copper ions and H_2O_2 and able scavenge peroxy radicals [26], albumin also inhibits copper dependent lipid per oxidation system. LDL oxidation is one of early steps in atherosclerotic process. Albumin may inhibit endothelial apoptosis [27]. We believe that such processes may be involved in the pathogenesis of atherosclerosis, which is more common after age 40 years [28].

References

1. Slater E and Desanctis R. The clinical recognition of dissecting aortic aneurysm. A M J med. p 625-633, 6. (1976).
2. Thomas C, ed. Taber's cyclopedic medical dictionary. 18th ed. Philadelphia: FA Davis, p 167. (1997).
3. WUAHB, Apple F, Gibler WB, et al. National academy of clinical biochemistry standards of laboratory practice: recommendations for the use of cardiac markers in coronary artery disease. Clin chem, 1104-1121, 45 (7). (1999).

4. Panl N, Lily L, Steven C, et al. Higher serum bilirubin is associated with decreased risk for early familial coronary artery disease. American heart association, Arteriosclerosis, thrombosis, and vascular biology. 250-255, 16. (1996).
5. Stocker R, Yamamoto Y, Mcdonagh A, et al. Bilirubin is an antioxidant of possible physiological importance. Science. 235:1043-1046, [medline] [order article via infortrieve]. (1987).
6. Stocker R, Glazer A, and Ames B. Antioxidant activities of albumin-bound bilirubin. Proc Natl Acad Sci U.S.A; p 5918-5922. (1987).
7. Stocker R, Mcdonagh A, Glazar A, et al. Antioxidant activities of bile pigments: biliverdin an bilirubin. Methods enzymol. p 301-309, 186. (1990).
8. Harvey A and Schwer tner. Bilirubin concentrate UGT 1A1*28 polymorphism, and coronary artery disease. American association for clinical chemistry, INC. Clinical chemistry; 1039-1040, 49. (2003).
9. Deckert T, Feldt B, Borch K, et al. Albuminuria reflects widespread vascular damage: The steno hypothesis. Diabetologia. 219-226, 32. (1989).
10. Jensen J. Renel and systemic transvascular albumin leakage in severe atherosclerosis. Arterioscler thrombo vasc boil. 1324-1329, 15. (1995).
11. Damjanov I. pathology for the health related protessions. Philadelphia: WB Sanders. (1996).
12. Wilkinson H. The principles and practice of diagnostic enzynology. 1 st ed. Edward Arnold. P 116. (1976)
13. Margaret R, Elizabeth H, and Robert M. Plasma proteins, immunoglobulin and blood coagulation. In: Harper's Biochemistry. Appleton and Lange, Norwalk, Connecticut /Los Altos, California. 24th ed: P 707. (1996).
14. Marshall J. Illustrated textbook of clinical chemistry. 2nded. Gower Medical Publishing London. New York. P 210. (1992).
15. Zilva F, Pannal R, Mayne D. Clinical chemistry in diagnosis and treatment. 5th. ed. Edward Arnold. P 287. (1988).
16. Whitby G, Smith F, and Beckett J. Lecture notes on clinical chemistry. 4th ed. Black well scientific publications. P 103. (1988).
17. James B, Wyngunarde L, Loyd H,et al. Cecil text of meddicin. 18th ed. Volume 1. (1988).
18. Reitman S, and Frankle S. A colorimetric method for the determination of serum glutamic oxaloacetic and glutamic pyruvic transaminases. AM. J. Cli. Pathol. 56-61, 28. (1957).
19. Rodkey L. Direct spectrophotometer determination of albumin in human serum. Clin. Chem 478 - 483, 11. (1965).
20. Cerade W, and Walter I. Aconfirmed method for determination of serum bilirubin by using dimethylsulfoxide. Microchem. J. 231-238,15. (1970).
21. Donald S, and Edward W. Specimen collection and processing: Sources of biological variation. In: Tietz W (Ed.)Fundmentals of clinical chemistry. 3rd ed. Vo 1. 64-69. (1999).
22. Rollins G. With smoking cessation drugs, dosing is key. 16-17, 22(4);1. (2001).
23. Gowenloek A. Valley's practical clinical biochemistry. 6th Heineman medical books. 275-278. London. (1988).
24. Fairbanks F. Hemoglobin, hemoglobin derivatives, and myoglobin. In: Tietz W (Ed.) Fundamentals of clinical chemistry. 2nd ed. 411. Saunders company. London. (1982).
25. Halliwell B. Albumin: An important extracellular antioxidant. Biochem Pharmacol. 569-571, 37. (1998).
26. Wayner D, Butron G, and Lngold K. Quantitative measurement of the total, peroxyl radical-trapping antioxidant capability of human blood plasma by controlled per oxidation: The important contribution made by plasma proteins. FEBSLett; 33-37, 137. (1985).
27. Zoellner H, Hofler M, and Beckmann R. Serum albumin is a specific inhibitor of apoptosis in human endothelial cells. JCellScL; 2571-2580, 109. (1996).
28. Bonetti P, Lerman L, and Lerman A. Endothelial dysfunction a marker of atherosclerostic risk. Atherosclerosis, Thrombosis and Vascular Biology. 23. (2003).