

Cardiac Enzymes (Creatinine Kinase, Troponin I) and Their Gender Relationship

Salwa Muftah Eljamay ^{1*}, Mstafa Suliman Nuesry ²,

¹ Public Health Department, College of Medical Technology, Derna, Libya

² General Department, College of Medical Technology, Derna, Libya

*Corresponding author: salwaeljamay@gmail.com

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Abstract:

Cardiovascular disease (CVD) events in a sex-dependent manner. in apparently healthy males and females across the age span is largely unknown. Aim to find out if their a Relationship between gender and cardiac enzyme (Creatinine Kinase, Troponin I). Material and Methods: Alrazi medical lab from Benghazi collected 506 Blood serum samples, and analysis them by Creatine Kinase (CK) analysis by Biosystems, and A comparison of the Elecsys Troponin T hs assay (MODULAR ANALYTICS E170 analyzer. Result: the frequency for normal result of CKMp up to 25 U \ L was 316(61.5%), the Higher than 26 U \ L 190(37.5%), the frequency for normal result of Up To 0.8 ng \ L was 475(93.9%), and the High More Than < 0.9 ng \ L, 31(6.1%), and about mean for CKMm and Troponin I(1.38, 1.06), and St. D (0.485, 0.240).In figure (1) illustrate the frequency and the percent of the cases which have high rates of CKMp and Troponunel 190(37.5%), 31(6.1%) from 506 cases, there is no correlation between CKMm and Troponin I with gender the p-value > 0.05, R(0.076, -0.031) and there is strong correlation between cardiac enzymes (CKMm and Troponin I), R(0.244**), p-value < 0.05, the strong **. Correlation is significant at the 0.01 level (P-Value), and there is a relationship between CK - MB and Troponin I because of the correlation (0.244**), X2(30.217a), p-value 0.00 > 0.05. Conclusion: there are no correlations between CKMm and Troponin I with gender and there is a strong correlation between cardiac enzymes CKMm with Troponin I.

Keywords: Creatinine Kinase (CK), Troponin I, Cardiac Enzymes, Cardiovascular disease (CVD).

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إنزيمات القلب (كرياتينين كيناز، تروبونين I) وعلاقتها بين الجنسين

سلوى مفتاح الجامعي^{1*}، مصطفى سليمان النويصري²

¹ قسم الصحة العامة، كلية التقنية الطبية، درنة، ليبيا

² القسم العام، كلية التقنية الطبية، درنة، ليبيا

أمراض القلب والأوعية الدموية (CVD) في بعض البحوث تعتمد على النوع سواء الذكور والإناث الأصحاء على ما يبدو عبر الفترة العمرية غير معروف إلى حد كبير. تهدف إلى تحديد العلاقة بين الجنس وأنزيم القلب (كرياتينين كيناز، تروبونين I)، المواد والطرق: قام مختبر الرازي الطبي من بنغازي بجمع 506 عينة من مصل الدم، وتم تحليلها عن طريق تحليل كرياتينين كيناز (CK) بواسطة BioSystems، ومقارنة مقايصة جهاز Troponin T hs Elecsys

محلل MODULAR ANALYTICS E 170. النتيجة: التكرار للطبيعي. نتيجة CKMp حتى 25 وحدة/ لتر كانت 316(61.5%)، والأعلى من 26 وحدة/لتر 190(37.5%)، وكان التردد للنتيجة الطبيعية حتى 0.8 نانوجرام/لتر 475(93.9%)، و الارتفاع أكثر من $0.9 >$ نانوجرام/لتر، وحوالي متوسط CKMm و Troponin I (1.38، 1.06)، و St.D 0.485 (0.240). التكرار والنسبة النسبية المئوية للحالات التي لديها معدلات عالية من CKMp و TroponineI 190 (37.5%)، 31(6.1%) من 506 حالة، لا توجد ارتباطات بين CKMm و Troponin I مع الجنس لان قيمة $p < 0.05$ ، $R(0.076, -)$ (0.031) ويوجد ارتباط قوي بين الإنزيمات القلبية (CKMm و Troponin I، $R(0.244, **)$ ، قيمة $p > 0.05$ ، القوية **. الارتباط مهم عند مستوى 0.01 (P- Value)، وهناك توجد علاقة بين CK - MB و Troponin I بسبب الارتباط $(0.244, **)$ ، $X^2(30.217, a)$ القيمة $p < 0.00 < 0.05$. الاستنتاج: لا توجد علاقة ارتباطية بين (Troponin وCKMm) I مع الجنس، كما توجد علاقة قوية بين الإنزيمات القلبية CKMm و Troponin I.

الكلمات المفتاحية: كرياتينين كيناز (CK)، تروبونين الأول، إنزيمات القلب، أمراض القلب والأوعية الدموية (CVD).

Introduction

Cardiovascular diseases (CVD) are one of the main causes of death globally, accounting for an estimated 17.9 million deaths per year.1 Between 1990 and 2010, the global prevalence of CVD in women declined, but there has been a notable increase in recent years, particularly in densely populated nations.[16], the direct relation of abnormal CK level with MI. The frequency of CK level in MI patients was very high. [22], creatine phosphate could significantly improve myocardial function, improve myocardial enzyme profile and reduce myocardial damage in children with pediatric myocarditis and had a high safety of use, which was worthy of clinical promotion.[15], gender specificities in cardiac troponins T and I in the diagnostics of ACS, and to suggest the most likely mechanisms for the formation of differences in the serum levels of cardiac troponins in men and women.[13], The cardiovascular disease which is associated with diabetes has a higher risk factor in men as compared to women [11], sex-specific serum levels of cardiospecific troponins T and I in the diagnosis of myocardial infarction and the mechanisms of formation of sex-specific serum levels of troponins[6], a direct relationship exists between Troponin T and CPK, and CK-MB was more specific with even more closer and linear relationship with Troponin T hs [2] , Demonstrate higher CRF is associated with greater SEVR in males and females after adjusting for CVD risk factors and medications, therefore highlighting subtle sex-specific nuances that warrant further investigation.[17], Factors influencing women's cardiovascular health in Eastern Europe may differ by location owing to socioeconomic issues.[14], Gender-related differences in CK levels have been observed. Research suggests that men generally tend to have higher baseline CK levels compared to women, possibly due to differences in muscle mass and metabolism [21], gender-related variations in troponin levels. found that women, particularly younger women, may have lower baseline troponin levels than men. However, it is important to note that the diagnostic cutoff values for troponin are typically gender-neutral, and any elevation above these thresholds is clinically significant.[20], There are gender-related differences in cardiac function, and, starting from the observation that women are more likely to present with heart failure with preserved ejection fraction but reduced diastolic compliance, the issue of gender-related variability of cardiac pathologies came into light.[12], the first guidance on how to include sex and gender in cardiovascular research. , a sex and gender lens to enable comparison across studies and laboratories, resulting in better health for all[10], age and sex interactions occur and their contribution to the changes in myelopoiesis in MI disease states is inconclusive and this necessitates extensive investigations[8], Awareness of sex differences in medical diagnosis, treatment, secondary prevention of cardiovascular disease (CVD), and cardiac rehabilitation (CR) has been in focus of the scientific community for more than two decades[8], estrogen is protective against ischemic stroke (IS) in adult female rats and that ABR played a role in this beneficial action. Dysfunction of ABR and unresponsiveness to estrogen in aged female rats may contribute to a reduced estrogen efficacy against cerebral ischemia.[7], the role of sex-specific serum levels of cardiospecific troponins T and I in the diagnosis of myocardial infarction and the mechanisms of formation of sex-specific serum levels of troponins [6], Women exhibited a better prognosis than men with iCMP, but similar for niCMP. Nevertheless, sex was not an independent predictor of death for both CMP [5], females ≤ 70 years old had a significantly higher incidence of MAE, compared with males and MIOCA female peers, likely due to the different pathophysiology of the ischaemic event.[4], hypertension were more strongly associated with MI in women, whereas lipid traits were more strongly associated with both MI and stroke in men, [3].

Material and methods

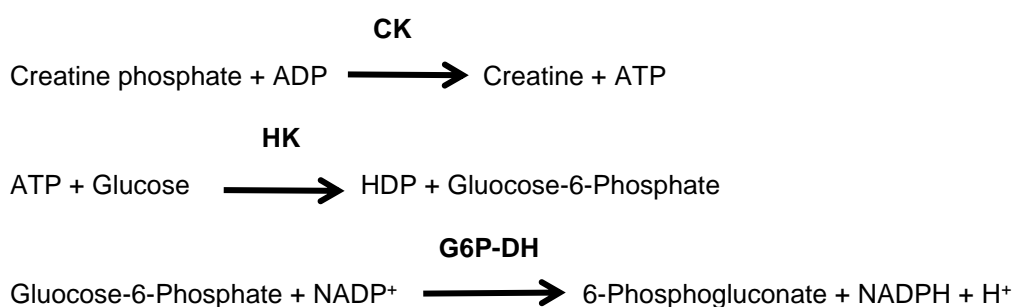
Data Collection

Data collected from Alrazi medical lab from Benghazi was 506 Blood serum samples from May 2021 to April 2023.

Data Analysis Creatine Kinase (CK)

Creatine Kinase (CK) analysis by BioSystems, (Biosystems S.A Costa Brava,30. 0BOS0 Barcelona (Spain), www.biosystems.global, this reagent is for use in the bioSystems BA analyzers or other analyzer with similar performance characteristics.

Creatine kinase (CK) is the phosphorylation of ADP in the presence of creatinine phosphate, to form creatine. The catalytic concentration is determined from the rate of NADPH formation measured at 340 nm, using the hexokinase (HK) and glucose-6- phosphate dehydrogenase (G6P-DH) coupled reaction.



Specimen collection and preparation

he Cardiac Troponin I Rapid Test Cassette (Serum) by use Elecsys and cobas e 411 analyzer. Only the specimens listed below were tested and found acceptable. Serum collected using standard sampling tubes or tubes containing separating gel. K2-EDTA, K3-EDTA, Li-heparin and Na-heparin plasma. Plasma (EDTA, heparin) and serum samples should not be used interchangeably.

Method comparison: A comparison of the Elecsys Troponin T hs assay (MODULAR ANALYTICS E170 analyzer; y) with the Elecsys Troponin T hs STAT assay (Elecsys 2010 analyzer; x) using clinical samples gave the following correlations (ng/L).

Ethical Approval: All participants were voluntary and informed about the objectives of the study and informed consent was obtained from all the participants. The study was conducted in accordance with the Declaration of Helsinki.

Data analysis:

Data analyses were carried out using the Statistical Packages for the Social Sciences (SPSS Version 26.0) Data was described using frequency tables, mean, and standard deviation and crosstabs The level of significance was adopted at $P < 0.05$, and χ^2

Results and discussion

Table (1) show the frequency and percentage for gender, male 296(86.5%), and for female 210(41.5%)

Table 1 Frequency and Percentage for Gender

| Gender | Frequency(n) | Percentage % |
|--------|--------------|--------------|
| Male | 296 | 58.5 |
| Female | 210 | 41.5 |
| Total | 506 | 100.0 |

Table (2) illustrated the frequency and percent of CKMm, Troponin I and their mean, stander

deviation, the frequency for normal result of CKMp up to 25 U\ L was 316(61.5%), the Higher than 26 U \ L 190(37.5%), the frequency for normal result of Up To 0.8 ng\ L was 475(93.9%), and the High More Than < 0.9 ng\ L, 31(6.1%), and about mean for CKMm and Troponin I(1.38, 1.06), and St. D (0.485, 0.240).

Table 2 frequency, Percentage, mean and St.D for CKMm and Troponin I

| CKMm | N (%) | Mean | St. D |
|----------------------------|------------|------|-------|
| Normal up to 25 U\ L | 316(61.5%) | 1.38 | 0.485 |
| Higher than 26 U \ L | 190(37.5%) | | |
| Troponin I | | | |
| Normal Up To 0.8 ng\ L | 475(93.9%) | 1.06 | 0.240 |
| High More Than < 0.9 ng\ L | 31(6.1%) | | |
| Total | 506(100%) | | |

Figure (1) illustrates the frequency and the Percentage of the cases which have a high rate of CKMp and Troponine I 190(37.5%), 31(6.1%) from 506 cases.

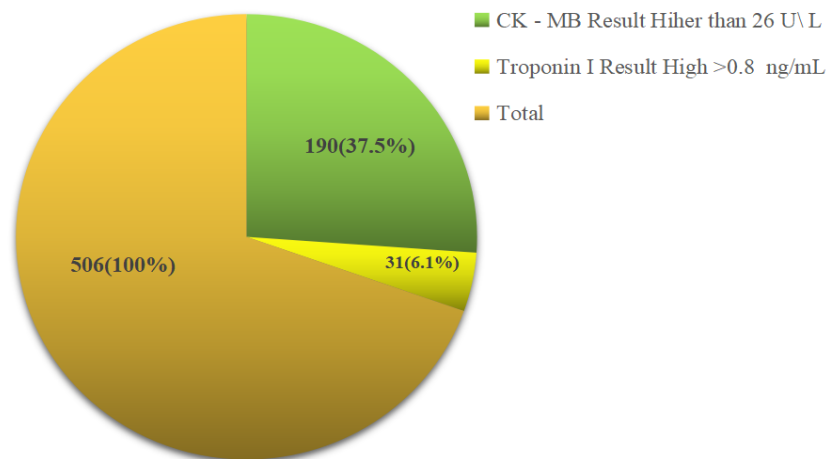


Figure 1 the percent of CKMp, Troponine I of the total sample.

Table (3) illustrates that there is no correlation between CKMm and Troponin I with gender the p-value > 0.05, R (0.076, - 0.031) and there is a strong correlation between cardiac enzymes (CKMm and Troponin I), R(0.244**), p-value < 0.05, the strong **. Correlation is significant at the 0.01 level (P-value).

Table 3: there is no Relationship between Gender and because P-Value (0.089, 0.484) and there is a strong correlation between the ratio of CKMm and Troponin I, 0.000 < 0.05

| Correlations | | CK - MB Result | Troponin I Result |
|-------------------|----------------|---------------------|---------------------|
| Gender | R | 0.076 | - 0.031 |
| | X ² | 2.904 ^a | 0.493 ^a |
| | P-Value | 0.089 | 0.484 |
| CK - MB Result | R | 1 | 0.244** |
| | X ² | - | 30.217 ^a |
| | P-Value | - | 0.000 |
| Troponin I Result | R | .244** | 1 |
| | X ² | 30.217 ^a | - |
| | P-Value | 0.000 | - |
| | N | 506 | 506 |

** . Correlation is significant at the 0.01 level (P-Value)

Figure (2) illustrates that there is no relationship between gender and CK - MB and the male and female there are no differences in results between them that the correlation (0.076), $\chi^2(2.904^a)$, p-value $0.089 > 0.05$

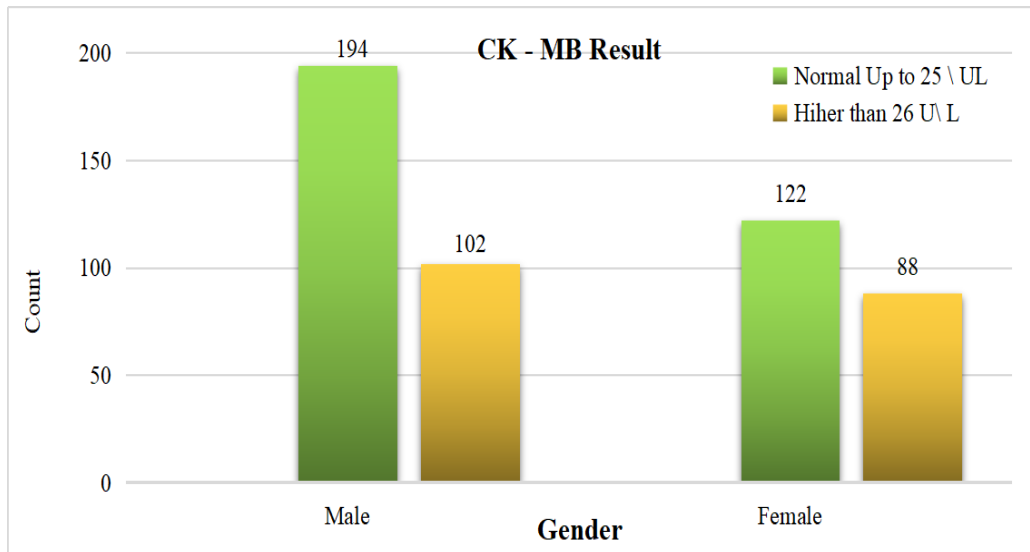


Figure 2 relationship between gender and CK - Mp

Figure (3) illustrate that there is no relationship between gender and CK - MB and the male and female there are no differences in results between them that the correlation (- 0.031), $\chi^2(0.493^a)$, p-value $0.484 > 0.05$

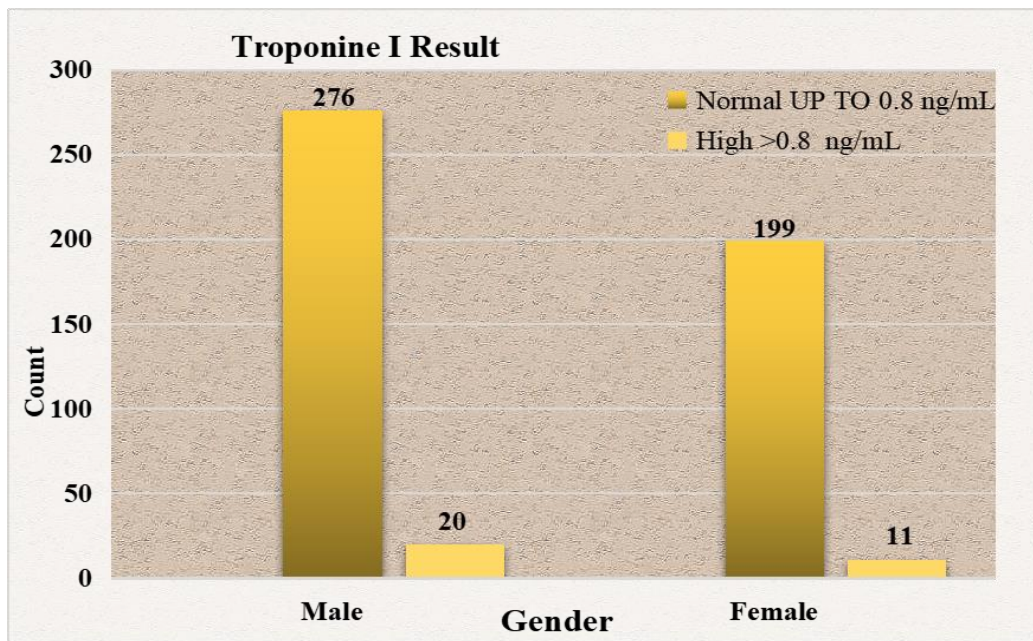


Figure 3 Relationship between Gender and Troponine I

Figure (4) illustrates that there is relationship between CK - MB and Troponin I because the correlation (0.244**), $\chi^2(30.217^a)$, p-value $0.00 > 0.05$

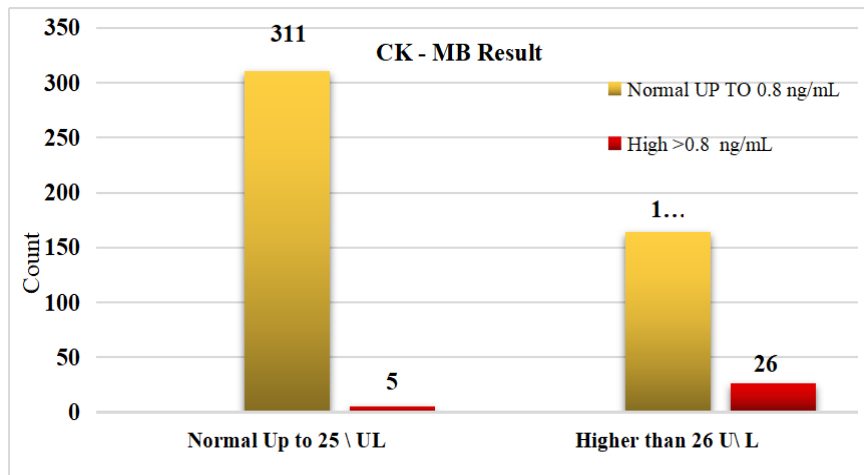


Figure 4 Relationship between CKMp and Troponin I

Discussion:

In this study, the result noted that In the table (1) shows the frequency and Percentage for gender, male 296(86.5%), and for female 210(41.5%), Table (2) illustrates the frequency and percentage of CKMm, Troponin I and their mean, stander deviation, the frequency for the normal result of CKMp up to 25 U \ L was 316(61.5%), the Higher than 26 U \ L 190(37.5%), the frequency for the normal result of Up To 0.8 ng \ L was 475(93.9%), and the High More Than < 0.9 ng \ L, 31(6.1%), and about mean for CKMm and Troponin I(1.38, 1.06), and St. D (0.485, 0.240).In figure (1) illustrate the frequency and the percent of the cases which have a high rate of CKMp and Troponin I 190(37.5%), 31(6.1%) from 506 cases, Table (3) illustrates that there is no correlations between CKMm and Troponin I with gender the p-value > 0.05, R(0.076, - 0.031) and there are strong correlation between cardiac enzymes (CKMm and Troponin I), R(0.244**), p-value < 0.05, the strong **. Correlation is significant at the 0.01 level (P-value). Figure (2) illustrates that there is no relationship between gender and CK - MB and the male and female there are no differences in results between them that the correlation (0.076), X²(2.904a), p-value 0.089 > 0.05. Figure (3) illustrate that there are no relationship between gender and CK - MB and the male and female there are no difference in result between them that the correlation (- 0.031), X²(0.493^a), p-value 0.484 > 0.05, Figure(4) illustrate that there are relationship between CK - MB and Troponin I because that the correlation (0.244**), X²(30.217^a), p-value 0.00 > 0.05.there are many study agree with this study as [13] which concluded the study the role of gender specificities in cardiac troponins T and I in the diagnostics of ACS, and to suggest the most likely mechanisms for the formation of differences in the serum levels of cardiac troponins in men and women, and [10], which concluded study that cardiovascular physiology, incorporating sex and gender is a necessary component when optimally designing and executing research plans, [5], concluded the study in sex was not an independent predictor of death for both Cardiomyopathy(CMP), And this study not agree with [1], a huge bias towards CVDs in women, and continuing to extrapolate data from men to women is currently known to be a harmful approach, and [12], These findings indicate that the evaluation of cardiac function and volumes of patients by gated SPECT should consider age- and gender-matched normative values [7], Summarize that age is the key element in heart disease and that there is a difference in injury between males and females [3], Older age, hypertension and smoking appeared stronger drivers of cardiovascular disease in women, whereas lipid metrics appeared stronger risk determinants for men. These findings highlight the importance of sex-specific preventive strategies and suggest priority targets for intervention in men and women. In their study, Bennu shows that there is a close relationship between the height of CKMP and Troponin I and direct relationship exists between Troponin T and CPK, and CK-MB was more specific with an even closer and linear relationship with Troponin T hs. It was further observed that the highly sensitive Troponin T reagent method alone was sufficient to make a final diagnosis of AMI. Troponin T hs alone not only reduces the investigation time but reduces the overall cost as well [2].

Conclusion

This study, which examined the data and results of cardiac enzyme tests aimed at the relationship of these enzymes to males and females, shows that there is no correlation between cardiac enzyme

(CKMm and Troponin I) gender. At the same time, there is a strong correlation between CKMm cardiac enzymes and Troponin 1.

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