Journal of Clinical Cardiology and Cardiology Research
2023 Volume 2, Issue 2
DOI: 10.59657/2837-4673.brs.23.013

BioRes Scientia
Value your Research

Research Article

Open Access

Evaluation of Iron Profiles and Coagulation Profiles in Ischemic Heart Diseases Patients in Elmek Nimir Hospital, Sudan

Hind Mohammed Ali[1], Hamza Ahmed Hassan[2], Tibyan Abd Almajed[2], Ghanem Mohammed Mahjaf[3], Wafaa Bashir Haj Ahmed[1], Mosab Nouraldein Mohammed Hamad[4]*

[1]*Department of Haematology, Faculty of Medical Laboratory Sciences, Shendi University, Sudan.*
[2]*Department of Clinical Chemistry, Faculty of Medical Laboratory Sciences, Shendi University, Sudan.*
[3]*Department of Medical Microbiology, Faculty of Medical Laboratory Sciences, Shendi University, Sudan.*
[4]*Department of Microbiology, Faculty of Medicine, Elsheikh Abdallah Elbadri University, Sudan.*
**Corresponding author: Mosab Nouraldein Mohammed Hamad.*

Abstract

Background: Ischemic heart disease (IHD) isa constellation of diseases that includes stable angina, unstable angina, myocardial infarction, and sudden cardiac death. It belongs to the group of cardio vascular diseases and is the most common type among them. Iron is an essential trace element. It plays an important role in maintaining various cellular function sand enzymatic reactions. On the other hand, excessive intake of iron is known to be a risk factor for the progression of atherosclerosis. Abnormal iron deposition in the heart causes hemochromatosis and dilated cardiomyopathy, which leads to ischemic heart disease. Objective: This study aims to investigate the role of serum iron, serum ferritin, total iron-binding capacity (TIBC), PT, and PTT in ischemic heart disease (IHD)and their relationship with other risk factors for IHD.

Methods: This is a prospective, case-control, cross-sectional analytical study conducted at Elmek Nimir University Hospital, Shendi City, to assess they are on profile and coagulation profile of patients with is chemic heart disease. The study included (30) patients diagnosed with is chemic heart disease and the study group was compared with the mean of the control group (20). Serum iron, ferritin, and TIBC were estimated using a spectrophotometer, and PT and PTT were estimated using manual methods. Data were collected using a structured personal questionnaire and the program (SPSS) version (11.5) was used for data analysis.

Results: In this study, patients with are chemic heart disease were (40%) male and (60%) female. In this study, iron averaged (41.0) ug/dl (P-value 0.010), ferritin averaged (233.0) ug/dl (P-value 0.000), and TIBC averaged (44.0) µg/dl. Was shown. (P-value 0.000) compared to mean controls (27.0), (162.0), (56.0). A significant difference was found between them on profile and his IHD. This study showed the mean PT, PTT for cases (13.4), (40.4) (P-value 0.024), (P. value 0.009) compared with the mean for controls (12.0), (35.1). A significant difference was found between the coagulation profile and IHD.

Conclusions: This study concluded that serum levels of iron, ferritin, TIBC, PT, and PTT may be associated with Is chemic heart disease.

Keywords: ischemic heart disease; iron; ferritin; pt; ptt; shendi; sudan

Introduction

Cardio vascular disease (CVD)isa type of disease that affects the heart, blood vessels (arteries, capillaries, veins), or both [1]. Cardiovascular disease refers to all diseases that affect the cardio vascular system, primarily heart disease, cerebral and renal vascular disease, and peripheral arterial disease [2]. The causes of cardiovascular disease are varied, but atherosclerosis and/or hypertension are the most common [3]. In addition, a variety of physiological and biochemical changes alter cardiovascular function in association with aging, leading to an increased risk of subsequent cardiovascular disease, even in healthy asymptomatic individuals [4]. Cardio vascular disease is a leading cause of death. In 2008, 30% (30%) of all deaths worldwide were due to cardiovascular disease. Mortality from cardiovascular disease is also higher in low- and middle-income countries, as more than 80% of all cardiovascular deaths occur in these countries [5]. It is also estimated that by 2030 more than 23 million people will die annually from cardiovascular disease [5,6]. The causes, diagnosis, prevention, control, and/or

treatment of all forms of the cardiovascular disease continue to be an active area of biomedical research, with hundreds of scientific studies published each week. I'm here. In 2013, coronary heart disease (CHD) was the leading cause of death worldwide, with (8.14) million deaths (16.8%) compared with (5.74) million deaths (12%) in1990 [7]. the risk of dying from (CAD) at a given age decreased between1980 and 2010, especially in developed countries [8]. The number of cases of (CAD) in a given age group also decreased between 1990 and 2010 [9]. In the United States in 2010, approximately (20%) of (ages 65+) had (CAD) (CAD), while (7%) and (1.3%) (Ages 45–64) (CAD) of (18-45 years old) Now. (10) More men than women at a given age [10]. The Sudan House hold Survey (SHHS) reported a prevalence of heart disease (2.5%). Hypertensive heart disease (HHD), rheumatic heart disease (RHD), ischemic heart disease (IHD), and cardiomyopathy account for more than (80%) of (CVD)in Sudan [6]. Heart disease is the leading cause of morbidity and mortality in Sudan. Hypertension (RHD), (IHD), and cardiomyopathy account for the majority of four (CVD). Hyper tensions common and poorly controlled [11]. Most cardiovascular diseases can be prevented by addressing risk factors such as tobacco use, unhealthy diet and obesity, physical inactivity, hypertension, diabetes, and elevated lipids. More than half of the heart disease deaths in 2009 were men. Coronary heart disease (CHD) is the most common type of heart disease, causing more than (385,000) deaths each year [6]. Ischemic heart disease is associated with progressive mechanical obstruction, dynamic obstruction, plaque inflammation, instability, and rupture, followed by super imposed thrombosis. Clinicians are employing additional tools to aid clinical assessment and improve their ability to identify "at-risk" patients who are at risk for cardiovascular disease [12,13]. Bio markers are one of the tools to better identify at-risk individuals, diagnose medical conditions quickly and accurately, and effectively diagnose and treat sick patients. Biomarkers can be measured in biological samples (as blood, urine, or tissue tests), can be human records (blood pressure, electrocardiogram, or holder), or imaging tests (echocardiogram). Normally, very small amounts of iron are present in most body cells, plasma, and other extracellular fluids, and the body strictly limits its iron supply so that every day (0.1%) of the body's iron content is lost. maintain. Mainly in desquamated cells [14]. Iron`s high activity is a two-edged sword, and free iron ions in the body also participate in destructive chemistry, primarily in catalyzing the formation of toxic free radicals. Iron play role in the process of atherosclerosis by catalyzing the formation of free radical and also this contributes to reperfusion damage. High serum ferritin concentration was associated with increased risk of myocardial infarction, independent of major cardiovascular risk factors. Abnormal deposition of iron in the heart cause hemochromatosis and dilated cardio myopathy and this causes causing is chemic heart disease [1]. Coagulation play role in ischemic heart disease, increase plasma levels of coagulation protein are associated with an increased risk of myocardial infarction The prothrombin time alone is derived from measures of prothrombin ratio {PR} and international normalized ratio {INR] are assays evaluating the extrinsic pathway and common path way of coagulation. They are used to determine the clotting tendency of blood in the measure of war far in dosage [2]. The role of blood clotting activation such as elevated circulating level of a marker of thrombin generation and fibrin peptide A in the occurrence of angina in ischemic heart disease [3]. Activated thromboplastin time is used to monitor the effects of heparin on intrinsic pathways and detect defects in factors XII, XI, IX, VIII, and the common pathway.

Material and Methods

Study design

This is an analytical, laboratory-based, hospital case-control study to evaluate the iron profile and coagulation profile of patients with ischemic heart disease at Elmek-Nimir University Hospital for the period from December 2021 to October 2021.

Study area

The study was conducted at his Elmek-Nimir University Hospital in Shendi City, Sudan. Shendi is a city in northern Sudan, northeast of Khartoum, on the eastern bank of the Nile River (150 km). Shendi is also about(45km) south west of the ancient city of Meroe. Located on the Nile state River. Its main western bank suburb is Almatama. A major traditional trade route through the Bayuda Desert connects Al Matamma to the northwest with Napata (250km) in Malawi.

Study Population

A total of (50) samples were collected from the study group of is chemic heart patients.

Inclusion Criteria

Both men and women with is chemic heart disease (medicated or not) participated in the study.

Data Collection Tools

Data were collected using a laboratory-based scored pre-coded questionnaire. Its nature is designed to ultimately retrieve useful information for research.

Ethical Considerations

The procedure for venous blood sampling was explained to the patient undergoing the examination. All participants were briefed on the purpose and procedures of the study during the interview period. Valid written consent was obtained from all participants. All results were highly private and confidential.

Result

Demographically, a total of 30 blood samples were collected from patients with ischemic heart disease and 20 from healthy subjects as controls. Participation in ischemic heart disease mirrored 30(60%) and 20(40%) of the control group (Table1). The frequency of ischemic heart disease patients was 9 males (18%) and 21 females (42%) (Table2). As a result of the analysis, the mean PT and PTT of the case group (13.4 seconds) (and 40.4 seconds) was), and the mean of PT and PTT of the control group was (12.0 seconds) (and 35.1seconds) (Table 3). The analysis also shows the average iron, TIBC, and ferritin values (41.0 ng/dl) in this case. (44.0), (233.0), and mean iron and TIBC and ferritin in controls (27.0 ng/dl), (56.0), (162, 0) (Table 4). The male and female averages in PT were (13.3), (13.5) seconds, and the male and female averages in PTT were (43.6) (39.0) seconds (Table5). Also, the mean of S. iron, TIBC, S. Ferritin in men (38.0), (45.0), (255.0) and the mean of S. iron, TIBC, S. Ferritin in women (42,2), (56.0), (224.2) (Table 6).

Table 1: Distribution of the study population after testing and controls

Variables	Frequency	Percent
Test	30	60%
Control	20	40%
Total	50	100%

Table 2: Distribution of study according to sex.

Sex	Frequency	Percent
Male	9	30%
Female	21	70%
Total	30	100%

Table 3: Comparison between case and control in PT and PTT.

Group		N	Mean	SD	P-value
PT	Case	30	13.4	2.94	0.024
	Control	20	12.0	1.45	
PTT	Case	30	40.4	7.78	0.009
	Control	20	35.1	6.00	

Table 4: The comparison between iron and TIBC and Ferritin in case and control.

Group		N	Mean	SD	P-value
Iron	Case	30	41.0	16.3	0.010
	Control	20	27.0	4.25	
TIBC	Case	30	44.0	11.3	0.000
	Control	20	56.0	6.71	
Ferritin	Case	30	233.0	19.4	0.000
	Control	20	162.0	21.9	

Table 5: Comparison between PT and PTT in male and female.

Group		N	Mean	SD	P-value
PT	Male	9	13.3	3.64	0.874
	Female	21	13.5	2.69	
PTT	Case	9	43.6	11.3	0.135
	Control	21	39.0	5.47	

Table 6: The comparison between iron and TIBC and Ferritin in male and female.

Group		N	Mean	SD	P-value
Iron	Male	9	38.0	12.2	0.456
	Female	21	42.2	17.9	
TIBC	Male	9	45.5	10.2	0.416
	Female	21	56.0	11.9	
Ferritin	Male	9	255.0	4.3	0.000
	Female	21	224.2	15.5	

Discussion

Ischemic heart disease (IHD) isa constellation of diseases that includes stable angina, unstable angina, myocardial infarction, and sudden cardiac death [15]. Studies have shown that female patients are infected more often than male patients. Results of the presented study showed a significant increase in PT and PTT compared to controls (P-value 0.024) and PTT (0.009). The results of this current study are consistent when compared to a study performed by

Haseeb Akhan that showed changes in prothrombin time and activated partial thromboplastin time in patients with acute myocardial infarction. As a result, the average S. The iron content of the case (41.0 µg/dl) and the control (27.0µg/dl) showed a significant difference (P-value 0.010). The results also show that the mean of TIBC was in cases (44.0µg/dl) and controls. (56.0µg/dl), and this result showed significant variation (P-value 0.000). On the other hand, the dominant result was that the mean ferritin values showed significant static values (P-value 0.0 00) in cases (233.0µg/dl) and controls (162.0µg/dl). This study was consistent with that by Das De et al. A 2015 study showed a significant association between markers of iron status and IHD. Furthermore, this study was consistent with that reported by Sunny Chopra et al, A 2015 study confirmed that an IHD patient experienced a significant increase in his S. iron and ferritin and a significant decrease in his TIBC [16]. Furthermore, the results showed that the average PT was in males (13.3 s) and females (13.5 s). On the other hand, the results show the average PTT values for men (43.6seconds) and women (39.0seconds), with no significant difference between men and women. The results of this study showed significant statistical differences between PT and PTT compared by gender. Further results were iron and TIBC in men (38.0), (45.5) and women (42.2), (56.0). These results indicated no significant difference between males and females (P-value0.456). On the other hand, the average value of S. ferritin was (255.0) in men and (244.2) in women. These results showed a significant difference between men and women (P-value0.000), this study disagreed with that reported by wafaa Bashir and her colleague, 2022 showed that the mean of S. ferritin in males was (206.3µg/dl) and in females was (162.2µg/dl) which showed an insignificant statically value, (P. value 0.101) [17].

Conclusion

PT and PTT were increased in subjects with ischemic heart disease compared to control subjects. S. iron and S. ferritin were increased in ischemic heart disease patients compared to healthy controls. TIBC was lower in the ischemic heart disease patient compared to healthy subjects in the control group. PT and PTT increase according to gender. S. iron, TIBC, s. Ferritin increased according to gender.

Declarations

Sources of Funding: There was no specific grant for this research from any funding organization in the public, private, or nonprofit sectors.

Conflict of Interest: The author has affirmed that there are no conflicting interests.

References

1. Maton, Anthea; Jean Hopkins, Charles William McLaughlin, Susan Johnson, Maryanna Quon Warner, et al. (1993). Human Biology and Health. Englewood Cliffs, New Jersey: *Prentice Hall*. 0-13-981176-1.
2. Bridget B. Kelly. (2010). Institute of Medicine; Fuster, Valentin. Promoting Cardiovascular Health in the Developing World: A Critical Challenge to Achieve Global Health. Washington, D.C: *National Academies Press*. 0-309-14774-3.
3. onow RO, et al. (2012). Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 9th ed. Philadelphia, Pa.Saunders *Elsevier.*
4. Dantas AP, Jimenez-Altayo F, Vila E. (2012). "Vascular aging: facts and factors".*Frontiers in Vascular Physiology*, 1-2.
5. Mathers CD, Loncar D. (2006). Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med*, 3(11):e442.
6. Peden,M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A.H. et al. (2010). World report on road traffic injury prevention. Geneva: World Health Organization.
7. Finegold JA, Asaria P, Francis DP. (2013). "Mortality from ischemic heart disease by country, region, and age: Statistics from World Health Organization and United Nations.". *International journal of cardiology* 168(2): 934-945.
8. Hung MJ, Cherng WJ. (2003). Comparison of white blood cell counts in acute myocardial infarction patients with significant versus insignificant coronary artery disease. *Am J Cardiol* 91(11):1339-1342.
9. Moran AE, Forouzanfar MH, Rotti GA, Mensah, et al. (2014). The global burden of disease 2010 study.
10. Mozaffarian D, Roger VL, Benjamin EJ, Berry et al. (2013). Heart disease and stroke statistics. A report from the American heart association.
11. Mendis S, Puska P, Norrving B. (2011). Global Atlas on cardiovascular disease prevention and control.

12. Finks SW, Airee A, Chow SL, Macaulay TE, Moranville MP, et al. (2012). "Key articles of dietary interventions that influence cardiovascular mortality. *Pharmacotherapy*, 32(4): e54–87.
13. Yusuf S, Hawken S, Ounpuu S, et al. (2004). "Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the inter_heart study): case-control study".
14. Burtis C E, Ashwood E and Bruns D E Tietz text book of clinical chemistry and molecular diagnosis. Fourth edition. (2006) United States of America.
15. Wong, N.D. (2014). Epidemiological studies of CHD and the evolution of preventive cardiology. (May 2014). *Nature reviews. Cardiology*, 11(5):276-289.
16. Sunny Chopra Anju Huria Ashok Kumar Lal Meenakshi Dhar Journal of Cardiovascular Disease Research, 6(1).
17. Wafaa Bashir Haj Ahmed, Rashid E. Abdalla, Ghanem Mohammed Mahjaf, Hamza A. Hassan, Tarig M. A. Mohamed, et al. (2022). Evaluation of Iron Profile among Ischemic Heart Disease Patientsin Shendi City, Sudan, *SAR J Med*, 3(3):36-40.

Cite this article: M.N.M. Hamad, Hind M. Ali, Hamza A. Hassan, Tibyan A. Almajed, Ghanem M. Mahjaf, et al. (2023). Evaluation of Iron Profiles and Coagulation Profiles in Ischemic Heart Diseases Patients in Elmek Nimir Hospital, Sudan. *Journal of Clinical Cardiology and Cardiology Research*, BioRes Scientia Publishers, 2(2):1-5. DOI: 10.59657/2837-4673.brs.23.013

Article History: **Received:** September 02, 2023 | **Accepted:** September 22, 2023 | **Published:** October 06, 2023