

**The Role of Human Fatty Acid Binding  
Protein as an Early Predictive  
Biomarker for Carbon Monoxide  
Induced Cardiotoxicity**  
(A Prospective study)

*Thesis*

*Submitted for Partial Fulfillment of Master Degree  
In Clinical Toxicology*

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## Abstract

**Introduction:** Carbon monoxide (CO) is an odorless, colorless, tasteless, non-irritating gas formed as a by-product of burning organic compounds. The affinity of hemoglobin for CO is 200 to 250 times greater than its affinity for oxygen. This results in competitive inhibition of oxygen release due to a shift in the oxygen-hemoglobin dissociation curve, reduced oxygen delivery, and subsequent tissue hypoxia.

**Aim of the Work:** This study aims to assess the role of human fatty acid binding protein as an early predictor biomarker for carbon monoxide induced cardiotoxicity among patient admitted to the Poison Control Center Ain Shams University Hospitals.

**Patients and Method:** A prospective observational study was conducted beginning from November 2015 to April 2016 for adult (18-65years old) patients with history of acute moderate and sever carbon monoxide intoxication of both sex, admitted to PCCASUH. 25 patients were included in this study according to sample size determined by statistical specialist at community medicine and environmental department, faculty of medicine, Ain Shams University.

**Results:** *Group 1* (moderately intoxicated cases):

All patients diagnosed as acute moderate CO poisoning who were seven patients (28%) of all patients.

*Group 2* (severely intoxicated patients):

All patients diagnosed as acute severe CO poisoning who were eighteen patients (72%) of all patients.

**Conclusion:** From the current study it was concluded that identification of the degree of cardiac injury is essential in patients admitted and followed-up with the diagnosis of CO intoxication. ECG, cardiac enzymes, and even echocardiography should be performed in the ED on these patients to determine the level of injury.

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**Keywords:** Human Fatty Acid, Early Predictive Biomarker, Carbon Monoxide,

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قالوا

سبحانك لا علم لنا  
إلا ما علمتنا إنك أنت  
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

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## *List of Abbreviation*

<b>Abbreviation</b>	<b>Meaning</b>
<b>A-FABP</b>	Adipocyte fatty acid binding protein
<b>ALT</b>	Alanine amino transfrease
<b>ANP</b>	Atrial natriuretic peptide
<b>AST</b>	Aspartate amino transferase
<b>ATA</b>	Atmosphere of absolute prusser
<b>ATP</b>	Adenosine triphosphate
<b>B-FABP</b>	Brain fatty acid protein
<b>BNP</b>	Brain natruritic peptids
<b>CAD</b>	Coronary artery disease
<b>CBC</b>	Complete blood count
<b>CD-4</b>	Cluster of differentiation
<b>CNS</b>	Central nervous system
<b>CO</b>	Carbon monoxide
<b>COHb</b>	Carboxyhemoglobin
<b>CPK</b>	Creatine phosphokinase
<b>CPK-BB</b>	Creatine phosphokinase brain
<b>CPKMB</b>	Creatine phosphokinase myocardial brand
<b>CPK-MM</b>	Creatine phosphokinase skeletal muscle
<b>CSF</b>	Cerebrospinal Fluid
<b>CT</b>	Computed tomography
<b>CTnI</b>	Cardiac troponin I
<b>CTnT</b>	Cardiac troponin T
<b>DIC</b>	Disseminated intravascular coagulation
<b>DNS</b>	Delayed neurological sequalea
<b>ECG</b>	Electrocardiography
<b>E-FABP</b>	Epidermal/ fatty acid binding protein

<b>Abbreviation</b>	<b>Meaning</b>
<b>ESC</b>	European Society of Cardiology
<b>FABPs</b>	Fatty acid binding proteins
<b>FA-CoA</b>	Fatty acids acyl-CoA
<b>FAs</b>	Fatty acids
<b>Hb</b>	Hemoglobin
<b>HBOT</b>	Hyperbaric oxygen therapy
<b>HF</b>	Heart Failure
<b>HFABP</b>	Human fatty acid binding protein
<b>H-FABP</b>	Heart type fatty acid binding protein
<b>ICU</b>	Intensive care unit
<b>iLBP</b>	Intracellular lipid-binding protein
<b>II-FABP</b>	Ilial fatty acid binding protein
<b>INR</b>	International normalization ratio
<b>IP</b>	Inpatient
<b>k</b>	Potassium
<b>LDH</b>	Lactate dehydrogenase
<b>LV</b>	Left ventricle
<b>MBP</b>	Myelin basic protein
<b>M-FABP</b>	Myelin fatty acid binding protein
<b>MI</b>	Myocardial Infraction
<b>MPV</b>	Mean Platelet Volume
<b>MV</b>	Mechanical ventilation
<b>Na</b>	Sodium
<b>NADH</b>	Nicotinamide adenine dinucleotide
<b>NADPH</b>	Nicotinamide adenine dinucleotide phosphate
<b>NO</b>	Nitric oxide



<b>Abbreviation</b>	<b>Meaning</b>
<b>NSTEMI</b>	Non ST segment elevation myocardial infarction
<b>NT-ProBNP</b>	Terminal prohormone of brain natriuretic peptide
<b>PaO<sub>2</sub></b>	Partial pressure of arterial O <sub>2</sub>
<b>PCCASUH</b>	Poison Control Center Ain Shams University Hospitals
<b>PCO<sub>2</sub></b>	Partial pressure of arterial CO <sub>2</sub>
<b>PPM</b>	Part per million
<b>PT</b>	Prothrombin time
<b>PTT</b>	Partial prothrombin time
<b>ROS</b>	Reactive oxygen species
<b>SaO<sub>2</sub></b>	Oxygen saturation
<b>SGOT</b>	Serum glutamic oxaloacetic transaminase
<b>SIRS</b>	Systemic inflammatory response syndrome
<b>T-FABP</b>	Testicular fatty acid binding protein
<b>Tpa</b>	Tissue Plasminogen Activator
<b>USCPSC</b>	United state consumer product safety commission
<b>V.D</b>	Vasodilatation

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