PREVALENCE OF URINARY TRACT INFECTION IN PATIENTS WITH ACUTE ST SEGMENT ELEVATION MYOCARDIAL INFARCTION

DISSERTATION SUBMITTED FOR

M.D. DEGREE (BRANCH I) (GENERAL MEDICINE)

SEPTEMBER 2006

MADURAI MEDICAL COLLEGE, MADURAI

THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY

CHENNAI

CERTIFICATE

This is to certify that this dissertation entitled ***"PREVALENCE OF URINARY TRACT INFECTION IN PATIENTS WITH ACUTE ST SEGMENT ELEVATION MYOCARDIAL INFARCTION"*** *submitted by* ***Dr. B. J. GOKUL*** *to the Faculty of General Medicine, The Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of M.D. Degree Branch I (General Medicine) is a bonafide research work carried out by him under our direct supervision and guidance.*

Dr. A. Ayyappan M.D.,
Professor of Medicine,
Chief III Medical Unit,
Department of Medicine
Madurai Medical College
Madurai

Dr. P. Thirumalaikolundu Subramanian *M.D.,*
Professor and Head
Department of Medicine
Madurai Medical College
Madurai

DECLARATION

I, ***Dr. B.J. GOKUL****, solemnly declare that the dissertation titled* ***"PREVALENCE OF URINARY TRACT INFECTION IN PATIENTS WITH ACUTE ST SEGMENT ELEVATION MYOCARDIAL INFARCTION"*** *has been prepared by me.*

This is submitted to the Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the rules and regulations for the M.D. degree Branch I (General Medicine).

Place : Madurai

Date : **Dr. B.J. Gokul**

ACKNOWLEDGEMENT

*My sincere thanks to **the Dean** for permitting me to use the facilities of Madurai Medical College and Govt. Rajaji Hospital to conduct this study.*

*My Professor and Head of the Department of Medicine, Prof. **Dr. P. Thirumalaikolundu Subramanian** M.D, has always guided me, by example and valuable words of advice through the conduct of the study and also during my post graduate course. My sincere thanks to him.*

*I will ever remain in gratitude to my beloved chief **Dr. A. Ayyappan** M.D. for guiding me through this study.*

*Knowledge and kindness abounds my beloved teachers, **Dr. Nalini Ganesh** M.D, **Dr. A.P. Selvaraj** M.D., **Dr. M. Kamaraj** MD. **Dr. A. Radhakrishnan** M.D., **Dr. Ashok kumar** M.D, I owe them a lot and my sincere thanks to them.*

*My sincere thanks to **Dr. A. Uma** M.D, Additional Professor of Microbiology, Madurai Medical College for her valuable guidance.*

*I am thankful to **Dr. R.V. Amuthan** M.D., D.M., Assistant Professor of Cardiology, Department of Cardiology, Govt. Rajaji Hospital for his valuable support and guidance.*

*My heartfelt thanks to my Assistant Professors, **Dr. L. Jerald Magellah** MD., **Dr. J. Sangumani** M.D, and **Dr. P.R. Sheela** M.D, for their valuable suggestions.*

*Last but not the least, I sincerely thank all the **patients** who participated in the study, for their cooperation.*

CONTENTS

GLOSSARY

CAD / CHD	-	Coronary Artery Disease / Coronary Heart Disease
STEMI	-	ST segment Elevation Myocardial Infarction
HT	-	Hypertension
DM	-	Diabetes Mellitus
UTI	-	Urinary Tract Infection
LDL	-	Low Density Lipo protein
ED	-	Endothelial Dysfunction
GM-CSF	-	Granulocyte – Macrophage Colony Stimulating Factor
IL	-	Interleukin
TNF	-	Tumor Necrosis factor
TGF	-	Transforming Growth Factor
MCP	-	Monocyte Chemotactic Protein

NO	-	Nitric Oxide
CRP	-	C – Reactive Protein
ACS	-	Acute Coronary Syndrome (s)
PDGF	-	Platelet Derived Growth Factor
FGF	-	Fibroblast Growth Factor
TXA_2	-	Thromboxane A_2
CK-MB	-	Creatine Kinase – MB Isoenzyme
tPA	-	Tissue Plaminogen Activator
PCI	-	Percutaneous Coronary Intervention
EF	-	Ejection Fraction
RWMA	-	Regional Wall Motion Abnormality
ECG	-	Electrocardiogram
UFH	-	Unfractionated Heparin
LMWH	-	Low Molecular Weight Heparin

INTRODUCTION

Ischemic heart disease is now the leading cause of death worldwide[1]. WHO estimates that by 2020 the global number of deaths from coronary artery disease (CAD) will have risen from 7.1 in 2002 to 11.1 million[2].

Based on data from the Framingham Heart Study the lifetime risk of developing symptomatic CAD after age 40 is 49% for males and 32% for females[3].

CAD is most commonly due to obstruction of the epicardial coronary arteries by atheromatous plaque[4].

Regarding the coronary hemodynamics little additional oxygen can be extracted from the blood in the coronaries, so increase in oxygen consumption requires increase in coronary blood flow. By reducing the lumen of the coronary arteries (especially when a stenosis reduces the cross sectional area by 75%) atherosclerosis limits its appropriate increase in perfusion when the demand for flow is augmented, as occurs during exertion or excitement[5]. This results in effort-induced angina.

A superficial erosion of the endothelium or a frank plaque rupture or fissure usually produces the thrombus that causes episodes of unstable angina pectoris or the occlusive and relatively persistent thrombus that causes acute myocardial infarction.

The major risk factors for atherosclerosis are smoking, hypertension, diabetes mellitus, high plasma LDL and low plasma HDL in addition to non-modifiable risk factors like age, sex, family history and genes.

There are still subsets of patients where CAD occurs in the absence of the aforementioned risk factors.

There is increasing evidence to suggest that inflammation plays a major role in the pathogenesis of atherosclerosis and therefore CAD.

Several hypothesis have been postulated to account for the association between inflammation and coronary events including endothelial dysfunction (ED), cytokine interaction with coagulation factors and activation of proteases that promote plaque destabilization[6].

Subclinical infarction with respiratory pathogens such as Chlamydia pneumoniae as a potential stimulus had been the focus of many recent investigations. On the other hand less attention has been given to other common infection such as urinary tract infection (UTI) in promoting the inflammatory process and triggering acute coronary events.

The aim of the present study is to determine if subclinical UTI is associated with acute coronary syndrome (especially ST segment elevation myocardial infarction - STEMI), to gain insight into whether an acute infection may play a role in triggering plaque rupture in patients with underlying CAD.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Coronary artery disease (CAD) has been defined as 'impairment of heart function due to inadequate blood flow to the heart compared to its needs caused by obstructive changes in the coronary circulation to the heart ' (WHO -1982)[7].

Epidemiology

The WHO has drawn attention to the fact that the CAD is an modern epidemic that may manifest itself in many presentations

a) Angina pectoris of effort
b) Cardiac failure
c) Myocardial infarction
d) Sudden cardiac death
e) Cardiac arrhythmias

Epidemics of CAD began at different times in different countries. In US, it began in early 1920's; in Britain in 1930's and now the developing countries are catching up[8]. For example in Singapore the age standardized death rate from CAD has more than doubled in the past 20 years (rising from 22 per 100,000 population in 1957 to 50 per 100,000 population in 1979). Similar trends were also noted in

Malaysia, Sri Lanka and Mauritius. Countries where the epidemic began earlier are now showing a decline. This has been attributed to changes in life style and related risk factors (diet, cigarette use and exercise habits) plus better control of hypertension.

CAD is a world wide disease. Mortality rates vary widely in different parts of the world. The highest mortality is seen in North Europe especially Finland, Scotland and Sweden. On the other hand Southern Europe and those in Japan are extremely low.

Epidemiological transition

At the beginning of 20th century cardiovascular diseases (CVD) accounted for <10% of all deaths worldwide. At the beginning of 21st century CVD accounts for nearly half of all deaths in developed world and 25% in the developing world[9]. By 2020 its predicted that CVD will claim 25 million lives annually and that CVD will surpass infectious disease as world number one cause of death and disability.

Before 1900, infectious disease and malnutrition was the most common cause of death. This had been gradually supplanted in some (mostly developed) countries by chronic disease such as CVD and

cancer, thanks largely to improved nutrition and public health measures.

This shift in the diseases that account for the lion's share of morbidity and mortality is known as **epidemiological transition**[10,11]. This is tightly interlinked with changes in personal and collective wealth (economic transition), social structure (social transition), and demographics (demographical transition). Because the epidemiological transition is linked to the evolution of social and economic forces, it takes place at different rates around the world.

CAD in Indians[12,13,14]

CAD afflicts Indians at a relatively younger age with severe and diffuse form of lesions. Prevalence of CAD has progressively increased in India during the latter half of the last century, particularly among urban population.

The conventional risk factors do not fill all the blanks in information. Infections may be one yet unrecognised factor.

The risk of CAD in Indians is 3-4 times higher than white Americans, 6 times higher than Chinese and 20 times higher than

Japanese. It affects Indians 5-10 years earlier than other communities. The post infarction course is also worse with 3 times higher rate of reinfarction and 2 times higher rate of mortality.

Prevalence of CAD is 2 times higher (10%) in urban than in rural India. South Indians have higher prevalence; 7% in rural and 14% in urban areas. The vulnerability of urban Indians to CAD is possibly related to difference in nutritional, environmental factors and life style changes.

A large body of data exists on the occurance of CAD in hospitalised patients. However there are only two studies in its prevalence in general population. On screening of persons over age 30 by 12 lead ECG in Chandigarh (urban), prevalence was 65.4% and 47.8% per 1000 males and females respectively.

Pattern of CAD in India reported to be as follows:

a) CAD appears a decade earlier compared with age incidence in developed countries. Peak period is between 51-60.
b) Males are affected more than females.
c) Hypertension and diabetes account for 40% of the cases.
d) Heavy smoking is responsible etiologically in a good number of cases.

Evolution of concepts concerning pathogenesis of atherosclerosis

Until very recently most physicians viewed arteries as inanimate tubes rather than living dynamic tissue. 100 years ago Virchow recognised participation of cells in atherosclerosis. He viewed it as a proliferative disease but Rokitansky believed that atheroma derived from healing and resorption of thrombi[15].

Then in early twentieth century experiments using dietary modulation identified cholesterol as the culprit. This was followed by characterisation of human lipoprotein particles as the cause for atherosclerosis. We now recognise that elements of all these pathogenic theories participate in atherogenesis.

Atherosclerosis – an inflammatory disease[6]

Atherosclerosis is an inflammatory disease. It is much more than high LDL cholesterol, which is considered to be the principal risk factor causing atheroma. Despite life style changes to curtail high cholesterol, CVD are on the rise. In fact, atherosclerotic lesions represent a series of highly specific cellular and a molecular response that is best described as an inflammatory disease.

The earliest lesion, the fatty streak is a pure inflammatory lesion with monocyte derived macrophages and T-lymphocytes secondary to lipoprotein accumulation.

Factors initiating and promoting inflammation:

Numerous pathophysiologic observations suggest exposure to injury hypothesis as first step in atherosclerosis. This emphasizes endothelial dysfunction (ED) rather than denudation as the first step, the causes of which are increased and modified LDL; free radicals caused by smoking, hypertension and diabetes mellitus; genetic alterations; increased plasma Homocysteine levels; infectious microorganisms like Herpes virus or Chlamydia pneumoniae or combinations of these.

The ED that results from injury increases its adhesiveness to leucocytes and platelets as well as its permeability. In addition cause it to have procoagulant (instead of anticoagulant) properties and to form vasoactive molecules: cytokines and growth factors. If the inflammatory response does not effectively neutralize/remove the offending agents, it can go indefinitely causing migration and proliferating of smooth muscle cells(SM) to produce intermediate

lesion. This gradually thickens the arterial wall, which compensates by dilation for sometime before altering the diameter of the lumen.

At every stage of the disease, the responses mediated by monocyte-derived macrophages and specific T-lymphocytes sub types. They multiply and elaborate hydrolytic enzymes; cytokines; chemokines and growth factors, which induce further damages and leads to further necrosis.

Thus, cycles of accumulation of mononuclear cells, migration and proliferation of SM cells and fibrous tissue proliferation leads to further enlargement and restructuring so that it becomes covered by a fibrous cap that overlie a core of lipid and necrotic tissue called advanced, complicated lesion. At some point, the artery no longer compensate by dilation the lesion may intrude into the lumen causing stenosis.

How lipids cause inflammation?

When LDL particles become trapped in an artery, they undergo oxidation; glycation; aggregation; association with proteoglycans and incorporation into immune complexes. Lipid peroxide are then internalised by macrophages to become foam cells. Modified LDL is

chemotactic for other monocytes and it upregulates expression of genes for M-CSF and MCP, thus expanding the inflammatory response. The mediators of inflammation (IL-1,TNF-α and M-CSF) increases LDL binding to endothelium and SM and thus increases LDL gene transcription. Thus a vicious cycle ensures. Therefore antioxidants (vitamin E) can have an anti-inflammatory effect.

Role of homocysteine

Homocysteine is toxic to endothelium; is prothrombotic and it increases collagen synthesis and decreases availability of NO. Therefore high plasma homocysteine concentrations are associated with atherosclerosis. Trials are underway to determine whether treatment with Folic acid will prevent the progression or possibly even induce regression of atherosclerotic lesions.

Hypertension

Angiotension two levels are often elevated in patients with hypertension. Its a potent vasoconstrictor, stimulates SM growth and by increasing its lipo-oxygenase activity it causes oxidation of LDL. Hypertension also increases free radical formation; reduces NO synthesis and increases leucocyte adhesion.

Infection

An accumulation of clinical evidence shows that markers of inflammation correlate with coronary risk.[16] for example, variation of plasma levels of C-reactive protein (CRP), as measured by a high sensitivity assay, can prospectively predict risk of myocardial infarction. CRP levels also correlate with outcome of patients with ACS. In control to several other novel risk factors, CRP adds predictive information to that derived from established risk factors such as cholesterol. Elevated levels of acute phase reactant, (APR) CRP may merely reflect ongoing inflammation rather than a direct etiologic role for CRP in CAD. Elevation in APR such as fibrinogen or CRP could reflect overall atherosclerotic burden and / or extravascular inflammation that could potentiate atherosclerosis or its complications[17]. In all likelihood, both factors contribute to elevation of inflammatory markers in patients at risk for coronary events. Indeed, lipid lowering therapy may reduce coronary events in part by reducing the inflammatory aspects of the pathogenesis of atherosclerosis.

One source of inflammatory stimulus could arise from infections agents. Interest has resurged in the possibility that infections may cause or contribute to atherosclerosis. A spate of recent publications has furnished evidence that supports a role of Chlamydia pneumoniae,

Cytomegalovirus, or other infections agents in atherosclerosis and restenosis following coronary intervention[18,19,20,21].

Infection combined with other factors may be responsible for the genesis of the lesions of atherosclerosis in some patients.

Molecular aspects of atherosclerosis[6]

The earliest change that precedes atherosclerotic lesions takes place in the endothelium. This includes

1. Increased endothelial permeability to lipoproteins mediated by NO, prostacyclin, PDGF, angiotensin two and endothelin.
2. Up regulation of endothelial cell adhesion molecules including L-selectins, integrins and platelet-endothelial cell adhesion molecule 1 and up regulation of endothelial adhesion molecules which includes E-selectin, P-selectin, intercellular adhesion molecule 1 and vascular cell adhesion molecule 1.
3. Migration of leucocytes into the arterial wall is mediated by oxidized LDL, monocyte chemotactic protein 1, IL-8, PDGF, M-CSF and osteopontin.

Fatty streaks initially consist of lipid-laden monocytes and macrophages (foam cells) together with T-lymphocytes. Later they are joined by SM cells. Steps involved are

1. Smooth muscle migration -stimulated by PDGF, FGF and TGF-ß
2. T cell activation by TNF α, IL-2 and GM-CSF.
3. Foam cell formation by oxidised LDL, M-CSF, TNF α and IL-1.
4. Platelet adherence and aggregation by integrins, P-selectin, fibrin,TXA_2, tissue factor etc.

As these lesions progress to intermediate and advanced lesions they form fibrous cap. This covers a mixture of WBC'S, lipids and debris. These lesions expand at their shoulders by means of continued leucocyte adhesion and entry by same factors mentioned above. The necrotic core represents the results of apoptosis and necrosis; increased proteolytic activity and lipid accumulation. The fibrous cap forms as a result of increased activity of PDGF, TGF ß, IL-1,TNF α and osteopontin and of decreased connective tissue degradation.

ACUTE CORONARY SYNDROMES

ACUTE CORONARY SYNDROMES

Acute coronary syndromes (ACS) comprises patients with acute myocardial infarction with ST segment elevation on their presenting ECG (STEMI) and those with unstable angina (UA) and non ST segment elevation MI (NSTEMI).

Unstable angina and Non – ST elevation myocardial infarction

The diagnosis of UA is based largely on clinical presentation. UA is defined as angina pectoris or equivalent ischemic discomfort. With atleast one of three features

1. It occurs at rest usually lasting > 10 minutes.
2. It is severe and of new onset (i.e. within the prior 4-6 weeks)
3. It occurs with a crescendo pattern (i.e. distinctly more severe, prolonged or frequent than previously).

The diagnosis of NSTEMI is established if a patient with clinical features of UA develops evidence of myocardial necrosis, as reflected in elevated cardiac biomarkers.

Pathophysiology

Four pathophysiologic factors may contribute

1. Plaque rupture / erosion with superimposed non occlusive thrombosis.
2. Dynamic obstruction (coronary spasm).
3. Progressive mechanical obstruction.
4. Secondary UA related to increased oxygen demand and / or decreased supply to myocardium (eg. Anemia).

Clinical features

Substernal chest pain that frequently radiates to neck, left shoulder and left arm is present. Anginal equivalents such as dyspnea and epigastric discomfort may also occur. Clinical examination may be unremarkable or may include diaphoresis, cool skin, tachycardia, S3 and / or S4, basilar rates and sometimes hypotension.

Investigations

In UA, ST-segment depression, transient ST-segment elevation, and / or T-wave inversion occur in 30-50% of patients depending on the severity.

Patients with UA with elevated cardiac biomarkers (CK-MB and Troponin) are at increased risk of death or recurrent MI.

The 2002 American College of Cardiology / American Heart Association Guidelines[22] include a clinical history typical of ischemic discomfort, a history of established CAD by angiography, prior MI, CHF, new ECG changes, or elevated biomarkers (High likelihood). Factors associated with intermediate likelihood includes age > 70 yrs, male gender, diabetes, known peripheral arterial or cerebrovascular disease and old ECG abnormalities.

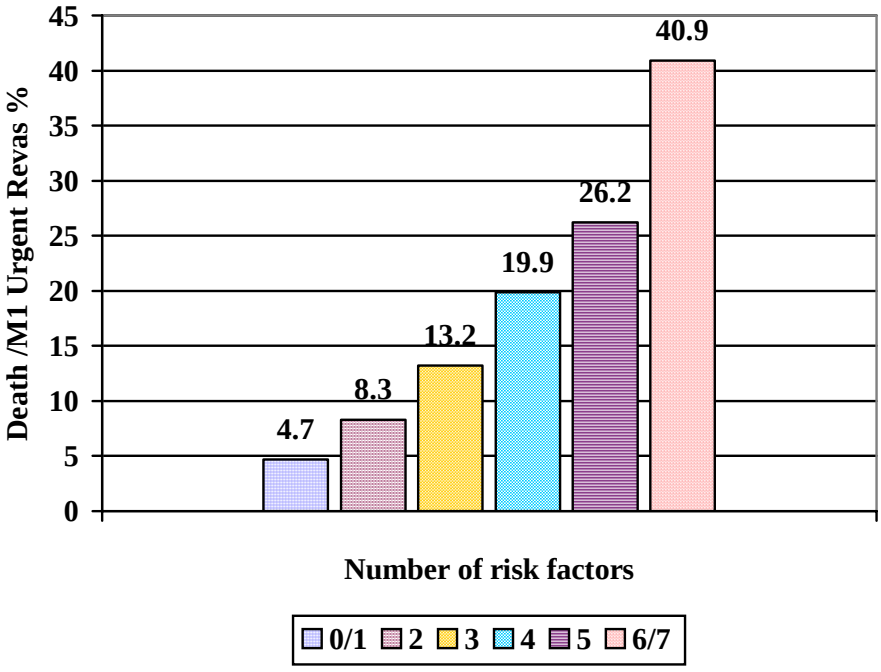
The goals are

1. Recognize or exclude MI (using cardiac markers).
2. Evaluate for rest ischemia (chest pain at rest, serial or continuous ECGs) and
3. Evaluate for significant CAD (using provocative stress testing).

Risk Stratification

This is accomplished by TIMI scoring system[23] (Thrombolysis in Myocardial Ischemia Trial) which includes seven independent risk factors age $\geq$ 65 yrs, three or more risk factor for CAD, documented CAD at catheterization, development of UA/ NSTEMI while on aspirin, more than two episodes of angina within the preceding 24 hours, ST deviation $\geq$ 0.5 mm and on elevated cardiac marker.

TIMI Scoring System



Treatment

Anti-ischemic treatment is with nitrates (sublingual / IV), intravenous followed by oral (beta blockade), with or without calcium channel blockers. Antithrombotic therapy with a combination of aspirin and clopidogrel along with UFH / LMWH is added. For high risk patients, small molecular inhibitors eptifibatide and tirofiban holds promise. Multiple clinical trials have shown the benefit of early invasive

strategy in high risk patients (eg. those with multiple risk factors, ST – segment deviation, and / or positive biomarkers).

STEMI[24]

It is one of the most common diagnoses in hospitalized patients in industrialized countries. The early mortality (30 day) rate is around 30%, with more than half of these deaths occurring before the individual reaches the hospital. Survival is markedly reduced in elderly patients more than 75 years.

Diagnosis

The 12 lead ECG is critical for management since it distinguishes patients with ST elevation from those without ST segment elevation. Cardiac biomarkers distinguishes UA from NSTEMI and assesses the magnitude of STEMI

Clinical features

Presentation is similar to angina but is severe and lasts longer. Other presentations include sudden loss of consciousness, acute confusional state, profound weakness, arrhythmias, evidence of peripheral embolism or unexplained drop in blood pressure.

The WHO criterion for MI diagnosis requires two of the following.

1. Chest discomfort or an anginal equivalent.
2. ECG changes consistent with ischemia or infarction.
3. Elevated cardiac specific enzymes.

On examination patients may have tachycardia/ hypertension (one fourth of patients with acute anterior wall infarction); or bradycardia and hypotension (one half of inferior wall infarction). Abnormal systolic pulsation by dyskinetic bulging of infarcted myocardium, signs of ventricular dysfunction like S_3 and S_4, soft S_1 and paradoxical splitting of S_2. midsystolic or late systolic murmur due to dysfunction of mitral valve apparatus and pericardial friction rub (transmural infarction) are also seen.

Investigation

ECG shows ST elevation in leads depending on the wall type affected. Acute transmural anterior wall ischemia is reflected by ST elevations or increased T wave positivity in one or more of the precordial leads (V1 to V6) and leads I, and AVL. Inferior wall ischemia produces changes in leads II, III and AVF. Posterior wall ischemia may be recognized indirectly by reciprocal ST depression in leads V1 to V3. Right ventricular ischemia produces changes in right sided chest leads. When ischemic ST elevations occur as the earliest sign of acute

infarction, they are followed by T inversions and often by Q waves. (Q wave and non Q wave infarction). With infarction, repolarisation (ST-T) abnormalities also occur.

Biomarkers like CK-MB isoenzyme has advantage over total CK. It rises within 4 to 8 hours, returns to normal by 48 to 72 hours. Cardiac specific troponin T and troponin I are now preferred as they are more specific. Levels remain elevated for 7 to 10 days.

Non-specific reaction to myocardial injury includes polymorpho nuclear leucocytosis and elevated erythrocyte sedimentation rate.

Abnormalities of wall motion (RWMA) on 2 – dimensional echo though cannot distinguish old from acute ischemia is very helpful. Radionuclide imaging techniques are also available in evaluating patients with suspected STEMI.

Management

Aspirin is essential (160 to 325 mg stat) followed by 75 to 162 mg daily orally. Control of pain is achieved with nitroglycerin (Sublingual / intravenous). Morphine and intravenous beta blockers

are also helpful in this regard. Oxygen is given in patients with hypoxemia.

When ST – segment elevation of atleast 2 mm in two contiguous precordial leads and 1 mm in two limb leads is present, the patient should be considered for ‘reperfusion’ therapy. If the hospital is not capable of primary PCI, the patient is treated with fibrinolytic therapy. Other drugs used in management includes antithrombotics, ACE inhibitors to prevent ventricular remodelling, and inotropics if and when needed.

URINARY TRACT INFECTIONS

URINARY TRACT INFECTIONS

Acute infections of the urinary tract can be subdivided into two anatomic categories; lower tract infection which are superficial (urethritis and cystitis) and upper tract Infections, which are usually invasive (acute pyelonephritis; prostatitis; intra renal and perinephric abscess).

These infections may occur independently or occur together; may be asymptomatic or symptomatic.

ACUTE UTI

Epidemiology

UTI are sub divided into catheter associated (Nosocomial) and non-catheter associated (or community acquired) infections. These infections occur in 1-3% of school girls and then increases markedly with onset of sexual activity. In young women the annual incidence is 0.5 to 0.7 infections per patient year[25]. Acute symptomatic UTI are unusual in female under 50 yrs, while its quite common in between 20 – 50 years. Asymptomatic bacteremia is more common among elderly and with rates as high as 40 to 50%.

Etiology

The most common agents are gram negative bacilli (GNB). Escherichia coli causes 80% of acute infections in patients without catheters, urologic abnormalities, or calculi. Other organisms being Proteus, Klebsiella and Enterobacter. These organisms plus Serratia and Pseudomonas; assume importance in recurrent infections and infections associated with urologic manipulation, calculi or obstruction. Proteus and Klebsiella predispose to stone formation.

Gram positive cocci play a lesser role. Staphylococcus saprophyticus – coagulase negative, novobiocin – resistant species account for 10-15% of acute symptomatic UTI in young females. Enterococci and Staph aureus infects patients with renal stones or previous instrumentation.

In women with acute urinary symptoms, pyuria, and urine that is sterile, sexually, transmitted urethritis – producing agents such as Chlamydia trachomatis, Neisseria gonorrhoeae, herpes simplex virus are etiologically important.

Some other causes are Ureaplasma urealyticum, Mycoplasma hominis; Adeno viruses and Candida.

Pathogenesis

In vast majority of UTIs, bacteria gain access to the bladder via the urethra. Ascent of bacteria from the bladder may follow and is probably the pathway for most renal parenchymal infections.

In females prone to cystitis, GNB (that normally reside in the bowel) colonize the introitus, periurethral skin, and distal urethra, predisposing factors being altered vaginal flora by antibiotics, other genital infections or contraceptives. Periurethral bacteria gain entry into the bladder by urethral massage during intercourse. Bacteria thus placed in the bladder are normally cleared partly through flushing but also due to antibacterial properties of urine (high urea concentration and high osmolarity of bladder urine). Prostatic secretions possess antibacterial properties. There is a role for locally produced antibodies as well.

Conditions affecting pathogenesis

1. Female gender
2. Pregnancy
3. Obstruction
4. Neurogenic bladder
5. Vesico ureteral reflex (VUR)

6. Bacterial virulence factors
7. Genetic factors

Localization of infection

Cystitis

Dysuria, frequency, urgency; suprapubic pain, malodorous, cloudy (sometimes bloody) urine are then features. Fever, nausea and vomiting usually indicate concomitant renal infection.

Pyelonephritis

Fever, shaking chills, nausea, vomiting and diarrhoea are the features with or without symptoms of cystitis. Clinically fever, tachycardia, muscle tenderness, renal angle tenderness are present. Leucocyte casts in the urine is diagnostic.

Urethritis

Presents with dysuria, frequency and pyuria. In case of sexually transmitted pathogens the onset is gradual without pain or hematuria. In case of cystitis due to E-coli pain, hematuria and abrupt onset are common.

Diagnostic testing

Is with routine urine analysis, which shows ‘pyuria’.

UTI exists when pathogenic micro organism are detected in urine, urethra, bladder, kidney or prostrate. Growth of > 10^5 organisms per ml from properly collected midstream “clean – catch” urine sample indicates infection. In symptomatic patients, a smaller number of bacteria (10^2-10^4/ml) may signify infection. In casea of suprapubic aspirates and samples from in dwelling catheter, colony counts of 10^2-10^4/ml indicates infection.

Treatment principles[26]

1. Except in acute uncomplicated cystitis in females always do urine culture before empirical treatment.
2. Predisposing factors (obstruction, calculi) should be corrected.
3. Relief of symptoms does not always indicate bacteriological cure.
4. Each treatment course is classified as failure (symptoms / bacteriuria not eradicated during therapy) or a cure (symptoms / bacteriuria both are eliminated).
5. In general, upper tract infection requires longer treatment.
6. Community negative infection are usually antibiotic sensitive.
7. Suspect resistant strains in patients with repeated infections, instrumentation or recent hospitalisation.

Prevention

Primary prevention is based on elimination or modification of risk factors of CAD like smoking, hypertension, diabetes, hypercholesterolemia, obesity, promoting physical activity and reduction of emotional stress. Treating homocysteinemia with folic acid to prevent CAD progression is under way.

Levels of inflammatory markers (like hs CRP) correlates with ACS outcomes. One source of inflammatory stimulus could arise from infectious agents. (Especially C. pneumonia, CMV etc.) At present no sufficiency proved clinical trial supports the use of antibiotics to reduce CHD risk.

Secondary prevention consists of early diagnosis and adequate treatment of CHD. Long term treatment with an antiplatelet agent (aspirin) after STEMI is associated with 25% reduction in the risk of recurrent infarction, strokes or cardiovascular mortality[27]. In these patients STEMI tend to be smaller and are more likely to be non Q wave in nature. An alternative antiplalet agent is clopidogrel. Trials are underway to access the effectiveness and safety of aspirin and clopidogrel combination. ACE inhibitors should be used indefinitely by patients with clinically evidence heart failure, moderate decrease in

global EF, or a large RWMA to prevent late ventricular remodeling and recurrent ischemic events[28]. The chronic use of oral β blocker for atleast 2 years after STEMI is supported by trials that demonstrated reduction in total mortality, sudden death and reinfarction. Warfarin is used in patients with high risk of embolism.

Hurdles

The obstacles to implementation of current evidence based prevention and treatment of atherosclerosis include economics, education, physician awareness and patient adherence to recommended regimens.

Future goals

Future goals in the field of treatment of atherosclerosis should include application of current knowledge regarding risk factor management and when appropriate, drug therapy.

We should begin anew rather than discard the possibility of expanding our limited knowledge base with regard to proatherogenic mechanisms (including viral vectors), include trials that better select target patients (those at an earlier stage of atherosclerosis or those with better markers of latent / active infection) and intervene them with novel anti infective agents and vaccines.

ANALYSIS OF PUBLISHED REPORT

ANALYSIS OF PUBLISHED REPORT

1) URINARY TRACT INFECTION IN PATIENTS WITH ACUTE CORONARY SYNDROMES: A POTENTIAL SYSTEMIC INFLAMMATORY CONNECTION (AHJ, VOLUME 149, NUMBER 6).

Sims JB, de Lemos JA, Maewal P, Warner JJ, Peterson JE, McGuire DK Department of medicine, university of Texas, Southwestern Medical Center, Dallas, U.S.A.

This single-centre, case-control, retrospective study evaluated the prevalence of urinary tract infection (UTI) among 100 consecutive ACS patients, compared with a contemporary control group undergoing elective coronary artery bypass graft (CABG) surgery. Cases were excluded if ACS was not confirmed by chart review or if urinalysis was not obtained within 6 hours of arrival. Patients excluded from the control group were those with myocardial infarction within 21 days before CABG or without a preCABG urinalysis.

The case and control groups were well matched, with the only significant differences being less congestive heart failure

and more prior MI in the CABG control group. UTI was present in 27 of the ACS cases and 11 of the controls. Among ACS case patients, those with UTI tended to be older and more often women, with more diabetes, hyperlipidemia, hypertension and renal insufficiency and more commonly had non STEMI. In unadjusted analysis, UTI was three times more common in the cases versus controls; results were similar after multivariate adjustment.

2) WEEKLY INTERVENTION WITH ZITHROMAX FOR ATHEROSCLEROSIS AND ITS RELATED DISORDERS (WIZARD) TRIAL

O'Conner CM, Dunne MW, Pfeffer MA et al., JAMA 2003; 290; 1459-1466.

This randomized controlled trial was the first to suggest a potential benefit for longterm antibiotic regimens. WIZARD randomized more than 7000 patients with a history of myocardial infarction and seropositivity of Chlamydia pneumoniae to Azithromycin 600 mg or placebo for 12 weeks. After 14 months, there was no significant risk reduction for all-cause death, nonfatal MI, coronary revascularisation; or hospitalisation for angina (hazard ratio 0.93; P=0.23). A trend toward therapeutic

benefit was seen in men, diabetic subjects and smokers, but not in those with high baseline antibody titres of Chlamydia pneumoniae

3) ANTIBIOTICS IN CORONARY ARTERY DISEASE

A) AZITHROMYCIN IN CORONARY EVENTS STUDY (ACES)

j. thomas grayston, University of washington, seattle

This randomized, double-blind placebo controlled trial which was sponsored by the National Institute of Health, enrolled 4012 adults with stable coronary heart disease without regard to their serologic Chlamydia pneumoniae status. Participants received weekly Azithromycin or placebo for one year. The mean period of follow up was four years. The primary end point, a composite of death due to coronary heart disease, nonfatal myocardial infarction, hospitalisation for unstable angina or coronary revascularisation occurred in 22.4% of the patients who received placebo and 22.3% of those who received Azithromycin -a relative risk reduction of less than 1%, with narrow confidence intervals.

B) PRAVASTATIN OR ATORVASTATIN EVALUATION AND INFECTION THERAPY- THROMBOLYSIS IN MYOCARDIAL INFARCTION (PROVE IT- TIMI) TRIAL TWO.

Christopher P Cannon, MD., Brigham and women's hospital, Boston, Massachusetts.

A double-blind randomized, two by two factorial trial involved 4162 patients at multiple centers, addressed two complementary issues.

Results of second randomisation compared the results of treatment with Gatifloxacin and placebo, given after initial dosing for 10 days each month during a follow up period of 18 to 32 months (mean 24 months). The primary end point- a composite of death from any cause, myocardial infarction, unstable angina requiring hospitalisation, revascularisation performed atleast 30 days after randomisation, or stroke – occurred in 25.1% of the patients who received placebo and 23.7% of those who received Gatifloxacin; this represented a 5% reduction in hazard ratio, an insignificant difference with narrow confidence limits.

AIM OF THE STUDY

AIM OF THE STUDY

- To determine the prevalence of subclinical urinary tract infections and their bacteriological profile in patients with acute ST segment elevation myocardial infarction.

- To examine any relationship of subclinical urinary tract infection with atherosclerotic risk factors like hypertension, diabetes, smoking or hyperlipidemia.

MATERIALS AND METHODS

MATERIALS AND METHODS

Materials

The study included fifty patients with acute ST segment elevation myocardial infarction admitted in Intensive coronary care unit (ICCU) and Intensive medical care unit (IMCU) of Govt. Rajaji Hospital, Madurai.

Twentyfive age and sex matched patients with stable coronary artery disease (CAD) and with other acute medical emergencies admitted to IMCU were chosen as controls.

The study is a analytical study done between November 2005 to February 2006 over a period of 4 months.

It was carried out in collaboration with the Department of Cardiology and Department of Microbiology.

Informed consent was obtained from each case and control subject.

There was no conflict of interest and it was not financially supported.

The data collected from the case sheet of each patient included age, sex. A careful history was taken from each patient regarding personal habits like smoking; presence of atherosclerotic risk factors like hypertension, diabetes, hyperlipidemia; previous history of CAD and for history suggestive of urinary tract infection and obstruction.

Blood samples were drawn for doing blood counts, blood sugar, urea, creatinine and fasting lipid profile.

Urine samples were collected within six hours of hospital admission taking usual precautions (vide infra).

All patients (cases and controls) also underwent 12 – lead electrocardiogram (ECG), Echocardiogram (ECHO) and ultra sonogram (USG) of prostate (male patients).

Inclusion Criteria

All patients with ST elevation myocardial infarction who are admitted to ICCU / IMCU were included in my study.

WHO definition of myocardial infarction

It requires the presence of atleast two of the following criteria

1. A history of prolonged chest discomfort
2. ECG changes consistent with ischemia or necrosis
3. Elevated cardiac enzymes

Exclusion Criteria

1. All patients with symptomatic UTI.
2. Patients who gave history of previous urethral catheterization or instrumentation.
3. Patients with history suggestive of urinary tract obstruction were excluded.
4. Patients who gave history of recurrent UTI or had been treated for UTI in the recent past.
5. Patients whose USG showed enlarged prostate and / or significant residual volume of urine.
6. When urine sample was not obtained within 6 hours of admission.

Controls

Age and sex matched controls with stable CAD admitted to IMCU for medical emergencies other than acute coronary syndromes were selected for the study.

Method[32] - Collection and processing of urine

Specimen collection in males

The male patients were instructed as follows. Retraction of prepuce and washing the area with soap and water; collect mid stream urine in a sterile screw capped container after voiding the first portion of urine.

In females

The following instructions were given.

1. To wash the external genitalia with soap and water. Not to use antiseptics.
2. Collect midstream urine with labia majora held apart with fingers of left hand, with fingers of right hand holding the sterile wide mouthed container.

The urine samples were transported to the Institute of Microbiology, Madurai Medical College, Madurai within half an hour. If delay was unavoidable it was refrigerated before transport (2 hours).

Preparation of Smears

A loopful trial (4 mm diameter loop) of well mixed, uncentrifuged urine is placed on a clean glass slide. Without spreading, it was

allowed to dry, heat fixed and stained with gram stain. It is then examined when microscope for pus cells, epithelial cells and bacteria.

Inoculation into culture media

Calibrated loop method was used to count the bacteria, which is a simple, more rapid, less expensive and satisfactory method. 4 mm nichrome loop delivers 0.01 ml of urine. Nutrient agar plate, blood agar plate and MacConkey agar plate were inoculated using the above loop and the plates were incubated overnight at 37^0c.

The number of colonies on each plate is counted. The number of viable bacteria present in 1 ml of undiluted urine is then calculated.

< 1000 colonies / mL	insignificant bacteriuria, UTI unlikely for midstream urine. Significant for cystoscopic and suprapubic samples.
10,000 – 1,00,000 colonies / mL	Probably significant bacteriuria. Repeat specimen indicated.
> 1,00,000 colonies / mL	Significant bacteriuria. UTI certain.

The bacteria were identified by colony morphology and biochemical tests. Antimicrobial susceptibility by disc diffusion technique was carried out with antibiotic impregnated discs.

Statistical methods

Descriptive statistics (mean values for continuous variables and percentages of discrete variables) were generated for baseline demographic and clinical characteristics and were compared using student 't' test for continuous and Chi-square tests for categorical variables. Relative risk was determined. P value < 0.05 was considered significant.

OBSERVATIONS AND RESULTS

OBSERVATIONS AND RESULTS

Fifty patients with acute ST segment elevation myocardial infarction admitted to IMCU / ICCU were chosen for the study (cases). Twentyfive patients with stable CAD with other acute medical emergencies admitted to IMCU were chosen as controls.

CLINICAL CHARACTERISTICS OF PATIENTS AT BASELINE BY CASE VERSUS CONTROLS

Age and Sex distribution of case and controls

Table 1

Cases and Controls		Male	Female	Among both males and females
Case	Mean	50.14	66.83	52.14
	SD	10.53	7.41	11.53
Control	Mean	54.27	55.67	54.44
	SD	8.5	9.5	8.43
P value		> 0.05	> 0.05	> 0.05

This shows that the baseline demographics were similar between case and controls (‘p’ > 0.05)

Baseline characteristics – hypertension

Table 2

Variable hypertension	Cases	Controls	Total	P value
Present	17	9	26	0.8638
Not present	33	16	49	
Total	50	25	75	

P value is > 0.05 (0.86) and is therefore not significant. This shows that cases and controls were similar with regard to the presence of hypertension and therefore well matched.

Baseline characteristic – diabetes

Table 3

Variable Diabetes	Cases	Controls	Total	P value
Present	19	8	27	0.6098
Not present	31	17	48	
Total	50	25	75	

'P' value is > 0.05 (0.60) and is not significant. Cases and controls were similar with regard to the presence of diabetes.

Baseline characteristic – Hyperlipidemia

Table 4

Variable Hyperlipidemia	Cases	Controls	Total	P value
Present	35	17	52	0.8595
Not present	15	8	23	
Total	50	25	75	

'P' value is 0.8595 (>0.05). Presence of hyperlipidemia is similar between cases and controls.

Baseline characteristic – Smoking

Table 5

Variable Smoking	Cases	Controls	Total	P value
Present	31	15	46	0.8668
Not present	19	10	29	
Total	50	25	75	

'P' value is 0.86 (> 0.05). Presence of Smoking is similar between cases and controls.

Presence of UTI in case versus controls

Table 6

Urine culture	Cases	Controls	Total	P value
Positive	11	3	14	0.2948
Negative	39	22	61	
Total	50	25	75	

11 out of 50 (22%) of cases had UTI, whereas 3 out of 25 (12%) of controls had UTI. P value was 0.2948 (P > 0.05) and is not significant. But RR (Relative risk) was 1.23 (RR>1) indicating positive association between STEMI and UTI.

CLINICAL CHARACTERISTICS OF CASES (STEMI)

BY PRESENCE OF UTI

Hypertension and UTI

Table 7

Variable	UTI (N=11)	No UTI (N=39)	t	P value
Hypertension	7	10	2.3597	0.0224
Percentage	63.63	25.6		

Among patients (cases) with UTI 63.63% were hypertensives and in those without UTI only 25.6 % were hypertensives. 'p' is significant ($p < 0.05$).

Diabetes mellitus and UTI

Table 8

Variable	UTI (N=11)	No UTI (N=39)	t	P value
Diabetes	3	16	0.8834	0.3814
Percentage	27.27	41.02		

Among patients with UTI 27.27% were diabetics and in those without UTI only 41.02 % were diabetics. But this difference is not statistically significant (p = 0.38).

Hyperlipidemia and UTI

Table 9

Variable	UTI (N=11)	No UTI (N=39)	t	P value
Hyperlipidemia	7	28	0.5037	0.6167
Percentage	63.63	71.79		

63.63% of patients with UTI and 71.79% of patients without UTI had hyperlipidemia and this difference is not significant statistically (p = 0.61).

Smoking and UTI

Table 10

Variable	UTI (N=11)	No UTI (N=39)	t	P value
Smoking	6	25	0.5667	0.5735
Percentage	54.54	64.10		

In patients with UTI, 54.54% were smokers whereas 64.10% of patients without UTI were smokers but the difference is not statistically significant (p = 0.57).

DISCUSSION

DISCUSSION

Fifty patients with acute ST segment elevation myocardial infarction admitted to IMCU / ICCU of Government Rajaji Hospital, Madurai during the period of Nov 2005 to Feb 2006 were included in the study.

Twentyfive patients admitted to IMCU with acute medical emergencies other than ACS were chosen as controls.

Mean age was 50.14 among male cases (SD 10.53) and 54.27 among male controls (SD 8.5) and P value was > 0.05. Mean age was 66.83 among female cases (SD 7.41) and 55.67 among female controls (SD 9.5) and p value was > 0.05. Therefore the case group and control group were well matched with respect to age and sex.

17 out of 50 cases (34%) and 9 out of 25 controls (36%) had hypertension. P value was 0.86 (>0.05).

19 out of 50 cases (38%) and 8 out of 25 controls (32%) had diabetes at baseline. P value was 0.60 (>0.05).

Similarly 35 out of 50 cases (70%) and 17 out of 25 controls (68%) had hyperlipidemia. P value was 0.85 (> 0.05).

Regarding smoking, 62% (31 out of 50) of cases and 60% (15 out of 25) controls were smokers. P value was 0.86 (>0.05).

Therefore case and control groups were well matched with respect to hypertension, diabetes, hyperlipidemia and smoking. Therefore the cases and controls are very much comparable.

11 out of 50 (22%) of cases had subclinical UTI, whereas 3 out of 25 (12%) of controls had UTI. P value was 0.2940 (P > 0.05) and is not significant. However the relative risk (RR) was 1.23 (RR>1) indicating the positive association between STEMI and UTI. This observation was similar to earlier study by ***John B. Sims et al*** which stated that subclinical UTI was 3 times more common in the cases than among controls. This discrepancy is probably because of the fact that in my study UTI was diagnosed based on urine culture rather than on counting number of white blood cells per high power field on urine analysis.

The following organisms were isolated. Four patients had E.coli.Two patients had K.pneumoniae. Two patients had S.aureus.

Two patients had Pseudomonas. One patient had Coagulase-negative Staphylococcus.

Among cases with UTI 63.63% were hypertensives compared to 25.6 % in those without UTI (p=0.02). Therefore among STEMI patients, those with UTI more often had hypertension than those who did not. This observation was similar to earlier study by ***John B. Sims et al***.

Other risk factors like diabetes, smoking and hyperlipidemia were more commonly observed in patients with UTI. However they were not statistically significant.

Given the association between subclinical measures of systemic inflammation and CAD development, progression, and instability[29], it is plausible that inducers of systemic inflammation such as subclinical infections (bacterial or viral) may play a direct role in triggering STEMI. A potential link between acute infection and complications of atherosclerosis was first described as early as 1897 by Sir William Osler. A number of studies have implicated infections agents such as Herpesvirus; Cytomegalovirus, C. pneumoniae, Helicobacter pylori and other infections pathogens in the atherosclerotic disease process. Moreover, acute bacterial respiratory tract infections have been linked to acute MI[30].

Chronic and acute infections may trigger plaque rupture via nonspecific inflammatory mechanisms. For example, the presence of elevated WBC count, independent of etiology; was a risk factor for MI in a cohort study.[31] These observations suggest that systemic inflammation may precipitate ACS events.

UTI is associated with a systemic host response, whether bacteremia occurs. The bacterial attachment to uroepithelial cells activate a cytokine cascade that includes the release of IL-1, IL-6 and IL-8 followed by neutrophil and other inflammatory cell recruitment. Local cytokine activation may thus induce systemic inflammation, promote plaque instability and thrombosis formation. This mechanism may in part explain the observation in the present study that UTI is associated with incident STEMI.

The limitation of this study is that urine was not cultured for organisms other than bacteria. For example fungal culture and culture for chlamydia, or mycoplasma was not done as they are not routinely available. These investigations could have detected more number of UTI cases and therefore could have contributed to greater association with STEMI.

SUMMARY

The study ‘’Prevalence of urinary tract infection in patients with acute ST segment elevation myocardial infarction” was conducted among 50 patients admitted in ICCU / IMCU and 25 controls admitted in IMCU of Government Rajaji Hospital, Madurai.

From the patients who satisfied inclusion criteria, urine samples were collected for culture within 6 hours of admission. All patients were subjected to detailed history taking, clinical examination, blood investigations in addition to 12 lend ECG, Echo and USG of prostate.

The baseline demographic and clinical characteristics were similar between cases and controls.

Among cases with STEMI, 11 out of 50 (22%) had UTI whereas 3 out of 25 (12%) of controls had UTI. The relative risk (1.23) was > 1 indicating positive association between STEMI and UTI. Predominantly Gram Negative Bacilli(GNB) were isolated.

Regarding risk factors, 63.63% of cases with UTI were hypertensives compared to 25.6 % of cases without UTI. Therefore UTI patients more often had hypertension than their counterparts without UTI.

Other risk factors like diabetes, smoking and hyperlipidemia though more commonly observed in patients without UTI, could not be correlated as it was not statistically significant.

CONCLUSION

1. The prevalence of subclinical UTI in STEMI patients is found to be higher when compared to controls.

2. UTI is positively associated with ST segment elevation myocardial infarction.

3. Among patients with STEMI, those with UTI more often had hypertension.

4. Patients with combined UTI and hypertension had higher risk of developing STEMI.

5. Gram Negative Bacilli especially Escherichia Coli was the commonest organism isolated in STEMI patients with subclinical UTI.

6. Among STEMI patients, other risk factors like diabetes, smoking and hyperlipidemia are not significantly associated with UTI.

BIBLIOGRAPHY

1. Murray CJ, Lopez AD. Mortality by cause for eight regions of the world : Global Burden of disease study. Lancet 1997; 349 : 1269-1276.
2. American Heart Association : International Cardiovascular Disease Statistics. Dallas, American Heart Association, 2004.
3. American Heart Association : Heart Disease and Stroke Statistics – 2004 Update. Dallas, American Heart Association, 2004.
4. Maseri A : Ischemic Heart Disease. In A Rational Basis for Clinical practice and Clinical Research. New york, Churchill Livingstone, 1995.
5. Selwyn AP, Braunwald E. Ischemic Heart Disease, in Harrison's principles of internal medicine 16th edition, vol – 2, P 1434.
6. Ross R. Atherosclerosis – an inflammatory disease. N Engl J Med 1999; 340 : 115-26.
7. WHO. Techn Rep. Ser. No. 678, 1982.
8. Rose G. Oxford Textbook of Public Health 1985; 4 : 133.
9. Gaziano JM. Global Burden of Cardiovascular Disease, in Braunwald's Heart disease 7th edition, P 1.
10. Omran AR. The epidemiologic transition : A theory of the epidemiology of population change. Milbank Mem Fund 1971; 49 : 501.

11. Olshansky SJ, Ault AB. The fourth stage of epidemiologic transition : The age of delayed degenerative diseases. Milbank 1986; 64 : 355.
12. Sarvotham SG, Berry JN. Circulation 1968; 37 : 339.
13. Dewan BD et al. Indian Heart Journal 1974; 26 : 68.
14. Sinha BC. Jr Ind Med Assoc 1970; 55 : 171.
15. Libby P, Aikawa M, Schonbeck U. Cholesterol and atherosclerosis. Biochim Biophys Acta 2000; 1529 : 299.
16. Pearson TA et al. Markers of inflammation and cardiovascular disease. Circulation 2003; 107 : 499.
17. Ridker PM. Role of inflammatory biomarkers in prediction of coronary heart disease. Lancet 2001; 358:946.
18. Higuchi ML, Sambiase N, Palomino S, et al. Detection of Mycoplasma pneumoniae and Chlamydia pneumoniae in ruptured atherosclerotic plaques. Braz J Med Biol Res 2000; 33 : 1023-6.
19. Muhlestein JB, et al. Infection with chlamydia pneumoniae accelerates the development of atherosclerosis and treatment with azithromycin prevents it in a rabbit model. Circulation 1998; 97 : 633-6.
20. Danesh J, et al. Chronic infection with Helicobacter pylori, Chlamydia pneumoniae, or cytomegalovirus. Heart 1999; 81: 245-7.
21. Gattone M, et al. Chlamydia pneumoniae and cytomegalovirus seropositivity, inflammatory markers, and the risk of myocardial infarction at a young age. Am Heart J 2001 ; 142 : 633-40.

22. Cannon CP, Braunwald E. Unstable angina and Non – ST Elevation Myocardial infarction, in Braunwald's Heart Disease 7th edition, P 1251-67.
23. Antman EM, et al. The TIMI risk score for unstable angina / non ST elevation MI. JAMA 2000; 284 : 835.
24. Antman EM, Braunwald E. ST – segment elevation myocardial infarction, in Harrison's priciples of internal medicine 16th edition, P 1448-59.
25. Fihn SD et al. Clinical practice : Acute uncomplicated urinary tract infection in women. N Engl J Med 2003; 349 : 259.
26. Stamm WE, Schaeffer AJ. The state of the Art in the Management of Urinary Tract Infections. Am J Med 2002; 113:1S-84S.
27. Eidelman RS, et al. An update on aspirin on the primary prevention of cardiovascular disease. Arch Intern Med 2003; 163 : 2006-10.
28. Domanski MJ, et al. Effect of Angiotension – converting enzyme inhibition on sudden cardiac death following acute myocardial infarction. J Am Coll Cardiol 1999; 33 : 598-604.
29. Libby P, et al. Inflammation and atherosclerosis. Circulation 2002; 105 : 1135-43.
30. Mattila KJ. Viral and bacterial infections in patients with acute myocardial infarction. J Intern Med 1989; 225 : 293-6.
31. Bovill, et al. White blood cell counts in persons aged 65 years or more from the Cardiovascular Health Study. Am J Epidemiol 1996;143:1107-15.

32. Cheesebrough M. District Laboratory Practice in Tropical Countries, part 2, P 105-114.

PROFORMA

DEPARTMENT OF MEDICINE AND CARDIOLOGY

PREVALENCE OF URINARY TRACT INFECTION IN ST SEGMENT ELEVATION MYOCARDIAL INFARCTION

1. Name :
2. Age / Sex :
3. Ward / Unit :
4. OP/IP Number :
5. Address :

6. Presenting Illness :
   - Complaint :
   - Duration :

7. Past History :

HT	:	Yes / No	Duration	:
DM	:	Yes / No	Duration	:
MI	:	Yes / No	Duration	:
Hyperlipidemia	:	Yes / No	Duration	:

8. Personal History :

Smoking	:	Yes / No	Duration	:
Alcoholism	:	Yes / No	Duration	:

9. Family History :
   Premature CAD : Yes / No

10. Symptoms of UTI / lower urinary tract obstruction :

No	Yes

11. Physical Examination:
    - Obese: Weight, Height, Waist, HIP — BMI
    - Pulse :
    - BP :

CVS :
RS :

11. Diagnosis :

12. Investigations :

Blood : TC ESR
DC
Hb%

Urine analysis: Alb
Sugar
Deposits

Urine Culture :

Total C :
Blood Sugar : TGL :
Blood Urea : LDL :
Serum Creatinine : HDL :
VLDL :

13. ECG :

Rate :
Rhythm :
Axis P :
QRS :

Intervals PR :
QRS :
QT :
QTc :

Q wave :

ST-T changes :

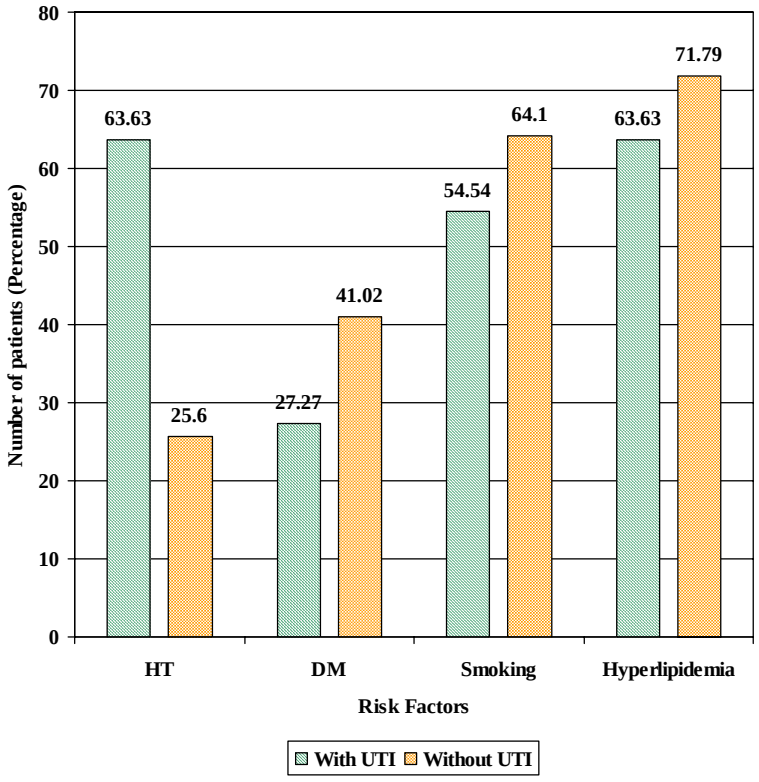
Others :

Remarks :

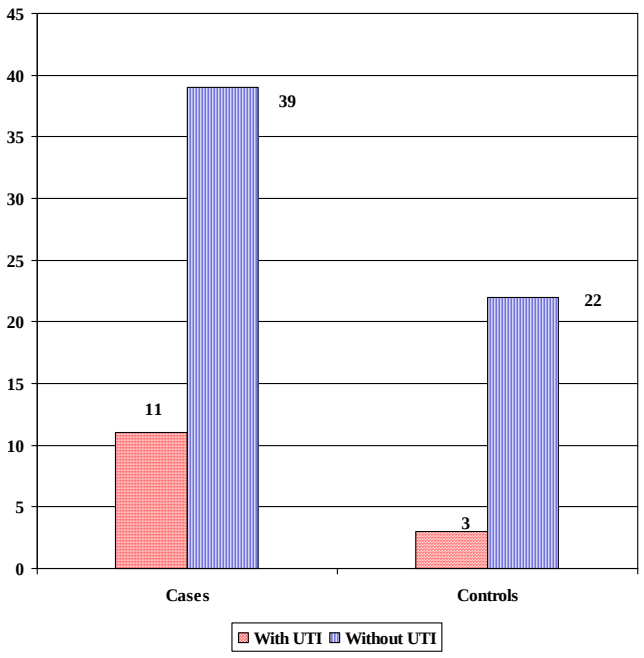
14. ECHO :

15. USG Abdomen :

Comparative Bar Chart between UTI and risk factors



UTI between Case and Controls



MASTER CHART

S.No.	Age	Sex	HT	DM	LIPIDS	SMOKE	MI-Type	Thrombo.	TC	Pus cells	Culture	Urea	Creat.	Echo-EF	USG	Uti/ Uto
1	31	M	2	2	2	1	1	-	12200	+	-	37	1.0	30	N	No
2	60	M	1	1	1	1	1	-	8700	-	-	19	0.7	56	N	No
3	42	M	2	2	1	1	1	+	12000	+	+	19	1.0	42	N	No
4	47	M	2	2	1	1	2	+	9000	-	-	29	0.9	70	N	No
5	60	F	1	1	1	2	2	+	8000	-	-	20	0.9	65	N	No
6	55	M	1	1	1	2	1	+	11700	+	+	42	1.4	37	N	No
7	70	M	2	2	1	1	2	+	8000	-	-	31	1.0	48	N	No
8	37	M	2	2	1	1	1	+	9700	-	-	35	0.9	35	N	No
9	70	M	1	1	1	1	2	-	9500	-	-	37	1.5	50	N	No
10	46	M	2	1	1	2	1	-	11900	-	-	32	1.0	54	N	No
11	38	M	2	2	1	1	1	+	9000	-	-	28	0.9	33	N	No
12	55	M	2	2	1	1	1	+	12600	+	+	17	0.9	37	N	No
13	60	M	2	2	2	2	1	+	9000	-	-	28	0.7	40	N	No
14	36	M	2	2	2	1	2	-	12400	-	-	33	1.4	45	N	No
15	60	F	2	2	1	2	1	-	12100	-	-	20	0.7	42	N	No
16	28	M	2	2	1	2	1	+	8000	-	-	20	0.8	50	N	No
17	38	M	2	2	1	1	1	-	11800	-	-	22	0.7	40	N	No
18	52	M	1	2	1	2	1	+	8200	-	-	34	1.0	42	N	No
19	45	M	1	1	1	1	2	+	9000	-	-	31	0.9	47	N	No
20	69	F	1	1	1	2	1	+	9300	-	-	34	1.0	40	N	No
21	52	M	1	2	2	2	1	+	10200	-	-	20	0.8	49	N	No
22	65	M	1	2	1	1	1	-	10700	+	+	54	1.6	43	N	No

S.No.	Age	Sex	HT	DM	LIPIDS	SMOKE	MI-Type	Thrombo.	TC	Pus cells	Culture	Urea	Creat.	Echo-EF	USG	Uti/ Uto
23	52	M	1	1	1	2	2	-	11200	-	-	87	2.5	66	N	No
24	71	M	1	1	2	2	1	+	10000	+	+	24	0.9	45	N	No
25	50	M	1	1	1	1	1	+	8200	-	-	31	1.0	44	N	No
26	46	M	2	2	1	1	1	+	9800	-	-	19	0.8	40	N	No
27	47	M	2	2	2	1	1	-	10800	+	-	21	0.8	42	N	No
28	50	M	2	1	2	1	2	-	9800	-	-	26	0.9	40	N	No
29	42	M	2	2	1	2	1	+	9800	-	-	38	1.0	40	N	No
30	67	F	1	2	1	2	1	+	11200	+	+	19	0.8	39	N	No
31	55	M	2	2	1	2	2	-	9800	-	-	24	1.1	47	N	No
32	55	M	2	1	2	1	2	-	9600	-	-	53	1.4	36	N	No
33	55	M	2	2	1	1	2	+	8000	-	-	27	1.2	47	N	No
34	56	M	1	2	2	1	2	+	8200	-	-	32	1.3	46	N	No
35	69	M	2	2	2	1	2	-	10800	+	+	49	1.8	72	N	No
36	80	F	1	1	1	2	2	+	12200	+	+	23	0.9	44	N	No
37	62	M	2	2	2	2	1	+	8000	+	+	44	1.1	39	N	No
38	50	M	2	1	2	2	1	+	8200	-	-	45	1.4	28	N	No
39	60	M	1	2	1	1	1	+	10800	+	+	39	0.8	42	N	No
40	47	M	1	1	2	1	1	+	9000	-	-	26	0.9	44	N	No
41	46	M	2	2	1	1	1	+	8000	-	-	14	0.6	41	N	No
42	52	M	2	1	1	1	1	+	11800	-	-	28	0.9	56	N	No
43	53	M	2	2	1	1	1	-	10800	-	-	32	1.0	40	N	No
44	50	M	1	2	2	1	1	+	11200	+	+	29	0.9	39	N	No
45	40	M	2	2	2	1	2	+	8400	-	-	21	0.8	47	N	No
46	43	M	2	1	1	2	1	-	8800	-	-	25	1.3	44	N	No

S.No.	Age	Sex	HT	DM	LIPIDS	SMOKE	MI-Type	Thrombo.	TC	Pus cells	Culture	Urea	Creat.	Echo-EF	USG	Uti/ Uto
47	53	M	2	2	1	1	1	+	12800	-	-	45	1.4	38	N	No
48	45	M	2	1	1	1	2	+	9600	-	-	22	0.8	46	N	No
49	30	M	2	2	1	1	1	-	11200	-	-	22	0.9	34	N	No
50	65	F	2	1	1	2	1	-	13700	-	-	18	0.9	44	N	No
1	55	M	2	2	1	1	1	+	9400	-	-	32	0.8	Y	N	No
2	60	M	2	1	1	2	2	-	8800	-	-	27	0.9	Y	N	No
3	65	F	2	2	2	2	2	+	8600	-	-	236	11.5	Y	N	No
4	47	M	1	1	1	1	1	+	7800	-	-	18	1.2	Y	N	No
5	40	M	2	2	1	1	1	-	9200	-	-	21	1.1	Y	N	No
6	54	M	1	2	2	1	2	+	8400	-	-	15	0.9	Y	N	No
7	57	M	1	1	1	2	1	-	9900	+	+	22	1.0	Y	N	No
8	45	M	2	2	2	1	1	+	7400	-	-	18	0.7	Y	N	No
9	46	M	2	1	1	1	1	+	6400	-	-	25	1.2	Y	N	No
10	64	M	1	1	1	2	2	-	5800	-	-	28	0.9	Y	N	No
11	55	M	2	2	2	1	2	+	8000	-	-	30	0.7	Y	N	No
12	50	M	1	2	1	2	1	+	7800	-	-	23	1.2	Y	N	No
13	70	M	1	1	1	2	2	-	10000	+	+	27	0.8	Y	N	No
14	65	M	2	2	1	1	1	+	7100	-	-	29	0.8	Y	N	No
15	46	F	2	2	2	2	1	+	9200	-	-	31	1.1	Y	N	No
16	58	M	2	2	1	1	1	+	8200	-	-	19	0.7	Y	N	No
17	49	M	2	2	1	1	2	+	7800	-	-	17	1.0	Y	N	No
18	44	M	2	2	1	2	1	+	9600	-	-	20	0.8	Y	N	No
19	67	M	1	1	1	1	2	-	10200	+	+	30	1.0	Y	N	No

S.No.	Age	Sex	HT	DM	LIPIDS	SMOKE	MI-Type	Thrombo.	TC	Pus cells	Culture	Urea	Creat.	Echo-EF	USG	Uti/ Uto
20	47	M	2	2	2	1	1	+	11400	-	-	25	0.8	Y	N	No
21	56	F	2	2	1	2	1	-	9600	-	-	35	0.8	Y	N	No
22	65	M	2	2	2	2	2	-	8700	-	-	19	0.6	Y	N	No
23	57	M	2	2	2	1	1	-	6600	-	-	23	0.9	Y	N	No
24	44	M	1	1	1	1	1	+	5800	-	-	25	1.0	Y	N	No
25	55	M	1	2	1	1	2	-	9800	-	-	27	1.1	Y	N	No

Abbreviations in Master Chart

Hypertension
1- Present
2- Absent

Diabetes
1- Present
2- Absent

Hyperlipidemia
1- Present
2- Absent

Smoking
1- Present
2- Absent

Type of MI
1- Antr. Wall MI
2- Infr. Wall MI

Thrombolysed
+ - Yes
- - No

Pus cells
> or =5/hpf +
<5/hpf -

USG
N = Normal

Uti/Uto - No
Symptoms of Urinary tract infection / Urinary tract obstruction is absent