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ACUTE CORONARY SYNDROME (ACS) AS A PREDICTOR OF RENAL PARAMETER DERAGNEMNT AT A TERTIARY CARE HOSPITAL.

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Abstract
Objective; To determine the frequency of renal dysfunction in patients with acute coronary syndrome at a tertiary care hospital. **Study design;** Descriptive Cross-sectional study. **Setting;** Department of Medicine, Nishtar Hospital Multan. **Material and Methods;** Consecutive 285 patients who met inclusion criteria of our study were enrolled from department of Cardiology, Nishtar Hospital Multan. History was taken and relevant investigations were done. Computer based formula for MDRD eGFR was used to calculate eGFR in our patients. All these findings were entered in pre-designed, pre – tested study questionnaire. Data was entered and analyzed using computer based software SPSS version 20. All the quantitative variables of the study (such as age, serum creatinine level, GFR value) were calculated for mean and standard deviation. Frequencies and percentages were calculated for categorical variables like gender, residential area, socioeconomic status, level of education, H/O diabetes, H/O hypertension, H/O smoking and family history of IHD etc. **Results;** We studied 285 patients of acute coronary syndrome admitted in Cardiology department of Nishtar Hospital Multan, 210 (73.7%) were male and 75 (26.3%) female. One hundred eighty (63.2%) were from rural area and 105 (36.8%) were urban. One hundred thirty two (46.3%) were from low income group, 144 (50.5%) from middle income and 9 (3.2%) were from high income group. Two hundred four (71.6%) patients presented with chest pain and 72 (25.3%) presented with chest pain and shortness of breath. One hundred eight (37.9%) were hypertensive, 63 (32.6%) were diabetic, 135 (47.4%) were smokers and family history of IHD was present in 102 (35.8%) of the cases. eGFR was calculated by MDRD eGFR formula. eGFR was less than 30 ml/min/1.73 m^2 in 30 (10.5%) of the cases, 31-60 ml/min/1.73 m^2 in 66 (23.2%) cases and eGFR was more than 60 ml/min/1.73 m^2 in 189 (66.3%) of the cases. **Conclusion;** The present study reveals that the substantial proportion of our study patients have underlying renal dysfunction. So eGFR estimation in ACS patients should be given due consideration. This will help in the management of these patients and may improve short and long term disease outcome. Further follow up studies especially in terms of morbidity and mortality in this sub-group of patients are suggested.
Keywords; Acute coronary syndrome, renal dysfunction, myocardial infarction.

Introduction

Among the cardiac emergencies, ACS still remains the major catastrophic cardiac emergency and leading cause of morbidity and mortality in developing countries [1-3]. In hospital mortality has been reported to be 13.5% among the admitted ST segment elevation MI (STEMI) patients [4]. The patients of ACS are at high risk of short and long term adverse out comes. The ACS is highest cause of death in UK. The poor prognostic factors include advancing age, presence and severity of ECG changes, high level of bio markers of myocardial infarction especially serum Troponin levels, presence of left ventricular dysfunction, cardiogenic shock, heart failure, heart rate and arrhythmias, renal impairment, diabetes mellitus, hypertension and anemia [5-8].
Renal dysfunction is an independent and important risk factor for cardiac diseases and is also a strong predictor of adverse outcomes in patients with various cardiovascular conditions including ACS, even if it is mild [9-15]. The adverse out come in MI patients associated with renal dysfunction has been reported by Anavekar et al [13].

Glomerular Filtration Rate (GFR) estimation is an important and independent predictor of in hospital and outpatient mortality in patients with ACS [16]. In Valsartan acute MI trial (VALIANT), 14527 patients of MI were studied and it has been highlighted in this study that even mild renal dysfunction, assessed on the basis of estimated GFR, is to be considered as major risk factor for cardiovascular complications in patients of MI [13]. It was further noted that 10 units reduction of GFR was associated with 10% increased risk of adverse outcomes in these patients. Amount of renal dysfunction as assessed by serum creatinine may be misleading because insignificant slight increase in serum creatinine, or even patients with normal creatinine may have significant renal dysfunction as estimated by Modification of Diet in Renal Diseases (MDRD eGFR) formula. It was also found that up to 30 % of these patients undergoing primary percutaneous coronary intervention are expected to have significant renal dysfunction as defined by MDRD eGFR less than 60 ml/min/1.73 m^2. [17]

Hence renal dysfunction remains important issue in patients with ACS. The present study has been conducted to see the frequency of renal dysfunction on the basis of MDRD eGFR in ACS patients.

Material and methods;
Study design; Descriptive cross – sectional study.
Setting; Department of Medicine, Nishtar Hospital Multan.
Sample size; 285 patients with ACS.
Sampling Technique; Non – probability, purposive sampling.
Inclusion Criteria;
1. Both genders.
2. Age range (More than 20 years).
3. Patients with ACS.

Exclusion Criteria;
1. Patients having any malignancy will not be included.
2. Renal transplanted patients.
3. Pregnant ladies.
4. Patients who have already undergone cardiac intervention or surgery.
5. Who do not give consent for participation.

Consecutive 285 patients who met inclusion criteria of our study were enrolled from department of Cardiology, Nishtar Hospital Multan. Informed written consent was taken from each patient describing them objectives and benefits of this study, ensuring them confidentiality of the information provided and the fact that there is no risk involved to the patient while taking part in this study.
Relevant history was taken. Clinical examination and relevant investigations were carried out. All socio-demographic information (like age, gender, residential status, socioeconomic status, etc) was also asked. Computer based formula for MDRD eGFR was used to calculate eGFR in our patients. All these findings were entered in pre-designed, pre – tested study questionnaire.

Data was entered and analyzed using computer based software SPSS version 20. All the quantitative variables of the study (such as age, serum creatinine level, GFR value) were calculated for mean and standard deviation. Frequencies and percentages were calculated for categorical variables like gender, residential area, socioeconomic status, level of education, H/O diabetes, H/O hypertension, H/O smoking and family history of IHD etc.

Results;
We studied 285 patients of acute coronary syndrome admitted in Cardiology department of Nishtar Hospital Multan, out of which 210 (73.7%) were male and 75 (26.3%) female. One hundred eighty (63.2%) were from rural area and 105 (36.8%) were urban. One hundred thirty two (46.3%) were from low income group, 144 (50.5%) from middle income and 9 (3.2%) were from high income group. Two hundred four (71.6%) patients presented with chest pain and 72 (25.3%) presented with chest pain and shortness of breath. One hundred eight (37.9%) were hypertensive, 63 (32.6%) were diabetic, 135 (47.4%) were smokers and family history of IHD was present in 102 (35.8%) of the cases. eGFR was calculated by MDRD eGFR formula. eGFR was less than 30 ml/min/1.73 m^2 in 30 (10.5%) of the cases and eGFR was 31-60 ml/min/1.73 m^2 in 66 (23.2%) cases and eGFR was more than 60 ml/min/1.73 m^2 in 189 (66.3%) of the cases.

Discussion;
Both ACS and renal dysfunction patients have cardiovascular risk factors in common and various researchers have studied the existence of renal dysfunction in ACS patients. The underlying uremic risk factors for accelerated atherogenesis in renal dysfunction patients, put these patients to further risk for coronary artery disease. Renal insufficiency has been described as an independent risk factor for cardiac diseases. The independent association between renal dysfunction underlying in ACS patients has also been studied [18, 19]. Renal dysfunction is also an important predictor of poor short as well as long term outcomes in ACS patients [13]. Indeed, renal insufficiency in ACS patients doubles the mortality rates and it is 3rd important cause for prediction of mortality in these patients [20].

We studied 285 admitted patients of ACS. Two hundred ten (73.7%) were male and 75 (23.3%) were female, eGFR was calculated. In our study eGFR was less than 30 ml/min/1.73m^2 in 30 (10.5%) of cases, 31 – 60 ml/min/1.73m^2 in 66 (23.2%) of cases and it was more than 60 ml/min/1.73m^2 in rest of cases. Among the ACS patients, 48 (16.8 %) with low eGFR (i.e. 60 ml/min/1.73m^2) were diabetic, 42 (14.7%) were hypertensive, 45 (15.8 %) were smokers and 45 (15.8%) were having positive family history of IHD.

It has also been reported that almost 40 % of the cases with non ST segment elevation myocardial infarction (MI) and 30 % of the cases having ST segment elevation MI have renal insufficiency as defined by eGFR less than 60 ml/min/1.73 m^2 .[21]The pathophysiology in ACS patients with underlying renal dysfunction has been studied [22] Lesions in the coronaries of patients with renal dysfunction were found to be longer with more luminal encroachment and have higher plaque burden compared to coronaries of non renal dysfunction patients. Coronary plaque composition assessed with radio frequency IVUS depicted greater necrotic core with dense calcium and less fibrous tissue, all these changes make the coronary plaque less stable. Furthermore serum matrix metalloproteinases were found raised in cases of moderate to severe renal dysfunction patients and these result in progression of plaque and degradation of overlying fibrous cap [23]. Experimental data support the view that renal dysfunction increases foam cell generation by stimulating macrophage entry into vascular endothelium [24]. Further studies have revealed an accelerated infarct expansion, active inflammation and oxidative stress in patients having ACS with renal dysfunction [25]. Morenzi et al [20] have suggested that eGFR should be done as baseline and should be part of evaluation of any patient admitted with ACS, especially if they have hypertension, diabetes mellitus and low hemoglobin. Similar findings have also been suggested by Hemmelgarn et al [26]. Amsterdam et al [27] suggested that non-ST segment elevation MI patients must have eGFR estimated initially and throughout the optimal care of these patients, this will decrease complications and hence mortality.

The baseline estimation, while these ACS patients are being optimally treated, may prevent complications like contrast induced nephropathy, coronary stent thrombosis and re-stenosis, bleeding can be minimized while doing reperfusion procedures. ACS patients with underlying renal dysfunction have prolongation of bleeding time, abnormal platelet aggregation and adhesion and also have state of hyper-coagulation [28-29]. Hence anti-thrombic therapy, use of heparin, anti-platelet aggregation agents and drugs like statins may be modified in renal dysfunction patients.

Conclusion;

The present study reveals that the substantial proportion of our study patients have underlying renal dysfunction. So eGFR estimation in ACS patients should be given due consideration. This will help in the management of these patients and may improve short and long term disease outcome. Further follow up studies especially in terms of morbidity and mortality in this sub-group of patients are suggested.

References;

1. Taseer IH, Khan SA, Nazir MI, Safdar S. Painless myocardial infarction; its frequency in patients of acute coronary syndrome. Professional Med J. 2013;20(6):882-886.
2. Polanska – Skrzypczyk M, Karez M, Bekta P, Kepka C, Przyluski J, Kruk M, et al. Prognostic value of renal function in STEMI patients treated with primary PCI: ANIN Registry. Br J Cardiol 2013;20:65
3. Walkowicz W[1], Gasior Z, Mizia-Stec K, Dabek J. Risk factors of death or re-hospitalization in acute coronary syndrome patients before and after earlier heart revascularization. Pol Merkur Lekarski. 2011 Feb;30(176):97-101.
4. Widimsky P, Wijns W, Fajadet J, de – Belder M, Knot J, Aaberg L, et al. Reperfusion therapy for ST elevation acute myocardial infarction in Europe : description of the current situation in 30 countries. Eur Heart J 2010:31;943-57.
5. Swanson N[1], Montalescot G, Eagle KA, Goodman SG, Huang W, Brieger D, et al. Delay to angiography and outcomes following presentation with high-risk, non-ST-elevation acute coronary syndromes: results from the Global Registry of Acute Coronary Events. Heart. 2009 Mar;95(3):211-5.
6. Boersma E, Pieper KS, Steyerberg EW, Simoons ML. Predictors of outcome in patients with acute coronary syndrome with out persistence ST Segment elevation results from international trial of 9461 patients. Circulation 2000;101:2557-67.
7. Shabbir M, Kayani AM, Qureshi O, Mughal MM. Predictors of fatal outcome in acute myocardial infarction. J Ayub Med Coll Abbottabad. 2008;20(3):14-16.
8. Kazmi KA, Bakr A, Iqbal SP, Iqbal MP. Admission creatine Kinase as a prognostic marker in acute MI. J Pak Med Assoc. 2009;59(12):819-22
9. Sarnak MJ, Levey AS, Schoolwearth AC, Coresh J. Kidney disease as a risk factor for the development of cardiovascular disease; A statement from American Heart Association Councils on kidney in cardiovascular disease, high blood pressure research, clinical cardiology and epidemiology and prevention. Circulation 2003:108;2154-69.
10. Best PJ, Lennon R, Ting H. The impact of renal insufficiency on clinical out come in patients under going percutanous coronary intervention. J Am Coll Cardiol 2002;39:1113-119

11. Radwan H, Salem A, Ammar Y, Ghazali K. Prognostic value of chronic kidney disease in acute coronary syndrome patients treated with percutaneous coronary intervention. Int cardiovas Forum J. 2016;8:27-33.
12. Rozenbaum Z, Leader A, Neuman Y, Shlezinger M, Goldenberg I, Mosseri M, Pereg D. Prevalence and significance of unrecognized renal dysfunction in patients with acute coronary syndrome. Am J Med. 2016;129;187-194.
13. Anavekar NS, McMurray JJ, Vlazque EJ, Solomon SD, Kober L, Rouleau J, et al. Relation between renal dysfunction and cardiovascular out comes after myocardial infraction. N Engl J Med. 2004; 351:1285-1295.
14. Pereg D, Tirosh A, Shochat T, Hasdai D; Metabolic, Lifestyle and Nutrition Assessment in Young adults (MELANY) Investigators. Mild renal dysfunction associated with incident coronary artery disease in young males. Eur Heart J. 2008 Jan;29(2):198-203.
15. Reis SE, Olson MB, Fried L, Reeser V, Mankad S, Pepine CJ, et al. Mild renal insufficiency is associated with angiographic coronary artery disease in women. Circulation. 2002 Jun 18;105(24):2826-9.
16. Sanchez Hidalgo A[1], Pou M, Leiro R, López Gómez D, Martínez Ruiz M, Saurina A, et al. Renal failure stages as predictors of mortality following acute coronary syndrome. Nefrologia. 2009;29(1):53-60.
17. Bachorzewska-Gajewska H, Malyszko J, Malyszko JS, Dobrzycki S, Sobkowicz B, Musial W.Estimation of glomerular filtration rate in patients with normal serum creatinine undergoing primary PCI: is it really normal? Nephrol Dial Transplant. 2006;21(6):1736-8.
18. Shlipak MG, Heidenreich PA, Noguchi H, Chertow GM, Browner WS, McClellan MB.Association of renal insufficiency with treatment and outcomes after myocardial infarction in elderly patients. Ann Intern Med. 2002 Oct 1;137(7):555-62.
19. Reddan DN, Szczech L, Bhapkar MV, Moliterno DJ, Califf RM, Ohman EM, et al. Renal function, concomitant medication use and outcomes following acute coronary syndromes. Nephrol Dial Transplant. 2005 Oct;20(10):2105-12.
20. Marenzi G, Cabiati A, Assanelli E. Chronic Kidney disease in acute coronary syndromes. World J Nephrol. 2012;1(5):134-45.
21. Wong JA, Goodman SG, Yan RT, Wald R, Bagnall AJ, Welsh RC, et al. Temporal management patterns and outcomes of non-ST elevation acute coronary syndromes in patients with kidney dysfunction. Eur Heart J. 2009 Mar;30(5):549-57.
22. Baber U, Stone GW, Weisz G, Moreno P, Dangas G, Maehara A, et al. Coronary plaque composition, morphology, and outcomes in patients with and without chronic kidney disease presenting with acute coronary syndromes. JACC Cardiovasc Imaging. 2012 Mar;5(3 Suppl):S53-61.
23. Pelisek J, Hahntow IN, Eckstein HH, Ockert S, Reeps C, Heider P, et al. Impact of chronic kidney disease on carotid plaque vulnerability. J Vasc Surg. 2011 Dec;54(6):1643-9.
24. Ponda MP, Barash I, Feig JE, Fisher EA, Skolnik EY. Moderate kidney disease inhibits atherosclerosis regression. Atherosclerosis. 2010 May;210(1):57-62.
25. Naito K, Anzai T, Yoshikawa T, Anzai A, Kaneko H, Kohno T, et al. Impact of chronic kidney disease on postinfarction inflammation, oxidative stress, and left ventricular remodeling. J Card Fail. 2008 Dec;14(10):831-8.
26. Hemmelgarn BR, Zhang J, Manns BJ, Tonelli M, Larsen E, Ghali WA, et al. Progression of kidney dysfunction in the community-dwelling elderly. Kidney Int. 2006 Jun;69(12):2155-61.
27. Amsterdam EA, Wenger NK, Brindis RG, Casey DE Jr, Ganiats TG, Holmes DR Jr, et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Circulation. 2014 Dec 23;130(25):e344-426.
28. Sagripanti A, Barsotti G. Bleeding and thrombosis in chronic uremia. Nephron. 1997;75(2):125-39.
29. Stam F, van Guldener C, Schalkwijk CG, ter Wee PM, Donker AJ, Stehouwer CD. Impaired renal function is associated with markers of endothelial dysfunction and increased inflammatory activity. Nephrol Dial Transplant. 2003 May;18(5):892-8.