Original Article

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Clinical and Therapeutic Characteristics in Patients with Chronic Kidney Disease presenting with Acute Coronary Syndrome

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Abstract

Background and Aims: The prevalence of chronic kidney disease (CKD) and coronary artery disease (CAD) is increasing in Nepal. Chronic inflammation, metabolic and uremic effect of CKD along with traditional cardiovascular (CV) risk factor makes CV disease common and unique in these patients. Even with advancement in treatment, acute coronary syndrome (ACS), there is tendency towards lower rates of evidence-based therapies. This study was conducted with an aim to know clinical profile and the management strategy of CKD patient presenting with ACS.

Methods: Single-centered, cross-sectional study carried out in, Manmohan Cardiothoracic and Vascular Transplant Centre, Kathmandu from July 2021 to December 2021. Of total 68 patient with ACS and CKD, history, physical examination, laboratory investigations along with electrocardiogram, echocardiography and coronary angiogram, were critically assessed.

Results: Out of total 68 patients, 47 (69.1%) were male. In CKD patient presenting with ACS, predominant age group involved was 51-60 years (27.9%) with the mean age of 61.4 years. Out of them, 34 (50%) were in stage 5 with 32 (47.1%) already on maintenance hemodialysis. Average serum creatine and creatine clearance was 5.84 mg/dl and 16.29 mL/min/1.73m2 respectively. Smoking, diabetes and hypertension were common occurring in 39 (57.4%), 49 (72.1%) and 57 (83.8%) of all CKD patient respectively. Among them, 61 (89.7%) underwent angiography in which 23 (37.7%) had triple vessel disease. Percutaneous intervention was done for 38 (55.9%) patients and 13 (19.1%) were referred for coronary artery bypass graft (CABG).

Conclusion: Traditional risk factor and multivessel involvement were common in CKD patient presenting with ACS and there less tendency to undergo revascularization procedure, especially with advancing age in the studied population.

Keywords: Chronic Kidney Disease, Acute Coronary Syndrome, Angiography

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Introduction

The prevalence of chronic kidney disease (CKD) and coronary artery disease (CAD) is increasing worldwide with Nepal being no exception to this.[1,2] In addition to traditional cardiovascular risk factor, uremia causes chronic inflammation, hyperfibrinogenemia, hyperhomocystinemia, and lipoprotein(a) abnormalities which accelerates the atherosclerotic process in patients with CKD, making it one of the independent cardiovascular risk factors.[3]

Treatment in CAD, especially acute coronary syndrome (ACS) with CKD have always been a problem among cardiologist. Even though coronary angiography followed by either percutaneous intervention (PCI) or coronary artery bypass grafting (CABG) should represent the treatment of choice in ACS irrespective of the CKD stage, CKD patients with ACS tend to receive lower rates of evidence-based therapies which adversely affect outcome. The lower rate of evidence- based therapies is mostly due to underutilization of anti-platelet agents, beta-blockers, angiotensin-converting enzyme inhibitors, glycoprotein IIb/IIIa receptor antagonists, use of thrombolytic therapy and revascularization procedure in CKD patients due to concerns of bleeding risk, worsening of renal function, and comorbidities.[1,4,5]

This study focuses on ACS patients with renal impairment to highlight the evolutionary particularities of these patients and their management strategy. The outcome of this study can be useful to provide insight in management of CKD patient presenting with ACS, in whom most common cause of death is ischemic heart disease.

Methods

This was a single center, cross-sectional, observational study carried out at the department of cardiology, Manmohan Cardiothoracic and Vascular Transplant Centre (MCVTC), Tribhuvan University, Institute of Medicine, Kathmandu from July 2021 to January 2022.

A total of 68 patients were taken as our sample size for the study to have 95% confidence interval and allowable error of 5% from various similar studies.[1,3,4,6]

After obtaining institutional review board approval and written informed consent of patient, all the adult patient who presented with ACS as defined in accordance to European society of cardiology (ESC) and CKD as defined by (Kidney disease outcomes quality initiative) KIDOQ guidelines were enrolled in study.[7,8]

ACS was defined by any patient presenting with positive cardiac troponin and at least one of the following: chest discomfort, with persistent or no persistent ST-segment elevation (ECG changes that may include transient ST-segment elevation, persistent or transient ST-segment depression, T-wave inversion, flat T waves, or pseudo-normalization of T waves; or the ECG may be normal) and imaging evidence of loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology.

CKD was defined abnormalities of kidney structure (albuminuria, urine sediment abnormalities, abnormalities detected by histology or radiological imaging and history of prior kidney transplantation) or function (glomerular filtration rate less than 60 ml/min/1.73m2 or patient on maintenance hemodialysis [MHD] or any other renal replacement therapy), present for ≥3 months as according to the medical record. Stages of CKD were defined by estimated glomerular filtration rate eGFR (stage 1 if eGFR ≥ 90 ml/min/1.73m2, stage 2 if eGFR 60 to 89 ml/min/1.73m2, stage 3 if eGFR 30 to 59 ml/min/1.73m2, stage 4 if eGFR 15 to 29 ml/min/1.73m2 and stage 5 eGFR less than 15 ml/min/1.73m2)

Any patient with previous electrocardiogram (ECG) changes consistent with myocardial ischemia without new signs of acute coronary disease, myocardial injury described as nonspecific elevation of cardiac necrosis enzymes in other conditions (like sepsis), advanced heart failure, chronic kidney disease, cerebrovascular accidents, myocardial trauma and decreased value of the GFR due to dehydration and no other signs of kidney function alterations were excluded from the study.

History was taken focusing cardiovascular risk factors including hypertension (HTN), diabetes (DM), smoking and dyslipidemia. Transthoracic echocardiogram and Coronary angiogram, of the participants, were studied to assess left ventricular ejection fraction (LVEF) and coronary artery involvement. Left ventricular systolic function (LVSF) were defined by LVEF (normal if LVEF ≥ 50%, mild 40% to 49%, moderate 30 to 39% and severe ≤50%).

Angiographic CAD extent, defined by vessel (left anterior descending artery [LAD], left circumflex artery [LCX], right coronary artery [RCA]), degree (no apparent CAD: no stenosis >20%; non obstructive CAD: stenosis ≥20% but no stenosis ≥70%; obstructive CAD: any stenosis ≥70% or left main [LM] stenosis ≥50%) and distribution (1,2, or 3 vessel).

A pro forma questionnaire method was applied to elicit requisite data and relevant data was obtained. The Statistical Package for the Social Sciences (SPSS) version 22.0 was used to perform data analysis.

Table 1: Clinical profile

Characteristics		Number	Percentage
Age (Years)	31-40	4	5.9
	41-50	13	19.1
	51-60	19	27.9
	61-70	15	22.1
	70-80	9	13.2
	81-90	8	11.8
Gender	Male	47	69.1
	Female	21	30.9
Smoking	Yes	39	57.4
	No	29	42.6
Hypertension	Yes	57	83.8
	No	11	16.2
Diabetes	Yes	49	72.1
	No	19	27.9
Diagnosis	Unstable angina	12	17.6
	NSTEMI	38	55.9
	STEMI	18	26.5
LVEF	Normal	29	44.6
	Mild	18	26.5
	Moderate	15	22.1
	Severe	6	8.8
CKD	Stage 3	20	29.4
	Stage 4	14	20.6
	Stage 5	34	50
Maintenance hemodialysis	Yes	32	47.1
	No	36	52.9
Treatment	Medical	17	25
	PCI	38	55.9
	CABG	13	19.1
Vascular Access	Radial / Snuff box	18	29.5
	Femoral	43	70.5
CAD	Minor CAD	4	6.6
	Single vessel	16	26.2
	disease	18	29.5
	Double vessel	23	37.7
	disease		
	Triple vessel		
	disease		
Vessel Involved	Left main	6	
	LAD	49	
	LCX	29	
	RCA	43	
Previous Intervention	PCI	3	
	CABG	1	

Results

Out of total 68 patients, 47 (69%) were male and 21 (31%) were female. In CKD patient presenting with ACS, predominant age group involved was 51-60 years (27.9%) with the mean age of 61.4 years and BMI of 24.28 kg/m2. Of all CKD patients 34 (50%) were in stage 5 with 32 (47%) already on maintenance hemodialysis. Average serum creatine and creatine clearance based on MDRD equation was 5.84 mg/dl and 16.29 mL/min/1.73m2 respectively.

Smoking, diabetes and hypertension were common occurring in 39 (57%), 49 (72.1%) and 57 (83.8%) of all CKD patient respectively.

ST elevation MI was present in 18 cases, among them 12 involving anterior wall and rest inferior wall MI. Among all patients 61 (89.7%) underwent angiography,11 of them were primary PCI. Vascular site was predominantly from femoral site 43 (61 of all angiography). Among patient who had coronary angiography, 23 (37.7%) had triple vessel disease and most commonly involved vessel was left anterior descending (LAD) followed by right coronary artery (RCA). Percutaneous intervention was done for 38 (55.9%) patients and 13 (19.1%) were referred for coronary artery bypass graft (CABG).

Seventeen cases were medically managed, among which 4

cases had minor CAD, 2 cases had diffuse disease not amenable to either PTCA or CABG, 4 cases patient denied PCI after angiography sighting risk of further renal impairment due to contrast induced nephropathy and possible need of renal replacement therapy. 7 cases denied angiography among them 4 were due to old age and 3 cases had multiple other comorbid condition which severely impaired activities of daily living.

Table 2: Patient Characteristics

Characteristics	Total (n=68)
Age (yrs.)	61.4±13.73
Weight (kg)	162.26±5.86
Height (meters)	56.87±7.03
BMI (kg/m2)	24.28±2.59
Serum Creatinine (mg/dl)	5.84±3.83
eGFR (mL/min/1.73 m2)	16.29±12.41
Total cholesterol (mg/dl)	129.98±57.92
HDL (mg/dl)	43.16±20.16
LDL (mg/dl)	69.98±43.60
TAG (mg/dl)	138.33±92.82

Data are presented as mean ± SD

Discussion

CKD and CAD are both major health problem. Its incidence rises as age advances.[6] Though there are various advances in the treatment of coronary artery disease, the benefit of these advances has limited impact in CKD patients.[1] The increase in patients with disease like diabetes, hypertension, increasing life expectancy and advances in the health care management have probably resulted in an increased number of patients with CAD and CKD. [4]

In the present study of a total of 68 patients 47 (69.1%) were male, similar results of male dominance were present in studies across the globe. Age ranged from 35 years to 88 years with the mean of 61.4±13.[7] years, which is similar to Malaysian national cardiovascular disease database percutaneous coronary intervention (NCVD-PCI) registry.[9] Interestingly, around 50% of the total patients are of less than 60 years of age. Though the actual reason for this is not clearly understood, the change in lifestyle, urbanization, increased incidence of smokers in that age group, and change in dietary habits in Nepal can be the probable reasons.

Of all CKD patients 34 (50%) were in stage five with 32 (47.1%) already on maintenance hemodialysis which is in sharp contrast to study done by Moisi et al and Pradhan et al.[9,10] This disparity could be due to late diagnosis of renal impairment in our country due to lack of proper awareness and health facility in rural area of Nepal.

Patients with CKD tend to have more conventional cardiovascular risk factors. Presence of hypertension and diabetes in the patients with chronic kidney disease is one of the most important contributing factors for CV morbidity and mortality. Diabetes and hypertension were common occurring in 49 (72.1%) and 57 (83.8%) of all CKD patient respectively which is similar to various similar studies.[3,11,12]

Non-ST elevation myocardial infraction (NSTEMI) was most common form of ACS occurring in 38 (55.9%) followed by ST segment elevation myocardial infraction (STEMI) and unstable angina (UA). The data are in similar to studies conducted by Pradhan et al. in which there were fewer STEMIs and more NSTEMI and left bundle branch block among populations with increasingly worse renal function.10 The diagnosis of NSTEMI may also be attributed to stably elevated troponin concentrations which are commonly observed in CKD patients in the absence of clinical evidence of myocardial damage.[3,12] This also explains four cases of minor CAD diagnosed during coronary angiography.

Coronary angiography was done in 61 (89.7%) of patient, predominantly from femoral access, majority of which showed triple vessel disease. Results regarding the high incidence of three-vessel CAD and LMCA in CKD patients were similar to other findings of similar studies. Out of 61 cases, [13] were referred for Coronary artery bypass graft (CABG), 38 underwent percutaneous transluminal coronary angioplasty (PTCA) and rest were medically managed. In our study, the most of cases who were medically managed had advance age. The trend seems to be no different from other studies. Though recent ISCHEMIA-CKD trial failed to show that routine invasive therapy was associated with a reduction in death/myocardial infarction vs. medical therapy among stable patients with moderate ischemia and chronic kidney disease, more data is needed to clarify treatment strategy in ACS patient with impaired renal function.[13]

This study has few limitations. It was a single center study with limited sample size, and short study duration. Angiographic lesions were not classified and medical therapy of the patients were not studied.

Conclusion

The study concludes that patient with CKD with acute coronary events have associate coexisting comorbid conditions such as diabetes mellitus, hypertension, ischemic stroke, and chronic CAD. NSTEMI is common form of ACS in theses patient and multivessel disease, common finding during angiography. Though there are lot of recent advancement in revascularization, there is a predisposition for electing medical management in subjects with impaired kidney function specially with advance age, instead of the interventional or surgical myocardial revascularization throughout the world wide and this study seems no exception.

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Conflict of interest None

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