Original Article

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Predictive Capacity of ACEF Score to Detect All-Cause Mortality and Post Contrast Acute Kidney Injury Among PCI Patients.

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Abstract

Background and Aims: ACEF score is simple risk score which uses only three parameters for predicting mortality and postcontrast acute kidney injury (PC-AKI). This study was designed to look into various risk factors and ACEF score for patients undergoing Percutaneous Coronary Intervention (PCI).

Methods: This is single-centre, observational, cross-sectional study. The patients were divided into tertiles.Bivariate analysis of various risk factors and ACEF score was done for PC-AKI as well as In-hospital and 30-day mortality.

Results: Total 257 patients were included.The total mortality among PCI patients were low: In-hospital (0.8%) and 30-day (1.9%). The risk factor for increased mortality were higher Killip class and reduced Ejection Fraction (EF). PC-AKI occurred in one-fifth. The risk factors for PC-AKI were increasing age, higher Killip class, diabetes, reduced EF, emergency PCI procedure and higher contrast volume. Hydration with NS was protective against PC-AKI. Mean ACEF score was higher among those who died within 30 days (p=0.35) and who developed PC-AKI (p<0.001). ACEF-low had trend toward better outcome with no mortality (p=0.17) and had low risk of PC-AKI (p=0.026). ACEF-moderate had reduced risk of PC-AKI (p=0.029), however was not associated with increased odds of 30-day mortality (p=0.66). ACEF-high showed significantly increased odds of mortality (p=0.04) and PC-AKI (p<0.001). Discriminatory capacity of ACEF score to detect 30-day mortality was good (AUC 0.82, p= 0.016) and goodness of fit=0.70. Discriminatory capacity of ACEF score to detect PC-AKI was fair (AUC 0.7, p<0.001) and goodness of fit=0.62.

Conclusions: ACEF score fairly predicts the short-term mortality and PC-AKI in patients undergoing PCI.

Keywords: Contrast Induced Acute Kidney Injury; Contrast Induced Nephropathy; In-hospital Mortality; Short Term Mortality; 30-day Mortality.

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Introduction

Coronary artery disease (CAD) and Ischemic heart disease (IHD) are global disease which causes significant morbidity and mortality. Among cardiovascular deaths, 85% of death is due to IHD in low and middle income countries.[1] Treatment for CAD is either optimal medical management or revascularization by either Coronary Artery Bypass Grafting or Percutaneous Coronary Intervention (PCI).[2] PCI was first done in 1977 AD and was limited to only 10% of the of CAD. With development of better techniques and hardware, the periprocedural complications has greatly reduced with mortality around one percent.[3] This has led to rise in PCI procedures around the world including Nepal. According to annual report of Shahid Gangalal National Heart Centre (SGNHC), Bansbari there has been

100% rise in numbers of PCI procedures from 2013 to 2018 AD.[4,5]

Among various score for risk determination, ACEF is simple score which uses just three risk factors; Age, Creatinine and Ejection Fraction (EF). Though developed for cardiac surgery, it can also be used to determine outcome of patients undergoing PCI in terms of short term and long term mortality as well as contrast induced acute kidney injury.[6-10] Risk stratification study has not been done in Nepal for PCI, thus this study was undertaken to evaluate various risk factors and ACEF score in determining short term mortality and postcontrast acute kidney injury (PC-AKI).

Methods

Study was a single center hospital based, cross-sectional, observational, comparative study conducted in SGNHC during the period of October to December 2019 AD. As our sample was to be arranged in tertiles, the minimum sample size of 73 for each group was calculated by prevalence method using maximum estimated prevalence of 5.04% of net adverse effect on highest quintile points of a large multicenter study.[11] Eligibility criteria was all patient aged more than 18 years who underwent PCI in SGNHC. Age < 18 years, not having pre procedure Creatinine (Cr) values or Echocardiography with EF, patient not giving consent and those who were lost to follow up were not included in the study. Ethical approval was granted by Institutional Review Board (IRB) of National Academy of Medical Sciences, Kathmandu prior to collection of data. Informed written consent was acquired from each participant of the study.

Age, gender, Killip class, history of hypertension, diabetes, and Angina, smoking status, coronary anatomy, indication of PCI, pre procedure Cr and EF, number (no.) of vessels intervened, number of stents and contrast volume used, use of 0.9% Saline (NS) used as prevention strategy for Contrast Induced Nephropathy (CIN), and rate of NS infusion (ml/kg/hr) were collected. Indication of PCI was classified was Primary PCI (PPCI) for those who underwent PCI for Acute ST Elevation Myocardial Infarction (STEMI) presenting within treatment period as per guidelines,[12] Early Invasive who underwent rescue PCI for those who either had Non-STEMI or STEMI patients who did not meet the criteria of PPCI, Ad-HOC for those whom PCI planned and done in same setting of first coronary angiography, and Elective for those who underwent PCI with prior anatomical knowledge of CAD. For those who had either Primary or Early invasive PCI were grouped as emergency PCI and those who had Ad-HOC or elective PCI were grouped as non-emergency PCI. ACEF score was calculated by using formula [[Age (years) ÷ EF (%)]+ 1 (if Creatinine >166 µmol/L)].[6] The study population was arranged into tertiles the lowest tertile was designated ACEF-Low, middle tertile was designated ACEF-moderate and highest tertile was designated ACEF-high.[7]

Post procedure Cr was evaluated each day until 72 hours or hospital discharge after PCI. In this study, In-hospital mortality was defined as death in the hospital during admission for index procedure, and 30-day mortality was defined as death within 30 days considering day of index procedure as day one. Vital status of all participants was confirmed by follow-up telephone at day 30. PC-AKI was defined as rise in Serum Cr ≥ 44 µmol/L or ≥ 25% from baseline within 72 hours after PCI.[13]

Statistical Analysis

SPSS version 20 was used to enter data in spreadsheet and perform statistical analysis. The study population was categorized into tertiles. Odds Ratio (OR) for various risk factors and each tertile for outcome variables were calculated. Post HOC analysis was done for categorical variables. C statistics was performed to evaluate the performance of ACEF score in determining outcome of In-hospital, 30-day Mortality as well as PC-AKI. The data was depicted in percentages, means, and OR with standard deviation. The significance of occurrences for comparisons done was calculated using Chi-square/Fisher-Exact test for dichotomous and independent T-test for continuous variables. The p-value less than 0.05 was considered significant.

Results

This study enrolled 257 patients, they were grouped into tertiles, ACEF-low (ACEF scores <1.076), ACEF-moderate (ACEF score 1.076 to <1.500), and ACEF-high (ACEF scores >=1.500) of 84, 87 and 86 patients respectively. Baseline characteristics were uniformly distributed among the tertiles apart from few variables (Table 1). Minimum age was 32, and maximum was 83 years. The mean age was higher in higher tertiles compared to lower tertiles. Males were more common than females. Over 90% of the patients had Killip class I. Nine out of 11 who had higher Killip Class were present in ACEF-high tertile. Diabetics were more common in ACEF-high tertile. Nearly half were never smokers. Current smokers were less common among the ACEF-low tertile. None of the patient had left main disease, very few had proximal LAD lesions, and those who had TVD were more common in higher tertiles. None of the participants had Serum Cr more than 123 µmol/L (1.4 mg/dl), mean pre-procedure Cr was higher among ACEF-moderate tertile. Mean EF was lower among ACEF-high tertile. Majority of participants had PCI in single vessel and had only one stent deployed. All patients received non-ionic contrast and there was no difference between mean contrast volume in between the tertiles. 45.9% of patients received NS as the CIN prevention strategy and it was mostly used (95.7%) after the procedure was completed. Among them 1.0 ml/kg/hr was the infusion rate in two-thirds of patients and was employed less commonly among the ACEF-high tertile.

Two (0.8%) patients died during index hospitalization. One was elective case and other PPCI. Both Patients had EF less than or equal to 30% (p=0.017). Both of the cases were male, diabetic, older than 60 years and in ACEF-high tertile, however this occurrence was not statistically significant (p=1.0 ,0.10, 0.49 and 0.11 respectively).

Among the participants 5 (1.9%) died within 30 days of index procedure. Killip class II to IV (18.2% vs 1.2%), EF ≤ 35% (5.9% vs 0.5%) and Reduced EF ≤ 30% (8.8% vs 0.9%) were associated with increased odds of 30-day mortality (Table 2). Those who had emergency PCI had trend towards increase mortality (4.3% vs 1.4%, OR 3.07, p=0.23). Age of 60 years or more (3.0% vs 0.8%, OR 3.75, p=0.37) and EF ≤ 40% (3.7% vs 0.7%, OR 5.78, p=0.16) also had trend towards worse outcome but was not statistically significant. Gender (p=0.67), Hypertension (p=0.37), Diabetes (p=0.33), Angina (p=0.66), Coronary Anatomy (p=1.0), no. of vessel intervened (p=1.0) and no of stents (p=1.0) was not associated with increased mortality.

Mean ACEF score was higher among those who died within 30 days (1.82±0.34 vs 1.36±0.47, p=0.35). ACEF-low had no mortality in the group but finding was statistically not significant (0% vs 2.9%, p=0.17). ACEF-moderate was not associated with increased odds of 30-day mortality (p=0.66). ACEF-high showed increased odds of mortality (4.7% vs 0.6%, OR 8.29, 95% CI 1.01-75.37, p=0.04). ACEF-high had higher mortality rate by 4.7% (95% CI 0.5% to 8.8% p=0.03) compared to ACEF-low. However, the difference between ACEF-high and ACEF-moderate (3.5%, 95% CI -0.6% to 7.6%, p=0.09), also ACEF-moderate and ACEF-low (1.1%, 95% CI -2.9% to 5.2% p=0.58) were not statistically significant. Discriminatory Capacity of ACEF score to detect 30-day mortality was good (AUC 0.82, 95% CI 0.70 to 0.93, p=0.016) and goodness of fit=0.70 (Figure 1).

Table 1: Baseline Characteristics of Study Population

Variables		Total	ACEF-low	ACEF-moderate	ACEF-high	P Value
		257 (100%)	84 (32.7%)	87 (33.8%)	86 (33.5%)	
Age (years)		59.53±10.3	51.24±8.5	60.63±9.2	65.88±7.5	<0.001
Gender	Male	172 (66.9%)	55 (32.0%)	58 (33.7%)	59 (34.3%)	0.91
	Female	85 (33.1%)	29 (34.1%)	29 (34.1%)	27 (31.8%)	0.91
Killip Class	Class I	246 (95.7%)	84 (34.1%)	85 (34.6%)	77 (31.3%)	0.002
	Class II to IV	11 (4.3%)	0 (0.0%)	2 (18.2%)	9 (81.8%)	0.002
History	Hypertension	127 (49.4%)	44 (34.6%)	44 (34.6%)	39 (30.7%)	0.63
	Diabetes	83 (32.3%)	24 (28.9%)	20 (24.1%)	39 (47.0%)	0.005
	Angina	87 (33.8%)	37 (42.5%)	24 (27.6%)	26 (29.9%)	0.05
Smoking Status	Never	138 (53.7%)	53 (38.4%)	42 (30.4%)	43 (31.2%)	0.11
	Past	41 (15.9%)	14 (34.1%)	13 (31.7%)	14 (34.1%)	0.95
	Current	78 (30.4%)	17 (21.8%)	32 (41.0%)	29 (37.2%)	0.04
Coronary Anatomy	SVD	112 (43.5%)	39 (34.8%)	37 (33.0%)	36 (32.1%)	0.81
	DVD	90 (35.0%)	35 (38.9%)	29 (32.2%)	26 (28.9%)	0.27
	TVD	55 (21.5%)	10 (18.2%)	21 (38.2%)	24 (43.6%)	0.03
	Proximal LAD	15 (5.8%)	4 (26.7%)	6 (40.0%)	5 (33.3%)	0.84
Preprocedural Serum Cr (µmol/L)		77.43±17.04	75.82±17.42	81.44±16.23	77.43±17.04	0.02
LVEF (%)		46.48±11.54	56.30±8.54	48.28±7.97	46.48±11.54	<0.001
No. of Vessels Intervened	One	209 (81.3%)	67 (32.1%)	70 (33.5%)	72 (34.4%)	0.79
	Two	46 (17.9%)	17 (37.0%)	17 (37.0%)	12 (26.1%)	0.50
	Three	2 (0.8%)	0 (0.0%)	0 (0.0%)	2 (100.0%)	0.13
No of Stents Deployed	One or less	201 (78.2%)	66 (32.8%)	68 (33.8%)	67 (33.3%)	0.99
	Two or more	56 (21.8%)	18 (32.1%)	19 (33.9%)	19 (33.9%)	0.99
PCI Indication	Primary	45 (17.5%)	9 (20.0%)	17 (37.8%)	19 (42.2%)	012
	Early Invasive	2 (0.8%)	0 (0.0%)	2 (100.0%)	0 (0.0%)	0.14
	Ad-HOC	33 (12.8%)	14 (42.4%)	11 (33.3%)	8 (24.2%)	0.35
	Elective	177 (68.9%)	61 (34.5%)	57 (32.2%)	59 (33.3%)	0.60
Contrast Volume (ml)		128.95±47.8	131.07±51.9	121.55±37.6	134.0±52.4	0.19
CIN	None	139 (54.1%)	42 (30.2%)	46 (33.1%)	51 (36.7%)	0.46
Prevention	0.5 ml/kg/hr	43 (16.7%)	12 (27.9%)	10 (23.3%)	21 (48.8%)	0.06
Strategy	1.0 ml/kg/hr	75 (29.2%)	30 (40.0%)	31 (41.3%)	14 (18.7%)	0.005

Only nine participants (3.5%) had absolute rise in Serum Cr (>44 mmol/L). With broader definition of rise of Cr by 25% or more total 59 (22.9%) were diagnosed to have PC-AKI. Mean age of those who had PC-AKI was higher (63.2±11.7 vs 58.2±9.6 years) with mean difference of 5.11 years (95% CI, 1.8 to 7.4 years, p=0.003). There was increasing odd with increasing age when evaluated every five-year point starting from 55 years to 75 years (Table 2). The rates of PC-AKI was higher in those with age of 75 years or more compared with those with ages 65 to 74 years (40.7%, 95% CI 16.7 to 64.6%, p=0.001) and those with less than 65 years (52.5%, 95% CI 29.5 to 75.47%, p<0.001), also more in age group of 65 to 74 compared to less than 65 years (11.8%, 95% CI 0.8 to 22.8%, p=0.04).

Table 2: Risk factors with increased Odds of 30-day Mortality And PC-AKI

Outcomes	Variables	Total Number	No of Events	Odds Ratio	95% CI		P Value
					Lower	Upper	
30 Day Mortality		257 (100%)	5 (1.9%)				
	Killip II to IV	11 (4.3%)	2 (18.2%)	18.00	2.67	121.42	0.016
	EF ≤ 35%	68 (26.5%)	4 (5.9%)	11.75	1.29	107.06	0.018
	EF ≤ 30%	34 (13.2%)	3 (8.8%)	10.69	1.71	66.54	0.018
PC-AKI		257 (100%)	59 (22.9%)				
	Age ≥ 55 years	176 (68.4%)	48 (27.3%)	2.39	1.17	4.89	0.017
	Age ≥ 60 years	134 (52.1%)	41 (30.6%)	2.57	1.38	4.78	0.003
	Age ≥ 65 years	90 (35.0%)	31 (34.4%)	2.61	1.43	4.71	0.002
	Age ≥ 70 years	50 (19.5%)	20 (40%)	2.87	1.47	5.581	0.002
	Age ≥ 75 years	13 (5.1%)	9 (69.2%)	8.73	2.58	29.51	<0.001
	Killip Class II to IV	11 (4.3%)	6 (54.5%)	4.30	1.28	14.88	0.02
	Diabetes	83 (32.3%)	26 (31.3%)	1.95	1.07	3.55	0.039
	EF ≤40%	107 (41.6%)	35 (32.7%)	2.55	1.4	4.63	0.002
	EF ≤ 35%	68 (26.5%)	27 (39.7%)	3.23	1.74	5.98	<0.001
	EF ≤ 30%	34 (13.2%)	15 (44.1%)	3.21	1.51	6.8	0.004
	Emergency PCI	47 (18.3%)	16 (34%)	2.01	1.01	3.99	0.046
	Contrast > 100 ml	159 (61.9%)	45 (28.3%)	2.37	1.22	4.59	0.01
	No Hydration*	139 (54.1%)	45 (32.4%)	3.56	1.84	6.89	<0.001

** Not using NS in any form for prevention of CIN*

Diabetes had increased risk of PC-AKI (31.3% vs 19.0%). There was no difference between males and females (22.7% vs 23.5%, p=0.876). History of hypertension (23.6% vs 22.3%, p=0.88), or angina (21.8% vs 23.5%, p=0.87) did not show association with PC-AKI. Higher Killip Class II to IV (54.5% vs 21.5%) had higher odds.

Mean EF was higher in those who did not have PC-AKI (47.8 ± 11.2% vs 41.86±11.5%) with mean difference of 5.99% (95% CI 2.6% to 9.4%, p=0.001). Reduced EF had increasing odds of PC-AKI with decreasing EF (Table 2). There was increased rate of PC-AKI in those who had EF 30% or less compared those who had EF more than 40% (28.1%, 95% CI 12.7 to 43.5%, p<0.001). There was also trend in increased PC-AKI rates in EF 30% or less compared to EF 30% to 40% (16.7%, 95% CI-0.1% to 33.6%, p=0.052) and with EF 30% to 40% compared to EF more than 40% (11.4%, 95% CI-0.2 to 22.9%, p=0.054) but wasn't statistically significant.

Those who underwent emergency PCI had increased odds of PC-AKI. There was trend towards increased PC-AKI in PPCI group (31.1% vs 21.2%, p=0.173) and Ad-HOC group (30.3% vs 21.9%, p=0.27) but wasn't statistically significant. Both patient who underwent Early invasive PCI developed PC-AKI but finding was not statistically significant (p=0.052). Non emergent PCI (20.5% vs 34.0%, OR 0.5, 95% CI 0.25 to 0.99, p=0.46) and more so Elective PCI (18.6% vs 32.5%, OR 0.48, 95% CI 0.26 to 0.87, p=0.017) had reduced odds for PC-AKI.

Figures 1 and 2: ROC Curves for ACEF score

Figure 1: 30 Day Mortality

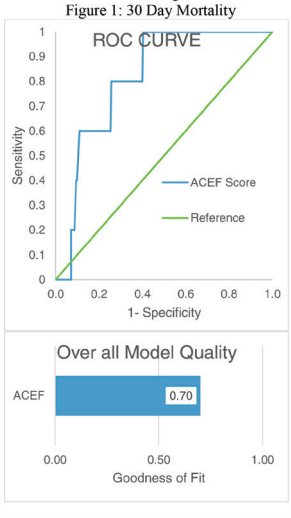


Figure 2: Post Contrast AKI

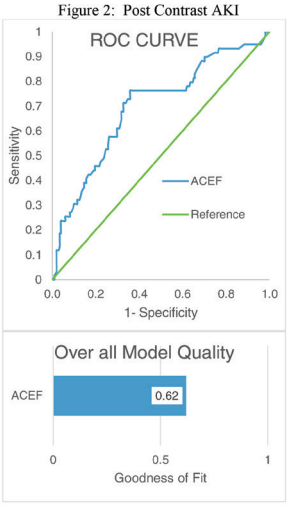
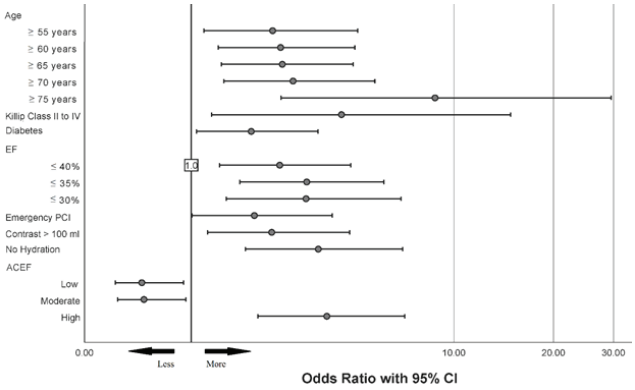


Figure 3: Forrest Plot Risk Factors with Increased ODDs of PC-AKI and ACEF Tertiles.



Mean contrast volume was higher in those who had PC-AKI (138.72±38.99 ml vs 126.04±49.89 ml, p=0.043). Use of contrast more than 100 ml was associated with increased odds of PC-AKI. (Table 2). When NS was used as CIN prevention strategy there was reduced risk of PC-AKI (11.9% vs 32.4%, OR 0.28, 95% CI 0.15 to 0.55, p<0.001). Reduction of odds was more among those who received contrast more than 100 ml (13.5% vs 47.5%, OR 0.18, 95% CI 0.08 to 0.38, p<0.001). Reduction of risk was significant with NS infusion rate of 1 ml/kg/hr (10.7% vs 28%, OR 0.31, 95% CI 0.14 to 0.68, p=0.003) more so for those who received contrast more than 100 ml (11.8% vs 36.1%, OR 0.24, 95% CI 0.09 to 0.60, p=0.001). Use of NS infusion rates at 0.5 ml/kg/hour showed some trend towards better outcome (14% vs 24.8%, OR 0.49, 95% CI 0.20 to 1.232, p=0.16), also in those with contrast volume more than 100 ml (15.8% vs 32.2%, OR 0.40, 95% CI 0.15 to 1.02, p=0.05), but lost statistical significance. When the data was adjusted for those who received higher infusion rates, 0.5 ml/kg/hr also showed better outcomes (14% vs 32.4%, OR 0.34, 95% CI 0.13 to 0.86, p= 0.020) and more so for those who received contrast more than 100 ml (15.8% vs 47.1%, OR 0.21, 95% CI 0.08 to 0.57, p=0.001). There were trends towards better outcome with use of NS even in those who had contrast volume was 100 ml or less (6.9% vs 17.4%, OR 0.352, P=0.22), also at rates of 1.0 ml/kg/hr (8.3% vs 16.2%, OR 0.47, p=0.50), and 0.5 ml/kg/hour (0.0% vs 17.4%, p=0.58) but was statistically not significant. PCI-AKI was reduced by 21.7% (95% CI 10.1 to 33.3%, p=<0.001) when NS was used as CIN prevention strategy at 1.0 ml/kg/hr, and by 18.4% (95% CI 4.3 to 32.5%, p=0.011) at 0.5 ml/kg/hr compared to when no CIN prevention strategy was used.

Mean ACEF score was higher among those who developed PC-AKI (1.62±0.51 vs 1.29±0.42, p<0.001). Risk of PC-AKI was less among ACEF-low group (14.3% vs 27.2%, OR 0.45, 95% CI 0.22 to 0.90, p=0.026) and ACEF-moderate group (14.9% vs 27.1%, OR 0.47, 95% CI 0.24 to 0.93, p=0.029). ACEF-high showed significantly increased odds of PC-AKI (39.5% vs 14.6%, OR 3.82, 95% CI 2.08-6.99, p<0.001). (Figure 3) ACEF-high had significant increase in PC-AKI rates by 25.2% (95% CI 13.0% to 37.5%, p< 0.001) and by 24.6% (95% CI, 12.4% to 36.8%, p<0.001) when compared to ACEF-low and ACEF-moderate respectively. However, the difference between ACEF-moderate and ACEF-low (0.7%, 95% CI -11.6% to 12.9%, p= 0.91) was statistically non-significant. Discriminatory Capacity of ACEF score to detect PC-AKI was fair (AUC 0.7, 95% CI 0.62 to 0.78, p<0.001) and goodness of fit=0.62 (Figure 2).

Discussion

Rates of mortality in our study was low for both In-hospital and 30-day mortality. These findings are similar to past experiences around the world.[3] In a study done by Maskey et al.[14] the mortality with PCI was around one percent in Nepal. Rates of In-hospital mortality are reported from less than one percent to around 3 percent.[15,16] Reported rates of 30 day mortality is as low as 0.4% up to 3.7%.[11,17] In our study higher Killip class, lower EF, emergency PCI procedures and higher age were associated with increased mortality after PCI which are known risk factors of increased mortality.[3,8,15,16]

The incidences of PC-AKI have not been well established; however, it is fairly common and under-recognized. In our study, absolute rise of creatinine was present in 3.5% but when broad definition was used, we experienced high rates of PC-AKI which occurred in more than one-fifth participants. Overall reported incidences are around 3% but can be up to 50% when there are risk factors like increased age, low cardiac output, large volume contrast media, chronic kidney disease, systemic hypotension, emergent/PPCI, nephrotoxic drugs, anemia and PCI related blood loss, diabetes with renal impairment.[18] For patients undergoing PCI various incidences have been reported like Ando et al.[10] 5.2%, McCollough et al.[19] 14.6%, Ikavou et al.[20] 16.5%, and Marnezi et al.[21] 20.5%. Capodanno et al[9] had incidence of 5.5% when narrow definition was used and 13.6% when broader definition was used. In study done by Rudnick et al.[22] Cr rose ≥ 0.5 mg/dl (>44 µmol/L) in 13.4% among non-ionic contrast group and 21.1% in ionic contrast group. In a study done in Nepal by Sharma et al.[23] had incidence of 8.2% however study population had only one-third patients of PCI. In another study done by Mandal et al.[24] in this same center in 2010 showed CIN incidence of 13.6%. The difference in rates may be due to alteration in various demographic factors. In our study more than 50% of population were above the age of 60 years and nearly one-fifth above 70 years, two-thirds had received higher contrast volume, one-third had diabetes. Nearly half had reduced EF and NS hydration was not given prior to procedure in any of these patient. All of which may have led to increased incidence of PC-AKI. Creatinine estimation method was not prespecified. Also, the Cr values, especially the pre-procedural values were collected from available reports of different centers. This also might have led to perceived rise in creatinine in percentage points. The study was done in a short period using purposive sampling which may have led to sampling bias causing an error if it happened. Our study demonstrated similar risk factors for PC-AKI as in various previous Rates of mortality in our study was low for both In-hospital and 30-day mortality. These findings are similar to past experiences around the world.[3] In a study done by Maskey et al.[14] the mortality with PCI was around one percent in Nepal. Rates of In-hospital mortality are reported from less than one percent to around 3 percent.[15,16] Reported rates of 30 day mortality is as low as 0.4% up to 3.7%.[11,17] In our study higher Killip class, lower EF, emergency PCI procedures and higher age were associated with increased mortality after PCI which are known risk factors of increased mortality.[3,8,15,16]

The incidences of PC-AKI have not been well established; however, it is fairly common and under-recognized. In our study, absolute rise of creatinine was present in 3.5% but when broad definition was used, we experienced high rates of PC-AKI which occurred in more than one-fifth participants. Overall reported incidences are around 3% but can be up to 50% when there are risk factors like increased age, low cardiac output, large volume contrast media, chronic kidney disease, systemic hypotension, emergent/PPCI, nephrotoxic drugs, anemia and PCI related blood loss, diabetes with renal impairment.[18] For patients undergoing PCI various incidences have been reported

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ACEF scores has shown to predict mortality and PC-AKI in various studies. Wykrzykowska et al.[7] showed high ACEF tertile had higher cardiac death. Palmerini et al.[8] Kovacic et al.[25] and Chichareon et al.[11] also showed that ACEF score fairly predicts mortality in short and long term compared to other scores with fair discriminatory capacity with AUC 0.7, 0.76 and 0.75 respectively. Ando et al.[10] and Capodanno et al.[9] showed that rising ACEF scores are associated with higher incidence of CIN. Discriminatory capacity of ACEF was good (AUC 0.82).[10] In our study ACEF score were higher in those who had 30-Day mortality and also PC-AKI. ACEF score showed lower mortality and PC-AKI in low tertile, and was associated with higher odds of death and PC-AKI in higher tertile. It also showed with good discriminatory capacity for 30-day mortality and fair for PC-AKI.

Limitations

This study was limited by its relatively small sample size, limited time frame and purposive sampling. Also, by single-center, cross-sectional, observational quality. Technical specification for laboratory value of creatinine and echocardiography were not prespecified. This study didn't have patients with renal impairment. Few other important parameters like anemia, other comorbid conditions and ethnic variations were not included. Most of the analysis was bivariate and regression analysis was not done.

Conclusion

PC-AKI is fairly common among patients undergoing PCI and ACEF scores predicts PC-AKI in patients undergoing PCI with fair discriminatory capacity. Higher age, heart failure/higher Killip Class, Diabetes, low EF, and higher contrast volume. Hydration with NS is protective against PC-AKI. Rates of mortality are low in patients undergoing PCI and ACEF score predicts 30-day mortality with good discriminatory capacity. Thus, ACEF score looks to be promising tool in risk stratification in patients undergoing PCI. Further larger and high powered, long-term and multicenter studies are needed to truly identify rates and risks of mortality and PC-AKI in Nepalese population.

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