

# Rosuvastatin Therapy in Prevention of Contrast-Induced Acute Kidney Injury in Patients with Chronic Kidney Disease

ASADULLAH<sup>1</sup>, BHAGWAN DAS<sup>2</sup>, SANTOSH KUMAR<sup>3</sup>, ABDUL MANAN JUNEJO<sup>4</sup>, RAFIA MEMON<sup>5</sup>, OM LAL<sup>6</sup>

<sup>1</sup>Registrar, Department of Nephrology, Jinnah Postgraduate Medical Center, Karachi

<sup>2</sup>Associate Professor, Nephrology, Liaquat University of Medical and Health Sciences, Jamshoro

<sup>3</sup>Assistant Professor, <sup>4</sup>Professor, Nephrology, Jinnah Sindh Medical University, Karachi

<sup>5</sup>Postgraduate Trainee, Nephrology, Liaquat University of Medical & Health Sciences Jamshoro

<sup>6</sup>Consultant Physician, Medicine, Jinnah Postgraduate Medical Center, Karachi

Corresponding author: Asaduallah, Email: sandeeparyani@yahoo.com, Cell: +92 3337341980

## ABSTRACT

**Objective:** To determine the efficacy of rosuvastatin therapy in prevention of contrast-induced acute kidney injury in patients with chronic kidney disease.

**Study design:** Descriptive cross-sectional study.

**Place and Duration of Study:** Department of Nephrology, Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan from 21<sup>st</sup> January 2020 to 20<sup>th</sup> July 2019.

**Methodology:** One hundred and twenty-five patients were enrolled. Blood samples and creatinine levels were taken to measure CIN at 48 h and 72 h after PCI to assess the efficacy of therapy.

**Results:** The mean age was 51.1±10.6 years and mean duration of chronic kidney disease was 6.7±3.6 months. Seventy-eight (62.4%) were males while 47 (37.6%) were females. Efficacy of rosuvastatin therapy was found in 97 (77.6%) patients.

**Conclusion:** The efficacy of rosuvastatin therapy is an effective and safe treatment option in prevention of contrast induced acute kidney injury in patients with chronic renal failure.

**Keywords:** Efficacy, Rosuvastatin, Contrast induced nephropathy (CIN), Acute kidney injury, Chronic kidney disease

## INTRODUCTION

Contrast-induced nephropathy (CIN) is characterized by acute impairment of renal function after contrast exposure.<sup>1</sup> It is the acclaimed vasospasm of renal vessels set off that medium. The incidence of CIN is about 20-20.6% in cases with chronic kidney disease (CKD),<sup>2,3</sup>

Statin group of medicines are being advised routinely by cardiologists.<sup>4</sup> I have witnessed the pleiotropic properties of statins in the prevention of CIN due to their antithrombotic, antioxidative and anti-inflammatory effects.<sup>5,6</sup> This sort of things in statins put direct favorable effect against the occurrence of CIN and CIAKI.<sup>6-9</sup> Nonetheless, the outcomes concerning the viability of statin treatment in the avoidance of CI-AKI are conflicting.<sup>7-10</sup> The global prevalence of CIAKI is roughly about 150,000 cases per annum.<sup>11,12</sup> Studies reported comparatively less incidence in those groups that were treated by rosuvastatin.<sup>10-14</sup> CIAKI is related with cost of hospitalized burden for long duration, with morbidity and mortality and expanded medical services cost.<sup>13</sup>

Nowadays, contrast-enhanced imaging investigations are often employed. Acute kidney damage caused by contrast medium (CM) has been found to occur between 2.1% and 14.8% of the time.<sup>15</sup> Chronic kidney disease (CKD) patients frequently receive CM infusions from their doctors. However, individuals with renal failure may occasionally need imaging tests.<sup>16</sup>

This was intended to observe and analyze the efficacy of rosuvastatin in prevention of CIAKI in CRF cases. To date, very few studies have been conducted on above mention topic in our local setup, that's why the clinical relevance of this therapy is still debatable. Therefore, it was the need of hour to conduct this study in our population in order to fill the gap, open new gathering of conversation and given information and data in regards to the clinical workup of patients with AKI. Additionally, results of this study were also helpful for the clinical practice and reduce the morbidity, disease burden and hospital stay in this already compromised cohort of patients.

## MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at Department of Nephrology, Jinnah Postgraduate Medical Centre (JPMC), Karachi after the approval from ERC of the institute from 21<sup>st</sup> January 2020 to 20<sup>th</sup> July 2019. By using WHO sample size

calculator, taking efficacy of rosuvastatin therapy (86.5%)<sup>9</sup> in prevention of CIAKI in cases with CKD, at margin of error 6% with confidence interval (C.I) 95%, the calculated sample size was n=125. Patients between age group 20 to 70 years of age, either gender with chronic kidney disease with duration of CKD >3 months, who underwent percutaneous coronary intervention were included. While patients with CLD (assessed on history and serum bilirubin >2.0 mg/dl), taking lipid lowering drugs (assessed on medical record), acute STEMI were excluded. Patients were identified by their medical record numbers. Before proceeding for surgery, the included cases were thoroughly asked in terms of history, checked by perspective of examination and investigated regarding the issues. Blood samples and creatinine levels were taken to measure CIN at 48 h and 72 h after PCI to assess the efficacy of therapy in accordance with operational definition. All the procedures were done by experienced surgical team. All above data was noted. Analysis was conducted by using SPSS-23. Effect modifiers were controlled through stratification of age, gender, duration of CKD and creatinine level at 48 hours to see the impact of these on efficacy followed by Chi-square test consider two-sided p≤0.05 as criteria of statistical significance.

## RESULTS

There were 78 (62.4%) males while 47 (37.6%) females (Table 1). The means were of age 51.1±10.6 years, serum creatinine level at 48 and 72 hours was 0.87±0.61 and 0.98±0.68 mg/dl, duration of CKD was 6.7±3.6 months (Table 2). Efficacy of rosuvastatin therapy was documented in 97 (77.6%) patients. Stratification of age, duration of CKD, gender and serum creatinine level at 48 hours was done with respect to efficacy [Table 3]

Table 1: Frequency of genders (n=125)

Gender	No.	%
Male	78	62.3
Female	47	37.6

Table 2: Descriptive statistics of the patients

Variable	Mean±SD
Age (years)	51.1±10.6
Serum creatinine level at 48 hours	0.87±0.61
Serum creatinine level at 72 hours	0.98±0.68
Duration of CKD (months)	6.7±3.6

Table 3: Stratification of age, gender, duration of CKD, serum creatinine level at 48 hours with efficacy (n=125)

Variable	Efficacy		P value
	Yes	No	
Age (years)			
20-50	51 (40.8%)	11 (8.8%)	0.215
>50	46 (36.8%)	17 (13.6%)	
Gender			
Male	60 (48%)	18 (14.4%)	0.815
Female	37 (29.6%)	10 (8%)	
Duration of CKD (months)			
3-9	81 (64.8%)	22 (17.6%)	0.546
>9	16 (12.8%)	6 (4.8%)	
Creatinine level at 48 hours			
0.1-1	90 (72%)	20 (16%)	0.002
>1	7 (5.6%)	8 (6.4%)	

## DISCUSSION

In the present study, the mean age was 51.1±10.6 years. Yun et al<sup>17</sup> reported mean age was 63.6±12.5 years. Toso et al<sup>18</sup> reported age was 75±8 years, Jo et al<sup>19</sup> 65±9.3 years, Ha et al<sup>20</sup> 61.45±8.64 years and Qiao et al<sup>21</sup> 61.6±8.1 years. Another study done by Abaci et al<sup>22</sup> reported mean age as 67.7±8.9 years while Han et al<sup>23</sup> noted as 61.45±8.64 years. Kilit et al<sup>24</sup> stated mean ages 63±14 years.

In this study, the mean serum creatinine level at 48 hours was 0.87±0.61 mg/dL and at 72 hours, the mean serum creatinine level was 0.98±0.68 mg/dL. Yun et al<sup>17</sup> reported the level of serum creatinine as 0.99±0.44 mg/dL, Toso et al<sup>18</sup> noted serum creatinine level as 1.20±0.35 mg/dL whereas Jo et al<sup>19</sup> noted as 1.29±0.41 mg/dL and Ha et al<sup>20</sup> as 1.08±0.26 mg/dL. Abaci et al<sup>22</sup> noted serum creatinine as 1.5±0.4 mg/dL. Kilit et al<sup>24</sup> reported 0.95±0.21 mg/dL serum creatinine.

In recent study, the mean duration of CKD was 6.7±3.6 months, 78 (62.4%) were males while 47 (37.6%) were females. Yun et al<sup>17</sup> done a study on 286 (68.8%) males and 130 (31.2%) females, Abaci et al<sup>22</sup> also reported 76 (73.4%) males and 29 (26.6%) females whereas Han et al<sup>23</sup> reported 963 (64.3%) males and 535 (35.7%) females and Kilit et al<sup>24</sup> noted 16 (67%) males and 8 (33%) females.

This study showed that the efficacy was found to be in 97 (77.6%) patients. Leoncini et al<sup>25</sup> reported efficacy 105 (69.6%) patients which supports the finding of our study. On the other hand, Abaci et al<sup>22</sup> reported the prevalence of efficacy was 103 (29.1%) contrary to our result. Han et al<sup>23</sup> also reported efficacy in 878 (58.6%) cases.

In this study, stratification of confounders/effect modifiers with respect to efficacy, insignificant difference was noted in age group (P=0.215), gender (P=0.815) and duration of CKD (P=0.546) while significant difference was documented in serum creatinine level (P=0.002).

Zhang<sup>26</sup> in meta-analysis of five randomized controlled trials has witnessed the fruitful effect of rosuvastatin in cases of diabetes or CKD used preoperatively and furthermore; he recommends further studies to know about the cases which may be at risk to develop it, and regarding the ideal dose suggested preoperatively, and finally to decline the CIN incidence. In another meta-analysis and systemic review of 12 randomized controlled trials with sample of 5564 by Ukaigwe<sup>27</sup> reported that efficacy of statins, grouping into high and low dose; Subgroup investigation showed that the event of CIAKI didn't contrast in patients with diabetes and CKD. Finally, he concludes that in comparative to low dose statins or placebo, high dose declines the occurrence of CIAKI in cases going through PCI.

In comparative meta-analysis regarding efficacy of atorvastatin and rosuvastatin in 21 RCTs with 6385 cases by Zhou<sup>28</sup> found negligible difference in both groups in terms of efficacy; being most effective in high dose. Han<sup>23</sup> studied the multicenter randomized prospective study in 2998 cases with type 2 diabetes mellitus associated with chronic renal failure, he advised them rosuvastatin for short duration, before and after

surgery for 5 days and then renal status assessed and compared to control group. He also reported that rosuvastatin in diabetes and CRF, remarkably declines the danger of contrast induced acute renal damage.

## CONCLUSION

The efficacy of rosuvastatin therapy is the fruitful and secure option in prevention of CIAKI in cases with CRF.

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