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ORIGINAL ARTICLE

Frequency of Contrast Induced Nephropathy in Diabetic Patients Undergoing Coronary Angioplasty

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ABSTRACT

Objective: To find out the frequency of contrast induced nephropathy in diabetic patients undergoing coronary angioplasty.

Material and Methods: After approval from the Hospital ethical committee, the study was conducted in the department of cardiology Hayatabad medical complex Peshawar from 28th July 2020 to 28th January 2021. A total of 136 patients were followed in this study. Oral anti-glycemic agents (metformin) were stopped before and after two days of cardiac catheterization. Previous medical record was checked including renal profile. Phlebotomist was called to take blood for random blood sugar, HbA1C level and renal functions tests (RFTs). Angioplasty was performed according to the set protocol. Serum creatinine level was checked both pre and post contrast.

Results: Our study included 136 individuals, with a median age of 48 (+13.36), and we found that 59% of them were men and 41% were women. Of the 136 individuals, only 7 (5%) had contrast-induced nephropathy.

Conclusion: To sum up, we found that five percent of diabetic patients having coronary angioplasty in a tertiary care hospital in Peshawar had contrast-induced nephropathy.

Keywords: Diabetes mellitis, Coronary angioplasty, Contrast-induced nephropathy.

INTRODUCTION

Worldwide, the number of people living with diabetes mellitus continues to rise at an alarming rate. Among a global health problem in the 21st century, it was the seventh biggest cause of death in the United States in 2010 [1]. From 8.8 percent of the world's population in their 20s to 80s in 2015, the number of persons with diabetes mellitus is expected to climb from 415 million in 2015 to 455 million in 2040 [2]. Africa has a 3.8% prevalence of DM, Europe a 7.4% prevalence, the MENA area 10.7%, North America and the Caribbean 11.5%, South East Asia 9.1%, and the Western Pacific at 8.8%. 3. About 1.2 million people worldwide died that year as a direct result of diabetes-related complications [3, 4].The prevalence for diabetes mellitus in Pakistan ranged from 7.6% in 2011 to 11% in 2030 [5].

People with diabetes mellitus have two to six times the risk of dying from cardiovascular causes compared to people who do not have diabetes mellitus. 44% of people with type1 DM and 52% of those with type2 DM die from heart-related causes [6]. The SAN Antonio Cohort study, which followed 45,487 people for 7 to 8 years, found that diabetes was linked to an increase in death from cardiovascular disease (RR 3.2 in men, RR 8.5 in women). Approximately 2.6% and 3.2% of the South Asian population suffer from type 2 diabetes and coronary heart disease, respectively.In contrast, 7-14% of the population has CAD in urban areas [7]. Increased contrast-induced nephropathy is seen after cardiac catheterization procedures like coronary angiography and angioplasty because of the large amounts of contrast media used (CIN). Increased morbidity and mortality have been linked to CIN, making it a serious health risk. Many different sets of recommendations and grading systems have been developed to use in assessing CIN risk. However, higher serum creatinine and decreased GFR after contrast delivery are the most often utilise risk factors [8-9]. Non-diabetic individuals have an incidence of CIN ranging from 2% to 50%, whereas those with diabetes mellitus had an incidence of 5.7% to 29.4% [10-12]. In most cases, CIN clears itself in a few of weeks. Chronic renal failure and the need for temporary or permanent dialysis may be required if the impairment is severe enough [13].

To what extent do diabetic individuals undergoing coronary angioplasty have contrast-induced nephropathy (CIN)? In spite of the availability of data from a number of worldwide studies, which show varying incidences of CIN in diabetic individuals who had angioplasty, the procedure is still controversial. Existing guidelines and protocols regarding the occurrence of CIN in diabetic patients undergoing angioplasty can be updated with the help of the limited local data on this subject in the gender and age make up, status of diabetes mellitus, family history of renal diseases, history of any vessel intervention, smoking status, socioeconomic and environmental conditions of the local population.

MATERIAL AND METHODS

After approval from the Hospital ethical committee, the study was conducted in the department of cardiology Hayatabad medical complex Peshawar from 28th July 2020 to 28th January 2021.A total of 136 individuals were included in this study, which was based on the prevalence of contrast induced nephropathy in the reference list study (number 11). The method for selecting sample size in the study established by the World Health Organization (WHO) was used. There was a 95% confidence interval and a 4% margin of error. Patients with type 2 diabetes mellitus having coronary angioplasty who were between the ages of 18 and 70 were considered eligible. Patients having a serum creatinine >1.5mg/dl, a history of recent contrast exposure prior to coronary angioplasty, a single-functioning kidney, an allergy to contrast medium or iodine, a current need for hemodialysis, and patients younger than 18 or older than 70 were not included in the study. Type 2 diabetic patients diagnosed with CAD undergoing coronary angioplasty were assessed. A written consent was taken from all the patients and a detailed history was taken. Complete general physical and relevant systemic examination (i.e., cardio vascular and renal system) was done. Baseline characteristics of patients including age, gender, height, weight, duration of diabetes, family history of preexisting renal disease (participants whose first degree relatives have renal disease like nephrotic syndrome, glomerulonephritis was considered as positive family history), history of any vessel intervention (angiography or angioplasty in past), smoking status, blood pressure and peripheral pulses were assessed.

Oral anti-glycemic agents (metformin) were stopped before and after two days of cardiac catheterization. Previous medical record was checked including renal profile. Phlebotomist was called to take blood for random blood sugar and HbA1C level and renal functions tests. Angioplasty was performed according to the set protocol. Serum creatinine level was checked both pre and post contrast. All the data was collected on the pre designed pro forma and frequency of CIN was calculated in diabetic patients undergoing coronary angioplasty.Statistical analysis was performed using SPSS version 22, with data recorded in Excel. For 56 categorical factors, such as gender, socioeconomic position, family history of renal illnesses, smoking status, and contrast-induced nephropathy, percentages and frequencies were determined. Numerical data like age and length of diabetes mellitus were used to determine means and standard deviations.

Proportion of contrast induced nephropathy were further stratified among age, gender, socioeconomic status, smoking status, family history of renal diseases, history of vessel intervention, volume of contrast used in single vessel and multiple vessel angioplasty, adjustment of effects requires a longer period of diabetes. A P-value of 0.05 or less was considered significant, thus a Chi-square test was performed after stratification. The information was shown graphically in the form of tables, charts, and graphs.

RESULTS

In this study the distribution of age, duration of diabetes, smoking status, renal disease and socioeconomic status is given in Table No.1. Mean age was 48 years + 13.36. Mean duration of diabetes was 15 years + 6.12. Table No 2 shows stratification of Contrast Induced Nephropathy with respect to Age, Gender, Duration of Diabetes, socioeconomic status and Smoking. Table No 3 shows stratification of Contrast Induced Nephropathy with respect to history of renal disease, Vessel Intervention, Volume of Contrast used and number of vessels involved.

Volume of contrast used among 136 patients was analyzed. 113(83%) patients had contrast volume ≤ 150 ml while 23(17%) patients had contrast volume >150 ml.

All the 136 patients had low osmolar contrast. Mean volume of contrast was 120±15ml

79(58%) patients had single vessel coronary angioplasty, 53(39%) patients had double vessel coronary angioplasty and 4(3%) patients had triple vessel coronary angioplasty.

Contrast induced nephropathy was seen in 7(5%) patients while 129(95%) patients didn't had contrast induced nephropathy. Stratification of contrast induced nephropathy with regard to age The chi-square test for gender found a P value of 0.7646. Data on socioeconomic level, smoking history, family history of renal illnesses, vascular intervention, and diabetes duration were analyzed using a Chi-square test, yielding a P value of 0.9260. (Tables-12 to 20)

Table 1: Demographic details of patients enrolled in study (n=136)

Demographics	Frequency	Percetage
Male	80	59%
Female	56	41%
Diabetes Duration		
1-10 years	49	36%
11-20 years	87	64%
Smoking		
Current smoker	39	29%
Ex smoker	25	18%
No smoker	72	53%
Socioeconomic Status		
Poor	64	47%
Middle Class	58	43%
Rich	14	10%
Renal Disease		
Yes	38	28%
No	98	72%
Vessel Intervention		
Yes	16	12%
No	120	88%
Total	136	100%

Table 2: Stratification of Contrast Induced Nephropathy with respect to Age, Gender, duration of Diabetes, socioeconomic status and smoking (n=136)

Contrast Induced Nephropathy	18-30 years	31-50 years	51-70 years	Total	p-Value
Yes	0	2	5	7	
No	7	43	79	129	0.9260
Contrast Induced Nephropathy		DM 1-10 years	DM 11-20 years	Total	p-Value
Yes		2	5	7	
No		47	82	129	0.6730
Contrast Induced Nephropathy		Male	Female	Total	p-Value
Yes		4	3	7	
No		76	53	129	0.1010
Contrast Induced Nephropathy	Poor	Middle Class	Rich	Total	p-Value
Yes	3	3	1	7	
No	61	55	13	129	0.9315
Total	64	58	14	136	

Table 3: Stratification of Contrast Induced Nephropathy with respect to history of renal disease, vessel intervention, volume of contrast used and number of vessels involved (n=136)

Contrast Induced Nephropathy	Renal Disease Yes	Renal Disease No		Total	p-Value
Yes	4	3		7	0.0770
No	34	95		129	
Contrast Induced Nephropathy	Vessel intervention Yes	Vessel intervention No		Total	p-Value
Yes	4	3		7	0.0001
No	12	117		129	
Contrast Induced Nephropathy	Volume of Contrast ≤ 150 Ml	Volume of Contrast >150 Ml		Total	p-Value
Yes	6	1		7	
No	107	22		129	0.8490
Contrast Induced Nephropathy	Single vessel	Double vessels	Triple vessels	Total	p-Value
Yes	4	2	1	7	
No	75	51	3	129	0.1795
Total	79	53	4	136	

DISCUSSION

The number of persons with diabetes mellitus is increasing every year all over the world. A global health problem of the 21st century, it was the seventh biggest cause of mortality in the United States in 2010. The number of people with diabetes mellitus is expected to rise from 415 million in 2015 to 455 million in 2040, an increase of 2.8 percent (8.8 percent to 10.4 percent) (aged 20-80). Diabetes mellitus affects 3.8% of Africans, 7.4% of Europeans, 10.7% of Middle Easterners and North Africans, 11.5% of North Americans and Caribbeans, 9.1% of Southeast Asians, and 8.8% of people everywhere else. Most of the 1.2 million persons who lost their lives to diabetes-related complications that year were from low-income regions [15]. Diabetes mellitus prevalence predictions for Pakistan varied between 7.6 % and 11%t between 2011 and 2030 [16]. Among our sample of 136 patients, we found that 5% were between the ages of 18 and 30, 33% were between the ages of 31 and 50, and 62% were between the ages of 51 and 70. They averaged 48 years old with an additional 13.36 years on top of that. There were 80 male patients (59%) and 56 female patients (41%). Patients' durations of diabetes ranged from 1-10 years in 49 (36%), and 11-20 years in 87 (64%). Thirty-nine (39%) patients were active smokers, twenty-five (18%) were ex-smokers, and fifty-three (53%) were never smokers. Nearly half (47%) of the patients were low-income, whereas nearly a third (58%) were middle-class, and just 10% were wealthy. There were 38 individuals with renal disease (28 percent), whereas the remaining 98 patients (72 percent) did not. Only 16 (12%) of the patients received vascular intervention, whereas 120 (88% of the patients) did not (7). Five percent of participants developed contrast-induced nephropathy; the other 129 patients (95 percent) did not. While non-diabetic individuals have a 2% to 50% CIN incidence rate, those with diabetes mellitus have a 5.7-29% rate (13,14). Similarly, Sajjad U et al. 85 showed that following PCI, 7.10% (n = 11) of 155 instances of diabetics having coronary angiography exhibited a rise in serum creatinine >0.5 mg/dl, resulting in CIN. 81 Similar results were reported by Worasuwant torak S et al. 86, who counted 248 patients in their study and found that men made up 50.8% of the participants. In the general population, 5.2 percent of people developed CIN. On average, this population is 65 years old with a body mass index of 25.6+4.0 kg/m2 and a creatinine clearance of 60.6+27.4 ml/min. V/CrCl was 3.7+2.9 in those with CIN and 2.2+1.7 in those without (p = 0.041) [17-20].

CONCLUSION

To sum up, we found that 5 percent of diabetic patients having coronary angioplasty in a tertiary care hospital in Peshawar had contrast-induced nephropathy.

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