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CO-RELATION BETWEEN CARDIOVASCULAR RISK FACTORS AND CAROTID ARTERY INTIMAL-MEDIAL THICKNESS IN PATIENTS ON MAINTENANCE HEMODIALYSIS

Nephrology

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ABSTRACT

BACKGROUND: Cardiovascular Diseases have been recognized for many years to be major cause of morbidity and mortality in patient on renal replacement therapy. CIMT is well-established index of systemic atherosclerosis that co-relate well with the incidence of coronary heart disease and stroke. The aim of this study is to look association of serum phosphate, serum PTH and other cardiac risk factors with carotid intimal thickness in patients on MHD

METHODS: Study population comprised of 00 patients of CKD on maintenance hemodialysis. Their basic demographic data was recorded. Patients were evaluated for serum lipid profile, CIMT, Serum PTH and serum phosphate. All patients underwent relevant clinical examination by doctor in unit. We applied appropriate statistics to analyze data.

RESULTS: There were 100 patients of CKD on hemodialysis. Study cohort comprised of 69% males and 31% females. Mean age of the patients was 56.98±12.93 years. Mean serum phosphate level was 5.13±1.9 mg%. A positive correlation was seen between serum phosphate levels and serum PTH with carotid intimal medial thickness in right carotid artery. There was a negative correlation between CIMT and Hb of CKD patients which was statistically significant. There was a positive correlation of CIMT with total cholesterol and it was found statistically significant.

CONCLUSION: Total serum cholesterol showed significantly positive correlation with CIMT and Hemoglobin had negative correlation with CIMT.

KEYWORDS

Carotid Intimal Medial Thickness, Chronic Kidney Disease, Serum Phosphate, Haemoglobin, Serum Cholesterol.

INTRODUCTION

Chronic renal disease is a significant predictor of cardiovascular disease [1]. It is a devastating disease with clinical, economical and ethical dimensions, recently recognized as a major public health problem. Cardiovascular diseases have been recognized for many years to be major cause of morbidity and mortality in patient on renal replacement therapy [2].The Incremental risk of cardiovascular disease in those with Chronic Kidney disease (CKD) compared to age- and sex-matched general population ranges from 10-to200-fold depending upon the stage of the CKD. Between 30 and 45% of patient reaching stage v has advanced cardiovascular complications [3]. Serum phosphate is a significant risk factor for vascular calcification. It is not clear whether serum phosphate concentration is associated with arterial wall thickness in CKD [4].

Patients with chronic kidney disease (CKD) are at a significantly increased risk of morbidity and mortality from cardiovascular disease (CVD). Cardiac disease is the single most important cause of death in patients receiving long-term dialysis, accounting for approximately 44% of overall mortality [4]. Carotid artery intimal-medial thickness (CIMT) is a well-established index of systemic atherosclerosis that correlates well with the incidence of coronary heart disease and stroke in the CKD population[5].

MATERIAL AND METHODS

Our study population comprised of 100 patients of CKD on maintenance hemodialysis at our centre. Duration of study was July 2017 to October 2019. The 100 cases were selected on the basis of the simple random sampling technique .The size of the sample was selected on the basis of the suitable formula of sampling,

Inclusion criteria: Patient age greater than 18years, Patient having chronic kidney disease V on hemodialysis for more than 3 months.

Exclusion criteria: Patient was diagnosed as ARF, History of carotid surgery, Patient of age less than 18years, Patient having previous history OF myocardial infarction and stroke.

CAROTID ARTERY INTIMAL-MEDIAL THICKNESS MEASUREMENT:

An ultrasound equipped with 5-12Mhz linear type B mode probe was used to measure CIMT of patients. A dedicated radiologist performed CIMT measured for all patients to take care of inter observer bias.

To measure the carotid artery intimal medial thickness three measurements were taken 0.5,1 & 2 cm below bifurcation of carotid artery. The arithmetical averages of these was taken .The image at this is more clearly depicted than that at the near wall . The measurement was always being per formed in plaque-free arterial segments .

Samples for serum lipid profile, serum PTH and ESR were collected fasting. Hemoglobin and other relevant laboratory parameters were collected. All patients underwent clinical examination by unit. Besides this their demographic data was collected.

Qualitative data was expressed in frequencies and quantitative data in Mean with standard deviation. Pearson correlation was used to see correlation of different quantitative variable with carotid artery intimal thickness. Means were compared using independent sample T test. p Value of <0.05 was taken to be statistically significant. Data was analysed using SPSS software version 18.

RESULTS

The study cohort comprised of total number of 100 subjects, Males were in majority (69%) in the study participants. Mean age of patients was 56.98±12.93 years. Causes of renal failure were DM (43%), chronic glomerulonephr it is (22%), hypertension (19%) and others (16%)

Table 1 shows mean value of kidney function test parameters, among the study participants.

Parameter	Mean	SD	Range
Serum Phosphate	5.13	1.90	1.58 – 10.60
Serum Creatinine	6.7	3.4	1.5 – 22.0

Blood Urea	118.0	58.9	35.0 – 303.0
potassium	4.86	0.86	2.8 – 7.0
Serum Calcium	8.5	0.83	5.0 – 10.1
GFR	10.1	6.3	2.0 – 31.0

Table 2:- Mean Values of Lipid Profile in study subjects.

Lipid Profile	Mean	SD	Range
Total Cholesterol	134.4	41.9	50.0 – 271.0
LDL	72.7	33.1	1.6 – 156.0
HDL	32.0	10.8	10.0 – 56.0
TG	135.6	64.2	45.0 – 352.0
VLDL	26.6	11.9	9.0 – 70.0

Table 3:- Mean Values of Other parameter in study subjects.

Parameter	Mean	SD	Range
CRP	30.81	28.18	1.07 – 197.00
ESR	50.5	20.9	1.1 – 90.0
Hb	8.3	1.2	5.6 – 13.5
Serum PTH	294.7	453.8	8.4 – 3152.0

Table 4:- Mean CIMT in study subjects.

Side	Mean	SD	Range
Right	1.1	0.46	0.5. – 3.2.

Table 4 shows that mean CIMT on right side was 1.1±0.46mm

Table 5:- Correlation of CIMT with different lab parameters.

Parameter	Variable	Pearson's Correlation	p Value
S. Phosphate	R CIMT	0.25	0.80
S. PTH	R CIMT	0.01	0.93
CRP	R CIMT	0.10	0.31
ESR	R CIMT	0.11	0.29
Hb	R CIMT	-0.22	0.03*
Creat	R CIMT	0.12	0.24
Ca	R CIMT	0.06	0.56

CIMT of CKD patients was found negative correlation with Haemoglob in which was statistically significant.

Table 6:- Correlation of CIMT with Lipid Profile.

Lipid Profile	Variable	Pearson's Correlation	p Value
Total Cholesterol	R CIMT	0.24	0.02*
S. Triglyceride	R CIMT	0.04	0.72
S. LDL	R CIMT	0.08	0.42
HDL	R CIMT	0.06	0.54
VLDL	R CIMT	0.13	0.21

Table-6 Correlation with total cholesterol was only found to be statistically significant.(P value= 0.02*)

Table 7:- Comparison of Mean CIMT among diabetics and non-diabetics

CIMT	Diabetics		Non- Diabetics		p Value
Right	1.04	0.29	1.16	0.55	0.24

In our study mean CIMT of diabetic patients found more than non-diabetic patients.

Table 8:-Comparison of Mean CIMT according to age group

CIMT	<40yrs		>40yrs		p Value
Right	0.89	0.40	1.13	0.46	0.05

In our study we found that CIMT was higher in age more than 40 yrs. compared to age less than 40 yrs. which was statistically significant.

DISCUSSION

In the present study male patients were more than female subjects. The total number of male patients was 69, constituting 69 % of study subjects. In a similar study by Sharma, V. K et al also reported higher number of males (57%).Hyperphosphatemia may induce osteoblastic phenotypic changes in vascular smooth muscles and proliferation may lead to increased arterial wall thickness in CKD patients, same study they found greater serum phosphate level significant independent factor associated with increased IMT[4]. We also observed positive correlation though it was not statistically significant.

In another study by Singh et al on the epidemiology and risk factors of chronic kidney disease in India, the mean age of patients of CKD was found to be 45.22±15.2 years [5]. In our study Mean age of patients was found 56.98±12.93 yrs.

According to a study by Rajapurkar et al on chronic kidney disease in India, the maximum number of patients was seen in stage V, followed by stages IV, III, II and I respectively [6]. Though our study was done on patients on maintenance hemodialysis. Anaemia is associated with more advanced renal failure in stage V and its negative correlation was seen with CIMT of CKD patients which was statistically significant in our study. Ganidegli et al also reported negative association of Hb with CIMT[8].

A study done by Levin et al showed that chronic kidney disease associated anaemia is a normochromic, normocytic anaemia which usually accompanies progressive CKD [9]. McClellan et al observed that the overall prevalence of CKD-associated anaemia is approximately 50% [10]. However, 11–12 g/dl level emerged as the standard of care in the treatment of pre-dialysis CKD patients—driven in large part by the Kidney Disease Outcome Quality Initiative (KDOQI) guidelines [9, 10].

CHOIR demonstrated that increased risk of cardiovascular events with higher normalisation of Hb [11]. With contrast to this study CREATE showing no cardiovascular benefit, but a higher absolute number of cardiovascular events and a higher rate of dialysis events [12].

Our patients showed mean serum phosphate level of 5.13±1.90 mg/dl, serum creatinine of 6.7±3.4 mg/dl. Sharma et al also found that mean s. phosphate in diabetic was 6.84± 1.51 and in non-diabetic was 5.15 ±1.31, which was similar to our study.

Our cohort high mean CIMT thickness of 1.1±0.46mm Abolhassan Shakeri et al also found higher CIMT of .71±0.11mm, In our study Mean CIMT in diabetics was 1.04+0.29 and in non-diabetics was 0.98±0.39 thus mean CIMT is higher in Diabetics then non-diabetic kidney patients which was statistically non-significant. In our study age wise CIMT was measured. In young patients, age less than 40 years, mean CIMT was found 0.89+0.40mm and 1.13+0.46mm in patients age more than 40 years which was statistical significant in our study.

Mohan et al study showed that IMT was increased in diabetic patients compared with non-diabetic subjects both in men and women[15]. Moreover, at every age point, diabetic patients had increased IMT compared with their non-diabetic counterparts. Our study also showed a positive correlation of CIMT in diabetic patients which conclude that CIMT was more in diabetic patients then non-diabetic patients.

In our study, no correlation was seen between serum phosphate and CIMT in CKD patient below 40 years of age, which was statistically non-significant but in patients of a age more than 40 years it showed a positive significant correlation In our study, mean Serum PTH was found 294.7±453.8. In an another study Oh june et al," serum PTH was found 364±204 which showed a statistically significant data between serum PTH and CIMT, in contrast to this study, our study showed positive correlation but statistically non-significant results due to limited number of patients.

We found significantly positive correlation between lipid profile and CIMT. But there was significantly positive correlation was seen by total cholesterol only. Our patients showed mean values of Total Cholesterol 134.4±41.9 while in an another study Narinder Maheshwari et al observed the mean cholesterol of 131.38 ± 36.4 in CKD patients[16] which was similar to our study but their correlation with CIMT was not statistically significant but in our study it was statistically significant (p=0.02*).

CONCLUSION:

Patients of CKD on hemodialysis had higher CIMT. Our study showed significantly positive correlation of CIMT with total cholesterol. There was significant negative correlation with hemoglobin. We also observed significant positive correlation with serum phosphorus on patients more than 40 years of age. There was positive correlation of CIMT with s. PTH but not significant.

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