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Study of Cardiovascular Autonomic Function in Non Diabetic Patients Treated With Various Modalities

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Abstract

Background-Autonomic neuropathy is a frequent complication of chronic renal failure. Similar cardiovascular disease is a leading cause of mortality in hemo dialysis patients.

Methods-It was a hospital based observational study conducted in department of medicine at government medical college, Kota.

Results- maintenance hemo dialysis Fifteen (53.57%) CRF pre dialysis patients, 14(50%) patients complained of symptoms suggestive of autonomic dysfunction.

Conclusion-Autonomic system dysfunction was common finding in patients with uremia and even exists in CRF patients who were on maintenance hemo dialysis.

Keywords: Autonomic nervous system (ANS), chronic renal failure (CRF), electrocardiography (ECG), Expiration-inspiration ratio, Hemo dialysis

Introduction

Chronic renal failure is irreversible deterioration in renal function. Autonomic neuropathy is a frequent complication of chronic renal failure, results in the abnormalities of papillary reflexes, nocturnal diarrhea, Intestinal mal absorption, sweating disturbances, impotence and orthostatic hypotension.

The study of autonomic nerve function in case of chronic renal failure is essential for prognosis and treatment of the disease.

Similar cardiovascular disease is the leading cause of mortality in hemo dialysis patients accounting for 44%of the overall mortality. A number of mechanisms have been proposed to explain this excess cardiovascular mortality including hypertension, arterial stiffness and cardiovascular autonomic dysfunction.

Material and Methods

Place of study-Inpatient and outpatient department of department of medicine at government medical college Kota and associated group of hospitals.

Study design-It was a hospital based observational study.

Sample size-28 patients in each group i.e. CRF patients on conservative treatment, hemo dialysis patients and control.

Duration of study- One year: between June 2018 to may 2019.

Inclusion criteria-28 patients of non diabetic CRF, equal number of non diabetic CRF patients on maintenance hemo dialysis were taken up for study. Equal number of age and sex matched healthy control subjects were taken up for study.

Exclusion criteria-Following patients were excluded from study

1. Diabetic patients
2. Reversible renal failure patients
3. Cardiac arrhythmia
4. Pericardial effusion
5. Emphysema
6. Cardiac failure
7. Prolonged bed ridden patient
8. Age more than 60 years
9. Alcoholic
10. Patients on drugs like beta blockers, anti arrhythmic drugs.

Data collection (Method)

All the patients who fulfilling the inclusion and exclusion criteria attending OPD and IPD at Department of Medicine of Government medical college, kola and associated group of hospitals are examined by investigator of study (Dr. Pankaj Kumar Jain, Assistant Professor in department of medicine and Dr. Shiv Charan Jelia, professor in department of medicine). A pre informed written consent was observed from every case. The patient was evaluated according to pre determined Performa to record the details of history, physical examination and investigations. Assessment of autonomic functions done by 6 tests viz. Heart rate response to valsalva, heart rate response to deep breathing, immediate heart rate response to standing, hand immersion and hand grip test.

Observation

In all three groups i.e. cases of CRF on conservative management, CRF patients on maintenance dialysis and of healthy control subjects there were 22 males and 6 females i.e. in all three groups male constitute 78.57% of all subjects and female constitute 21.43% of all subjects. This male to female ratio was 3.66:1 in all groups. Age of cases of CRF ranged from 30-60 years, cases of maintenance dialysis group ranged from 20-53 years, while in control group ranged from 20-60 years.

Table 1: Features suggestive of autonomic dysfunction

Group	Symptoms suggestive of autonomic dysfunction			
	Present	%	Absent	%
Normal control subject (n=28)	1	3.57	27	96.43
Chronic renal failure patients (n=28)	15	53.57	13	46.43
Maintenance dialysis group n=28)	14	50.00	14	50.00
	X2		P	
Control Vs CRF	17.15		<0.001 HS	
Control Vs MD	8.67		<0.01 S	

Fifteen (53.57%) CRF patients, 1(50%) maintenance hemo dialysis patients, complained of symptoms suggestive of autonomic dysfunction.

Table 2: Comparison of number of abnormal autonomic function tests in various groups

Group(n=28)	Autonomic function test; No of subject with abnormal value of autonomic function test					
	Valsalva ratio	Deep breath test	P.T.I.	Decrease in SBP in response to standing	Increase in SBP in response to hand immersion test	Rise in DBP in response to hand grip test
Normal subject	2	0	0	0	0	0
Ch. Renal failure	15	16	20	8	13	9
Maintenance dialysis group	20	17	20	6	15	11

This table shows the number of abnormal autonomic function tests in various groups which we included in our study.

Table 3: Comparative study of Autonomic Function Test in Control group and CRF Patient group

S. No	Parameter	Normal Subjects (n=28)		CRF subjects (n=28)		t	P
		Mean	SD	Mean	SD		
1	Valsalva Ratio	1.39	0.007	1.25	0.28	-2.613	0.014 S
2	Deep Breath test ratio	1.28	0.003	1.15	0.21	-3.244	0.003 S
3	Postural tachycardia Index Ratio	1.22	0.004	1.04	0.16	-5.664	<0.001 HS
4	Decrease in SBP (in mm Hg) in response to standing	22.71	4.87	21.07	15.86	-0.544	0.591 NS
5	Increase in SBP (in mm Hg) in response to hand immersion test	22.43	4.40	10.11	8.28	-6.806s	<0.001 HS
6	Increase in DBP in response to sustained hand grip test	13.07	1.76	5.43	5.57	-6.323	<0.001 HS

Table 3 shows that except decrease in systolic blood pressure in response to standing, rest all autonomic function tests shows statistically highly significant difference in control group and CRF group.

Comparative study of parasympathetic function tests in control group and CRF group

Table 4: Comparative study of autonomic function tests in control group and maintenance dialysis group

S. No.	Parameter	Normal subject (n=28)		Maintenance dialysis subjects (n=28)		t	p
		Mean	SD	Mean	SD		
1.	Valsalva ratio	1.39	0.007	1.16	0.18	-6.109	<0.001 HS
2.	Deep breath test ratio	1.28	0.003	1.11	0.11	-8.232	<0.001 HS
3.	Postural tachycardia index ratio	1.22	0.004	0.99	0.005	-17.179	<0.001 HS
4.	Decrease in SBP in response to standing	22.71	4.87	16.71	15.37	-1.981	0.058 NS
5.	Increase in SBP in response to hand immersion test	22.43	4.40	11.50	6.66	-7.075	<0.001 HS
6.	Increase in DBP in response to sustained hand grip test	13.07	1.76	3.07	4.20	-10.937	<0.001 HS

Table 4 shows that all parameters related to autonomic function tests shows statistically significant difference in control group and maintenance dialysis subject group except decrease in systolic blood pressure in response to standing

Discussion- In this study symptoms suggested of autonomic dysfunction were present in 15 (53.57%) out of 28 cases of CRF patients and 14 (50%) out of 28 cases of maintenance dialysis patients. When these two groups were compared with healthy control group there is statistically significant difference between the numbers of subjects with symptoms suggested of autonomic dysfunction. Similar observation reported by solders et al (1986)[1]

In our study in pre dialysis CRF patients deep breath test was abnormal (<1.10) in 16 (57.14%) patients, valsalva ratio was abnormal (<1.2) in 15 (53.57%) patients, and P.T.I. abnormal in 20(71.43%) patients, while 8 patients (28.57%) had a postural fall in BP. More or less similar results observed by anupam agarwal et al (1991)[2] reported abnormal E/I ratio in 21 pre dialysis patients (84%), abnormal valsalva ratio in 8 (32%) patients and 6 patients (24%) with postural BP fall.

Results of the studies on the effect of chronic hemo dialysis on autonomic function are contradictory, ranging from fair or excellent improvements (compese et al 1981[3],Heidbreder et at 1985)[4] to in different changes(Rockel et at 1979[6],Malik et al 1986[5]).Similarly

we also found that except decrease in systolic blood pressure in response to standing rest all parameters statistically highly significant between normal subject VS maintenance dialysis subjects means there is no improvement in autonomic dysfunction after dialysis.

The results of our study show that autonomic dysfunction was common in non diabetic uremic patients (85.71%) and no acute improvement was seen in the autonomic function by hemo dialysis (92.86%).

Conclusions-Autonomic system dysfunction was common finding in patients with uremia and was observed in 85.71% cases of CRF in our study.

Autonomic dysfunction even exists in CRF patients who were on maintenance hemo dialysis and hemo dialysis does not significantly alter the autonomic function.

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