ORIGINAL RESEARCH PAPER

Volume-8 | Issue-7 | July - 2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PREVALANCE OF ELEVATED SERUM CREATININE IN HYPERTENSION- A SILENT KILLER

Physiology

Dr. Shweta* Assistant Professor , Dept. of Physiology, Government Medical College, Suryapet, Telangana *Corresponding Author

Dr. Prafful Kumar Post Graduate, Dept of Community Medicine, KIMS

ABSTRACT

Introduction: The study is carried to evaluate the elevated levels of Serum Creatinine in hypertension near Suryapet District,Telangana. Chronic Kidney diseases are recognised as a problem worldwide. It is expected that Hypertension in India is almost doubled from 118 million in 2000 to 213.5million in 2025 1.

Materials & Methods: A total of 120 participants,70 Hypertensives,50 Normal healthy were selected,Blood pressure measurement followed by blood sampling for measuring serum creatinine. Statistical analysis done by STAT 16.0,Student t test.

Results: Hypertensive cases has elevated levels of serum creatinine compared with that of Normotensive controls, the cases showed 1.13±0.52 and Healthy Controls 0.77±0.12 with $p<0.000$ statistically significant.

Conclusion: Hypertensive subjects have significant alteration in serum creatinine and raise blood pressure together augmenting the development of Chronic Kidney Disease.

KEYWORDS

INTRODUCTION

Hypertension is a major public health problem due to its high prevalence all around the globe [2-5]. Its predicted to increase to 1.56 billion adults with hypertension in 2025 [6].

Epidemiology

Systolic BP of ≥140 and /or diastolic BP of ≥90 mmHg is the currently accepted standard threshold for diagnosis of hypertension worldwide, although the 2017 American College of Cardiology/American Heart Association (ACC/AHA) hypertension guidelines have proposed a lower threshold of ≥130 and/or ≥80 mmHg[7]

GBD-Global Burden of Diseases

Study has reported that high systolic BP, poor dietary intake and tobacco use are most important risk factors for mortality as well as morbidity [8].GBD has reported that in 2017, high systolic BP was the leading risk factor globally, accounting for **10.2 million** [95% uncertainty intervals (UI) **9.16–11.3 million** deaths and **208 million** (UI 188–227 million) disability adjusted life years (DALYs).

Overall, **8.61% (**UI 7.66–9.56) of total DALYs were attributable to high SBP. Most of the burden attributable to high SBP was due to ischemic heart disease and stroke, and high SBP accounted for **55.5%** (UI 48.0–62.7) and **56.5%** (UI 49.0–63.2) of DALYs due to ischemic heart disease and stroke, respectively[8]

In India also, it has emerged as the most important risk factor for deaths and disability[9]

According to reports from World Health Organization (WHO)[10], GBD study[11] and Non-Communicable Disease Risk Factor Collaboration (NCDRiSC)[12].

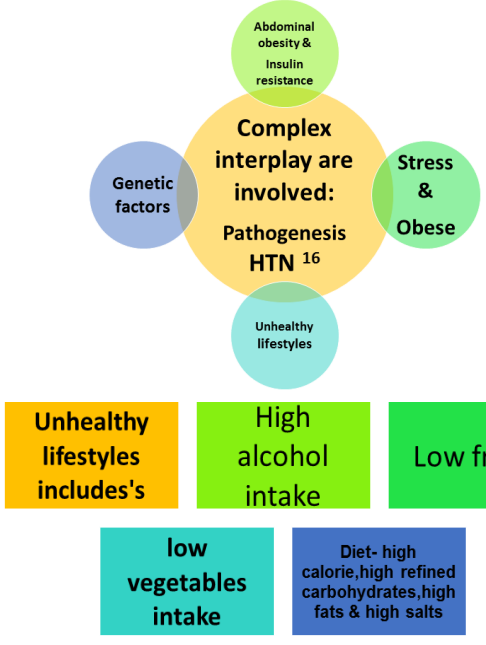
Preventive measures :

A.Government of India proposals to create 150,000 Health Wellness Centers across the country devoted to preventative care and to strengthen primary care and National Health Protection Scheme for increasing healthcare access and reducing disease-related morbidity and mortality are the right steps in this direction[13].

B. Government of India, under the National Program for Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke, has initiated a large project of opportunistic screening in India[14].

C.Periodic surveys conducted by the government of India, e.g., National Family Health Surveys (NFHS), National Statistical Survey Organization (NSSO) surveys and District Level Household Surveys (DLHS) should focus on hypertension screening using standardized tools and uniform methodology [15].

Association of Hypertension with macrolevel risk factors



It is a SILENT KILLER a very rarely any symptom can be seen in its early stages until a severe medical crisis take place like heart attack,stroke or chronic kidney disease[17-19].

MATERIALS & METHODS:

A total 120 subjects selected for the study. Participation in the study was strictly by the patient CONSENT & will.

1. Blood pressure measurements were obtained 3 times during the examination. Each reading was measured: Mercury Sphygmomanometer, with the participant seated, relaxed for 5-10min.

The arithmetic mean: calculated using all available systolic and diastolic readings. In this analysis, individuals with SBP lower than 140 mmHg & DBP lower than 90 mm Hg who were not receiving antihypertensive medication were defined as normotensive. Individuals were classified as hypertensive if they had MBP(Mean Blood Pressure) of 140 mm Hg or higher (systolic) or 90 mm Hg or higher (diastolic) or reported current use of medication for hypertension[20]

2. **Exclusion criteria:** Type 2 Diabetes Mellitus, Alcoholics, Cardiac diseases, Chronic renal diseases & Chronic diseases.
3. Venous ample was collected under aspectic conditions.Serum was separated by centrifugation and creatinine measurements done by the modified kinetic Jaffe reaction [21] and were reported using conventional units (1 mg/dL = 88.4 µmol/L).
4. **Total 120 subjects:** 70:Hypertensive among them Male:38, Female:32. & 50: Normal healthy,among them Males: 30,Females:20.
5. **Statistical analysis:** STAT,16.0 Mean±SD used. Statistical significance of Hypertension among cases and controls, Student t test and p value <0.005 was considered as statistically significant.

RESULTS:

Table No.1 Age-wise distribution of Cases

Age in years	Cases	
	Male	Female
30 yrs	4	7
40 yrs	6	8
50 yrs	10	10
60 yrs	9	3
70 & above	9	4
Total	38	32

Mean age was 57.11years ,SD: ±13.48years in Cases
Mean age was 50.54years,SD : ±14.42years in Controls

Table No.2 : Age-wise distribution of Controls

Age in years	Controls	
	Male	Female
30 yrs	6	4
40 yrs	8	5
50 yrs	10	8
60 yrs	3	1
70 & above	3	2
Total	30	20

Table No.3: Duration of Hypertension : Cases

Age	Duration
30	2yrs
40	3-4yrs
50	5-7yrs
60	8yrs
70 & above	More than 10yrs

Table No. 4
SBP & DBP :Cases

Variables	Mean±SD
SBPmmHg	160.57±24.61
DBPmmHg	95.11± 7.21

SBP & DBP :Controls

Variables	Mean±SD
SBPmmHg	110.52±3.47
DBPmmHg	73.66±3.32

Table No. 5
Serum Creatinine: Cases & Controls

Cases	Controls	p value
1.13±0.52	0.77±0.12	p<0.000

DISCUSSION:

Molecular Mechanism predicting the **ROLE** Serum Creatinine associated with **HIGH RISK ARAS** (Acute Renal Artery Stenosis)

Renal ischemia resulting from ARAS has 2 important sequelae
1. Systemic Hypertension--- increasing the RISK Stroke & MI [22-23].
2. Renal Atrophy & Nephron loss[24].

ARAS is therefore a cause of both HYPERTENSION & RENAL INSUFFICIENCY[25-26]. Later progress to END STAGERENAL DISEASES[22-23].

LITERATURE

Plasma constituents have been identified as **POTENTIAL** risk factors for development of ARAS.

Creatinine

Plasma Creatinine levels are associated with greater risk of **VASCULAR EVENTS**[27-30]. This association may reflect an adverse vascular risk profile in patients with even marginally impaired renal function[29-30]. Elevated creatinine values predict a worse outcome(higher morbidity & mortality) following MI [31-33].

Research on Creatinine ROLE in hypertension

Role of creatinine in predicting significant (≥50% luminal diameter narrowing).

A. ARAS (acute renal artery stenosis) were investigated 427 patients undergoing Cardiac Catherization, by univariable logistic regression analysis, plasma Creatinine were ≥1.5mg/dl (115µmol/L), this study was a STRONG predictor of ARAS (p=0.0001)[36].
B. 1,200 consecutive patients were undergoing Coronary Angiography, significant (≥ 50%) ARAS, present in almost 1 for every 10 patients (116 patients or 9.7%)
C. Multivariate logistic regression analysis, Serum Creatinine levels ≥133µmol/L were predicted significant ARAS(acute renal artery stenosis)[36-37].

Many studies have been done to predict the importance of creatinine in hypertension, all the studies suggested that **serum creatinine levels SHOULD NOT ONLY BE USED AS A DIAGNOSTIC TEST FOR VERIFICATION OF RENAL IMPAIRMENT BUT ALSO FOR THE PRESENCE OF ARAS** (acute renal artery stenosis) [24,38-42].

Nevertheless, creatinine is a promising emerging vascular risk factor that can be used to successfully predict not only progressive ARAS but also improvement of renal function.

Present study showed higher levels of serum creatinine in hypertensive cases compared to that of healthy normotensive controls ie**1.13±0.52 in cases & 0.77±0.12** in controls with **p<0.000** value having statistical significance, similar finding were noted Nagah et al showed that mean values of serum creatinine was increased hypertensive cases than normotensive control ie 141± 39.0 mol/L vs 52.4 ±18.0. mol/L and the difference was statistically significant. [43]

National Health and Nutrition Examination Survey III have shown that serum creatinine level is an indicator of chronic kidney disease and was found common and strongly related to unadequately treatment of hypertension[44].

CONCLUSION

Elevated serum creatinine, an indicator of Chronic Kidney Disease is commonly & strong associated with High Blood Pressure.

LIMITATION OF THE STUDY

1. Sample size could have been more for more accuracy.
2. Patient co-operation for sampling
3. GFR measurement would have help more about the renal functioning status
4. Adherence to ANTI-HYPERTENSIVE medication.

CONFLICT OF INTEREST: No conflict of interest
Source of Funding: Self

REFERENCES :

1. Kearney PM,Whelton M,Reynolds K,et al.Global burden of hypertension:analysis of worldwide data.Lancet 2005;365;217-23
2. C.Erem,A.Hacihasangolu,M.Kocack,O.Deger and M.Topbas,'Prevalence of prehypertension and hypertension and association risk factors Turkish adults:trabzon hypertension study',Journal of public health,Vol.31,no.1,pp.47-58,2009
3. A Ahmed,M.Rahman,R.Hasan et al,'hypertension and associated risk factors in some selected rural areas of bangladesh' International Journal of Research in Medical Sciences,vol.2,no.3,p.925,2014
4. C.P Mishra ans S.Kumar,'risk factors of hypertension in a rural area of varanasi'. Indian journal of preventive and social medicine,vol.42,no.1,pp.101-111,2011.
5. S.M.Abebe,Y.Berhane,A.Worku,A.Getachew,'prevalence and associated factors of hypertension : a cross sectional community based study in northwest ethipoia.PLoS ONE,vol.10,no.4,Article IDe0125210,2015.
6. J.STabrizi,H.Sadeghi-Bazargani,M.Farahbaksh,L.Nikniaz,Z.Nikniaz,'prevalene & associated factors of prehypertension and hypertension in iranian population: the lifestyle promotion project (LPP); PLos ONE.VOL.11,no,0,Article ID e0165264,2016..
7. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. ACC/AHA/AAPA/ABS/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation and management of high blood pressure in adults: executive summary. J Am Coll Cardiol. 2017;2018:2199–269.
8. GBD 2016 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 84 behavioral, environmental and occupational, and metabolic risks or clusters of risks, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet 2017; 1345–422.

9. Gupta R, Xavier D Hypertension: the most important non-communicable disease risk factor in India. Indian Heart J. 2018; 10.1016/j.ihj.2018.02.003.
10. World Health Organization. Global Status Report on Non-Communicable Diseases 2014. Geneva: World Health Organization. 2014
11. Farouzanfar MH, Ng M, Biryukov S, Roth GA, Alexander L, Liu P, et al. Global burden of hypertension and systolic blood pressure of at least 110 to 115 mm Hg, 1990-2015. JAMA. 2017;317:175–82.
12. NCD Risk Factor Collaboration (NCD-RiSC). Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19.1 million participants. Lancet. 2017; 389:37–55
13. Reddy KS. Health care reforms in India. JAMA. 2018;319:2477–8
14. Ministry of Health and Family Welfare. National Programme For Prevention and Control of Cancer, Diabetes, Cardiovascular Disease and Stroke (NPCDCS). http://mohfw.nic.in/index1.php?lang=1&level=3&sublinkid=3627&lid=2194.
15 Gupta RConvergence in urban-rural prevalence of hypertension in India.J Hum Hypertens.2016;30:79-82
16. Hall ME, Hall JE Pathogenesis of hypertension. In: Bakris GL, Sorrentino MJ. Hypertension: a companion to braunwald's heart disease, 3rd Ed. Philadelphia. Elsevier. 2018;33–51.
17. A.V.Chobanian,G.L.Bakris ,H.R Black et el,seventh report of Joint National Committeee on prevention,detection,evalutation & treatment of high blood pressure, Hypertension,vol.42,no.5,pp.1206-1252,2003
18. Wikipedia,Hypertension,http://en.wikipedia.org/wiki/hypertension.
19. J.Prabakaran ,N,Vijayalaksmi,E & VenkatRao,prevalence of hypertension among urban adult population (25-64 years) of nellore,International journal of research & development of health,vol.1.no.2,pp.42-49,2013.
20. Burt VLWhelton PRoccella EJ et al. Prevalence of hypertension in the US adult population. Hypertension. 1995;25305- 313
21. Kasiske BLKeane WF Laboratory assessment of renal disease: clearance, urinalysis, and renal biopsy. Brenner BMRector FC Jreds. The KidneyPhiladelphia, Pa WB Saunders Co1996;1137- 1173
22. Safian RD,Textor SC:Renal-artery stenosis.N Engl J Med 2001;344:431-442
23. Rimmer JM, Gennari FJ:Atherosclerosis renovascular diseases and progressive renal failure. Ann Intern Med 1993;119:712-719
24. Dzielinska Z,Januswicz A,Demkow M,Makowiecka-Cielsa M,Prejbisz A,Naruszewicz M, Nowicka G,Kadziela J,Zielinski T,Florczak E,Janas J,Januszewicz M,Ruzyllo W:cardiovascular risk factors in hypertension patients with coronary artery diseases and coexisting renal artery stenosis .J Hypertens 2007;25:663-670
25. Jacobson HR:Ischemic renal diseases an overlooked clinical entity? Kidney Int 1988;34:729-743
26. Working Group on Renovascular Hypertension: Detection,evaluation & treatment of renovascular hypertension:final report.Arch Intern Med 1987;147:820-829.
27. Athyros VG,Mikhailidis DP,Papageorgiou AA,Symeonidis AN,Pehlivandis AN, Bouloukos VI,ElisaF M:The effect of statins versus untreated dyslipidemia on renal function in patients with coronary heart disease: a subgroup analysis of the Greek atorvastatin coronary heart disease evaluation (GREACE) study.J Clin Pathol 2004;57:728-734
28. Athyros VG.Elisaf M,Papageorgiou AA,Symeonidis AN,Pehlivanidis AN,Bouloukos VI,Milions HJ,Mikhalidis DP: GREACE study Collaborative group:Effect of statins versus untreated dyslipdemia on serum uric acid levels in patients with coronary heart disease: a subgroup analysis of GREek Atorvastatin Coronary heart disease Evaluation (GREACE) study.Am J Kidney Dis 2004;53:493-502
29. Elisaf M,Mikhailidis DP:Statins and renal function.Angiology 2002;53:493-502
30. Segura J,Ruilope LM:Minor abnormalities of renal function: a situation requiring integrated management of cardiovascular risk. Fundam Clin Pharmol 2005;19:429-437
31. Jose P,Skali H,Anavekar N,Tomson C,Krumholz HM,Rouleau JL,Moye L,Pfeffer MA,Solomon SD: Increases in creatinine cardiovascular risk in patients with systolic dysfuntion after myocardial infarction.J Am Soc Nephrol 2006;17:2886-2891
32. Jaffe AS,Krumholz HM,Catellier DJ,Freedland KE,Bittner V,Blumenthal JA,Calvin JE,Norman J,Sequeria R,O`Connor C,Rich MW,Sheps D,Wu D;Enchancing recovery in coronary heart diseaes patients (ENRICHD) Trial Investigators:Prediction of medical morbidity and mortality after acute myocardial infarction in patients at increase psychosocial risk in Enchancing Recovery in Coronary Heart Disease Patients (ENRICHD) study.Am Heart J 2006;152:26-135
33. Williams BA,Wright RS,Murphy JGBrilakis ES,Reeder GS,Jaffe AS: anew simplified immediate prognostic risk score for patients with acute myocardial infarction.Emerg Med J2006;23:186-192
34. Bertomeu-Gonzalez V,Nunez J,Nunez E,Facila L,Sanchis J,Bodi V,Pellice M,Bosch MJ,Martinez A,Chorro FJ,Llacer A: Prognostic effect of renal dysfunction after ST-segment elevation myocardial infarction with and without heart failure.Int J Cardiol 2006;112:159-165.
35. Anavekar NS,McMurray JJ,Velazquez EJ,Solomon SD,Kober L,Rouleau JL,White HD,Nordlander R,Maggioni A, Dickstein K,Zelenkofske S,Leimberger JD,Califf RM,Pfeffer MA: Relation between renal dysfunction and cardiovascular outcomes after myocardial infarction.N Engl J Med 2004;351:1285-1295.
36. Song HY,Hwang JH,Noh H,Shin SK,Choi DH,Shim WH,Lee HY,Cho SY,Han DS,Choi KH:The prevalence and associated risk factors of renal artery stenosis in patients undergoing cardiac catheterization.Yonesi Med J 2000;41:219-225.
37. Zhang Y,Ge JB,Qian JY,Ye ZB:Prevalence and risk factors of atherosclerosis renal artery stenosis in 1200 chinese patients undergoing coronary angiography.Nephron Clin Pract 2006;104:c185-192
38. Saleh AA,Bustami BB:Prevalence of renal artery stenosis in patients undergoing routine cardiac catheterziation.Saudi Med J 2004;25:52-54
39. Rigatelli G,Rigatelli G:Vascular profile of patients with mutlivessel coronary artery disease.Int J Cardiol 2006;106:35-40.
40. Edwards MS,Craven TE,Burke GI,Dean RH,Hansen KJ:Renovascular diseases and risk of adverse coronary events in the elderly: a prospective,population-based study.Arch Intern Med 2005;165:207-213.
41. Lanzer P.Vascular multimorbidity in patients with a documented coronary artery disease.Z Kardiol 2003;92:650-659
42. Buller CE,Nogareda JG,Ramanathan K,Ricci DR,Djurdjev O,Tinckam KJ,Penn IM,Fox RS,Stevens LA,Duncan JA,Levin A:The profile of cardiac patients with renal artery stenosis.J Am Coll Cardiol 2004:43:1606-1613.
43. Nagah AA Mohamed,H.H. Hamad.Serum creatinine, albumin, protein hypertension patients. Indian Journal of Basic & Applied Medical Research 2012;1(4):292-295
44. Coresh J,Wei GL,McQuillan G, Brancati FL,Levey AS, Jones C, et al Prevalence of high blood pressure and elevated serum creatinine levels in US.Finding from NH & NESIII (1988-1994).Arch Intern Med 2001;161:1207-1216