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Polyneuropathy in Patients with Chronic Kidney Disease

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Abstract: Background:A critical reason for worldwide mortality and bleakness is constant kidney sickness. Neuropathy is the most predominant of every single neurological intricacy and has been generally connected to the level of renal dysfunction. The pace of advancement, force, engine, tactile and dysasthesia commonness are truly factor. Given its enormous commitment to dreariness in patients with CKD, No huge commitment has been made in recognition or the executives of uremic neuropathy in Indian writing. We thus have arranged this investigation to survey the range of fringe neuropathy in patients of CKD, and correspond it with the seriousness of renal dysfunction.

Objectives :To study clinical picture of polyneuropathy in patients of chronic kidney disease, and to study the correlation between polyneuropathy and different stages of chronic kidney disease and it's outcome.

Methods: The examination will be directed after moral leeway from Institutional morals panel,DMIMS, inAVBRH, JLN, DMIMS, Wardha, Maharashtra, India. Subjects will be included in the study after detailed history and clinical examination of all patients being admitted. Assessment of pre-existing comorbidities in patients if any will be enquired by H/O hypertension, diabetes mellitus, cancer and other chronic ailments will be recorded in the pro-forma. Laboratory investigations like Complete blood counts, kidney function tests, blood glucose levels will be done. Nerve conduction velocity testing will be performed in every patient.

Expected Results: This examination will clarify the clinical picture and connection of polyneuropathy concerning the seriousness and term of the CKD and the results are relied upon to be like past investigations where it shows that the predominance of fringe neuropathy was straightforwardly corresponding to length and seriousness of CKD.

Keywords: chronic kidney disease, creatinine, polyneuropathy, nerve conduction velocity, end stage renal disease, neuropathy

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INTRODUCTION:

The NKF Kidney Disease Outcomes quality activity work group in 2002 had built up an arranging framework including 5 phases where the last stage is assigned as end stage renal sickness which encourages a requirement for dialysis or relocate. The prominent commonness of Chronic kidney illness in various areas goes from <1% to 13% and The International Society of Nephrology's Kidney Disease Data Center Study announced a predominance of 17% (1). It is However seen that neurological difficulties which create auxiliary to uremic state are the major contributing components to horribleness and mortality. The ongoing investigations in neuropathy of the end stage renal illness have been able to demonstratethat 70–100% of patients who are on dialysis tend to experience neuropathic indications, in spite of achieving objective dialysis adequacy(2-4).

The number of cases of chronic kidney disease (CKD) is rising day by day, resulting in high morbidity and mortality rates. In developed countries, the recorded incidence of chronic kidney disease is 15% of the population and it rises to 40 percent among people over Neurological complications arise in approximately 60% of these patients and affect any section of the population. The nervous system induces fatigue, sensory deficiency, and sensory alterations. The most prevalent neurological morbidity mediated among these patients are uremic polyneuropathy. Vibratory sensation, reduced deep tendon reflexes, paraesthesia, hyperesthesia or hyperesthesia are affected during clinical evaluation. Hypoesthesia, cramps, restless legs, fatigue and atrophy of the muscles. Careful clinical diagnosis of uremic polyneuropathy is conducted by If the diagnosis remains uncertain, examination, biochemical assessment and electrophysiological tests or nerve biopsy.

In diabetic patients with CKD, the full range of pathways that cause neurotoxicity remains uncertain. The development of autonomic cardiac neuropathy and peripheral diabetic neuropathy in diabetes is a result of complex interactions between the degree of hyperglycemia, length of the disease, age-related neuronal attrition, and systolic and diastolic blood pressure. In the development and progression of both cardiac autonomic neuropathy and diabetic peripheral neuropathy, hyperglycemia clearly plays a key role by activation of biochemical pathways linked to the cell's metabolic and/or redox state. Metabolism driven pathways are: glucose flux via the polyol pathway; inappropriate activation of isoforms of protein kinase C , the hexosamine pathway; Dysfunction of the Na+/K+ pump. and accumulation of advanced glycation end products. Although each pathway can be harmful on its own, it collectively creates an imbalance in the cell's mitochondrial redox state and results in excessive reactive oxygen species (ROS) formation. Increased stress of oxidative species within the cell leads to poly(ADPribose) polymerase (PARP) pathway activation, Regulating gene expression to facilitate inflammatory reactions, microvascular deficiencies and neuronal dysfunction.

Uremic neuropathy usually includes large width axons.(5) There are various elements which are ordinarily hastened by wholesome lacks. In spite of all advances, it has been seen that uremic neuropathy generally neglects to react totally to the accessible treatment alternatives. On Clinical assessment there is disabled vibratory sensation, diminished deep tendon reflexes.paraesthesias, hyperesthesia or hypoesthesia, cramps, anxious legs, muscle weakness and atrophy. Along these lines Diagnosis of uremic polyneuropathy. Should be finished by vigilant clinical assessment, biochemical assessment and electrophysiological studies or nerve biopsy, if the analysis remains unclear.(6) .

Roundabout impacts of the uraemic milieu incorporate their commitment to foundational irritation, endothelial damage and atherosclerosis as referenced previously. Numerous

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uraemic poisons have been researched for a potential job in direct neurotoxicity with regards to Chronic Kidney Disease. Cerebro-renal communications have been proposed for a few mixes including uric acid, indoxyl sulfate, p-cresyl sulfate, interleukin-1β (IL-1β), IL-6 and tumor necrosis factor-α (TNF-α). Recent examinations have shown that raised serum levels of cystatin-C are related with lower psychological scores free old enough, race, schooling and clinical comorbidities.It is conjectured that cystatin-C may add to neurodegeneration through amyloid plaque development albeit further longitudinal investigations are required for its confirmation.

The assessed age-changed occurrence of end-stage renal sickness (ESRD) is 229 for each million populace, while in India, more than one lakh new patients join renal substitution programs each year.(7) However just 10% of these ESRD patients in India get a type of renal substitution treatment because of scant assets (7,8)
The prevalence seen of chronic kidney disease in the SEEK-India cohort was found to be 17.2%. The recorded prevalence of the different stages of CKD 1, 2, 3, 4 and 5 was as following 7%, 4.3%, 4.3%, 0.8% and 0.8%, respectively.
A high prevalence of CKD is seen in reports from different countries. Jafar et al. found a 9% prevalence of CKD in males and 11% in females over 40 years of age (using NKF criteria)[9]
The CKD prevalence can easily be explained by the high prevalence of different risk factors such as diabetes and hypertension (18.8 percent and 431.1 percent , respectively). 64.5 percent of patients with chronic kidney disease had hypertension and 31.6 percent had diabetes .

Background/rationale:
Thusly, clinical treatment of the various neurological confusions in CKD requires a comprehension of the physiological and obsessive aggravations that add to them. While neurological side effects frequently become clinically evident in end-stage sickness, morbidity and mortality in later stages might be diminished by the analysis and therapy of these problems in prior phases of CKD.

Objectives :To study clinical picture of polyneuropathy in patients of chronic kidney disease and to study the correlation between polyneuropathy and different stages of chronic kidney disease and it's outcome.

Methods:
The research will be performed at the AVBRH, JLN Medical college, DMIMS, SawangiMeghe, Wardha, Maharashtra, India, following ethical approval from the Institutional Ethics Committee, DMIMS.

STUDY DESIGN:
This will be a prospective Cross-sectional Study which will be conducted for a duration of 2.5 years.

SELECTION OF SUBJECTS:
All subjects above 18 years of age, both male and female, medical and non-medical staff.

EXCLUSION CRITERIA: Patients <18 years of age, Patients on drugs known to cause polyneuropathy, Known cases of chronic alcoholism, Patients with pre-existing neurological disorders causing polyneuropathy.

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METHODS

Subjects to be included in the study will be explained regarding the study and proper consent will be obtained. The presence of nervedamage will be calculated by the nerve dysfunction on a clinical basis (Motor/ sensory symptoms and signs) and the electrophysiological studies such as –the nerve conduction testing. Clinical features like distal muscle weakness, peripheral sensory loss, burning feet sensation, sensations of pin & needle, and loss of distal reflex were taken as indicators of nerve dysfunction. The Nerve conduction testing will be done in all patients wherea nerve is been selected and it is stimulated at the two differentpoints throughthe course and the response will be recorded by the use ofelectrodes which will be put over muscles that are being supplied by that nerve. A detailed history and clinical examination of all patients being admitted will be done. Family history and previous history will be taken in detail. An assessment of pre existingcomorbidities will be done in patients by taking a history ofdiabetes mellitus, cancer, hypertension and other diseases. a. Further the subject will be instructed regarding the need for withdrawal of blood samples for Complete blood counts, kidney function tests, blood glucose levels and performing nerve conduction velocity testing in every patient.

Investigations : Complete blood count**,** Kidney function tests including serum urea, serum creatinine, serum sodium, serum potassium**,** Serum albumin**,** Nerve conduction velocity testing.

STATISTICAL ANALYSIS:

The data will be entered in Microsoft excel sheet and will be analysed with STATA version 13 statistical software. Test characteristics like specificity, sensitivity, negative predictive value, positive predictive value, positive likelihood ratio, negative likelihood ratio and test accuracy will be calculated for all the indices.From the data so obtained observations & conclusions will be arrived at.

SAMPLE SIZE:

A total of 230 subjects will be studied.

- Calculation:-: N = Z 1-α/ 2 *p* (1-P) d 2
- Here, Z 1-α/2 is the level of significance at 5%, i.e. 95% confidence interval= 1.96.
- P= prevalence of chronic kidney disease = 17% =0.17
- D = Desired error of margin = 5% = 0.05
- Therefore; N = 1.962*0.17*(1-0.17)/ (0.052*) =230 subjects required in the study.

Expected Outcomes/Results:

This study will explain the clinical picture and correlation of polyneuropathy in reference to the severity and duration of the CKD and the outcomes are expected to be similar to previous studies where it shows that the prevalence of the peripheral neuropathy was seen to be directly proportional to duration and severity of CKD.

DISCUSSION:

CKD is described by constant reformist decrease in renal capacity. There are different neurological complexities which are seen in CKD, out of which uremic neuropathy is generally debilitating. There is a kind of segmental demyelination and axonal degeneration in the fringe nerves. The actual importance of nerve dysfunction in chronic kidney disease is highlighted by the overallmortality in patients with End Stage Renal Disease which is 20% per year. Neuropathy occurs in minimally in 65% of patients who are on the verge of beginning dialysis for Chronic renal failure and is therefore the most common neurological

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complication of chronic uremia. As observed clinically from a neurological point of view, the clinical features of Chronic renal failure fairly include length-dependent sensory Impairment and weakness which then leads to a disability which is functional in nature and as observed in the patients of acute uremia, an altered sensorium contributing to encephalopathy. Neuropathy can have various manifestations as autonomic dysfunction, peripheral Polyneuropathy or mononeuropathy and sleep disturbance. Jain et. al. reported a rare case of Kikuchi's Disease a rare presentation with acute kidney injury, peripheral neuropathy (9). A number of studies were reported on chronic Kidney diseases(10-13).Dandeet. al. reported on oral manifestations in diabetic and nondiabetic chronic renal failure patients receiving hemodialysis (14).Goswamiet. al. reported on scoring systems and outcome of chronic kidney disease patients admitted in intensive care unit (15). Few studies on nerve conduction and neuropathy were reviewed(16-18). Certain other causes of chronic kidney disease that have been observed to affect the nervous system are diabetes mellitus, systemic lupuserythematosus, liver failure, hemodialysis or peritoneal dialysis, amyloidosis, ,polyarteritisnodosa and transplant. On biochemical evaluation of creatinine, parathyroid hormone and urea which are known as the "middle molecules," have a strong correlation with the reduction in nerve Conduction Velocity and the manifestations of peripheral neuropathy. Neuropathy generally becomes clinically evident once the GFR Falls below 12-20 mL/min or even if uremia has been persistent for atleast 6 months. Whereas encephalopathy maybe visualised with a lesser duration of kidney damage and mostly happens when there is an acute reduction in the glomerular filtration rate. But the relation between reduced kidney function and neural manifestations is poor .The administration of neuropathy in such patients requires foundation and assurance of kind of neuropathy by Nerve conduction velocity tests. Uremic neuropathy has been perceived as most regular intricacy, bringing about huge bleakness. The current examination will be done to consider the prevalence, clinical and electrophysiological highlights of fringe neuropathy in CKD patients. Nerve conduction considers are regularly utilized non-obtrusive strategy utilized for setting up presence of fringe sensory system Association and sort of contribution. Uremic polyneuropathy is seen in 70% of the patients according to previous studies. Careful neurological assessment combined with nerve conduction contemplates uncovered a blended tangible engine polyneuropathy, which is characteristic for uremic polyneuropathy.

CONCLUSION :

Polyneuropathy is common in patients of chronic kidney disease.The prevalence and severity of which worsens with disease progression. Earlier diagnosis of neuropathy in patients of CKD by Nerve conduction studies is needed too minimize patient discomfort. Thusly, clinical treatment of the various neurological confusions in CKD requires a comprehension of the physiological and obsessive aggravations that add to them. While neurological side effects frequently become clinically evident in end-stage sickness, morbidity and mortality in later stages might be diminished by the analysis and therapy of these problems in prior phases of CKD.

REFERENCES:

[1] Ene-Iordache B, Perico N, Bikbov B, Carminati S, Remuzzi A, Perna A, Islam N, Bravo RF, Aleckovic-Halilovic M, Zou H, Zhang L, Gouda Z, Tchokhonelidze I, Abraham G,Mahdavi-Mazdeh M, Gallieni M, Codreanu I, Togtokh A, Sharma SK, Koirala P, Uprety S, Ulasi I, Remuzzi G: Chronic kidney disease and cardiovascular

Received 15 December 2020; Accepted 05 January 2021.

risk in six regions of the world (ISN-KDDC): A cross-sectional study. Lancet Glob Health 4: e307–e319, 2016

[2] Krishnan AV, Phoon RK, Pussell BA, Charlesworth JA, Bostock H, Kiernan MC. Altered motor nerve excitability in end-stage kidney disease. Brain. 2005;128:2164–2174

[3] Laaksonen S, Metsarinne K, Voipio-Pulkki LM, Falck B. Neurophysiologic parameters and symptoms in chronic renal failure. Muscle Nerve. 2002;25:884–890

[4] Tilki HE, Akpolat T, Coskun M, Stalberg E. Clinical and electrophysiologic findings in dialysis patients. J ElectromyogrKinesiol. 2009;19(3):500–508

[5] Nielsen VK. The peripheral nerve function in chronic renal failure. II. Intercorrelation of clinical symptoms and signs and clinical grading of neuropathy. Acta Med Scand. 1971;190:113–7. [PubMed]

[6] ParagAradhey, AnandBakre, Sunil Kumar, SouryaAcharya. Clinical profile of Uremic polyneuropathy in Chronic Kidney Disease Patients. Medical Science, 2020, 24(102), 945951

[7] Kher V: End-stage renal disease in developing countries. Kidney Int. 2002, 62 (1): 350-62. 10.1046/j.1523-1755.2002.00426.x..

[8] Sakhuja V, Sud K: End-stage renal disease in India and Pakistan: burden of disease and management issues. Kidney Int Suppl. 2003, 83 (83): S115-8.

[9] Jain, J., S. Banait, I. Tiewsoh, and M. Choudhari. "Kikuchi's Disease (Histiocytic Necrotizing Lymphadenitis): A Rare Presentation with Acute Kidney Injury, Peripheral Neuropathy, and Aseptic Meningitis with Cutaneous Involvement." Indian Journal of Pathology and Microbiology 61, no. 1 (2018): 113–15. https://doi.org/10.4103/IJPM.IJPM_256_17.

[10] Balwani, M.R., C. Bawankule, P. Khetan, V. Ramteke, P. Tolani, and V. Kute. "An Uncommon Cause of Rapidly Progressive Renal Failure in a Lupus Patient: Pauci-Immune Crescentic Glomerulonephritis." Saudi Journal of Kidney Diseases and Transplantation : An Official Publication of the Saudi Center for Organ Transplantation, Saudi Arabia 29, no. 4 (2018): 989–92. https://doi.org/10.4103/1319-2442.239632.

[11] Balwani, M.R., C.P. Bawankule, A. Pasari, P. Tolani, S. Vakil, and R. Yadav. "Minimal Change Disease and Kimura's Disease Responding to Tacrolimus Therapy." Saudi Journal of Kidney Diseases and Transplantation : An Official Publication of the Saudi Center for Organ Transplantation, Saudi Arabia 30, no. 1 (2019): 254–57. https://doi.org/10.4103/1319-2442.252921.

[12] Balwani, M.R., A. Pasari, A. Meshram, A. Jawahirani, P. Tolani, H. Laharwani, and C. Bawankule. "An Initial Evaluation of Hypokalemia Turned out Distal Renal Tubular Acidosis Secondary to Parathyroid Adenoma." Saudi Journal of Kidney Diseases and Transplantation : An Official Publication of the Saudi Center for Organ Transplantation, Saudi Arabia 29, no. 5 (2018): 1216–19. https://doi.org/10.4103/1319-2442.243965.

[13] Balwani, M.R., A. Pasari, and P. Tolani. "Widening Spectrum of Renal Involvement in Psoriasis: First Reported Case of C3 Glomerulonephritis in a Psoriatic Patient." Saudi Journal of Kidney Diseases and Transplantation 30, no. 1 (2019): 258–60. https://doi.org/10.4103/1319-2442.252922.

[14] Dande, R., A.R. Gadbail, S. Sarode, M.P.M. Gadbail, S.M. Gondivkar, M. Gawande, S.C. Sarode, G.S. Sarode, and S. Patil. "Oral Manifestations in Diabetic and Nondiabetic Chronic Renal Failure Patients Receiving Hemodialysis." Journal of Contemporary Dental Practice 19, no. 4 (2018): 398–403. https://doi.org/10.5005/jp-journals-10024-2273.

[15] Goswami, J., M.R. Balwani, V. Kute, M. Gumber, M. Patel, and U. Godhani. "Scoring Systems and Outcome of Chronic Kidney Disease Patients Admitted in Intensive Care

Received 15 December 2020; Accepted 05 January 2021.

Units." Saudi Journal of Kidney Diseases and Transplantation : An Official Publication of the Saudi Center for Organ Transplantation, Saudi Arabia 29, no. 2 (2018): 310–17. https://doi.org/10.4103/1319-2442.229268.

[16] Taksande, A. "Sensory Nerve Conduction Study in Patient of Thyroid Dysfunction in Central India." Journal of DattaMeghe Institute of Medical Sciences University 15, no. 2 (2020): 223–26. https://doi.org/10.4103/jdmimsu.jdmimsu_158_20.

[17] Rathi, N., B. Taksande, and S. Kumar. "Nerve Conduction Studies of Peripheral Motor and Sensory Nerves in the Subjects with Prediabetes." Journal of Endocrinology and Metabolism 9, no. 5 (2019): 147–50. https://doi.org/10.14740/jem602.

[18] Acharya, S., S. Lahole, S. Shukla, P. Mishra, and P. Aradhey. "Copper Deficiency Myeloneuropathy with Bicytopenia-a Rare Case Report." International Journal of Nutrition, Pharmacology, Neurological Diseases 10, no. 3 (2020): 154–56. https://doi.org/10.4103/ijnpnd.ijnpnd_17_20.