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Review Paper

A Comparative Study and Analysis of Nutritional Status of Chronic Kidney Disease Patient in Indian Scenario

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ABSTRACT:
End-stage renal infection (ESRD) can result from a wide range of kidney illnesses. Right now, 90% of patients arriving at CKD have constant diabetes mellitus, glomerulonephritis or hypertension. With CKD comes a bunch of issues connected with the kidney's failure to discharge side-effects prompts side effects of uremia. The medicines of CKD require dialysis or kidney transplantation. In this survey, an endeavor has been made to make sense of the healthful administration of CKD alongside different dialysis treatment and the confusions connected with the dialysis technique. It is vital to keep up with ideal wholesome status, so the patient will be a decent possibility to answer the treatment effectively. Kidneys Patients require following a balanced diet intend to hold ordinary protein stores and to stay away from metabolic inconveniences. This article manages the remedial parts of sustenance in CKD patients and will work on the personal satisfaction

Keywords: ESRD, CKD, Dialysis, Health administration.

INTRODUCTION:

The kidney is the human organ essentially answerable for the filtration of nitrogenous and other metabolic byproducts from the body through the urinary framework and keeps up with the digestion of biochemical particularly haemostatics liquid, electrolyte and corrosive base equilibrium (1). Another key biochemical capability of the kidney is to assist with keeping up with pulse, actuate vitamin D and produce erythropoietin. In any case, the proficiency of the kidney is a downfall when there is a deficiency of nephron function (2). An ongoing renal disappointment which is likewise realized uremia is a radically elevated degree of urea in the blood which might be the final product of intense glomerulonephritis and nephrotic syndrome (3 ,4). CRF is a gradually moderate loss of renal capability over a time of month or year bringing about unusually low glomerular filtration rate which is typically resolved by implication by the creatinine level in the blood serum (5). The people with stage 4 constant kidney sickness (CKD) have progressed kidney harm with an extreme reduction in the glomerular filtration rate (GFR) to 15-30 ml/min (6,7). In the administration of ESRD, dialysis is utilized on either transitory premise or extremely durable premise. There might be plausible of a kidney relocate soon. Dialysis is a fake cycle by which nitrogenous side-effects are eliminated from the blood in case of kidney disappointment (8, 9). There is two principal kind of dialysis - hemodialysis and peritoneal dialysis. In hemodialysis, the blood is purged external the body by means of a robotized machine, and during the time spent peritoneal dialysis, the blood is separated through the peritoneal film situated in the midsection. The normal trademark reception of the two sorts of dialysis is the evacuation of the squanders and abundance liquids from the body (10).

REASONS FOR CKD:

There can be a few reasons for CKD which incorporates invulnerable complex glomerulonephritis, constant pyelonephritis, metabolic sicknesses with renal contribution as Diabetes mellitus, particularly IDDM, HT, harmful substances or medications like Paracetamol, Crocin, Diclofenac sodium, Vovron, Ibuprofen, Carbon tetrachloride, calming drugs, certain toxic mushrooms(11,12,13). CKD may likewise happen from immunological response to drugs like specific Anti-toxins. The states of CKD can likewise be because of diseases causing checks of the urinary plot like stones calcium phosphate, calcium oxalate and uric corrosive. The other likely explanations are hypertension, renal cylindrical sickness, renal vascular infections, innate irregularities like a polycystic illness, gout and stomach careful crisis, constant lack of healthy sustenance (14,15). For the most part, the pee yield relies on GFR. When renal disappointment happen the typical elements of kidney like guideline of body liquids, electrolytes, PH and discharge of metabolites are upset. (16)

COMPLEXITIES OF CKD:

The significant entanglement of CKD is osteodystrophy prompting sickliness. This especially happens because of disappointment in controlling Ca and P levels because of an aggravation in two metabolic capabilities for example initiation of Vit. D and activity of parathyroid chemicals(17,18). The side effects of Osteodystrophy is by and large appeared as bone agony, different bone disfigurements, stride, sluggishness, windedness on effort, draining because of unusual platelet function. CKD additionally influence sensory system which prompts muscle jerking, sensation in limits and spasms This can be forestalled by decreasing phosphate in counts calories like limitation PO4 rich food varieties like milk, entire grain, bread and so on((19).

COMPLEXITY IN HAEMODIALYSIS:

Hypotension:

It is a most intense complexity of the hemodialysis. Numerous dialytic and patient-related factors impact circulatory strain during the treatment cardiovascular result and pulse should be kept up with by an increment pulse and in certain occasions by an expansion in myocardial contractility (20). Notwithstanding, the enormous weight of cardiovascular illness in hemodialysis populace frequently restricts the capacity of the heart to answer properly to the pressure of liquid expulsion. These innately various reactions to ultrafiltration and dispersion extraordinarily impact the support of circulatory strain during Hemodialysis (21).

Cramps:

Muscle cramps happen in as numerous as 20% of dialysis treatment. Cramps are known to be more continuous when ultra filtration rates extremely high. Furthermore, when dialysate with low sodium fixation is utilized, a sign that spasms are brought about by intense extra cell volume compression (22)

Arrhythmias and Angina:

Patient with ESRD oftentimes have a few inclining factors for arrhythmias. There is a high predominance of left ventricular hypertrophy and valvular sclerosis. Coronary corridor sickness is normal in the dialysis populace, and pericardial radiations are habitually uncovered by echocardiography (23,24). The explanations for this are the quick changes in electrolyte fixations innate in effective Hemodialysis. It isn't is business as usual that Hemodialysis might incite cardiovascular arrhythmias. Angina regularly happens during dialysis. The frailty related with ongoing renal disappointment adds to the gamble of episodes of angina (25).

Hypoxia:

Hypoxia happens during Hemodialysis is impacted by the idea of the cradle utilized in the dialysate and by the kind of film in the fake kidney. The blood vessel Pco2 in acetic acid derivation supported dialysate is low, making a dispersion slope from blood to the dialysate. Since carbon dioxide is eliminated from the blood into the dialysate, there is diminished in the respiratory drive. The subsequent variable impacting the extent of hypoxia that happens during dialysis is the sort of film utilized. Hypoxia is noted when patients are dialyzed against a bioincompatible layer like a cellulosic film (26, 27).

Hypoglycemia:

Carbohydrate digestion is very strange in patients with ongoing renal disappointment. A diabetic patient who takes a typical portion of insulin might encounter hypoglycemia while going through dialysis against a shower with a decent glucose fixation (that is glucose clasp) and excessively low for how much insulin being directed (28, 29). It is habitually important to diminish the portion of insulin on dialysis days to forestall hypoglycemic episodes. (30)

Discharge:

The uremic climate produces disabled platelet working, changes in narrow penetrability and frailty, all of which can debilitate homeostasis. Patient going through Hemodialysis actually has a higher gamble of the hemorrhagic occasion in light of rehashed openness to heparin (31).Heparin is utilized to forestall coagulating in the extracorporeal circuit. Notwithstanding intense draining episodes, a patient going through Hemodialysis is presented to ongoing, poor quality episodes of blood misfortune with every dialysis treatment (32,33,).

COMPLEXITY IN PERITONEAL DIALYSIS:

Cardiovascular Sickness:

It is a significant reason for death in PD patients. The pace of CVD is higher in dialysis patients than in hypoalbuminmea.

Hypertension:

Hypertension is extremely normal. It happens in 50 to 90% of PD patients. It could be made sense of to some extent by liquid maintenance because of debilitated ultrafiltration(36,37). Hyperlipidemia: PD is related with an expanded glucose load in light of steady assimilation from the peritoneal depression. As a result of this glucose load, PD patient has a consistent weakness to the improvement of hyperglycemia and hyperinsulinemia. This increments insulin levels bring about an expansion in the union of fatty oils in the liver, moreover, dialysate protein deficiency of 5 to 15 gm each day brings about the deficiency, everything being equal, with special loss

of little particles like HDL.(38,39)

DIALYSIS IN ESRD:

Dialysis is the technique that replaces a portion of the kidney's ordinary capability. It is performed when an individual encounter kidney disappointment, generally when over 95% of kidney capability is lost in both kidneys. Dialysis keeps the body adjusted by eliminating side-effects including salt and overabundance liquid, keeping a protected degree of blood synthetic substances like Na, K and Cl and controlling pulse (40). It is of two kinds:-

HEMODIALYSIS:

PERITONEALDIALYS:

Hemodialysis: It is broadly performed. Survey to the vascular framework is through Scribner shunts, atriovenous fistulas, and unions. The genuine dialyzer might be of equal plate, loop, or empty fiber type. Body solutes & excessive body liquid can be effectively cleared by utilizing dialysate liquids of the known synthetic creation. In this cycle blood passes by the semipermeable film of the fake kidney and side-effects are taken out by dissemination and reestablish the body's substance balance. Non dialyzed uremic patients can process 0.5 to 0.6 gm per kg. body weight. protein. Clinically steady patients can ingest 1.13 gm. each day protein and 23 to 24 kcal per kg body wt. per day (42).

DIETARY ADMINISTERATION OF CKD:

Energy:

Energy necessity of the renal patients depends on their sex, level, weight, and sort of work (stationary or moderate).Sufficient non-protein calories as starches and fats is crucial for spare protein for protein blend and energy needs 32-38 kcal/kg/day for grown-ups and 100-150 kcal/kg/day in the event of kids. For the most part, 300-400gm Starch ought to be given everyday ideally as straightforward carbs like sugar, honey, glucose etc. (41).

Protein:

0.5-0.8gms/kg body weight of protein each day is expected with 60-70% as high organic worth protein. This necessity is to decrease azotemia hyperkalemia and acidosis. Sources ought to incorporate Fundamental Amino Acids from milk egg and so on. Protein necessity goes from 20-60 gm/day of high organic value, 50%from creature sources and 50%from plant sources (42).

Starches:

Adequate measure of sugar to meet the energy necessity to forestall starvation ketosis, decrease catabolism of protein, to have protein saving activity. (43).Generally, 300-400 gms/day in type of refined and complex sugar are preferred.(44)

Fats:

Unsaturated fats are liked to immersed fat .The proportion of PUFA: SFA ought to be 1:1. Emulsified fat like cream, margarine are preferred (45).

Sodium:

Ideal admission 1-2mmol/kg (baby) 40-60 mmol/day more established kid or 500mg - 2.0 gms/day in grown-ups (46, 47). Severe limitation is required if hypertension and oedema.2 mmol/kg body weight/day and diuretic until emergencies are finished. Reduced kidney capability prompts sodium unevenness; any abrupt expansion in sodium consumption can't be discharged and may cause more edema (48, 49, 50).

Potassium:

Potassium level in CRF can be either raised or discouraged. Spewing and the runs prompts hypokalemia in which little portion of potassium might be required (51). Serious Glomerular filtration disappointment brings about hyperkalemia which prompts expansion in serum potassium level bringing about heart failure (52, 53,54). So potassium rich food like tomato, juices, espresso, tea, cocoa, potassium rich vegetables ought to be stayed away from. Potassium admission ought to be 1500mg/day (35-40mEq/day (55, 56). Phosphorus, Sulfate, Natural Corrosive: There inadequacy prompts decreased nephron capability and diminished filtration and discharge of these material prompts acidosis (57,58).

Calcium and Phosphorus:

When GFR falls 20-30% beneath typical hyperphosphatemia happens. Hyperthyroidism prompts hypocalcemiaresulting in osteodystrophy. Phosphorus admission is confined 800-1200mg/day(59,60). Phosphate restricting specialists might be utilized whenever expected to lessen ingestion. Calcium supplements are additionally suggested. Calcium admission of 1 to 2 gms/day is encouraged (61,62). Try not to begin calcium supplements, except if phosphate is limited, to stay away from delicate tissue calcification. Calcium carbonate enhancements can assist with buffering metabolic acidosis. Multivitamin supplements are required .Supplement of nutrient D3 might be suggested in view of necessities (63,64).

Water:

Liquid is restricted to urinary result +-500 ml each day. Complete admission should represent extra liquids in the

food sources polished off and in water got from digestion of food supplements and waste liquids misfortunes (65,66,67).

Nutrients:
Limits in protein and lack of mineral utilization of nutrient eating routine. Multivitamin supplement ought to give to address osteodystrophy vitamin D ought to be enhanced different nutrients like folic corrosive and B6 ought to likewise be given. Vitamin E forestalls oxidate pressure in dialysis patients.(68,69,70,71,72)

Dietary Administration of Hemodialysis:

Energy:
35 kcal per kg ideal body weight (table-1) .Excessive body weight and protein energy malnutrition should be avoided (73). The prescribed amount of calories has protein sparing action and also it reduces protein catabolism and starvation keto acidosis (74).

Protein:
Protein necessity expands due to the dialysate misfortunes and catabolism in hemodialysis patients NKF-DOQI proposes the mean protein prerequisites for 1.2 g/kg/day in HD patients, separately (42). As per ESPEN, changed diet protein ought to be consumed as 1.1-1.2 g/kg/day and ought to be high in the natural worth (of creature beginning) of 50 % protein in hemodialysis patients.

Sodium:
When patients drink a lot of liquid it might really weaken their Na might be high. A lot of Na and water raise pulse and results in water maintenance, pneumonic edema (75). At the point when sodium admission is high really take a look at liquid status, if high liquid increases, advice patient to eat less pungent food sources. Eat less salt in diet and liquid. Really look at liquid status to check whether patient is most likely drinking an excess of Liquid. Limit wt. gains to under 4% of body wt. also, request that they eat less pungent food varieties and to restrict liquid to 3 cups + pee yield. On the off chance that low liquid additions, ensure they are acquiring around 1.5 kg body wt. also, are not dehydrated.2 to 3 gm each day sodium ought to be given. Sodium benzoate, potassium meta bisulphate added as additive in pickles, squashes and canned food ought to be kept away from. Business soda pops, restrictive beverages, dry food sources like fish, products of the soil blocks ought to be avoided(76,77).

Potassium:
2 to 3 gm each day of potassium is suggested (78, 79). At the point when the kidneys don't work as expected, potassium develops in the body and cause the heartbeat unevenly and stop abruptly (80, 81). Too little potassium can likewise be perilous. Filtering of vegetables is finished to decrease potassium content (82, 83).

Phosphorus:
1 to 1.2 gm each day of phosphorus is suggested (84,). It is a mineral found in every one of the food sources yet particularly present in milk items (85, 86). There should be a reasonable between the calcium and phosphorous in the body (87, 88). To keep up with calcium phosphorous equilibrium, protein and phosphorous admission needs limitation (89,90).

Liquid Admission:
In dialysis there is peril of both water inebriation from over-burdening and lack of hydration because of little water admission or retching or loose bowels (91,92). Liquid admission ought to screen cautiously. 24 hrs pee yield + 500 to 700 ml liquid is adequate in state of Oliguria (93, 94).

Table: Nutrient intake for patients of Hemodialysis.

Nutrients	Recommended intake
Dietary protein intake(DPI)	1.2g/kg/d for clinically stable patients (atleast 50% should be of high biological value)
Daily energy intake (DEI)	
	30–35kcal/kg/dif 60 years or 35kcal/kg/dif<60years
Total Fat	25–35%of total energy intake
Saturated fat	<7%of total energy intake
Polyunsaturated fatty acids	Upto10%of total calories
Monounsaturated fatty acids	Upto20%of total calories
Carbohydrate	Rest of calories (complex carbohydrate sp referred)
Total fiber	"/>20–25g/d
Minerals and Water (Range of Intake)	

Sodium	750–2000mg/d
Potassium	2000-2750mg/d
Phosphorus	800-1000mg/d
Calcium	<1000mg/d
Magnesium	200–300mg/d
Iron	10-18mg /d
Zinc	15mg/d
Selenium	55µq/d

Peritoneal dialysis is used electively or when circumstances prohibit chronic hemodialysis (98). In this dialysis improved soft catheters can be used repeatedly in comparison to hemodialysis. In this type the patient's blood is cleaned within the body. The blood stays in the blood vessels which line the patient's abdominal space (99).

DIETARY MANAGEMENT IN PERITONEAL DIALYSIS:

Table3: Recommendations for protein and energy supply in adult patients on routine Hemodialysis and (CAPD (100).

ESPEN		**NKF**
Protein intake	1.2–1.4(450%HBV)	
(g/kg BW/day	1.2(450%HBV) Hemodialysis CAPD	1.2–1.5(450%HBV)
	1.2–1.3	(450% HBV)
Energy intake (kcal/kg BW/day)		
Haemodialysis and CAPD*	35	<60yr35
<60yr 30		

ESPEN (European Society for Clinical Nutrition and Metabolism), NKF (National Kidney Foundation), CAPD (chronic ambulatory peritoneal dialysis). Including energy supply (glucose) from dialysis. HBV=high biological value.

Table3: Mineral requirements of patients on HD, haemodialysis; CAPD, chronic ambulatory peritoneal dialysis (101)

Phosphate (mg/d)	800–1000
Potassium (mg/g)	2000–2500
Sodium (g/d)	1.8–2.5
Fluid (ml)	1000+urinevolume

***Individual CKD patient's requirements may differ in acute conditions.**

Energy admission of 25 kcal per kg body weight each day, the protein admission of 1.2 to 1.3 gm per kg each day (11). (≥ half of high organic worth), 30 gm of fat each day, PUFA: SFA-1:1(101), cholesterol admission ≤ 300mg each day, sodium admission of 750 to 1000 mg each day, potassium consumption of40 to 70 mEq each day, phosphorus admission of 8 to 17 mg for every kg each day, calcium admission of1400 to 1600 mg each day, iron admission adequate to keep up with serum iron level and zinc admission of 15mg each day is recommended(102,103). 92.0% is squared value of adjusted R (RSquaredis92.0). This value represents the percentage of variation, explained by all variables. According to the mean value (3.79) & standard deviation (S.D.) (.84) along with little statistical difference among respondents opinion, it could be seen that a large number of respondents across different demographic categories validate null hypothesis i.e. majority of respondents across various demographic categories validate the null hypothesis "There is no significant difference among respondent opinion (gender-wise, education-wise, experience-wise and organization-wise) regarding "Indian governments have not been able to make the best use of Indians comparative advantages with China in order to tap into the under-exploited Chinese market". According to research statement, As India requires

immediate investment in its Manufacturing sector to improve output, employment opportunities and in resolving the supply-side issues. To overcome with trade deficit, another way is Foreign Direct Investment points according to hypothesis (H_{23}), according to respondents across different demographic categories, there is no difference regarding respondents opinion (gender-wise, education-wise, experience-wise and organization-wise), that India requires immediate investment in its Manufacturing sector to improve output, employment opportunities and in resolving the supply-side issues, another way to overcome the trade deficit is by attracting large sums of Foreign Direct Investment (FDI) from China.

CONCLUSION:

As recommended for high risk population, hemodialysis therapy should deal with by a multidisciplinary team. Because it is a part of medical nutrition therapy, it is important to provide periodic counseling and nutrition education by dietitians. For better and effective interventions, it important that dietitians should always present as a guide for educating hemodialysis patients about their nutritional needs. They should provide information about nutrients, food sources and usage exchange food lists. Patients requirements of food intakes should be based on theirs laboratory tests value. Initially patients may be predisposing for intake lower than recommended amounts of micronutrients and energy in their diet. Follow-up of patients must be done by renal dietitians, who received information and counseling about their diet.

REFERENCES:

1. Evans, DavidH., Peter M. Piermarini, and KeithP. Choe. "The Multifunctional Fish Gill: Dominant Site of Gas Exchange, Osmoregulation, Acid-Base Regulation, and Excretion of Nitrogenous Waste."PhysiologicalReviews85.1 (2005):97–177.

2. Sands, J.M., and J.W. Verlander. "Functional Anatomy of the Kidney ." Comprehensive Toxicology (2018): 1–26.

3. Nigwekar, Sagar U., and Ravi Thadhani. "VitaminD Receptor Activation: Cardio vascular and Renal Implications."Kidney International Supplements. 3.5(2013):427–430.

4. Menon, Shinaetal. "VitaminD Insufficiency and Hyperparathyroidism in Children with Chronic Kidney Disease."Pediatric Nephrology 23.10(2008):1831–1836.Crossref.Web.

5. Coresh, Josefetal. "Declinein Estimated Glomerular Filtration Rate and Subsequent Risk of End-Stage Renal Disease and Mortality." JAMA311.24 (2014):2518.

6. Hering,D.etal."Renal Denervation in Moderate to Severe CKD."Journal of the American Society of Nephrology. 23.7 (2012):1250–1257.

7. Levey,Andrew S.et al. "Definition and Classification of Chronic Kidney Disease: A Position Statement from Kidney Disease: Improving Global Outcomes (KDIGO)."Kidney International. 67.6(2005):2089–2100.

8. Oshima, Shinji et al. "The Use of an Artificial Skin Model ."Biological & Pharmaceutical Bulletin. 35.2(2012):203–209.

9. Oshima, Shinji et al. "The Use of an Artificial Skin Model to Study Transdermal Absorption of Drug sinInflamed Skin."Biological & Pharmaceutical Bulletin. 35.2(2012):203–209.

10. Dhondt,Annemieke et al. "The Removal of Uremic Toxins."Kidney International. 58(2000):S47–S59.

11. Blackshear, Joseph L. "Identification of Risk for Renal Insufficiency From Non steroidal Anti-Inflammatory Drugs." Archives of Internal Medicine. 143.6(1983):1130.Crossref.Web

12. Whelton, Andrew. "Nephro toxicity of Nonsteroidal Anti-Inflammatory Drugs: Physiologic Foundations and Clinical Implications."The American Journal of Medicine. 106.5(1999):13S–24S.

13. Gutierrez, Alberto, Jonas Bergström, and A. Alvestrand. "Hemodialysis-Associated Protein Catabolismwith and Without Glucose in the Dialysis Fluid." Kidney International 46.3 (1994): 814–822.

14. Whelton,Andrew."Nephrotoxicity of Non steroidal Anti-Inflammatory Drugs: Physiologic Foundations and Clinical Implications."The American Journal of Medicine 106.5(1999):13S–24S.Crossref.Web.

15. Mindell, Joseph A., and Glenn M. Chertow. "A PRACTICAL APPROACH TO ACUTE RENALFAILURE."Medical Clinics of North America. 81.3 (1997):731–748.

16. Davies, M. R. "Low Turnover Osteodystrophy and Vascular Calcification Are

Amenable to SkeletalAnabolism in an Animal Model of Chronic Kidney Disease and the Metabolic Syndrome." Journal of the American Society of Nephrology. 16.4(2005):917–928.

17. Moe,S.etal."Definition, Evaluation, and Classification of Renal Osteodystrophy: A Position Statement
From Kidney Disease: Improving Global Outcomes (KDIGO)."Kidney International 69.11(2006):1945–1953.

18. Burn,D.J.,andD.Bates."Neurology and the kidney. "*Journal of Neurology, Neurosurgery & Psychiatry* 65.6 (1998): 810-821. 20. Leypoldt, John K. et al. "Relationship Between Volume Status andBlood Pressure During Chronic Hemodialysis." Kidney International 61.1 (2002): 266–275.

19. Mazzuchi, Nelson, Enriqueta Carbonell, and Juan Fernández-Cean. "Importance of Blood PressureControl in Hemodialysis Patient Survival." Kidney International 58.5 (2000): 2147–2154.

20. Hinoshita,Fumihiko et al."Effect of Orally Administered Shao- Yao-Gan-Cao-Tang (Shakuyaku-Kanzo-to) on Muscle Cramps in Maintenance Hemodialysis Patients: A Preliminary Study."The American Journal of Chinese Medicine 31.03(2003):445–453.

21. Maier,LarsS."A Novel Mechanism for the Treatment of Angina, Arrhythmias, and Diastolic Dysfunction: Inhibition of Late INa Using Ranolazine." Journal of Cardiovascular Pharmacology 54.4(2009): 279–286.

22. Khan, Abdur Rahman et al. "Impact of Cell Therapy on Myocardial Perfusion and CardiovascularOutcomesinPatientsWithAnginaRefractorytoMedicalTherapyNoveltyandSignificance."Circulation Research118.6(2016): 984–993.

23. Kimura,Ken-ichietal. "Cardiac Arrhythmiasin Hemodialysis Patients."Nephron53.3(1989):201–207.

24. Holds tock, L. et al. "Four-Week Studies of Oral Hypoxia-Inducible Factor-Prolyl Hydroxylase Inhibitor GSK1278863 for Treatment of Anemia." Journal of the American Society of Nephrology 27.4 (2015):1234–1244.

25. Campos, Israeletal. "Intradialytic Hypoxemiain Chronic Hemodialysis Patients. "Blood Purification41.1-3(2016):177–187.

26. Sun,Chiao-Yin,Chin-ChanLee,andMai SzuWu. "Hypoglycemia in Diabetic Patients Undergoing Chronic Hemodialysis."Therapeutic Apheresis and Dialysis 13.2(2009):95–102.

27. Takahashi,A.etal."The Mechanism of Hypoglycemia Caused by Hemodialysis."Clinical Nephrology62.11(2004):362–368.

28. Shinohara, K. "Insulin Resistance as an Independent Predictor of Cardiovascular Mortality in Patientswith End-Stage Renal Disease." Journal of the American Society of Nephrology 13.7 (2002): 1894–1900.

29. Vázquez, Eduardoetal. "Ought Dialysis Patients with Atrial Fibrillation Be Treated with Oral Anticoagulants?"International Journal of Cardiology. 87.2-3(2003):135–139.

30. Brunet, Philippe et al. "Pharmaco dynamics of Unfractionated Heparin During and After a Hemodialysis Session."American Journal of Kidney Diseases. 51.5(2008):789–795.Crossref.Web.

31. Hafner,G.et al. "Laboratory Control of Minimal Heparinization During Haemodialysis in Patients with a Risk of Haemorrhage."Blood Coagulation & Fibrinolysis, 5.2(1994):221–226.

32. Go, AlanS. E tal."Chronic Kidney Disease and the Risks of Death, Cardio vascular Events, and Hospitalization."New England Journal of Medicine 351.13(2004):1296–1305.

33. Levin, Adeera. "THECLINICAL EPIDEMIOLOGY OF CARDIO VASCULAR DISEASES IN CHRONIC KIDNEY DISEASE: Clinical Epidemiology of Cardiovascular Disease in Chronic Kidney Disease Priorto Dialysis."Seminarsin Dialysis. 16.2 (2008):101–105.

34. Georgianos, PanagiotisI., and Rajiv Agarwal. "Epidemiology, Diagnosis and Management of Hypertension Among Patients on Chronic Dialysis." Nature Reviews Nephrology 12.10 (2016): 636–647.

35. Georgianos, Panagiotis I., Pantelis A. Sarafidis, and Carmine Zoccali. "Intra dialysis Hypertension in End-Stage Renal Disease Patients."Hypertension. 66.3 (2015):456–463.

36. Querfeld,U .et al."Hyper lipidemiain

Pediatric Patients Undergoing Peritoneal Dialysis."Pediatric Nephrology. 2.4(1988):447–452.

37. Chan, ManKam, ZachariahVarghese, and JohnF. Moorhead. "Lipid Abnormalities in Uremia, Dialysis, and Transplantation." Kidney International. 19.5(1981):625–637.Crossref.Web.

38. Kopple, JD."Dietary Protein and Energy Requirements in ESRD Patients."American Journal of Kidney Diseases. 32.6(1998): S97–S104.

39. Karalis, Maria."Low Protein Products."Journal of Renal Nutrition. 13.1(2003):E1–E3.

40. Brunet, Philippe et al." Pharmaco dynamics of Unfractionated Heparin Duringand Aftera Hemodialysis Session."American Journal of Kidney Diseases. 51.5(2008):789–795.

41. National Kidney Foundation. KDOQI Clinical Practice Guidelines for Nutrition in Chronic Renal Failure. AmJ KidneyDis. 2000;35(suppl2):S1–S140.

42. Merrill, John P. "The Use of the Artificial Kidney in the Treatment of Uremia." Journal of Urban Health75.4 (1998):911–918.

43. A Saxena, A Gupta"Manual ofNephrology"health science publisher, NewDelhi 2016
–page-288-289.

44. Huang, Xiaoyan et al. "Dietary Fat Modification in Patients with Chronic Kidney Disease: n-3 Fatty Acids and Beyond."Journal of Nephrology. 26.6(2013):960–974.Crossref.Web.

45. Henrich, William L. et al. "Competitive Effects of Hypokalemia and Volume Depletion on PlasmaRenin Activity, Aldosterone and Catecholamine Concentrations in Hemodialysis Patients." KidneyInternational
12.4(1977):279–284.Crossref.Web.

46. Waikar, Sushrut S., Gary C. Curhan, and Steven M. Brunelli. "Mortality Associated with Low Serum Sodium Concentration in Maintenance Hemodialysis."The American Journal of Medicine 124.1(2011):77–84.Crossref.Web.

47. Block,G.A. et al."Effect of Tenapanoron Inter dialytic Weight Gain in Patients on Hemodialysis." Clinical Journal of the American Society of Nephrology 11.9(2016):1597–1605.Crossref.Web.

48. Schork,A.etal."Association of Plasmin uria with Overhydration in Patients with CKD."Clinical Journal of the American Society of Nephrology 11.5(2016):761–769.

49. Sarkar, Shubho R. et al."Assessment of Body Compositionin Long-Term Hemodialysis Patients: Rationale and Methodology."Journal of Renal Nutrition 15.1(2005):152–158.Crossref.Web.

50. Murphy, S. C., S. Agger, and P. M. Rainey. "Too Much of a Good Thing: A Woman with Hypertension and Hypokalemia."Clinical Chemistry 55.12(2009):2093–2096.

51. Steen, Bertil. "Hypokalemia-Clinical Spectrum and Etiology."Acta Medica Scandinavica. 209.S647(2009): 61–66. Crossref.Web.

52. Karnik, Jwala A.,et al. "Cardiac arrest and sudden death in dialysis units."*Kidney international* 60.1(2001): 350-357.

53. Bleyer, A.J., et al."Characteristics of sudden death in hemodialysis patients."*Kidney international* 69.12(2006):2268-2273.

54. Herzog, Charles A., J. Michael Mangrum, and Rod Passman. "Non-Coronary Heart Disease In DialysisPatients: Sudden Cardiac Death and Dialysis Patients." *Seminars in dialysis*. Vol. 21. No. 4. Oxford,UK: Black well Publishing Ltd,2008.

55. Sahay, Manisha, Rakesh Sahay, and Manash P. Baruah. "Nutrition in chronic kidney disease." *Journal of Medical Nutrition and Nutraceuticals.* 3.1(2014):11.

56. Kraut, Jeffrey A., and Glenn T. Nagami. "Metabolic Acidosis of Chronic Kidney Disease. "*Text book of Nephro-Endocrinology*.2008.457-481.

57. ARTHUR, CHOIKIM MING."URINARY CITRATE IN CHINESE PATIENTS WITH NEPHROLITHIASIS." (1998).

58. Gal-Moscovici, Anca, and Stuart M. Sprague. "Endocrinology and Dialysis Jean L. Holley, SeriesEditor: Osteoporosis and Chronic Kidney Disease." *Seminars in dialysis*. Vol. 20. No. 5. Oxford, UK:Black well PublishingLtd, 2007.

59. Cano, N. J. M., et al. "ESPEN Guidelines on Parenteral Nutrition: adult renal failure." *ClinicalNutrition*28.4 (2009):401-414.

60. Block, Geoffrey A., and Friedrich K. Port.

"Re-evaluation of risks associated with hyper phosphatemia and hyper parathyroidism in dialysis patients:recommendations for a change in management."*American Journalof KidneyDiseases*35.6(2000):1226-1237.

61. Torres, Armando, et al. "Treatment with in termittent calcitriol and calcium reduces bone loss afterrenal transplantation."*Kidney international* 65.2(2004):705-712.

62. Kraft, Michael D. "Phosphorus and calcium: a review for the adult nutrition support clinician." *Nutritionin Clinical Practice*30.1 (2015):21-33.

63. Souberbielle, Jean-Claude, et al. "Vitamin Dandmusculo skeletal health, cardio vascular disease, autoimmunity and cancer: Recommendations for clinical practice." *Autoimmunity reviews* 9.11 (2010):709-715.

64. Scales, Katie, and Julie Pilsworth."The importance of fluid balance in clinical practice."*Nursing Standard*22.47 (2008).

65. Broscious, Sharon K., and JudithCastagnola."Chronic kidney disease acute manifestations and role of criticalcare nurses."*Criticalcarenurse*26.4 (2006):17-27.

66. Bostom, A. G. et al. “Controlled Comparison of L-5-Methyltetrahydrofolate Versus Folic Acid for the Treatment of Hyperhomo cysteinemia in Hemodialysis Patients.” Circulation 101.24 (2000): 2829–2832.Crossref.Web.

67. Lindner, Armando et al. “Vitamin B6 Metabolism and Homocysteine in End-Stage Renal Disease and Chronic Renal Insufficiency.” American Journal of Kidney Diseases 39.1 (2002): 134–145. Crossref.Web.

68. Matias, P. J. et al. “Cholecalciferol Supplementation in Hemodialysis Patients: Effects on Mineral Metabolism, Inflammation, and Cardiac Dimension Parameters.” Clinical Journal of the American Society of Nephrology5.5(2010):905–911.Crossref.Web.

69. Descombes, Eric, Alfred B. Hanck, and Gilbert Fellay. “Water Soluble Vitaminsin Chronic Hemodialysis Patients and Need for Supplementation.” Kidney International 43.6 (1993): 1319–1328.Crossref.Web.

70. Ross, Edward A. et al. “Vitamin B6 Requirements of Patientson Chronic Peritoneal Dialysis.”KidneyI nternational36.4(1989):702–706.

71. Galli, Francescoetal. “VitaminE, Lipid Profile, and Peroxidation in Hemodialysis Patients.”Kidney International59(2001):S148–S154.Crossref.Web.

72. Mahan, L. Kathleen, and JaniceL. Raymond. *Krause's food & the nutrition care process 14th edition.*St.Louis, Missouri,Elsevier Health Sciences,(2017):715.

73. Therrien M, Byham-Gray L, Beto J. A review of dietary intake studies in maintenance dialysi spatients.*JRenNutr*.2015;25(4):329-338.

74. Rakova, Natalia, et al. "Increased salt consumption induces body water conservation and decreases fluid intake."*The Journal of clinical investigation.* 127.5(2017):1932-1943.

75. Kallenbach,JudithZ. *Review of Hemodialysis for Nurses and Dialysis Personnel-E-Book*.ElsevierHealthSciences,2015.

76. Gutch, Charley Franklin, Martha H.Stoner, and AnnaL. Corea. *Review of hemodialysis for nurses and dialysis personnel*. Mosby,1979.

77. Cupisti, Adamasco, et al. "Dietary approach to recurrent or chronic hyper kalaemiain patients with decreased kidney function."*Nutrients* 10.3(2018):261.

78. Levin, Adeera, et al. "Guidelines for the management of chronic kidney disease."*Canadian Medical Association Journal* 179.11(2008): 1154-1162.

79. Braglia,Amy. *Dietary knowledge of and compliance with potassium restriction in maintenance hemodialysi spatients*.California StateUniversity,Long Beach,2007.

80. Noori, Nazanin, et al."Dietary potassium in take and mortality in long-term hemodialysis patients."*American journal of kidney diseases* 56.2(2010):338-347.

81. Bethke, P. C., and S. H. Jansky. "The effects of boiling and leaching on the content of potassium and other minerals in potatoes." *Journal of food science* 73.5 (2008):H80-H85.

82. Abraham, Georgi,etal."Malnutrition and nutritional therapy of chronic kidney disease in

developing countries: the Asian perspective." *Advances in renal replacement therapy* 10.3(2003):213-221.

83. Block, Geoffrey A., and Friedrich K. Port. "Re-evaluation of risks associated with hyper phosphatemia and hyperparathyroidism in dialysis patients: recommendations for a change in management."*American Journal of Kidney Diseases*35.6(2000):1226-1237.

84. Spinozzi, NancyS."Chronic renal disease."*Handbook of Pediatric Nutrition*. Aspen Publishing,1993.476.

85. Pereira, PaulaC."Milk nutritional composition and its role in human health."*Nutrition* 30.6(2014):619-627.

86. Hill,Kathleen M. ,etal."Oral calcium carbonate affects calcium but not phosphorus balance in stage 3–4 chronic kidney disease."*Kidney international* 83.5(2013):959-966.

87. Ayus, J.C.,etal. "Phosphorus balance and mineral metabolism with 3 h daily hemodialysis."*Kidney international* 71.4(2007):336-342.

88. Cupisti, A damasco, etal. "Dietary habits and counseling focused on phosphate intake in hemodialysis patients with hyperphosphatemia." *Journal of Renal Nutrition* 14.4 (2004):220-225.

89. Sherman, Richard A., and Ojas Mehta. "Dietary phosphorus restriction in dialysis patients: potential impact of processed meat, poultry, and fish products as protein sources." *American Journal of KidneyDiseases*54.1 (2009):18-23.

90. Spinazzé, Silvia, and Dirk Schrijvers. "Metabolic emergencies."*Critical reviews in oncology/hematology* 58.1 (2006): 79-89.

91. Ayus,J.Carlos, Robert Levine, and AllenI. Arieff. "Fatal dysnatraemia caused by electivecolonoscopy."*Bmj* 326.7385(2003):382-384.

92. Glassford, Neil J., and Rinaldo Bellomo. "The role of oliguria and the absence of fluid administration and balance information in illness severity scores." *Korean Journal of Critical Care Medicine* 32.2(2017): 106-123.

93. Brooks, David K. "The modern treatment of anuria and oliguria." *Postgraduate medical journal* 34.397(1958): 583.

94. Guidelines for Dialysis Centre. Directorate General of Health Services,Government of India(2010):108-110

95. Therrien M, Byham-GrayL, BetoJ. A review of dietary intake studies in maintenance dialysis patients. *JRenNutr.*2015;25(4):329-338.

96. Soucy M. The impact of alternative medicine therapies on the nutrition and well-being of the chronic kidney disease (CKD) stage 5 patient. *Renal Nutrition Forum.* 2008.27(2):1-7.

97. Kolff,W.J."Dialysis in treatment of uremia: artificial kidney and peritoneal lavage."*AMA archives of internal medicine*94.1 (1954):142-160.

98. Ende, Norman. "Infarction of the bowel in cardiac failure."*New England Journal of Medicine* 258.18(1958): 879-881.

99. Toigo, G. ,etal. "Expert Working Group report on nutrition in adult patients with renal in sufficiency (part 1of2)."*CLINICAL NUTRITION-QUARTERLY*-19.3(2000):197-208.

100. Cano, N., etal. "ESPEN guidelines on enteral nutrition:adult renal failure."*Clinical Nutrition* 25.2(2006): 295-310.

101. Huang, Xiaoyan, etal. "Dietary fat modification in patients with chronic kidney disease: n-3fatty acids and beyond."*J Nephrol* 26.6(2013):960-74.

102. Alpers, DavidH. *Manual of nutritional therapeutics*. Lippincott Williams & Wilkins,(2008):502-510