Epidemiology International
Volume 4, Issue 1 - 2019, Pg. No. 10-19
Peer Reviewed & Open Access Journal

Research Article

Outcome of "Renal Diet Therapy and Deep Breathing Exercises" on Biochemical Parameters in Chronic Kidney Disease Patients of Shere Kashmir Institute of Medical Sciences (SKIMS) Soura Srinagar Kashmir

Dilshada Wani[1], Pity Koul[2]

[1]Professor cum Vice Principal, MMINNS & R Sher - i - Kashmir Institute of Medical Sciences, Soura, Srinagar, Kashmir.
[2]Programme Coordinator and Ex. Director of School of Health Sciences, IGNOU, New Delhi, India.
DOI: https://doi.org/10.24321/2455.7048.201903

I N F O

Corresponding Author:
Dilshada Wani, MMINNS & R Sher - i - Kashmir Institute of Medical Sciences, Soura, Srinagar, Kashmir.
E-mail Id:
dilshadawani@gmail.com
Orcid Id:
https://orcid.org/0000-0002-6567-5047
How to cite this article:
Wani D, Koul P. Outcome of "Renal Diet Therapy and Deep Breathing Exercises" on Biochemical Parameters in Chronic Kidney Disease Patients of Shere Kashmir Institute of Medical Sciences (SKIMS) Soura Srinagar Kashmir. *Epidem Int* 2019; 4(1): 10-19.

Date of Submission: 2019-03-25
Date of Acceptance: 2019-04-29

A B S T R A C T

Chronic Kidney Disease (CKD) is an irreversible and progressive reduction of renal tissue function which affects almost all other systems of the body. It often goes undiagnosed and therefore remains undertreated. For this reason, various biochemical parameters such as: serum creatinine and blood urea nitrogen, urinary protein, urinary albumin, urinary creatinine and Glomerular Filtration Rate (GFR) act as baseline predictors in early detection and management of CKD manifestations. Hence the present study was undertaken to find out the outcome of "Renal diet therapy and Deep breathing exercises" on 21 kidney related biochemical parameters among adult CKD patients who were admitted in SKIMS from 5th March 2012 to 31st July 2013.A total of 200 adult CKD patients being randomly selected were studied in two groups (experimental=100; control=100). The findings of the study revealed that CKD patients in the experimental group who received "Renal diet therapy and Deep breathing exercises" reported a considerable improvement ($p \leq 0.05$) in 11 biochemical parameters including: fasting serum glucose, cholesterol, triglycerides, HDL, LDL, calcium, phosphorus, potassium, chloride, hematocrit and platelets as compared to CKD patients in control group who received routine care, had shown a considerable improvement ($p \leq 0.05$) in only 5 biochemical parameters such as: fasting serum glucose, cholesterol, triglycerides, calcium and phosphorus. Hence, it can be inferred that "Renal diet therapy and Deep breathing exercises" were effective in regulating various biochemical parameters within normal level in CKD patients. However, the long-term efficacy of these non-pharmacological therapies need to be investigated.

Keywords: Chronic Kidney Disease, Biochemical Parameters, Deep Breathing Exercises, Renal Diet Therapy

Introduction

Chronic kidney disease is a global health problem with an increasing incidence, prevalence, high cost and poor outcome that results into increasing morbidly and mortality due to complications of decreased kidney function and cardiovascular disease.[1] Kidneys are one of the vital organs in the human body. They perform vital functions like excretion of waste products, maintenance of fluid and electrolyte balance, production of erythrocytes, regulation of blood sugar and calcium levels thus maintaining the homeostasis. As the kidney performs a wide variety of functions, thus loss of renal function affects not only the kidney but also effects other systems of the body.[2]

Research data[1,3,4] reveal that CKD patients need comprehensive educational awareness in order to have strict adherence to their dietary pattern, exercise, weight control and medication adherence for controlling the adverse effects of disease process and spending a better quality of life.

National Kidney Foundation guidelines (NKF)[5] have recommended that the nutritional status of chronic kidney disease patients should be monitored every 6 to 12 months when the kidney function is less than 60 percent of normal, and every 1 to 3 months when function falls to less than 30 percent of normal. Patients with diabetes need strictly instruction to monitor their blood glucose level regularly. Screening for albuminuria is recommended at a minimum of once annually to assess therapy response and to monitor for nephropathy.

NKF guidelines[5] have recommended the typical dietary intake for chronic kidney disease patients to ensure slow the progression of kidney disease as: i) Protein: 0.6-0.8 g/kg/ day ii) Sodium: <2 g/ day (<6 g/ day of salt) iii) Potassium: 40-70 meq/day iv) Phosphate: 600-800 mg/ day v) Calcium: 1400-1600 mg/ day (not to exceed 2000 mg/day) vi) Free water (in excess of urine output): 1-1.5 L/ day. vii) Calorie intake for diabetics: 35 calories/ kg/ day for <60 years of age and 30 calories/ kg/ day for 60 and >60 years of age.

Meta-analysis of five of the best studies of both diabetic and non-diabetic renal disease as cited by (NKF)[5] have reported a strong association of dietary protein restriction (0.6-0.8 g/ kg/ day) with a reduction in glomerular hyper filtration that slows the progression of renal disease. Similarly, patients on antihypertensive therapy need regular monitoring for urinary protein and also to avoid high sodium foods such as: salt, ham, corned beef, sausage, pizza, Chinese food, fast foods, pickles, cheese, soya sauce, canned soups, potato chips, Cheetos. There is usually no restriction in the amount of fluid intake until severe kidney disease (Stage 4 or 5) is reached in which the kidneys fail to make urine. If there are signs of fluid retention such as: puffy face, swollen legs and fluid in the lungs, the fluid intake is restricted to 800-1,000 ml per day (about 4-5 cups) and sodium intake is restricted to 2 to 4 grams.

Fouque D, Laville M[6] reviewed randomized studies for comparing two different levels of protein intake in adult patients suffering from moderate to severe kidney failure. The patients were followed for at least one year to determine the efficacy of low protein diet in preventing the natural progression of CKD towards ESRD and retard the need for starting maintenance dialysis. Approximately 2000 CKD patients were analysed out of them 1002 had received reduced protein intake while as 998 had received a higher protein intake. There were 281 renal deaths recorded, 113 in the low protein diet and 168 in the higher protein diet group (RR 0.68, 95% CI 0.55 to 0.84, p=0.0002). It was assumed that to avoid one renal death, approximately 2 to 56 patients need to be treated with a low protein diet during one year and for people with non-diabetic kidney disease; low protein diet can delay end-stage kidney disease.

According to Campbell KL et al.[7] chronic kidney disease patients are not able to eliminate the excess of phosphorus in the urine and therefore are put on a low-phosphate diet. The high phosphorus foods like peanuts, cereals, red meat, canned food and carbonated drinks are avoided and medication called phosphate binder such as calcium carbonate, calcium acetate may be given at the time of meals which binds the phosphorus in the food and eliminates it in the stool. Dosage is adjusted to maintain a serum phosphorus level at or above 2.7 mg/ dl. Calcium and vitamin D supplementation are given to compensate calcium loss and treat bone problems. In CKD patient's calcium intake not more than 2,000 mg/ day including 1,500 mg from the binder and 500 mg from diet is suggested.

Potassium levels in the body are also controlled by the kidneys. Potassium is restricted when the urine output begins to decrease. The dietary serum potassium is reduced to 40 to 60 m eq./ day and intake of potassium-rich foods like bananas, oranges, orange juice, milk, tomato juice, tomato sauce, nuts, chocolate, dried peas and beans, canned food, picked food, lentils and spinach and meat is reduced. Other measures include: discontinuation or dose-reduction of medications that raise serum potassium, adherence to drug therapy such as loop diuretics, alkali replacement (if metabolic acidosis, serum bicarbonate concentration is < 21 m eq/ l), or treatment with sodium polystyrene sulfonate (SPS). SPS is a cation exchange resin that uses sodium ions for potassium ions, acting mostly in the large intestine, to enhance the faecal elimination of excess potassium.[5, 8]

In a retrospective study, conducted in UK the researchers have reported the prevalence of severe hyperkalemia (serum potassium ≥6.5 meq/ l) in 365 CKD patients as 0.11%,

ISSN: 2455-7048
DOI: https://doi.org/10.24321/2455.7048.201903

the majority of which had CKD Stage-5. The researchers added that patients with progressing chronic kidney disease and subsequent renal failure retain potassium and develop hyperkalemia (serum potassium >5 meq/ l). Although mild hyperkalemia can be tolerated by patients with chronic kidney disease but further increase in serum potassium can be life threatening, putting patients at risk for cardiac dysrhythmias and a subsequent need for dialysis.[8]

Chandel Vikas[9] in a prospective study from 2008 to 2011 while studying lipid abnormalities in 250 chronic kidney disease patients has reported that lipids have played a significant role in developing complications such as: atherosclerosis and cardiovascular disease as well as in increasing the morbidity and mortality among chronic kidney disease patients. The researcher emphasized that dyslipidemia had contributed to pathology among these patients by promoting atherosclerosis and subsequently deteriorating renal function.

All these studies recommend strict adherence of CKD patients to renal diet which plays a significant role in prevention of progressive deterioration of CKD and increasing occurrence of its morbidity and mortality rate all over the world.

Need for Study

Chronic kidney disease often goes undiagnosed and therefore remains undertreated. For this reason, various biochemical parameters such as: serum creatinine and blood urea nitrogen, urinary protein, urinary albumin, urinary creatinine and glomerular filtration rate (GFR) play a vital role in early detection and management of chronic kidney disease. The other clinical markers that help in detection of risk factors of chronic kidney disease and its manifestations are: serum levels of glucose, cholesterol, triglycerides, HDL, LDL, bicarbonates, platelet, haematocrit, albumin, sodium, calcium, phosphorus, potassium and chlorides.[10]

Education on issues related to disease process, strict adherence to renal diet, treatment and preventive strategies can help chronic kidney disease patients to self-regulate the biochemical parameters, control disease progress and manage their lifestyles thereby improving their physical and social functioning. NKF[5] has suggested that tight glycaemic control, blood pressure control, reducing dietary protein and sodium, implementing therapy for hyperlipidaemia and treating anemia have a considerable impact on reduction of adverse effects of the disease and on delay of chronic kidney disease progression and has recommended a blood pressure level of less than 140/ 90 mm Hg in the general population and less than 130/ 80 mm Hg in chronic kidney disease or diabetes.

Similarly, various Studies[3,4,6,7,11] have put great emphasis on potential benefits of educational program on strict adherence to renal diet, exercises, weight control and medication in terms of overall improvement of clinical and nutritional status of CKD patients with better outcomes. The patients have reported fewer symptoms as well as more confidence in their ability to manage those symptoms.

A longitudinal study was conducted by Lin CC et al.[11] 'To evaluate effect of (self-management education program based on self-regulation theory) on self-efficacy, self-management behavior and chronic kidney disease progression' among patients with early-stage chronic kidney disease in a Southern Taiwan hospital from 2008-2009, revealed that chronic kidney disease self-management program resulted in significant improvement in subjects' self-efficacy within one year and improved physiological outcomes in terms of a marginally significant reduction in serum creatinine levels and stability in the estimated glomerular filtration rate. This empirical data revealed that the chronic kidney disease self-management program designed in this study had a potential effect on preventing the deterioration of chronic kidney disease.

Correspondingly in a study on chronic kidney disease patients reported that teaching program on various issues such as: treating disease worsening conditions like diabetes mellitus, hypertension, anemia, smoking cessation, protein, sodium, potassium and phosphorus restriction and strict adherence to antihypertensive therapy was effective in preventing the progress of kidney disease in these selected samples while emphasizing that without intervention, renal function deteriorates in chronic kidney disease patients.[4]

Thus based upon the findings of various above studies, the investigator got strongly convinced to design some problem based non-pharmacological intervention on dietary management and exercises for chronic kidney patients through clinical research so that these patients can perform them regularly at home in order to self-regulate the biochemical parameters and control the manifestations of disease thereby promoting their physical, mental and social functioning.

Problem Statement

Outcome of "Renal Diet Therapy and Deep Breathing Exercises" on Biochemical Parameters in Chronic Kidney Disease Patients of Shere Kashmir Institute of Medical Sciences (SKIMS) Soura Srinagar Kashmir

Objectives

- To assess the selected pre and post-interventional biochemical parameters among patients with chronic kidney disease in experimental and control group (Pre-test & Post- test).
- To find out the outcome of "Renal diet therapy and deep breathing exercises" by comparing the selected

ISSN: 2455-7048
DOI: https://doi.org/10.24321/2455.7048.201903

pre and post-interventional biochemical parameters among patients with chronic kidney disease between experimental and control group.

Research Hypothesis

There is a significant change in selected biochemical parameters among patients with chronic kidney disease after implementation of "Renal Diet therapy and Deep breathing exercises" in experimental group than in control group (at 0.05 level of significance).

Materials and Methods

A quasi-experimental non-equivalent two group pre-test and post-test design was used to conduct study on adult chronic kidney disease patients in nephrology ward of a tertiary care hospital of Jammu and Kashmir (SKIMS Soura Srinagar) from 5th March 2012 to 31st July 2013. The sample consisted of 200 study subjects between age group of 50 to 59 years, 46% were male and 54 % were female who were selected purposively after fulfilling the inclusion criteria i.e. having similar demographic characteristics as shown in table 1 and were then randomly assigned to two groups (100 each to experimental and 100 to control group respectively) in order to maintain the homogeneity of the sample, the subjects who were dissimilar in demographic characteristics were excluded from the study.

The variables of study were (i) Independent variable: "Renal diet therapy and deep breathing exercises" **(**ii) Dependent variable: Improvement in selected biochemical parameters

The study was conducted on CKD patients in nephrology ward of SKIMS hospital after getting ethical clearance and permission from HOD nephrology of SKIMS. The data was first gathered from all the 100 experimental group subjects followed by control group subjects. After obtaining individual informed consent, 2 to 3 subjects were randomly selected at a time after fulfilling inclusion criteria, the data on demographic characteristics such as: "Age, gender, education, occupation, place of domicile, monthly family income, body mass index (BMI), co-morbidity and stage of CKD" was gathered by using interview schedule and patient's records.

The pre-test (0_1) was conducted by performing 1st observation of record analysis of biochemical parameters from patient's laboratory reports and case sheets on 2nd day of admission of patients as routinely the patients were reinvestigated for these biochemical parameters on first day of admission and reports were usually coming from laboratories within 24 hours. After conducting pretest, the subjects were given "Renal diet therapy and deep breathing exercises" regularly for 5 days. Renal Diet therapy included strict intake of therapeutic diet by subjects (CKD patients) which was calculated by the dietician after every 24 hours under prescription of nephrologist and deep breathing exercises were performed by subjects as demonstrated by investigator for 5 minutes each twice a day. The post-test 1 (0_2) was conducted on 6th day by performing 2nd observation of record analysis of laboratory reports of selected biochemical tests which were routinely performed and documented before discharging the patients. On discharge these therapies were taught and demonstrated to the subjects and the written dietary instructions along with an adherence checklist on these therapies was given to the subjects to ensure their scheduled practice at home. The Post-test 2 (0_3) was conducted on 15th day during their 1st follow up visit in nephrology OPD of SKIMS by performing 3rd observation of record analysis of selected biochemical parameters of the subjects who brought the reports along with after getting investigated one day before from the same institute as advised by concerned nephrologist.

After completion of experimental group, the data was gathered from the subjects in the control group. The same procedure was adopted for collecting data from all the 100 control group subjects i.e. at a time 3 to 4 subjects were randomly selected after full filing inclusion criteria and then similarly pretested and post-test tested as in the experimental group except that they received only routine care during hospitalization and routine health teaching on discharge. The difference between pre and posttest Mean and SD scores of experimental and control group subjects were compared by using 'unpaired t test' for measuring the outcome of "Renal diet therapy and deep breathing exercises" on selected biochemical parameters of CKD patients.

Results

The data collected on demographic characteristics of 200 CKD patients who were equally assigned to two groups (experimental = 100 and control = 100) was computed by descriptive and inferential statistics as per the objectives of the study in following tables.

Findings in Table 1, reveals that majority of CKD subjects were almost equally (38% in experimental and 35% in control group) in age group of (50 - 59) years. The gender distribution in both the groups was almost equal (46% in experimental group and 48 % in control group) were male and (54% in experimental group and 52 % in control group) were female. 52% of CKD subjects were from urban and 48% were from rural domicile in experimental group. Similarly, in control group 50% of subjects were equally from urban and rural domicile. About 55% of subjects in both the groups had primary education. Most of the subjects in both the groups were unemployed (63% in experimental group and 58% in control group). Monthly family income of majority of subjects in both the groups (71% in experimental group and 72% in control group) was up to Rs. 10, 000. Majority of subjects (66 % in experimental

ISSN: 2455-7048
DOI: https://doi.org/10.24321/2455.7048.201903

group and 69% in control group) had no obesity; 18 % in experimental group and 16% in control group subjects had type I obesity; 14% in experimental group and 12% in control group had type II obesity whereas least number of subjects (2% in experimental group and 3% in control group) had type III obesity. Highest percentage of the subjects (64% in experimental group 63% in control group) were hypertensive and 28% in both the groups were hypertensive as well as diabetics whereas lowest percentage of subjects (8% in experimental group and 9 % in control group) were having all the three co-morbidities (hypertension, diabetes mellitus and dyslipidemia). Both the groups had 53% of subjects with Stage-4 CKD and 47% of subjects with Stage-5 of CKD respectively.

The findings reveal no significant difference (p value>0.05) in demographic characteristics between the study subjects of experimental and control group. Hence the sample distribution in both the groups was homogeneous.

Table 1.Frequency and percentage distribution of demographic characteristics of study subjects with CKD between experimental and control group (N=200)

S. No.	Demographic characteristics	Experimental group (n_1=100) Frequency (f)	Percentage (%)	Control group (n_2=100) Frequency (f)	Percentage (%)	Unpaired 't' test value	p-value
1.	**Age (in years)**						
1.1	20-29	26	26%	25	25%	0.002	0.940 (NS)
1.2	30-39	16	16%	18	18%		
1.3	40-49	05	5%	06	6%		
1.4	50-59	38	38%	35	35%		
1.5	60-69	15	15%	16	16%		
2.	**Gender**						
2.1	Male	46	46%	48	48%	0.080	0.777 (NS)
2.2	Female	54	54%	52	52%		
3.	**Place of domicile**						
3.1	Urban	52	52%	50	50%	0.000	1.000 (NS)
3.2	Rural	48	48%	50	50%		
4.	**Educational status**						
4.1	≤ Primary	55	55%	55	55%	0.418	0.812 (NS)
4.2	≤Higher secondary	44	44%	43	43%		
4.3	≥Graduate	1	1%	2	2%		
5.	Occupation						
5.1	Unemployed (students/ retired/ house wife)	63	63%	58	58%	0.362	0.948 (NS)
5.2	Employed (govt./ private/ professional)	17	17%	20	20%		
5.3	Business	20	20%	22	22%		
6.	**Monthly family income (in rupees)**						
6.1	≤10,000	72	72%	71	71%	0.384	0.965 (NS)
6.2	10,001 to 15,000	15	15 %	15	15 %		
6.3	15,001 to 20,000	12	12 %	13	13 %		
6.4	20,001 to 25,000	0	0 %	0	0 %		
6.5	>25,000	1	1 %	1	1 %		

ISSN: 2455-7048
DOI: https://doi.org/10.24321/2455.7048.201903

7.	**Body mass index (Body wt. in kg/ht in m²)**						
7.1	<30.0 (no obesity)	66	66%	69	69%	0.105	0.588 (NS)
7.2	30-34.9 (type I obesity)	18	18%	16	16%		
7.3	35-39.9 (type II obesity)	14	14%	12	12%		
7.4	>40.0 (type III obesity)	2	2%	3	3%		
8.	**Co-morbidity**						
8.1	Hypertension	64	64%	63	63%	0.201	0.904 (NS)
8.2	Diabetes mellitus & hypertension	28	28%	28	28%		
8.3	Hypertension, diabetes mellitus & dyslipidemia	8	8%	9	9%		
9.	**Stage of CKD**						
9.1	Stage IV	53	53%	53	53%	0.353	1.000 (NS)
9.2	Stage V	47	47%	47	47%		

Significant (p-value≤0.05); NS (Non-significant; p-value>0.05).

Table 2.Pre-test mean and SD score distribution of biochemical parameters among subjects with CKD between experimental and control group (N=200)

S. No.	Biochemical parameters (normal values)	Experimental group (n_1=100) Pre-test score	Control group (n_2=100) Pre-test score	p-value
		Mean±SD	Mean±SD	
1.	Serum levels of Fasting glucose (60-110 mg/ dl)	125.05 ± 32.93###	148.32 ± 68.95###	<0.001*
2.	Urea (15-45 mg/ dl)	122.92 ± 36.50###	123.02 ± 36.99###	0.185 (NS)
3.	Creatinine (0.5-1.5 mg/ dl)	8.30 ± 3.55###	8.46 ± 3.54###	0.641 (NS)
4.	Cholesterol (50-200 mg/ dl)	161.27 ± 64.41#	163.14 ± 68.41#	0.388 (NS)
5.	Triglycerides (100-200 mg/dl)	133.76 ± 54.84#	131.57 ± 55.20#	0.799 (NS)
6.	HDL (30-60 mg/ dl)	76.90 ± 18.11###	76.12 ± 21.24###	0.780 (NS)
7.	LDL (100-150 mg/ dl)	90.82 ± 30.10##	73.52 ± 29.41##	<0.001*
8.	Total serum protein (5.5-8.5 g/ dl)	7.14 ± 1.52#	7.00 ± 1.51#	0.479 (NS)
9.	Albumin (3.5-5.5 g/ dl)	3.67 ± 0.85#	3.63 ± 0.71#	0.995 (NS)
10.	Sodium (135-145 meq/ l)	136.15 ± 7.59#	136.04 ± 7.55#	0.919 (NS)
11.	Calcium (8-10 mg/ dl)	7.03 ± 1.01##	7.04 ± 0.93##	0.254 (NS)
12.	Phosphorus (2.5-4.5 mg/ dl)	4.96 ± 0.99###	4.97 ±1. 04###	0.656 (NS)
13.	Potassium (3.5-5.5 mg/ l)	7.74 ± 0.97###	7.40 ± 1.06###	0.689 (NS)
14.	Chlorides (97 to 107 meq/ l)	66.30 ± 20.31##	66.07 ± 20.13##	0.729 (NS)
15.	Bicarbonates (22 to 30 meq/ l)	22.86 ± 4.63#	22.61 ± 4.57	0.701 (NS)
16.	Haematocrit (PCV - 37 to 54%)	32.49 ± 9.37##	35.73 ± 8.71##	0.608 (NS)
17.	Platelets (150000 to 300000)	120.04 ± 19.61##	118.37 ± 17.24##	0.523 (NS)
18.	Urinary volume (1500-3000 ml)	582.30 ± 256.22##	573.74 ±191.17##	0.790(NS)
19.	Urinary protein (0-1.5 gm/ 24 hr.)	1.90 ± 0.41###	1.81 ±0.30###	0.093(NS)
20.	Urinary creatinine (0-2.7 g/ 24 hr.)	1.52 ± 0.37#	1.65 ± 0.78#	0.285(NS)
21.	GFR (125 ml/ min / 1.73m²)	14.69 ± 4.12##	15.06 ± 4.53##	0.527(NS)

Significant (p value ≤0.05; <0.001); NS (Non-significant; p value >0.05), (# Normal; ## below normal; ### above Normal).

ISSN: 2455-7048
DOI: https://doi.org/10.24321/2455.7048.201903

Objective I

To assess the pre & post interventional biochemical parameters among patients with chronic kidney disease in experimental and control group. (Pre-test & post-test).

The findings in Table 2, depict that out of 21 biochemical parameters, the baseline values of 7 biochemical parameters such as: cholesterol, triglycerides, protein, albumin, sodium, bicarbonate and urinary creatinine were reported to be normal range. Whereas baseline values of other 7 biochemical parameters such as: LDL, calcium, chloride, platelet, hematocrit, urinary volume and GFR were reported to be below normal range. Similarly baseline values of remaining 7 parameters such as: fasting serum glucose urea, creatinine, HDL, phosphorus, potassium and urinary protein were reported to be above normal range.

The results in Table 3, shows that experimental group subjects who were exposed to 'Renal diet therapy and Deep breathing exercises' in addition to prescribed treatment have reported the change during post-test 2 in (Mean and SD scores) of 11 biochemical parameters such as: (fasting serum glucose, cholesterol, triglycerides, HDL, LDL, calcium, phosphorus, potassium, chlorides, haematocrit and platelets). However, remaining 10 biochemical parameters such as: (blood urea, creatinine, total serum protein, albumin, sodium, bicarbonate, urinary volume, urinary protein, urinary creatinine and glomerular filtration rate (GFR) remained constant. Whereas the subjects in control group, who received prescribed treatment and routine care have shown change during post-test 2 in (Mean and SD scores) of 5 biochemical parameters such as: (fasting serum glucose, cholesterol, triglycerides, calcium and phosphorus) and remaining 16 biochemical parameters have remained same.

Table 3.Mean and SD score distribution of biochemical parameters among subjects with CKD between experimental and control group (Post-test I & Post 2) (N=200)

S. No.	Biochemical parameters (normal values)	Experimental group (n_1=100)		Control group (n_2=100)	
		Post-test 1 $Mean_1 \pm SD_1$	Post-test 2 $Mean_2 \pm SD_2$	Post-test 1 $Mean_1 \pm SD_1$	Post-test 2 $Mean_2 \pm SD_2$
1.	Serum levels of fasting glucose (60-110mg/ dl)	94.06±27.50	75.68±6.185	141.3±60.03	137.21±52.57
2.	Urea (15-45 mg/ dl)	122.09±32.96	118.89±31.94	122.72±36.12	122.87±36.18
3.	Creatinine (0.5-1.5 mg/ dl)	8.90±3.99	7.70±2.09	8.24±3.31	8.28±3.38
4.	Cholesterol (150-200 mg/ dl)	157.42±60.94	150.61±48.17	160.42±60.03	158.15±58.67
5.	Triglycerides (100-200 mg/ dl)	128.16±51.24	125.05±48.002	130.97±53.92	128.40±40.02
6.	HDL (30-60 mg/ dl)	72.63±17.45	67.99±15.49	76.43±17.909	76.60±17.90
7.	LDL (100-150 mg/ dl)	84.76±24.79	82.76±24.69	71.41±25.266	72.01±27.01
8.	Total serum protein (5.5-8.5 g/ dl)	7.79±1.33	7.88±0.848	6.78±1.337	6.71±1.206
9.	Albumin (3.5-5.5 g/ dl)	3.80±0.71	3.85±0.78	3.68±0.843	3.70±0.72
10.	Sodium (135-145 meq/ l)	136.37±6.26	136.11±5.87	136.21±6.83	136.53±7.318
11.	Calcium (8- 10 mg/ dl)	7.86±0.96	8.91±1.09	7.45±0 .941	8.18±1.18
12.	Phosphorus (2.5-4.5 mg/ dl)	4.46±0.84	3.20±0.65	4.95±1.017	4.50±0.86
13.	Potassium (3.5-5.5 mg/ l)	6.81±0.23	6.03±0.03	7.37±0.96	7.27±0.83
14.	Chlorides (97 to 107 meq/ l)	66.52±15.46	79.12±15.07	64.90±21. 51	64.76±20.84
15.	Bicarbonates (22 to 30 meq/ l)	22.67±3.68	23.41±3.737	22.42±4.331	22.32±4.57
16.	Haematocrit (PCV 37 to 54%)	38.54±7.85	48.903±8.359	36.13±8.98	36.80±9.13
17.	Platelet (150000 to 300000)	125.80±22.02	130.51±13.77	120.36±16.57	122.39±15.011
18.	Urinary volume (1500-3000 ml)	586.00±196.1	580.00±196.01	580.0±174.03	590.0±174.23
19.	Urinary protein (0-1.5 gm/ 24hr.)	1.930±0.020	1.943±0.050	2.01±0.100	1.89±0.62
20.	Urinary creatinine (0-2.7 g/ 24hr.)	1. 43±0.493	1.32±0.452	1.65±0.78	1.69±0.100
21.	GFR (125 ml/ mt/ 1.73m^2)	15.02±4.365	15.13±4.84	16.11±3.92	16.20±3.96

ISSN: 2455-7048
DOI: https://doi.org/10.24321/2455.7048.201903

Table 4.Comparison of pre-test and post-test mean and SD scores of biochemical parameters of subjects with CKD between experimental and control group (N=200)

S. No.	Biochemical parameters (normal values)	Experimental group (n_1=100)				Control group (n_2=100)			
		Pre-test	Post-test 1	Post-test 2	p-value	Pre-test	Post-test 1	Post-test 2	p-value
		Mean±SD	$Mean_1$±SD_1	$Mean_2$±SD_2		Mean±SD	$Mean_1$±SD_1	$Mean_2$±SD_2	
1.	Serum levels of fasting glucose (60-110 mg/ dl)	125.05$^{\#\#\#}$±32.90	94.06±27.50	75.68±6.18	<0.001*	148.3$^{\#\#\#}$±68.93	141.3±60.03	137.21±52.57	0.002*
2.	Urea (15-45 mg/ dl)	122.92±36.50	122.09±32.9	122.98±31.94	0.810 NS	123.32±36.99	122.72±36.12	122.87±36.18	0.201 NS
3.	Creatinine (0.5-1.5 mg/ dl)	8.30±3.55	8.90±3.99	8.70±2.09	0.486 NS	8.46±3.45	8.24±3.31	8.11±3.09	0.486 NS
4.	Cholesterol (150-200 mg/ dl)	161.27±64.41	157.4±60.9	150.6±48.17	<0.001*	153.14±68.4	147.42±60.03	146.15±58.67	0.043*
5.	Triglycerides (100-200 mg/ dl)	133.6±54.81	128.16±51.24	125.05±48.00	<0.001*	131.57±55.29	130.97±55.92	128.40±40.02	0.021*
6.	HDL (30-60 mg/ dl)	76.90$^{\#\#\#}$±18.11	72.63±17.45	67.99±15.49	<0.001*	76.12$^{\#\#\#}$±21.23	76.43±21.90	76.60±21.45	0.141 NS
7.	LDL (100-150 mg/ dl)	90.82±30.10	84.76±24.9	82.76±24.69	<0.001*	73.52±29.3	71.41±25.26	71.0±25.26	0.852 NS
8.	Total serum protein (5.5-8.5 g/ dl)	7.14±1.52	7.79±1.33	7.88±0.84	0.14 NS	6.96±1.51	6.78±1.337	6.71±1.206	0.832 NS
9.	Albumin (3.5-5.5 g/ dl)	3.67±0.85	3.80±0.71	3.79±0.67	0.604 NS	3.63±0.91	3.68±0.843	3.70±0.728	0.301 NS
10.	Sodium (135-145 meq / l)	136.75±7.596	136.37±6.26	137.09±5.35	0.091 NS	136.04±7.55	136.21±6.837	136.53±7.318	0. 270 NS
11.	Calcium (8-10 mg/ dl)	7.03$^{\#\#}$±1.01	7.86±0.96	8.91$^{\#}$±0.89	<0.001*	7.04$^{\#\#}$±0.93	7.45±0.941	8.18$^{\#}$±1.18	0.055*
12.	Phosphorus (3.5-4.5 mg/ dl)	4.96$^{\#\#\#}$±0.99	4.46±0.84	3.20$^{\#}$±0.65	<0.001*	4.97±1.04	4.95±1.017	4.50±0.86	0.041*
13.	Potassium (3.5-5.5 mg/ l)	7.74$^{\#\#\#}$±0.97	6.81±0.23	6.03±0.03	<0.001*	7.40$^{\#\#\#}$±1.06	7.37±0.96	7.27±0.83	0.204 NS
14.	Chlorides (97 to 107 meq / l)	64.30$^{\#\#}$±20.31	66.52±15.4	79.12±15.07	<0.001*	65.07±20.13	64.90±21.51	64.±20.84	0.106 NS
15.	Bicarbonates (22 to 30 meq/ l)	22.86±4.63	22.67±3.68	23.41±3.73	0.244 NS	22.52±4.57	22.42±4.31	22.32±4.57	0.302 NS
16.	Haematocrit (PCV-37 to 54%)	32.49$^{\#\#}$±9.37	38.543±7.854	48.90$^{\#}$±8.35	0.043*	32.73$^{\#\#}$±8.71	36.13±8.98	36.80$^{\#\#}$±9.13	0.601 NS
17.	Platelet (15000 to 300000)	120.04$^{\#\#}$±19.61	125.80±22.04	130.51±25.77	<0.001*	118.37$^{\#\#}$±17.24	120.36±16.57	122.39±15.01	0.0975 NS
18.	Urinary volume (1500-3000 ml)	582.30±256.2	586.00±196.0	580.0±196.01	0.220 NS	573.74±191.7	580.0±174.23	580.0±174.23	0.133 NS
19.	Urinary protein (0-1.5 gm/ 24hr.)	1.902±0.41	1.93 0±0.020	1.943±0.050	0.331 NS	1.8150±0.307	2.01±0.100	1.89±0.623	0.231 NS
20.	Urinary creatinine (0-2.7 gm/ 24hr.)	1.52±1.12	1. 43±0.49	1. 321±0.452	0.071 NS	1.65±0.78	1.74±0.623	1.69±0.10	0.082 NS
21.	GFR (125 ml/ min/ 1.73m^2)	14.69±4.12	15.02±4.36	15.13±4.84	0.342 NS	15.06±4.13	16.11±3.92	16.20±3.96	0.392 NS

*Significant (p value ≤0.05; <0.001*); NS (Non-significant; p value >0.05), (# Normal; ## below normal; ### above Normal).

ISSN: 2455-7048
DOI: https://doi.org/

Objective 2

To find out the outcome of "Renal Diet therapy and Deep breathing exercises" by comparing the pre and post-interventional biochemical parameters among patients with chronic kidney disease between experimental and control group.

While comparing the pre-test and post-test Mean and SD scores of all 21 biochemical parameters of subjects in both the groups, as shown in findings (table 4) it can be emphasized that Mean and SD scores of 11 biochemical parameters such as: fasting serum glucose, cholesterol, triglycerides, HDL, LDL, calcium, phosphorus, potassium, chloride, hematocrit and platelets have shown a significant change ($p<0.001^{*}$) in experimental group subjects. A remarkable reduction in abnormally higher levels of serum fasting glucose, HDL, phosphorus and potassium and significant increase ($p<0.001^{*}$) in the below normal levels of calcium, chloride, hematocrit and platelets and also more decrease in levels of cholesterol, triglycerides and LDL was reported in experimental group subjects, who were strictly adhered to Renal diet therapy and practiced deep breathing exercise during hospitalization as well as at home for 15 days in addition to their medical treatment whereas in control group who received only medication and routine care, a significant change ($p<0.05$) was reported in only 5 biochemical parameters such as: fasting serum glucose, cholesterol, triglycerides, calcium and phosphorus which indicates that "Renal diet therapy and deep breathing exercise" were effective in regulating the levels of various biochemical parameters in experimental group subjects.

Hence the research hypothesis: there is a significant change in biochemical parameters after implementation of "Renal Diet therapy and deep breathing exercises" in experimental group than in control group (at 0.05 level of significance) is partially accepted.

Discussion

In present study a remarkable ($p<0.05$) reduction in abnormally higher levels of fasting serum glucose, phosphorus and potassium and significant increase ($p<0.001^{*}$) in the below normal level of calcium was reported in experimental group subjects as compared to control group which indicates that "Renal diet therapy and deep breathing exercise" were effective in regulating the levels of various biochemical parameters in CKD subjects.

Research data reveal that dietary adherence to decreased protein, sodium and phosphate intake has been found to be associated with reduction of nitrogenous compounds, optimization of serum levels of bicarbonate, potassium and phosphate, preventing development of severe secondary hyperparathyroidism as well as minimizing proteinuria.[6,7]

Lin CC et al.[11] in his longitudinal study in Taiwan from 2008-2009 on CKD patients who were exposed to 5 weeks group-session self-management program revealed a marginal significant decrease in serum creatinine level ($\pi^2=6.29$, $p=0.07$) and urinary protein ($\pi^2=5.06$, $p=0.05$) but estimated glomerular filtration rate remained stable throughout the period while emphasizing a potential effect on preventing the deterioration of chronic kidney disease.

Shi YX Fan XY, Han HJ, et al.[12] in a randomized trial study on nurse-led intensive educational program on chronic kidney disease patients with hyperphosphatemia reported significant decline ($p\leq0.05$) in serum phosphorus level in experimental group who received individualized teaching and educational sessions about diet and medicine regimen in addition to routine guidance as compared to control group who received exclusively routine guidance.

In another study (one group pre-test and post-test design) conducted by Shahram Baraz[13] in various hospitals of medical science universities in Tehran to determine the effect of self–care educational package program on problems and quality of life CKD stage-5 patients revealed a significant decrease in serum glucose ($p=0.020$) and serum potassium ($p=0.002$) and increase in serum calcium ($p=0.000$).

Cianciaruso B, Pota A, Bellizzi V et al.[14] in a randomized controlled trial study compared the metabolic effects of two diets with different protein content (0.55 vs 0.80 g/kg/day) in patients with CKD stages 4-5. The data analysis showed that serum urea nitrogen significantly ($p<0.05$) increased in the 0.8-Group vs 0.55-Group by 15%. The 24 hours urinary urea nitrogen and creatinine levels and serum sodium, bicarbonate and phosphate levels significantly ($p<0.05$) decreased after the first 3 months in 0.55 Group than in 0.8-Group. The prescription of phosphate binder's, allopurinol, bicarbonate supplements and diuretics resulted significantly less frequent in the 0.55-Group ($p<0.05$). This study represents the first evidence that in CKD patients a protein intake of 0.55 g/ kg/ day, compared with a 0.8 g/ kg/ day, guarantees a better metabolic control and a reduced need of drugs, without a substantial risk of malnutrition.

In another quasi experimental study conducted by Chaiopanont S[15], at Wat Khae Nok primary health center in Nonthaburi, Thailand on 50 chronic kidney disease patients with type 2 diabetic have shown a significant ($p<0.001$) postprandial hypoglycemic effect among patients after deep breathing exercises.

Conclusion

The biochemical parameters such as: fasting serum glucose, urea, creatinine, cholesterol, triglycerides, HDL, LDL, protein, albumin, sodium, calcium, phosphorus, potassium, chlorides, bicarbonates, hematocrit, platelet, urinary volume, urinary protein, urinary creatinine and

ISSN: 2455-7048
DOI: https://doi.org/10.24321/2455.7048.201903

glomerular filtration rate are powerful predictors of CKD progression. The finding of the study has supported the significance of "Renal Diet therapy and Deep breathing exercises" in bringing the levels of some of these parameters within normal limits. However, these therapies need to be reinvestigated on CKD patients for long term efficacy and reliable results. The findings also call the attention of CKD patients for the tremendous need of providing an aggressive approach towards the early management of modifiable predictors of CKD progression in order to enhance the quality of life of CKD patients. It can be concluded that modifiable predictors of CKD progression can be controlled through patient counseling regarding awareness of disease, medication, diet and exercise. These findings identify a subset of this high-risk population that might benefit from even more aggressive treatment.

Conflict of Interest: None

References

1. Bethesda MD; USRDS Annual Data Report: Chronic Kidney Disease in the General Population. National Institute of Diabetes and Digestive and Kidney Diseases; United States Renal Data System. 2011; 37–44 Available at: http://www.usrds.org/2011/pdf/v1_ch01_11.pdf. Accessed February 14, 2012.
2. Brunner and Suddarth. Textbook of Medical - Surgical Nursing. 11th ed. Vol 2. Lippincott Company, Philadelphia. 2008; 1527-1537.
3. Kuroki A. Management of chronic kidney disease-preventing the progression of renal disease. *Nihon Rinsho* 2008; 66(9): 1735-1740.
4. Mason J. Educational interventions in kidney disease care. Am *J Kidney Dis* 2008; 51(6): 933-951.
5. National Kidney Foundation. About chronic kidney disease, 2002. Available from: http://www.kidney.org/kidneydisease/aboutckd.cfm. Accessed on April 4, 2012.
6. Fouque D, Laville M. Low protein diets for chronic kidney disease in non-diabetic adults. *Cochrane Database Syst Rev.* 2006; 2: CD001892. Pub3.Copyright © 2009 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.
7. Campbell KL, Ash S, Davies PS et al. Randomized controlled trial of nutritional counseling on body composition and dietary intake in severe CKD. *Am J Kidney Dis* 2008; 51(5): 748-758.
8. Phillips BM, Milner S, Zouwail S et al. Clinical Kidney Journalckj.oxfordjournals.orgSevere hyperkalemia: demographics and outcome. *Clin Kidney J* 2014; 7(2): 127-133.
9. Chandel, Vikas. Dyslipidemia in chronic kidney disease. 2008-2011 (unpublished thesis) 54-55.
10. Norris KC, Greene T, Kopple J et al. Baseline Predictors of Renal Disease Progression in the African American Study of Hypertension and Kidney Disease. *JASN* 2006; 17(10); 2928-2936.
11. Lin CC, Tsai MF, Lin SH. Effects of a self-management program on patients with early-stage chronic kidney disease: A pilot study. *Applied Nursing Research* 2013; 26(3): 151-156.
12. Shi YX, Fan XY, Han HJ et al. Effectiveness of a nurse-led intensive educational programme on chronic kidney failure patients with hyperphosphatemia: randomized controlled trial. *J Clin Nurse* 2013; 22(7-8): 1189-1197.
13. Shahram Baraz. Determine the effect of self–care educational package programs on problems and quality of life of dialysis patients. 2006.
14. Cianciaruso B, Pota A, Bellizzi V et. al. Effect of a low-versus moderate-protein diet on progression of CKD: follow-up of a randomized controlled trial. *Am J Kidney Dis* 2009; 54(6): 1052-1061.
15. Chaiopanont S. Hypoglycemic effect of sitting breathing meditation exercise on type 2 diabetes CKD patients. *J Med Assoc Thai* 2008; 91(1): 93-98.

ISSN: 2455-7048
DOI: https://doi.org/10.24321/2455.7048.201903