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THE PATTERN OF BICARBONATE LEVEL IN PATIENTS ON MAINTENANCE HAEMODIALYSIS AND IT'S CORRELATION WITH FREQUENCY OF DIALYSIS AND POTASSIUM LEVEL

Anchana Raj[1], Anusree V. S.[1], Gokul Krishna A.[1], Padmesh P. R.[1], E. Sam Jeeva Kumar[2], Ranjani Ravi[1]*, Prasobh G. R.[3]

[1]MD(General Medicine), DNB(Nephrology), Senior Consultant in Department of Nephrology, Cosmopolitan Hospital, Thiruvananthapuram, India.

[1]Fifth Pharm D Students Sree Krishna College of Pharmacy and Research center, Parassala, Thiruvananthapuram, India.

[2]Associate Professor, Department of Pharmacy Practice, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, India.

[3]Principal and HOD, Department of Pharmacy Practice, Sree Krishna College of Pharmacy and Research Centre, Parassala.

***Corresponding Author: Ranjani Ravi**
MD(General Medicine), DNB(Nephrology), Senior Consultant in Department of Nephrology, Cosmopolitan Hospital, Thiruvananthapuram, India.

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ABSTRACT

Background: Chronic kidney disease (CKD) describes the gradual loss of kidney function. Metabolic acidosis can be defined as the pathological condition characterized by an absolute or relative increase in body concentration of hydrogen ions with a reduction in serum bicarbonate. One of the most important function of the kidney is the maintenance of acid base balance. Loss of renal function happens progressively leading to loss of excretory, metabolic and endocrine functions. **Aim:** To study the pattern of bicarbonate level in patients on maintenance haemodialysis and correlation with frequency of dialysis and potassium level. **Objective:** To determine the pattern of bicarbonate level in patients on maintenance haemodialysis To find the correlation with frequency of dialysis and potassium levels. To find the correlation with bicarbonate and potassium levels. **Materials And Methods:** This prospective observational study was carried out in 36 patients undergoing maintenance haemodialysis. In our study,26 patients were on twice weekly dialysis and 10 patients were on thrice weekly dialysis. The study was conducted in patients age greater than 18 years old and bicarbonate level <22mEq/l. Health related quality of life in patients undergoing maintenance haemodialysis were assessed by using KDQOL questionnaire. As a counseling aid Patient Information Leaflet were provided. A written informed consent form was obtained. **Result And Discussion:** This study aim is to determine the pattern of bicarbonate levels in patients on maintenance haemodialysis and it's correlation with frequency of dialysis and potassium level. Quality of life was assessed using KDQOL SF-36 scale and to evaluate the impact of patient counseling on improving the quality of life in patients with End stage renal disease. From the study,there was an increase in quality of life in patients who followed all the recommended dietary modifications and followed all the follow up of dialysis regularly. There was a significant change in bicarbonate level among patients on haemodialysis at successive follow up. There was no significant difference in the variations in bicarbonate level according to frequency of dialysis. There is a correlation between bicarbonate and potassium level as serum bicarbonate level increases and serum potassium decreases and also patients have significant increase in quality of life after patient counseling. **Conclusion:** There was a significant change in bicarbonate level in successive follow up. There was no significant difference in the variations in bicarbonate level according to frequency of dialysis. It was clear that potassium level at 6th follow up was found to be balanced under the criteria of KDQOL and also the bicarbonate level was increased (≥22mEq/l) from the KDQOL. Thus we concluded that there is a correlation between bicarbonate and potassium level as serum bicarbonate level increases, serum potassium level decreases. There is a significant improvement in quality of life in patients whom bicarbonate levels improved after patient counseling.

INTRODUCTION

Chronic kidney disease (CKD) describes the gradual loss of kidney function. Metabolic acidosis can be defined as the pathological condition characterized by an absolute or relative increase in body concentration of hydrogen ions with a reduction in serum bicarbonate. One of the most important function of the kidney is the maintenance of acid base balance.[1] Kidneys are bean shaped organ

with the size of 9-11 cm located below the rib cage, one on both side of spine.[2] The functional unit of kidneys are called Nephrons.[3]

Dialysis is an important treatment for the end stage kidney disease patients. There are two main types of dialysis, known as haemodialysis and peritoneal dialysis. Haemodialysis is the most frequently used form of dialysis. During this method, patients anticoagulated blood and electrolyte solution that are perfused through a dialyzer across a semi permeable membrane. The dialysis is performed three times per week. Each session lasts about four to five hours.[4] Kidney disease quality of life is a short term survey includes a 36 item health survey with multi item scales targeted at particular concerns of individuals with kidney disease and on dialysis.[5]

MATERIALS AND METHODS

This prospective observational study was carried out in 36 patients undergoing maintenance haemodialysis. In our study,26 patients were on twice weekly dialysis and 10 patients were on thrice weekly dialysis. The study was conducted in patients age greater than 18 years old and bicarbonate level <22mEq/l. Health related quality of life in patients undergoing maintenance haemodialysis were assessed by using KDQOL questionnaire. As a counseling aid Patient Information Leaflet were provided. A written informed consent form were obtained.

Inclusion Criteria

- Patients age greater than 18 years
- Patients undergoing maintenance haemodialysis
- Bicarbonate level less than 22mEq/l

Exclusion Criteria

Chronic kidney disease not on dialysis

This study was conducted the patients undergoing maintenance haemodialysis whose bicarbonate level is less than 22mEq/l. The patients were screened and recruited in the study after satisfying predefined inclusion and exclusion criteria. Also assess the health related quality of life in patients undergoing maintenance hemodialysis using KDQOL scale and monitor the frequency of dialysis and potassium level. A written informed consent form was taken from legal representatives as per ICMR Biomedical Research Guideline Format.

All information relevant to the study was collected from case records using a suitably designed pro forma and quality of life in patients undergoing maintenance haemodialysis was assessed using KDQOL questionnaire. All the questions in the questionnaire and scales were translated in local language (Malayalam) of the patient. Patients were requested to answer the questionnaire and were provided with counseling regarding the disease using patient information leaflet, which were provided in English and local languages (Malayalam).

Statistical Analysis

- The collected data on the study variables are subjected to suitable statistical analysis. Quantitative variables are expressed as mean, median, standard deviation and inter quartile range.
- Pattern of bicarbonate level and Correlation between frequency of dialysis and Potassium levels were analyzed by ANOVA according to nature of data.
- A P value <0.05 will be considered as statistically significant.
- Data analysis was performed using SPSS version 16.0

OBSERVATIONS AND RESULTS

The proposed study entitled "The Pattern Of Bicarbonate level in Patients on Maintenance Hemodialysis and It's Correlation With Frequency of Dialysis and Potassium Level" was a prospective observational study carried out in a multispecialty tertiary care hospital. In the study, data was collected from 36 patients diagnosed with CKD and ESRD patients and was analyzed. 36 patients was selected under the inclusion criteria with patients age >18 years, patients undergoing maintenance haemodialysis and having bicarbonate level <22mEq/l.The study aimed to determine the pattern of bicarbonate level in patients on maintenance haemodialysis, to find the correlation with frequency of dialysis and potassium levels and also to find the correlation with bicarbonate and potassium levels on health related quality of life using SF-36 scale, to assess the effect of bicarbonate supplements and change in dose on frequency of dialysis and to evaluate the impact of patient counseling on improving the QOL of patients with CKD and ESRD.

Demographic Details of the Patients

The data related to demographic details of patients were collected and recorded.

Percentage Distribution of Patients Based On Gender

Percentage distribution of patients based on gender is shown in the following table.

Table 1: Percentage distribution of patients based on Gender.

Gender	Frequency	Percent
Male	27	75
Female	9	25
Total	36	100

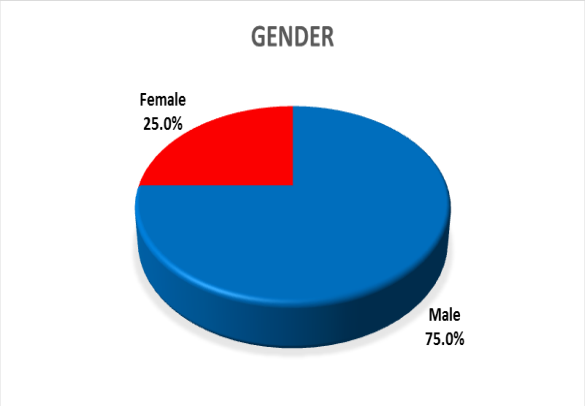


Figure 1: Diagrammatic representation of patients based on GENDER.

From table 1,it was observed that out of total patients with chronic kidney disease, 75% were Male and 25% were female. Thus from the above table, we conclude that there is higher chance of end stage renal disease(ESRD) in male as compared to that of female.

Percentage Distribution of Patients Based On age

The percentage distribution of patient based on age is shown in the following table.

Table 2: Percentage distribution of patients based on AGE.

Age in years	Frequency	Percent
≤ 30	3	8.3
31 - 40	3	8.3
41 - 50	4	11.1
51 - 60	4	11.1
61 - 70	15	41.7
71 - 80	7	19.5
Total	36	100

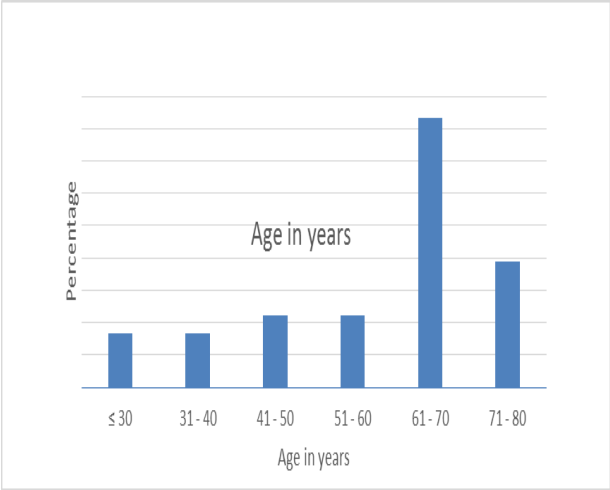


Figure 2: Diagrammatic representation of patients based on AGE.

From the table 2,it was observed that out of the total patients with chronic kidney disease, 41.7% of patients was under the age of 61-70 ,19.5% of Patients were under the age of 71-80 , 11.1% of patients were under the age group of 51-60,11.1% of patients were under the age group 41-50 , 8.3% of patients were under the age of 31-40 ,8.3% of patients were under the age of ≤30 .Thus from the above table we conclude that patients under 61-70 years of age shows higher percentage in maintenance haemodialysis.

Percentage Distribution Of Patients Based On Symptoms

The percentage distribution of patients based on symptoms is shown in following table

Table 3: Percentage distribution of patients based on SYMPTOMS.

Symptoms	Frequency	Percent
Decreased urine output	17	47.2
Swelling	21	58.3
shortness of breath	8	22.2
Loss of appetite	8	22.2
Sleep problems	13	36.1

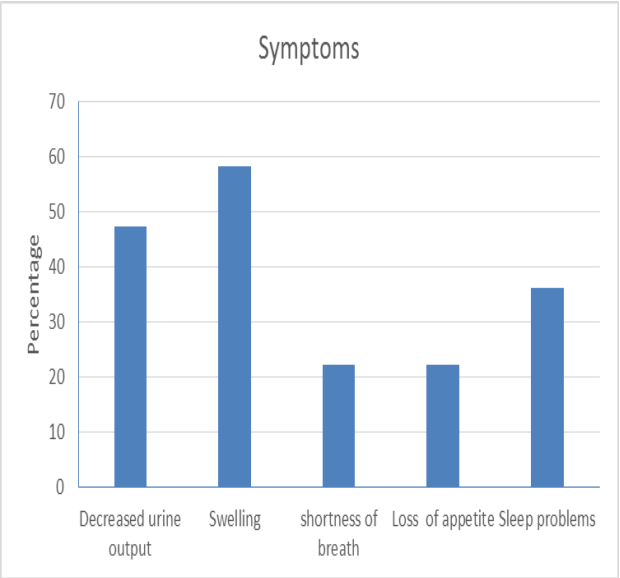


Figure 3: Diagrammatic distribution of patients based on Symptoms.

From the table 3;It was observed that 47.2% had decreased urine output, 58.3% had swelling, 22.2% had Shortness of breath, 22.2% had loss of appetite and 36.1% had sleep problems. Thus we concluded that there is higher chance of occurrence of swelling in 58.3% patients on haemodialysis.

Percentage Distribution Of Patients Based On Comorbidities

The percentage distribution of patients based on Comorbidities are shown in the following table,

Table 4: Percentage distribution of patients based on Comorbidities.

Comorbidities	Frequency	Percent
HTN	27	75
DLP	6	16.7
DM	21	58.3

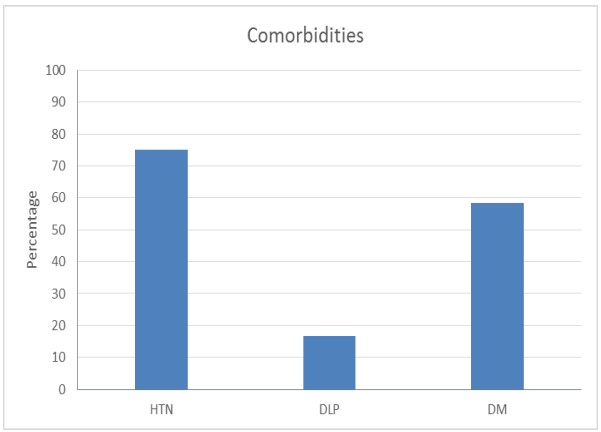


Figure 4: Diagrammatic representation of patients with Comorbidities.

From the table 4 it was observed that, out of 36 patients, 75% of patients was found to have Hypertension, 16.7% was found to have Dyslipidemia and 58.3% patients was found to have Diabetes mellitus as a co morbid condition. Thus we concluded that, there is higher occurrence of Hypertension in Males. Among 36 patients, 21 male patients is having hypertension and 7 female patients are having hypertension and also among 36 patients, 18 male patients are having diabetes mellitus and only 3 female patients are having diabetes mellitus. By using ANOVA,most of the patients with CKD have multiple comorbidities.

Percentage Association Of Smoking And Alcohol Among Esrd Patients

Percentage association of smoking and alcohol among ESRD patients are shown in the following table.

Table 5: Percentage association of Smoking and Alcohol among ESRD patients.

Personal history	Frequency	Percent
Smoking	2	5.6
Alcohol	2	5.6
Ex and non smokers	34	94.4%

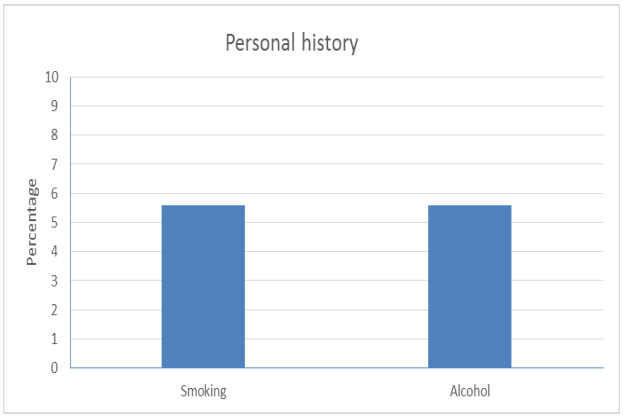


Figure 5: Diagrammatic representation of percentage association of Smoking and Alcohol among ESRD patients.

From the table 5, It was observed that 5.6% were Current Smokers and 94.4% were ex- and non-smokers and also 5.6% were current alcoholics and 94.4% were non-alcoholics respectively. The risk of ESRD was directly proportional to the smoking duration, number of cigarette smoked daily. Ex-Smokers were more likely to have comorbidities such as hypertension, dyslipidemia and Diabetes mellitus as compared to that of current smokers. Thus we can conclude that percentage is higher in ex and non-smokers and non-alcoholics than in current smokers and alcoholics.

Percentage Of Frequency Of Hemodialysis In Esrd Patients

Percentage of frequency of haemodialysis in ESRD patients are shown in the following table.

Table 6: Percentage adequacy of frequency of haemodialysis in ESRD patients

Frequency of dialysis	Frequency	Percent
Twice weekly	26	72.2
Thrice weekly	10	27.8
Total	36	100

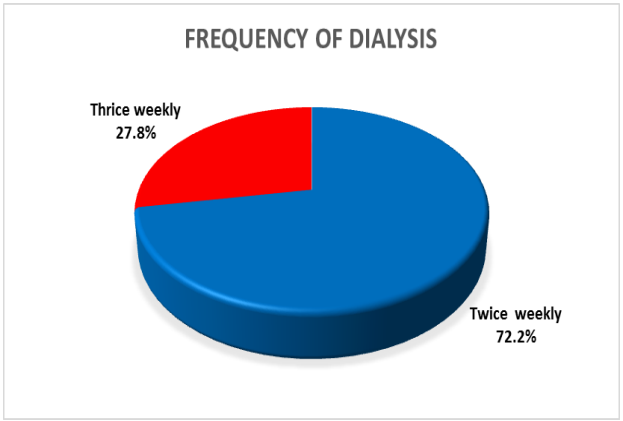


Figure 6: Diagrammatic representation of percentage adequacy of frequency of haemodialysis in ESRD patients.

From the table 6, a total of 36 patients were assessed for 6 months. Out of 36 patients, 26 patients were on twice weekly dialysis and 10 patients were on thrice weekly dialysis. Thus we compared thrice weekly dialysis schedule to twice weekly haemodialysis session. Almost 72.2% patients were on twice weekly dialysis and 27.8% patients were on thrice weekly dialysis had an arterio venous fistula. Thus we can conclude that there was increased number of patients on twice weekly haemodialysis patients when compared to thrice weekly haemodialysis patients.

Percentage Distribution of Patient Based On Diet

Percentage distribution of patients based on diet is shown in the following table.

Table7: Percentage distribution of patients based on DIET.

Diet	Frequency	Percent
Non Vegetarians	31	86.1
vegetarians	5	13.9
Total	36	100

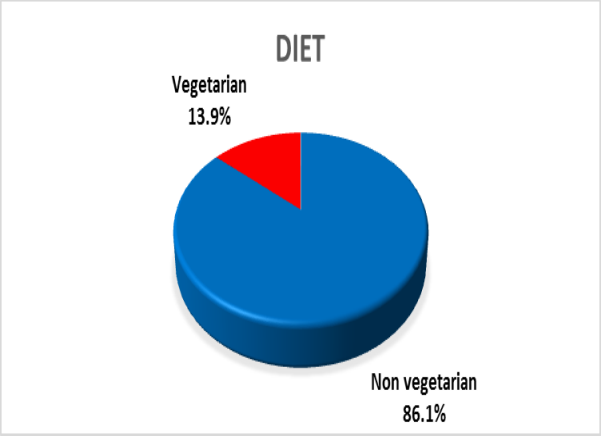


Figure 7: Diagrammatic representation of percentage distribution of patients based on DIET.

From the table 7, it was found that 31 patients were non-vegetarian and 5 patients were vegetarians. Almost 86.1% patients were non-vegetarians and 13.9% patients were vegetarians. Hence we conclude in CKD patients most of the patients are non-vegetarian when compared to vegetarian patients.

Effects Of Socioeconomic Status On Physical And Mental Health Of Hemodialysis Patients

The effects of socioeconomic status in physical and mental health of haemodialysis patients is shown in the following table.

Table 8: Effects of socioeconomic status on physical and mental health of haemodialysis patients.

QOL score	N	Mean	SD	Min	Max	Median	Q1	Q3
Physical health	36	68.1	22.6	23.7	104.7	63.7	51.3	86.5
Mental health	36	27.3	27.9	-8.5	117.3	19.7	7.4	52.1

From table 8, 36 samples who were on haemodialysis were analysed using quality of life(QOL) score as outcome measures shows a strong relationship between higher socioeconomic status (SES) and increased scores on some dimensions of a QOL scale. The mean differences between physical and mental health was found to be 68±22.6 and 27.3±27.9.SES is associated with the incidence or prevalence of end-stage kidney disease (ESKD) and also influences a wide range of health indicators in patients with ESKD and who are undergoing dialysis. Thus we conclude that higher SES is related to enhancing the physical health and lower the mental health like depression in patients undergoing dialysis.

Serum Bicarbonate Measures Of Hemodialysis Patients During Each Follow Up

The measurement of serum bicarbonate levels of haemodialysis patients during each follow up is shown the following table.

Table 9: Serum bicarbonate measures of haemodialysis patients during each follow up

Bicarbonate	N	Mean	SD	Min	Max	Median	Q1	Q3
Follow up 1	36	18.1	3.1	11.3	24.0	18.7	15.9	20.4
Follow up 2	36	17.7	3.0	11.5	23.4	18.2	15.3	20.3
Follow up 3	36	18.6	2.6	13.8	24.4	18.6	17.1	19.9
Follow up 4	36	19.8	2.8	14.9	27.4	19.7	17.5	21.8
Follow up 5	36	20.6	2.7	15.0	27.9	20.7	19.1	22.3
Follow up 6	36	21.2	2.6	16.2	28.6	21.1	19.6	22.9

$P<0.001$

From the table 9,total of 36 patients who were on once weekly, twice weekly and thrice weekly dialysis were taken and their predialysis serum bicarbonate levels on each follow up were observed. The mean serum bicarbonate level in follow up 1 was found to be 18.1±3.1 mEq/L, follow up 2 was 17.7±3.0mEq/l, follow

up 3 was 18.6±2.6 mEq/l, follow up 4 was 19.8±2.8 mEq/l, follow up 5 was 20.6±2.7 mEq/l and follow up 6 was 21.2±2.6 mEq/l. A statistical significant difference was defined by a p value less than 0.001whi h means that the observed difference were statistically significant. Thus we conclude that there was increase in serum bicarbonate level from 11.3mEq/l to 28.6mEq/l in the 6th follow up. Hence it maintains the acid base status of maintenance hemodialysis patients and is also associated with a low risk of CKD progression.

Comparison Of Serum Bicarbonate Level In Hemodialysis Patients

The comparison of serum bicarbonate level in haemodialysis patients is shown in the following table

Table 10: Comparison of serum bicarbonate level in haemodialysis patients.

Bicarbonate level	Follow up 1		Follow up 2		Follow up 3		Follow up 4		Follow up 5		Follow up 6	
	n	%	n	%	n	%	n	%	n	%	n	%
<22 mEq/L	34	94.4	35	97.2	34	94.4	28	77.8	26	72.2	23	63.9
>22 mEq/L	2	5.6	1	2.8	2	5.6	8	22.2	10	27.8	13	36.1
Total	36	100	36	100	36	100	36	100	36	100	36	100

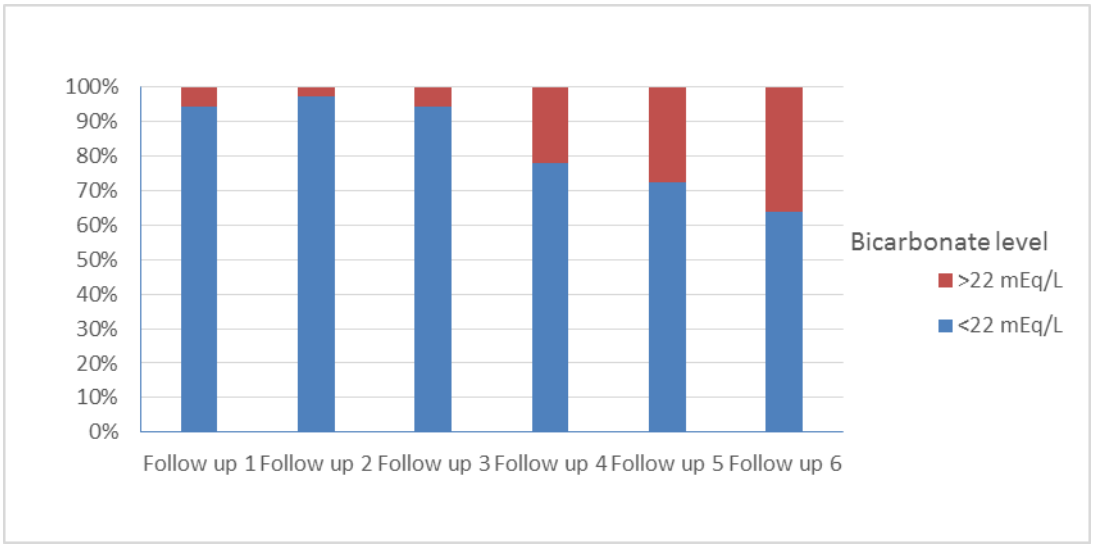


Figure 8: Diagrammatic representation of comparison of serum bicarbonate level in haemodialysis patients.

From the table 10, the mean percentage of serum bicarbonate level <22mEq/l and >22mEq/l were obtained. The percentage of serum bicarbonate level <22mEq/l in haemodialysis patients were found to be 94.4% in the 1st follow up, 97.2% in 2nd follow up, 94.4% in 3rd follow up, 77.8% in 4th follow up, 72.2% in 5th follow up and 63.9% in 6th follow up. The percentage of serum bicarbonate level >22mEq/l in haemodialysis patients were found to be 5.6% in 1st follow up, 2.8% in 2nd follow up, 5.6% in 3rd follow up , 22.2% in 4th follow up, 27.8% in 5th follow up and 36.1% in 6th follow up. Thus from the above table we can conclude that there were a significant increase in patients with bicarbonate level (from 5.6% to 36.1%) in the 6th follow up.

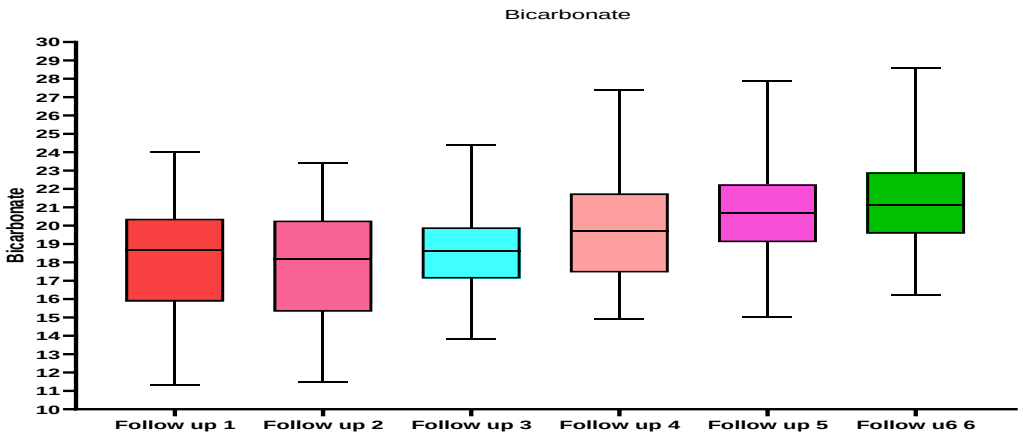
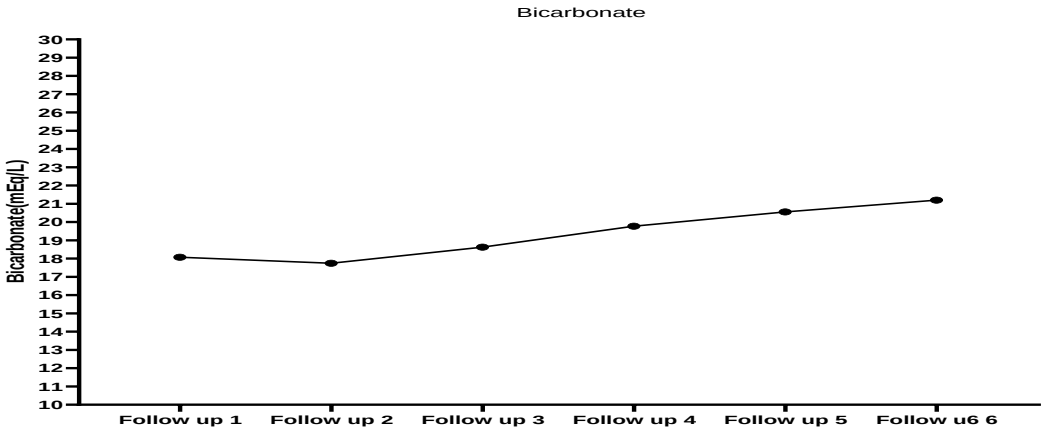


Figure 9: Diagrammatic representation of concentration of bicarbonate level.

The above figure also shows the increase in bicarbonate level in each follow up. Hence there were shown increased bicarbonate level in each follow up and 6th follow up shown the significant increase the serum bicarbonate level



Comparison Of Potassium Level In Hemodialysis Patients

The comparison of potassium level during each follow up is shown in the following table.

Table 11: Comparison of potassium level in haemodialysis patients.

Potassium	N	Mean	sd	Min	Max	Median	Q1	Q3
Follow up 1	36	5.1	0.8	3.2	7.1	5.1	4.5	5.6
Follow up 2	36	5.0	1.6	3.1	13.1	4.7	4.3	5.3
Follow up 3	36	4.9	0.8	3.1	6.8	5.0	4.4	5.6
Follow up 4	36	4.9	0.8	3.6	6.7	4.7	4.3	5.5
Follow up 5	36	4.7	0.7	3.2	6.2	4.8	4.3	5.2
Follow up 6	36	4.6	0.7	3.4	6.1	4.5	4.1	5.1

P=0.036

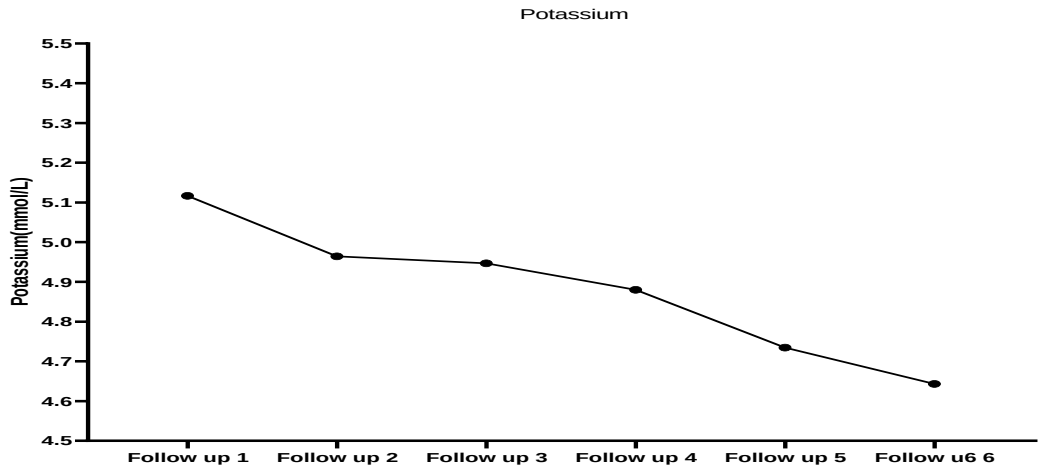


Figure 10: Diagrammatic representation of comparison of potassium level in haemodialysis patients.

From table 11, 36 patients were evaluated for analyzing the change in potassium concentration during each follow up. Potassium concentration in 1st follow up was 5.1±0.8mEq/l, 5.0±1.6mEq/l in 2nd follow up, 4.9±0.8mEqp/l in 3rd follow up, 4.9±0.8mEq//l in 4th follow up, 4.7±0.7mEq/l in 5th follow up and 4.6±0.7mEq/l in 6th follow up. P=0.0366 was found to be statistically significant. Thus we conclude that there were statistically significant decreases in potassium level in haemodialysis patients. Hence our data strongly suggest that there was an increase in reduction of potassium level by hemodialysis on each follows up.

Comparison Of Hemoglobin In Hemodialysis Patients

The comparison of hemoglobin in haemodialysis patients is shown in the following table.

Table 12: Comparison of hemoglobin in haemodialysis patients.

Hb	N	Mean	sd	Min	Max	Median	Q1	Q3
Follow up 1	36	9.6	2.1	6.3	16.7	9.7	8.1	10.7
Follow up 2	36	9.6	1.4	6.9	12.4	9.9	8.4	10.6
Follow up 3	36	9.7	1.4	7.0	12.7	9.9	8.5	10.6
Follow up 4	36	10.2	1.3	6.3	12.7	10.3	9.2	11.2
Follow up 5	36	10.4	1.1	7.3	13.0	10.6	9.6	11.2
Follow up 6	36	10.8	1.4	7.3	14.0	10.7	10.0	11.7

P<0.001

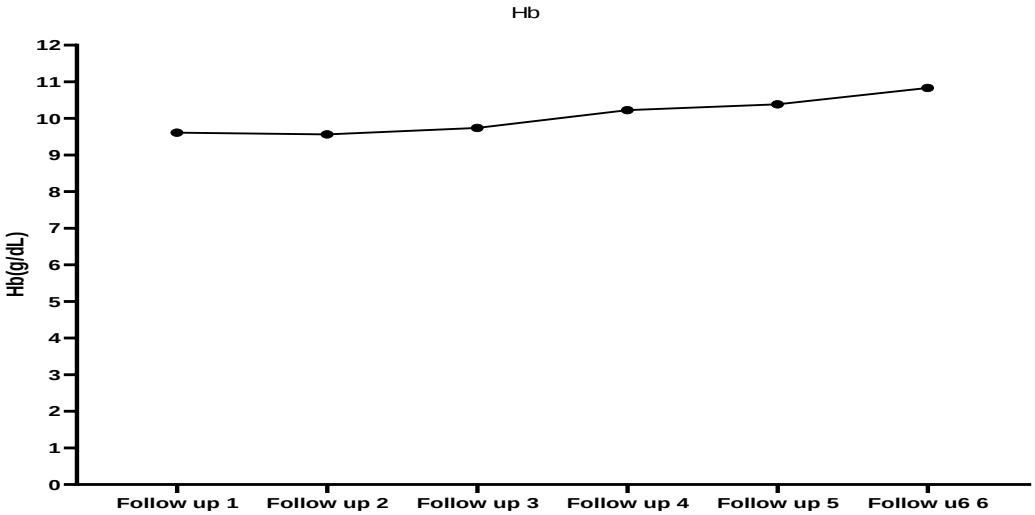


Figure 11: Diagrammatic representation of hemoglobin in haemodialysis patients.

From the table 12, the hemoglobin levels of 36 patients with end stage renal disease (ESRD) were measured before dialysis. Hemoglobin concentration in 1st follow up was found to be 9.6±2.1g/dl, 9.6±1.4g/dl in 2nd follow up, 9.7±1.4g/dl in 3rd follow up, 10.2±1.3g/dl in 4th follow up, 10.4±1.1g/dl in 5th follow up and 10.8±1.4g/dl in 6th follow up. There was a significant increase in hemoglobin level in each follow up with a p value of <0.001.P value was considered statistically significant. Thus we conclude that predialysis Hb measurements were significantly maintaining the target Hb level in ESRD patients receiving haemodialysis. Hence the rise in hemoglobin over time was associated with a better survival rate.

Assessing Quality Of Life Score Based On Kdqol Sf-36 Scale

In this section, the data related to Assessment of Quality of life of patients with End stage renal disease were collected and recorded. The collected data shown in the following table

Table 13: Assessing quality of life score based on SF-36 scale.

SF 36score	QOL
Number of values	36
Minimum	35.42
Maximum	93.75
Median	72.57
Q1	53.48
Q3	86.6
Mean	70.57
sd	17.16

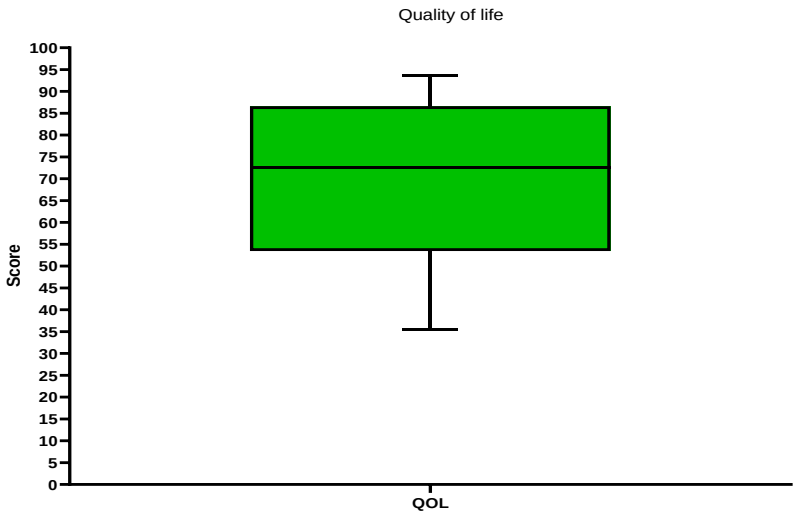


Figure 12: Diagrammatic representation of assessing quality of life score based on SF-36 scale.

From the table 13, the sample studied consisted of 36 patients undergoing haemodialysis. Data were collected by the completion of a specially designed questionnaire (KDQOL-SF 36) which apart from the socio demographic and clinical variables. The mean percent of QOL score was found to be 70.57% with a standard deviation of 17.16. The study findings indicate that CKD adversely affects the QOL of patients on maintenance haemodialysis. It revealed that the factors which affect the quality of life of CKD patients was age, gender, presence of co-morbidity, duration of haemodialysis, Vascular access for haemodialysis. From the study, we analyze that QOL in males were better as compared to females, the QOL of patients in the age group 18 years, 35 years, and 36 years to 59 years and above 60 years was affected with highest affected age group of 18-35 years. Also the QOL had been affected by presence of Anemia, Hypertension and Diabetes mellitus in CKD patients with highest impact by hypertension as the co-morbidity. Thus from our study we conclude that patients have improved quality of life by dialysis and hence patients sociodemographic and clinical characteristics are correlated to quality of life (QOL).

Correlation Between Bicarbonate Level And Frequency Of Dialysis

The correlation with frequency of dialysis and bicarbonate level is shown in the following table

Table 14: Correlation with frequency of dialysis and bicarbonate level.

Bicarbonate level (mEq/L)	Twice weekly (n=26)		Thrice weekly (n=10)	
	mean	sd	mean	sd
Follow up 1	18.2	3.3	17.9	2.8
Follow up 2	17.9	3.0	17.4	3.2
Follow up 3	18.8	2.8	18.1	2.0
Follow up 4	19.6	2.9	20.3	2.5
Follow up 5	20.3	2.8	21.3	2.6
Follow up 6	21.1	2.4	21.5	3.1

Table 15: Repeated measure ANOVA.

Repeated measure ANOVA	Type III Sum of Squares	df	Mean Square	F	p
Follow up	340.504	5	68.101	26.119	<0.001
Follow up Vs Frequency of dialysis	19.864	5	3.973	1.524	0.185
Error(factor1)	443.243	170	2.607		

From the table 15, Repeated measure ANOVA table shows that there was a significant change in bicarbonate level in successive follow up ($p<0.05$). There was no significant difference in the variations in bicarbonate level according to frequency of dialysis ($p>0.05$).

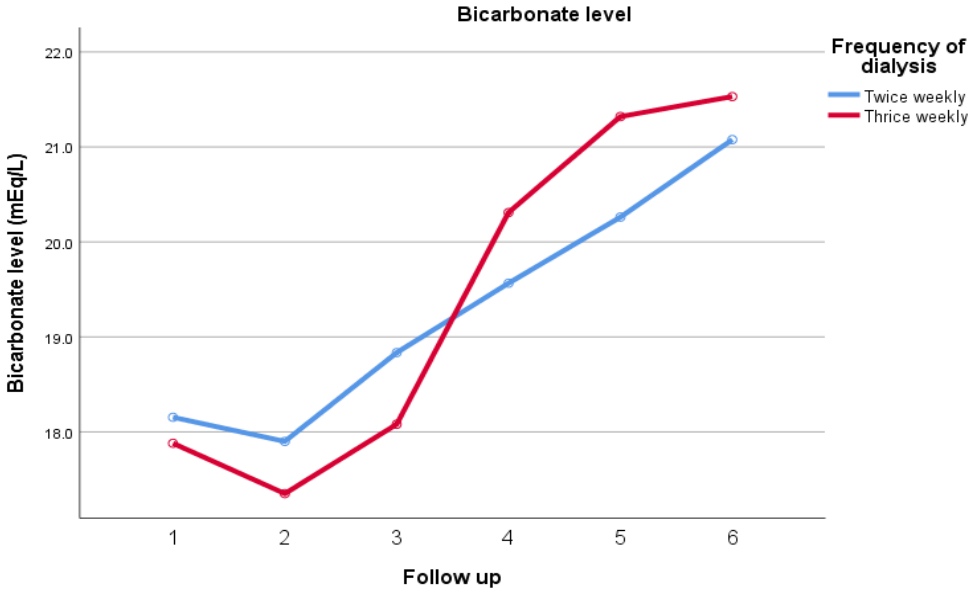


Figure 13: Diagrammatic representation of correlation between bicarbonate and frequency of dialysis.

From the table 14, the bicarbonate levels in twice weekly and thrice weekly dialysis were analyzed. From that, twice weekly bicarbonate level were found to be 18.2±3.3mEq/l in 1st follow up, 17.9±3.0mEq/l in 2nd follow up, 18.8±2.8mEq/l in 3rd follow up, 19.6±2.9mEq/l in 4th follow up, 20.3±2.8mEq/l in 5th follow up and 21.1±2.4mEq/l in 6th follow up and for thrice weekly dialysis, 17.9±2.8 in 1st follow up, 17.4±3. 2 in 2nd follow up, 18.1±2.0 in 3rd follow up, 20.3±2.5 in 4th follow, 21.3±2.6 in 5th follow and 21.5±3.1 in 6th follow up. Thus we can conclude that there was a significant change in bicarbonate level in successive follow up as the p value <0.05 was statistically significant. Hence there was no significant difference in the variations in bicarbonate level according to frequency of dialysis.

Correlation Between Change In Bicarbonate Level And Potassium Level At 6th Follow Up

The correlation between change in bicarbonate level and potassium level at 6th follow up is shown below graphically

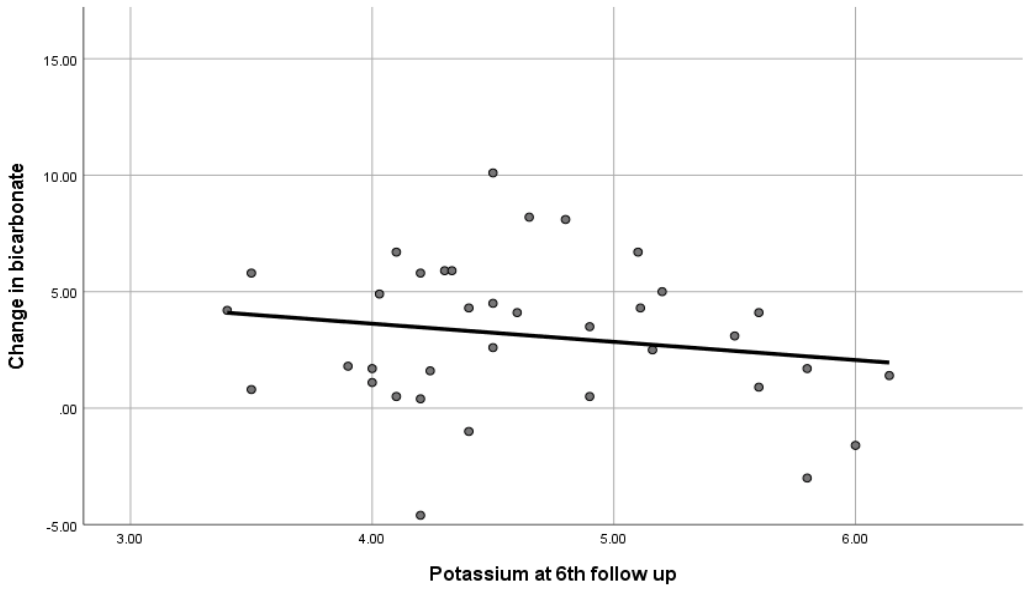


Figure 14: Diagrammatic representation of correlation between change in bicarbonate level and potassium level at 6th follow up

Pearson correlation r = -0.177 p=0.302

From the graph, it is clear the potassium level at 6th follow up was found to be balanced under the criteria of KDQOL(6.5mEq/l) and also the bicarbonate level was increased≥22mEq/L) from the KDQOL. From this data, p value is 0.302 which is highly significant. Thus we can conclude that, there is a correlation between bicarbonate

and potassium level as serum bicarbonate level increases and serum potassium decreases.

Correlation Between Frequency Of Dialysis And Dose Of Oral Supplmentation Of Bicarbonate

Table 16: Correlation between frequency of dialysis and dose of oral supplementation of bicarbonate.

Dose of oral supplementation of bicarbonate	Frequency				Total		χ^2	df	P
	Twice per week		Thrice per week						
	N	%	N	%	N	%			
250mg	3	37.5	1	50	4	40	0.1	1	0.75
500 mg	**5**	**62.5**	**1**	**50**	**6**	**60**			

From the table 16, in twice per weekly patients 250mg bicarbonate was given in 3 patients and the serum bicarbonate level increased up to 37.5%, 500mg bicarbonate was given in 5 patients having a percentage increase of serum bicarbonate level up to 62.5%.In thrice weekly patients, 1 patient was given with 250mg bicarbonate having a percentage increase of bicarbonate up to 50%, 1 patient was given with 500mg bicarbonate and the percentage increase in bicarbonate level up to 50%.Out of this, 4 patients who have 250mg bicarbonate supplementation have a percentage increase of 40% and 6 patients who have 500mg bicarbonate supplementation have a percentage increase of 60%.Hence, patients taking 500mg oral Bicarbonate shows increase in bicarbonate level of patients than that of patients taking 250mg oral bicarbonate. Thus we can conclude that, increase in dose of bicarbonate supplementation produces a dose-dependent increase in serum bicarbonate level

DISCUSSION

Chronic kidney disease (CKD) is characterized by a progressive deterioration in kidney function with an irreversible structural damage to Nephrons. CKD is defined as kidney damage with normal or decreased GFR (stage 1 and 2) or GFR less than 60ml/min/1.73m^2 (stage3-4).Clinical signs and complications of CKD are associated with uremic symptoms (eg;Nausea ,anorexia),hypertension and bleeding are observed when the disease advances to stage3-5.Patients GFR rate less than 30ml/min/1.73m^2 advances to stage 4.CKD will ultimately progress through ESRD.The clinical signs and symptoms of renal failure patients can be found out during the later stages of the condition. This stage is referred to as uremia. Untreated CKD can result in end stage renal disease (ESRD) and necessitate dialysis or kidney transplantation. The incidence rate of ESRD is highest in patients older than 65 years. Besides diabetes mellitus and hypertension, age is an independent factor of chronic kidney disease.

End Stage Renal Disease is a progressive loss of kidney function when the kidneys cannot remove waste materials regulate fluid and electrolytes and acid base balance. The two main therapies for dialysis are haemodialysis and peritoneal dialysis. Haemodialysis is the most frequently used form of dialysis. In this method, blood is circulated to the dialyzer across the semi permeable membrane using dialysis fluid. The dialysis is performed three times per week. Each session lasts about four to five hour. The acid base balance in these patients can be optimized by administering bicarbonate via the dialysate .Serum bicarbonate levels in dialysis patients is influenced by several factors that includes intake of dietary protein, nutritional status and dialysis prescription. Normal acid -base balance are pH of 7.38–7.42, serum bicarbonate level of 24–28 mEq/L and pCO2 of 38–42 mmHg.

This study aim to find out the pattern of bicarbonate levels in patients on maintenance haemodialysis and it's correlation with frequency of dialysis and potassium level. Quality of life was assessed using KDQOL SF-36 scale and to evaluate the impact of patient counseling on improving the quality of life in patients with End stage renal disease. From the study, we found out that there was a significant change in bicarbonate level among patients on haemodialysis at successive follow up. There was no significant difference in the variations in bicarbonate level according to frequency of dialysis. It was clear that potassium level at 6th follow up was found to be balanced under the criteria of KDQOL (potassium=6.5mEq/l) and also the bicarbonate level was increased (≥22mEq/l) from the KDQOL. Thus we concluded that there is a correlation between bicarbonate and potassium level as serum bicarbonate level increases and serum potassium decreases.

In this study 36 patients on maintenance haemodialysis were taken. Among this, 26 patients were on twice weekly dialysis and 10 Patients were on thrice weekly dialysis. Thus we compare thrice weekly dialysis schedule to twice weekly haemodialysis session. Our study demonstrated that percentage is higher in twice weekly haemodialysis patients when compared with thrice weekly haemodialysis patients and also patients have better quality of life by dialysis and hence patients socio demographic and clinical characteristics are correlated to quality of life (QOL).

K.T.C GOUTHAM etal. Conducted a study on "Persistent metabolic acidosis on regular haemodialysis or peritoneal dialysis. "They measured the pre-dialysis serum bicarbonate levels in 100 adult patients on regular haemodialysis and 41 adult patients on peritoneal dialysis and detect the extent of rise in serum bicarbonate levels from predialysis level after haemodialysis. They concluded that significant proportion of patients with ESRD on regular haemodialysis to have uncorrected

metabolic acidosis. So increasing the frequency of dialysis thrice a week.In our study, we concluded that there was a significant change in bicarbonate level in successive follow up. There was no significant difference in the variations in bicarbonate level according to frequency of dialysis. It was clear that potassium level at 6th follow up was found to be balanced under the criteria of KDQOL (potassium=6.5mEq/l) and also the bicarbonate level was increased (≥22mEq/l) from the KDQOL.

Ione de Brito Ashurst etal. conducted a randomized study on "bicarbonate supplementation slows progression of CKD and improves nutritional status". Randomly assigned 134 adult patients with CKD and serum bicarbonate for 2 years concluded that nutritional parameters improved significantly with bicarbonate supplementation, also demonstrate that bicarbonate level shows the progression of renal failure to ESRD and improves the nutritional status among patients with CKD. From our study, we concluded that increase in dose of bicarbonate supplementation produces a dose-dependent increase in serum bicarbonate level.

Shewta Bensal and Pablo .E.pergola conducted a study on "Current management of hyperkalemia in patients on dialysis "where they concluded that the key approaches to managing hyperkalemia in these patients are monitoring and restricting dietary intake of potassium, optimization of the dialysis prescription, modification of medicines that increase serum potassium concentrations. In our study, we concluded that in Chronic kidney disease patients majority of patients are non vegetarians than vegetarians.

Ricardo.M.Hegulien etal. conducted a study on The faster potassium lowering effect of high dialysate bicarbonate concentration in chronic haemodialysis patient. Where, 8 stable HD patients were studied. They concluded that high dialysate was associated with a faster decrease in serum potassium. This is due to shifting of potassium from extracellular to intracellular fluid compartment rather than its removal by dialysis.In our study we concluded that there is a correlation between bicarbonate and potassium level as serum bicarbonate level increases potassium level decreases.

CONCLUSION

In this present study 36 patients on maintenance haemodialysis were taken. Among this,26 patients were on twice weekly haemodialysis and 10 Patients were on thrice weekly haemodialysis .Our study concluded that

- Significant change was observed in bicarbonate levels at successive follow up.
- According to frequency of dialysis there is no significant difference in the variation in bicarbonate level and potassium level.
- Potassium level at 6th follow up was found to be balanced under the criteria of KDQOL.
- Bicarbonate level was increased (≥22mEq/l) according to KDQOL criteria.
- Correlation was observed between bicarbonate level and potassium level as serum bicarbonate level increases potassium level decreases.
- Increasing the dose of bicarbonate supplementation produces a dose dependent increase in serum bicarbonate level.
- Patients show improvement in quality of life by dialysis.
- Patient counselling shows an improvement in health related quality of life in ESRD .Awareness of patients on diet and medication through patient counselling was also found to be effective in improving quality of life in haemodialysis patients.

LIMITATIONS

Limitations in this study include

- Some patients were not adherent to prescribed dietary restrictions
- Some patients defaulted dialysis sessions
- Some patients were not complaints with medicines
- Lack of cooperation in some patients made it difficult to gather information required for the study.

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