

Comparative Analysis of nutritional status of CKD patients

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Abstract

Chronic kidney disease (CKD) is a rapidly growing public health concern nowadays. Its magnitude is growing globally making it a major community health issue in the present era. With this view in mind, present research work was planned to study nutritional status of chronic kidney disease patients who were not on dialysis. It was observed that the majority of the patients were males. Thirty five percent of the patients were either malnourished or at risk of malnutrition. This is closely associated with the clinical signs and symptoms of anemia, fatigue and loss of appetite and poor nutrient intake in these patients although 64% males and 50% female patients were normally nourished as their calorie intake was near normal. There is a strong need for dietary counseling of the patients suffering from chronic diseases.

Keywords

Kidney diseases, malnutrition, nutritional status, anthropometric measurements, biochemical profile, clinical examination, dietary recall

Introduction

Chronic kidney disease (CKD) is a rapidly growing health issue in those who come with morbidities of diabetes mellitus, heart problems and metabolic syndrome etc. Increasing age is also a risk factor due to poor functioning of the kidneys. Chronic kidney disease is characterized by impaired kidney function for more than 3 months. Decreased awareness and knowledge is also a contributory factor for chronic kidney disease¹.

Types of kidney diseases

1. Glomerulonephritis

Glomerulonephritis (GN) or also known as nephritis is characterized as inflammation in the glomeruli. Glomeruli act like a sieve that filters and purifies blood by removing impurities. In case of inflammation in glomeruli, kidney failure can occur. It needs immediate medical intervention or may prove fatal. It can be acute or chronic².

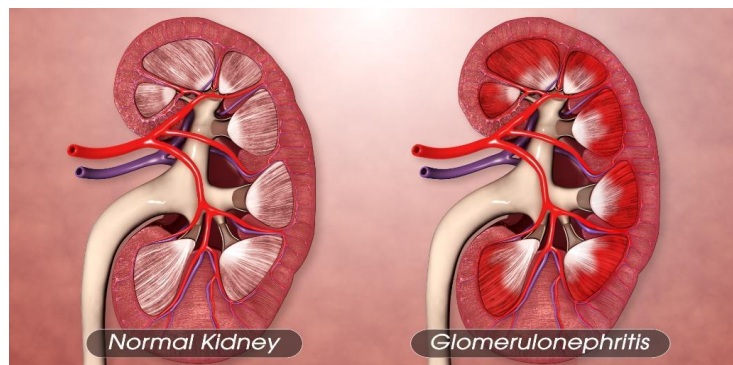


Figure 1: Kidney presentation in normal stage and in glomerulonephritis

2. Nephrotic Syndrome

Also known as Nephrosis, it is characterized by increased permeability of membranes of glomerular capillary. It further causes excessive leakage of albumin into urine that is presented with hypoalbuminemia and proteinuria. It is usually observed in young boys between 2-6 years. Here blood vessels are damaged in glomeruli. It is differentiated from glomerulonephritis as there is no hypertension, haematuria, anemia and nitrogen retention. Untreated glomerulonephritis can cause nephrosis or other etiologic factors may be diabetes, or progressive glomerulonephritis, diabetes, systemic lupus erythematosus, malaria fever or heavy metal toxicity³.

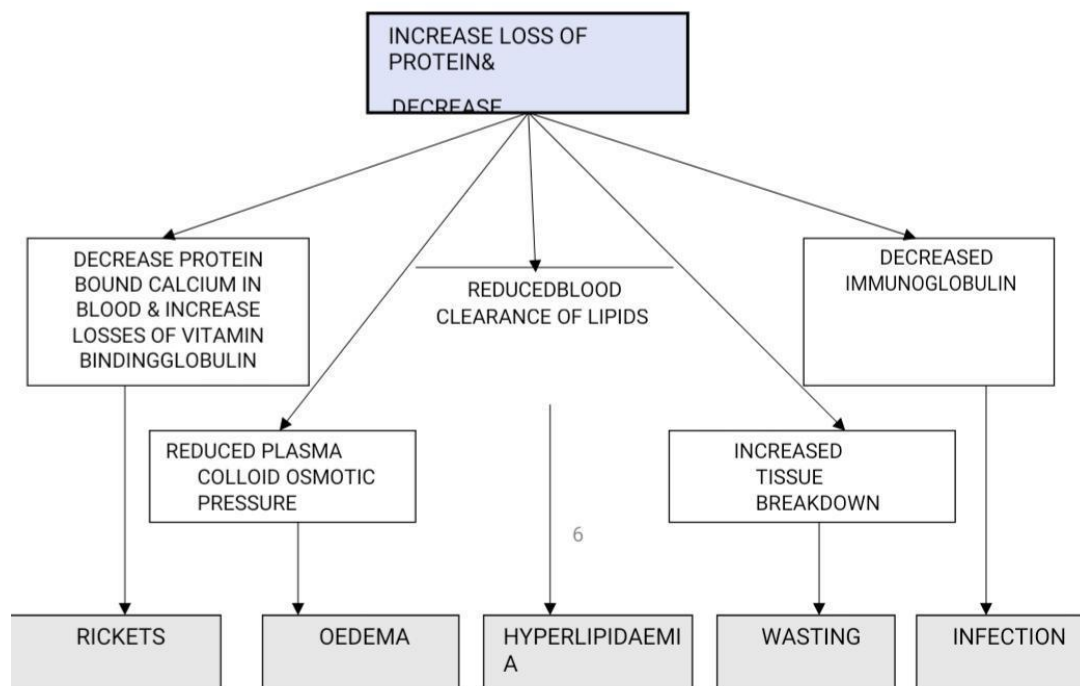
Effect of proteinuria in Nephrotic syndrome

Figure 2: Effect of proteinuria on Nephrotic syndrome

3. Chronic renal failure

Chronic renal failure (CRF) also known as chronic kidney injury or uraemia is identified as urea levels in blood are high for more than 3 months. Prevalence of chronic renal failure is prominently seen ever increasing in countries with high temperatures^{1,4}.

Chronic renal failure is the result of progressive breakdown of kidney tissues which impairs all kidney functions. Uraemia occurs when 90% of functional renal tissue is destroyed. It may be the end result of acute glomerulonephritis, pyelonephritis and nephrotic syndrome.

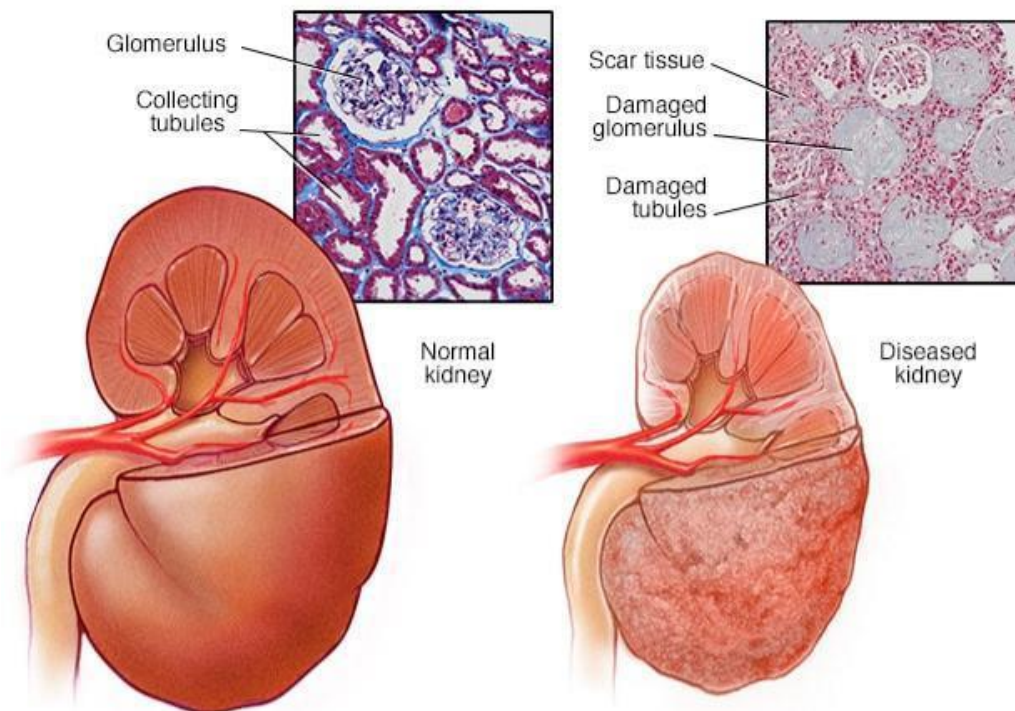


Figure 3: Demonstration of kidney in condition of chronic renal failure

Stages of renal failure

Chronic kidney disease (CKD) appears with 5 stages of progression on the basis of glomerular filtration rate (GFR) ^{5, 6}.

1. Stage 1 (GFR >90 ml/min.)
2. Stage 2 (GFR 60 -90 ml/min.)
3. Stage 3 (GFR 30 - 60 ml/min.)
4. Stage 4 (GFR 15 - 30 ml/min.)
5. Stage 5 (GFR <15 ml/min.)

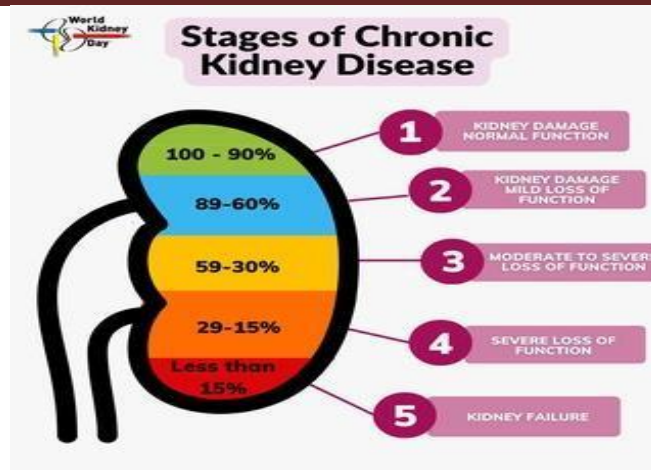


Figure 4: Stages of renal failure

Objective

- To study the nutritional status of CKD patients

Methodology

A prospective observational study was conducted on 30 patients admitted in Nephrology, Dept. of Mahatma Gandhi Medical College and Hospital, Jaipur. Purposive sampling technique was chosen for sample selection.

Inclusion criteria

- CKD patients without Dialysis
- Patients aged 25 - 80 years.
- Both male and female patients

Exclusion criteria

- Patients below 25 years and above 80 years
- Patients with Dialysis

Data collection

Samples selected were studied for their nutritional status as per following details.

Part 1: General information

Patient's general information was collected for the following details:

Name of the respondent, Age/ Sex, Educational status (Illiterate/ Primary/ Metric/ Graduate/ Post graduate), Working Status (Working/ Non Working), Activity pattern (Sedentary/ Moderate/ Heavy), Economic status: LIG (< 50000)/ MIG (50000 – 2 LAC)/ HIG (> 2 LAC) and information about marital Status (Married/Widow/Single/ Unmarried) was recorded from patient's file or patient's or attendant's interview. With this any comorbidity was also noted.

Part 2: Assessment of nutritional status

2.1 Anthropometric measurements

Patient's anthropometric data was collected for the following parameters as per standard procedures⁷.

Weight: Patient's weight was noted from the digital bathroom weighing scale in minimum clothing

Height: Height was measured using a stadiometer (Heightometer) on a flat surface, without shoes or hairdo.

Waist circumferences (WC): Patient's waist circumference was noted using a non stretchable measuring tape on the navel point crossing over iliac crest.

Hip circumferences (HC): It was also noted using a non stretchable measuring tape.

Mid upper arm circumference (MUAC): It was also measured using a non stretchable measuring tape. For this midpoint was marked on arm from olecranon process to acromion process

Body mass index (BMI): It was calculated using a formula -

Weight (kg) / Height (m²)

Waist/ Hip circumferences ratio (WHR): Waist to hip ratio was also calculated with waist and hip circumference.

2.2 Study of patient's biochemical profile

Reports for Renal function test (RFT), Electrolytes and Complete blood count (CBC) were noted from the patient's medical records.

2.3 Study of clinical signs and symptoms

Following clinical signs and symptoms were observed in patients to see the effect of disease on the body that may alter food intake also. These included presence or absence of symptoms of anorexia, nausea, vomiting, weight loss, low urine output and anemia

2.4 Dietary recall

It was recorded from an interview of the patient or attendant to find out the patient's nutrient intake, by which nutritional status at the time of hospitalization can be found out. It was noted for three consecutive days (preferably two working and one non working) and average nutrient intake of three days was taken as their general nutrient intake⁸.

Time	Meal	Menu	Household measurement

Table 1: Sample table shown below to record 24 hrs home diet recall

EMPTY CALORIES INTAKE THROUGH FOOD FREQUENCY					
Food Item	Daily	Weekly	Fortnightly	Monthly	Total Empty Calories Intake
Oil					
Sugar					
Cold drink / Sharbat/ Juice					
Pickles /fried foods/ Junk food					
Alcohol					
Total					

Table 2: Sample table to collect data for empty calorie intake

Part 3: Nutritional diagnosis

Patients were divided into following categories as per Subjective Global Assessment tool -

1. SGA rating A - Normally nourished/ Healthy
2. SGA rating B - Mildly malnourished (At risk of malnutrition)
3. SGA rating C – Malnourished

Results & Discussion

Results & Discussion part has been divided into following sub headings:

1. General information of the patients

Patients no.	Age / Gender	Education status	Working status	Types of activity	Economic status	Marital Status
1	40y / male	Metric	Working	Moderate	MIG	Married
2	45y/male	primary	working	moderate	LIG	Married
3	80y/male	metric	working	sedentary	HIG	Married
4	65y/male	metric	working	heavy	LIG	Married
5	60y/male	illiterate	working	sedentary	LIG	Married
6	43y/male	graduate	working	sedentary	HIG	Married
7	65y/female	illiterate	working	sedentary	MIG	Married
8	47y/male	metric	working	moderate	MIG	Married
9	53y/female	metric	working	moderate	MIG	Married
10	59y/male	graduate	working	moderate	HIG	Married
11	45y/male	graduate	working	heavy	MIG	Married
12	80y/male	illiterate	non working	Sedentary	MIG	Married
13	74y/male	primary	non working	Sedentary	MIG	Married
14	28y/male	metric	working	moderate	LIG	Married
15	36y/male	metric	working	heavy	MIG	Married
16	72y/male	illiterate	working	sedentary	MIG	Married
17	53y/male	metric	working	moderate	MIG	Married
18	34y/male	graduate	working	moderate	HIG	Married
19	65y/male	primary	working	moderate	MIG	Married
20	23y/male	graduate	working	moderate	MIG	Married
21	32y/male	metric	working	sedentary	HIG	Married
22	42y/male	metric	working	moderate	MIG	Married
23	67y/male	primary	working	sedentary	HIG	Married
24	45y/male	metric	working	heavy	MIG	Married
25	70y/male	illiterate	non working	Sedentary	HIG	Married
26	47y/male	primary	working	moderate	MIG	Married
27	65y/male	illiterate	working	sedentary	MIG	Married
28	49y/male	metric	working	moderate	MIG	Married
29	57y/male	metric	working	moderate	MIG	Married
30	52y/male	graduate	working	moderate	HIG	Married

Table 3: General information of CKD patients

Table 3 is showing that all patients were married. 13% of patients had low income status 53% patients were middle class and 33% patients were from higher class. Out of 30, 6 patients only graduated, while others were either metric or primary educated. On the other hand, 6 patients were illiterate also. Only 10% of patients were non-working, while 90% of patients were working. 50% of patients were moderately active while 10% of patients showed a heavy activity pattern. Rest had a sedentary lifestyle.

Out of 30, 28 patients were male while only 2 female patients were found during the entire study period. Less female patients may be due to the poor condition of females in our society as they ignore their health issues over their responsibilities and sometimes they do not get proper treatment due to financial problems.

2 Assessment of Nutritional status

2.1 Anthropometric measurements

Patients no.	Age/ gender	Height (cm)	Weight (kg)	BMI (kg/m ²)	WC (cm)	HC (cm)	WHR	MUAC (cm)
1	40y / male	173	60	20	79	82	0.91	26
2	45y/male	169	61	21	91	94	0.9	26
3	80y/male	165	45	16	63	66	0.93	21
4	65y/male	173	65	21	92	96	0.95	27
5	60y/male	168	55	19	81	89	0.9	23
6	43y/male	161	56	21	95	100	0.95	29
7	65y/female	156	65	26	85	93	0.86	30
8	47y/male	170	75	25	97	101	0.96	32
9	53y/female	164	55	20	86	98	0.87	26
10	59y/male	175	76	24	98	103	0.95	33
11	45y/male	173	65	21	82	87	0.94	28
12	80y/male	168	50	17	69	72	0.9	24
13	74y/male	161	68	26	93	89	0.95	25
14	28y/male	157	60	24	90	95	0.94	25
15	36y/male	174	72	23	93	98	0.94	28
16	72y/male	150	50	22	83	86	0.9	24
17	53y/male	170	65	22	92	95	0.96	26
18	34y/male	169	75	26	97	102	0.95	28
19	65y/male	170	68	23	94	99	0.94	28
20	23y/male	175	76	24	98	104	0.94	27
21	32y/male	173	72	24	97	102	0.95	26

22	42y/male	168	85	30	115	120	0.95	37
23	67y/male	167	76	27	101	105	0.96	32
24	45y/male	176	56	18	87	91	0.95	25
25	70y/male	177	80	25	96	101	0.95	29
26	47y/male	166	62	22	95	98	0.97	27
27	36y/male	174	72	23	93	98	0.94	28
28	72y/male	150	50	22	83	86	0.9	24
29	53y/male	170	65	22	92	95	0.96	26
30	34y/male	169	75	26	97	102	0.95	28

Table 4: Anthropometric measurements of CKD patients

Table 4 is showing that 53% of patients had normal BMI (18-23 kg/m²), 6.6 % patients had a low BMI range (below 18 kg/m²) and 40 % patients had a high BMI range (above 23).

2.2 Biochemical/ biomedical assessment

2.2.1 Electrolytes/RFT

Pa-tients no.	Age / gender	Sodium (Na) [135-145] mmol/L	Potassium (k) [3.5-5.1] mmol/L	Creatinine (cr) [0.5-1.25]	Blood urea [15.0-45.0] mg/dl	Serum uric acid [3.5-8.5] mg/dl
1	40y/male	124	3.7	2.4	90	7.9
2	45y/male	134	4.4	3	93	8
3	80y/male	139	5.8	2.7	132	9.4
4	65y/male	143	4.9	3.3	87	8.4
5	60y/male	121	4.7	10.6	200	7.4
6	43y/male	140	4.2	5.6	184	6.4
7	65y/female	136	3.5	4.7	158	10.6
8	47y/male	140	2.9	5.2	131	9.3
9	53y/female	137	4.2	4.3	115	8.7
10	59y/male	142	4.1	6.2	113	9.1
11	45y/male	136	3.7	5.7	97	6.9
12	80y/male	127	4.6	3.3	134	6.6
13	74y/male	135	5.3	3.8	69	6.8
14	28y/male	136	2.7	2.9	72	7.4
15	36y/male	138	5.35	10.6	208	6.2
16	72y/male	138	3.8	3.8	80	5.4
17	53y/male	136	5.3	4.2	67	6.2

18	34y/male	129	4.7	3.1	60	7.1
19	65y/male	142	3.2	2.5	85	5.7
20	23y/male	138	3.5	1.7	96	6.4
21	32y/male	133	4.1	2.6	109	5.2
22	42y/male	140	2.7	5.9	92	7.01
23	67y/male	123	5.6	7.4	63	9.7
24	45y/male	146	4.6	2.3	89	6.2
25	70y/male	133	5.12	5.4	104	8.4
26	47y/male	143	4.9	1.9	68	5.9
27	65y/male	140	2.9	5.2	131	9.3
28	59y/male	137	4.2	4.3	115	8.7
29	57y/male	142	4.1	6.2	113	9.1
30	52y/male	136	3.7	5.7	97	6.9

Table 5: Biochemical Profile of CKD patients

Table 5 show that 16% patients had low sodium, 83% has normal range of sodium and neither higher range of sodium.

- 13% patients has Low potassium, 66% has normal potassium range and 20% has higher potassium range
- All patients had higher range of creatinine and blood urea
- 66% patients showed normal range and 33% has high range of Serum uric acid

2.2.2 Complete Blood Count

Patients no.	Age/ gender	TLC [$10^3/\mu\text{l}$]	PLT [$10^3/\mu\text{l}$]	RBC [$10^6/\mu\text{l}$]	Hb [g/dl]
1	40y / male	3.6	127	2.5	8.3
2	45y/male	8.49	154	3.21	9.6
3	80y/male	3.75	150	2.18	6.5
4	65y/male	5.34	151	2.93	10.4
5	60y/male	7.87	121	3.12	8.5
6	43y/male	8.2	154	2.6	3.2
7	65y/female	4.8	115	3.05	8.8
8	47y/male	25.8	585	2.9	7.9
9	53y/female	6.9	170	3.01	8.1
10	59y/male	8.4	165	1.98	7.4
11	45y/male	4.8	155	2.4	9.5
12	80y/male	10.63	226	4.3	7.5
13	74y/male	10.58	281	2.26	4.7

14	28y/male	6.5	88	4.53	12.5
15	36y/male	8.07	120	2.89	8.4
16	72y/male	9.8	165	3.26	9.9
17	53y/male	5.21	155	3.92	8.7
18	34y/male	6.8	183	2.01	6.4
19	65y/male	8.3	166	4.1	9.7
20	23y/male	6.7	175	2.39	11.2
21	32y/male	9.4	193	3.07	8.2
22	42y/male	12.54	203	1.98	9.3
23	67y/male	7.9	198	3.42	7.5
24	45y/male	9.91	163	4.23	10.2
25	70y/male	10.6	212	4.70	6.8
26	47y/male	8.79	167	3.69	9.2
27	59y/male	8.4	165	1.98	7.4
28	45y/male	4.8	155	2.4	9.5
29	80y/male	10.63	226	4.3	7.5
30	74y/male	10.58	281	2.26	4.7

Table 6: CBC profile of CKD patients

All patients had low Hemoglobin levels. All patients were found anemic. Average TLC was 8.44×10^3 ul, platelets 82.38×10^3 ul and RBC of these patients was 3.10×10^6 ul Table 6).

2.3 Clinical signs and symptoms

Pa-tient s no	Age/ge nder	Weak- ness	Fa- tigu e	Urine out- put	Loss of muscle mass	Loss of fat mass	Loss of appetite	Anemia	Medical di- agnosis
1	40y/ / male	yes	yes	Low	No	No	Yes	yes	CKD/ HTN/Hypona tremia
2	45y/ma le	no	no	Low	No	Yes	no	Yes	Post RAR 2017/ HTN/ CKD
3	80y/ma le	yes	yes	Nor- mal	Yes	Yes	yes	yes	CKD
4	65y/ma le	no	no	Nor- mal	No	No	no	yes	CKD/ HTN
5	60y/ma le	No	No	Low	No	Yes	No	Yes	SOB/VOMIT ING/CAD/HT N/CKD

6	43y/male	yes	yes	Normal	No	No	yes	yes	DM2/CKD/PHTN/CLD/ASCITES/SEVER ANEMIA
7	65y/female	no	no	Low	No	No	no	yes	CKD/AKI
8	47y/male	yes	yes	Low	No	No	yes	yes	DM2/UTI/CKD/CHOLELITHIASIS
9	53y/female	yes	yes	Normal	No	No	No	yes	DM2/CKD
10	59y/male	yes	yes	Normal	No	No	yes	yes	DM2/CKD/HYPOTHYROIDISM
11	45y/male	yes	yes	Low	No	No	yes	yes	CKD/HTN
12	80y/male	yes	yes	Normal	No	Yes	yes	yes	DM2/CKD/TURP
13	74y/male	yes	yes	Normal	No	No	yes	yes	DM2/CKD/UTI/HTN
14	28y/male	yes	yes	Low	No	No	No	Yes	HTN/CKD/PSTARR (6/2022)
15	36y/male	yes	yes	Normal	No	No	yes	yes	CKD/HTN
16	72y/male	yes	yes	Normal	No	No	yes	yes	DM2/COPD/ACS/CKD
17	53y/male	yes	yes	Low	No	No	yes	yes	CKD/COPD/HTN
18	34y/male	yes	yes	Normal	No	No	yes	yes	CKD/CAD/ACS
19	65y/male	NO	NO	Normal	No	Yes	NO	yes	CKD/UTI/
20	23y/male	yes	yes	Normal	No	No	yes	yes	CKD/HYPOTHYROIDISM/HTN
21	32y/male	yes	yes	Normal	No	No	No	yes	DM2/CKD/HTN

22	42y/male	yes	yes	Normal	No	No	yes	yes	DM2/DIABETIC FOOT/DKD/ CKD
23	67y/male	yes	yes	Low	No	Yes	yes	yes	CKD/HTN/HYPO- NATREMIA
24	45y/male	yes	yes	Low	No	Yes	yes	yes	LRTI/COPD/ CKD/HTN
25	70y/male	yes	yes	Normal	No	Yes	No	yes	DM2/CKD/CAD/ACS/HTN
26	47y/male	yes	yes	Low	No	No	yes	yes	CKD/HTN
27	65y/male	yes	yes	Low	No	No	yes	yes	CKD/ HTN/HYPO NATREMIA
28	59y/male	Yes	Yes	Low	No	No	Yes	Yes	Ckd/ HTN/CAD
29	57y/male	Yes	Yes	Normal	No	No	Yes	Yes	CKD/HYPO THYROID- ISM
30	52y/male	No	No	Normal	No	No	No	Yes	CKD/DM2

Table 7: Clinical signs & symptoms in CKD patients

Table 7 is showing that all patients had anemia, 80% had weakness and fatigue, while 66% had fat loss. It is evident from the above table that 43% patients had low urine output.

2.4 Nutrient intake as per home diet recall

Patients no	Age /gender	Energy (Kcal)	Protein (g)	Carbohydrates (g)	Fat (g)	Na (mg)	K (mg)	Empty Calories
1	40y / male	1177(2190)	26 (73)	191 gm(355gm)	26 (48)	230	1730	350
2	45y/male	1765 (2070)	37(69)	308(336)	29(34)	209	2370	315
3	80y/male	1445(2600)	30(65)	234(422)	24(43)	198	1930	295
4	65y/male	1925(2190)	47(73)	336(355)	32(36)	167	2700	280
5	60y/male	1670(2040)	33(68)	271(331)	27(34)	213	2460	330

6	43y/male	1800(1830)	53 (61)	293(297)	30(30.5)	225	2850	365
7	65y/female	1575(1275)	37(51)	255(207)	26(21)	275	2245	290
8	47y/male	1640(1400)	40(70)	266(227)	27(19)	212	2790	340
9	53y/female	1745(1475)	50(59)	283(239)	29(24)	211	2560	350
10	59y/male	1800(1500)	55(75)	292(243)	30(25)	163	2975	370
11	45y/male	1720(2190)	63(73)	279(355)	28(36)	144	2865	280
12	80y/male	1262(2380)	45(68)	220(386)	21(39)	156	1689	320
13	74y/male	1180(1220)	38(61)	191(198)	19(20)	179	1570	340
14	28y/male	1900(1710)	65(68)	306(286)	31(29)	123.	2097	370
15	36y/male	1700(2220)	50(74)	276(360)	28(37)	110	1890	310
16	72y/male	1435(1350)	35(45)	233(219)	23(22)	178	1560	260
17	53y/male	1760(2100)	57(70)	308(341)	29(35)	189	2068	290
18	34y/male	1900(1725)	57(69)	342(310)	31(28)	205	2350	320
19	65y/male	1840(2100)	51(70)	322(341)	30(35)	195	2285	325
20	23y/male	2200(1875)	58(75)	385(304)	38(31)	222	3390	340
21	32y/male	1915(1460)	60(73)	311(237)	31(24)	201	2890	280
22	42y/male	2065(1360)	54(68)	361(221)	34(22)	215	3094	45
23	67y/male	1890(1541)	59(67)	331(269)	31(25)	198	2140	360
24	45y/male	1370(2280)	48(76)	239(370)	22(38)	142	1469	260
25	70y/male	1675(1540)	64(77)	272(250)	27(25)	169	2460	315
26	47y/male	1788(1980)	54(66)	290(321)	29(33)	176	2650	290
27	65y/male	2200(1875)	58(75)	385(304)	38(31)	222	3390	340
28	59y/male	1915(1460)	60(73)	311(237)	31(24)	201	2890	280
29	57y/male	2065(1360)	54(68)	361(221)	34(22)	215	3094	45
30	52y/male	1890(1541)	59(67)	331(269)	31(25)	198	2140	360

Table 8: Nutrient intake as per home diet recall (Values in parenthesis are their requirements)

Table 8 is showing that when patients' nutrient intake was compared to their requirements, it was found that 43% patients consumed high, 20% normal and 36% low calorie intake. 96.6% of patients consumed low protein and 3.3% consumed normal. Low intake of nutrients was due to poor appetite and weakness.

3. Nutritional diagnosis

Parameters	Total male patients (N=28)	Percentage	Total females (N = 2)	Percentage %
SGA Rating A	18	64%	1	50%
SGA Rating B	8	25%	1	50%
SGA Rating C	3	10%		

Table 9: Nutritional diagnosis

Table 9 is showing that 64% male patients had SGA Rating A i.e. they were found nutritionally normal. On the other hand, 25% patients were at risk of malnutrition with SGA Rating B and 10% were found malnourished in males showing SGA Rating C.

In females, 50% female patients were normal but 50% were at risk of malnutrition with SGA rating B.

Conclusion

After going through the ever growing magnitude of chronic kidney disease (CKD), present research work was planned to study nutritional status of CKD patients. For this, 30 patients admitted at Mahatma Gandhi Medical College and Hospital, Jaipur were selected with purposive sampling technique with inclusion criteria of patients with CKD, but without dialysis.

Patients between 25-80 years of age and both males and females were taken for study who were willing to participate with a written consent form. Patients who were unwilling or who were below 25 and above 80 years of age were excluded.

Data collection: Data was collected for general information, anthropometric measurements, biochemical reports, clinical signs and symptoms and dietary history. Patients nutritional status was assessed using subjective global assessment and as per this, patients were divided into A - Normally nourished, B - Mildly malnourished and C - Malnourished.

Results

General information data revealed that all patients were male except 2. All patients were married. Majority of the patients were from the middle income group. Twenty percent of patients had completed their graduation. Ninety percent patients were working. Fifty percent of patients were moderately active. Anthropometry suggested that 53% of patients had normal BMI (18-23 kg/m²).

Biochemical tests revealed that 83% of patients had a normal range of sodium. Normal range of potassium was seen in 66% of the patients but 20% patients showed higher potassium range. Renal function test was higher for all patients. All patients were anemic. Eighty percent had weakness and fatigue, while 66% had fat loss. Home diet recall showed that 36% of the patients had low calorie intake, 96.6% of patients consumed low protein. On the basis of this data, it was observed that 64% males and 50% female patients were normal, it means they showed SGA Rating A. On the other hand, 25% patients were at risk of malnutrition and 10% were found malnourished in males showing SGA Rating C.

In females, 50% female patients were normal but 50% were at risk of malnutrition with SGA rating B.

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