RISK FACTORS, NUTRITIONAL STATUS AND DIETARY INTAKE PATTERN OF CHRONIC KIDNEY DISEASE PATIENTS IN BANGLADESH.

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DEDICATED

To

MY

FATHER

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ABSTRACT

Chronic kidney disease (CKD) is a progressive loss of kidney function, which results in deterioration of renal function. It is a devastating medical, social and economic problem of the country .It is an important component of chronic non-communicable disease (NCDs) that are now one of the major causes of morbidity and mortality worldwide.

Nutrition is important non medicinal therapy in CKD patients, it can prevent the progression of CKD but in the literature the number of research on that subject is limited especially in Bangladesh.

This study was conducted to explore the risk factors, nutritional status and dietary intake pattern of the chronic kidney disease patients in Bangladesh. A cross sectional study was carried out in the outpatient department of nephrology unit of National Institute of kidney Disease and Urology (NIKDU) hospital, Kidney Foundation Hospital of Bangladesh (KFB), Bangabandhu Sheikh Mujib Medical University (BSMMU) Hospital, Dhaka Medical College Hospital (DMC), and Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) Hospital, Dhaka. In the study a total of 384 male and female CKD patients were selected. Study design was stratified simple random sampling with proportionate allocation. Stages of CKD was calculated based on estimated glomerular filtration rate (eGFR). CKD patients' socio-demographic, food and nutritional information and weekly food intake pattern were collected through a standard questionnaire. Multiple logistic regression analysis was done to identify various risk factors for the advancement of CKD progression. Odds ratios were calculated to find various risk factors. Data were analyzed SPSS computer software version 22.

In the study majority of CKD patients were male (57.6%) and most of the patients (53.7%) were above fifty years of age. Nearly 66% were from Dhaka division and their level of education ranges from >HSC to no formal education,34%of patients were less than SSC level, 29% were between SSC to HSC,17% were higher than SSC level and about 20% of the patients had no formal education. In the study, based on eGFR, patients with CKD stage 4 was found higher (38.5%) compared to other stages (stage 3, 30.7% and stage 5 30.7%).

In the study weakness and anorexia were the common general complain and more than half of the patients had anaemia, uncontrolled blood pressure and swelling of body. According to nutritional knowledge majority had poor knowledge (44%). Level of poor knowledge was significantly higher among the advanced stage group (stage 5, 66%.P value-0.04). In the study a lower number of patients (35%) consumed protein rich food in most of the days per week. Intake of fruits and vegetables was also found lower among all the patients in most of the days. According to food consumption score, 70% of CKD patients were found to be in acceptable consumption level which was comparatively lower among advanced stage groups(53% in stage 5).About 43% of patients were tobacco user and a huge number of patients (79%) were found to do no physical exercise. Regarding nutritional status, majority(38%) of patients were found to be overweight and obese (23%), which was going down according to stage of advancement.

In the study, the significant risk factors of CKD progression included high blood pressure, diabetes, anaemia, proteinuria, and poor nutritional knowledge, low intake of vegetables and lack of physical exercise. The insignificant risk factors of CKD progression were rural residence, inadequate dietary intake, over weight and obesity.

Certification

This is to certify that the thesis titled “RISK FACTORS, NUTRITIONAL STATUS AND DIETARY INTAKE PATTERN OF CHRONIC KIDNEY DISEASE PATIENTS IN BANGLADESH” Submitted by Fahmida Karim, Registration No: 023, Session: 2012- 2013 enrolled in Dhaka University, Bangladesh, for the partial fulfillment of the degree of M. Phil. from Institute of Nutrition and Food Science, was supervised by me. This thesis can certainly be submitted to the examination Committee for evaluation.

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1.1 INTRODUCTION:

The kidney is one of the most vital organs of the human body. Its two most important functions are to flush out harmful and toxic waste products from the body and maintain the balance of water, fluids, minerals and chemicals in the body. Its malfunction can lead to serious illness or even death. Chronic kidney disease (CKD) can be defined as the structural or functional abnormalities of the kidneys for more than or equal to 3 months, as manifested by either kidney damage, with or without kidney damage. Based on Glomerular Filtration rate (GFR) CKD can be divided into five stages. Stage 5 is called ESRD or end stage renal disease, which is a term defined by the US federal government that indicates the need for chronic treatment of patients by dialysis or transplantation. (Reiss, A, 2015)

Chronic kidney disease (CKD) is a permanent and progressive loss of kidney function, which results in deterioration of renal function or end-stage renal disease (ESRD). CKD is a devastating medical, social and economic problem for the patients, their families, and the country as a whole (Olugbenga et al, 2010). CKDis an important component of chronic non-communicable disease (NCDs) that are now of pandemic proportions and are the major cause of morbidity and mortality worldwide (Thorp, 2006). The incidence and prevalence of CKD has increased in recent years in both developed and developing countries (Hosseinpanah, 2009; Arogundade, 2008).

The prevalence of CKD and its different stages varies from region to region. Population studies in Asia showed prevalence of CKD in Japan was 13% (Imai et al., 2011), Korea 13.7% (Kim et al., 2009), Nepal 10.6% (Sharma et al., 2013). In Japanese general population CKD stage-3 (80%) was higher than other stages (Imai et al., 2011). In Korean population the prevalence of CKD stage 2 was dominant (49%) (Kim et al., 2009). In US general population the prevalence of CKD were 11% among them stage 3 CKD was higher (39%) (Kronenbery, 2009). In rural population of Bangladesh the prevalence of CKD was 19% among them CKD stage 3 (68%) was predominant (Hasan et al., 2012). Another study in adult disadvantaged population of Bangladesh revealed that the prevalence of CKD was 15% among them CKD stage 3 was higher than other stages of CKD (Alam et al., 2010). A study of multifocal screening population of Bangladesh showed that renal impairment was 10.4%& CKD stage 3 was 86% (Iqbal et al., 2010).

The risk factors of CKD vary from country to country. In Singapore the risk factors of CKD were diabetes mellitus (45%), hypertension (23%), dyslipidemia (16%) but in Japan risk factors of CKD were hypertension (59%), diabetes mellitus (27%) (Takahashi et al., 2009). In rural area of Bangladesh risk factors associated with CKD were hypertension (19%), diabetes mellitus (5%) (Hasan et al., 2012). In multifocal screening program of Bangladesh risk factors of CKD were hypertension (19%), diabetes mellitus (2%) and proteinuria (5%) (Iqbal et. at 2010). The risk factors of CKD in adult disadvantaged population of Bangladesh were hypertension 11% and diabetes mellitus 4% (Adam et al., 2010). In Nepal the risk factors of CKD were overweight, obesity, hypertension, diabetes mellitus, proteinuria and their frequency were 20%, 5%, 39%, 7.5%, 5% respectively (Kumar et al., 2013).

The risk of chronic kidney disease increases with ageing but also life style factors may play a role in the development of chronic kidney disease. It is known that obesity leads to chronic kidney disease through diabetes mellitus and hypertension, but emerging evidence indicates that obesity may also contribute directly to kidney damage (NKF, 2002)

Untreated chronic kidney diseases progresses to End Stages Renal Disease which necessities to dialysis. In Italian study ESRD was a more frequent outcome than death in stage 4 and 5 CKD but in stage 3 CKD death was more evident (Nicola et. al, 2011).

In India chronic glomerulonephritis, diabetic nephropathy, hypertension was the leading cause of ESRD but their frequency was different in different centers (Kher, 2002). Patients between 40- 60 years old diabetic nephropathy was the most common causes of ESRD in India. (Kher, 2002)

Bangladesh renal registry report showed that approximately 100 — 120 patients per million population reached ESRD every year in Bangladesh and the most common causes were glomerulonephritis 47%, diabetes mellitus 24% and hypertension 13% . Hypertension was the most common comorbidity. The risk factors of ESRD were diabetes mellitus, hypertension and glomerulonephritis.. Hypertension was the most common comorbidity. The risk factors of ESRD were diabetes mellitus, hypertension and glomerulonephritis (Rashid 2012).

Nutrition plays an important role in the treatment of many chronic diseases, but uniquely to CKD. Nutritional therapy allows good control of several consequences of the disease. (toigo, 2000).

Proper dietary pattern can play a major role in the preservation of kidney function; it can delay progression of CKD and overall well- being of the renal patients. Its application is limited by lack of knowledge regarding the requirement for certain nutrients in health as well as the way in which these requirements are modified according to stages of chronic kidney disease.

Management of the nutritional aspects presents a number of challenges. Patients with CKD frequently have high risk factors for atherosclerosis, hypertension, insulin resistance and dyslipidemia, which can be controlled by a fat, sodium, and sugar restricted but high fiber diet. (Mark Manual, 2012). But this patients also commonly present with malnutrition, which calls for a less restricted meal plan (Shoji and Nishizawa, 2005).

According to Bergstrom (1993), end- stage renal failure requires calorie, protein and micronutrient intake alterations which may contribute to the high incidence of protein-energy malnutrition (PEM). PEM has been shown to be one of the most important risk factors for increased morbidity and mortality in end stage renal disease, while ingestion of excessive potassium, phosphorus, sodium and fluid may have adverse effects on fluid balance and result in other complications induced by electrolyte disturbances (Zeier, 2002).

Consultation with a renal dietician to establish an appropriate diet can help to reduce cardiovascular risk factors and mortality risk (Caglar and Ikizler, 2002). Such a diet will also help to prevent MN and metastatie calcification of previously undamaged tissue (Albaaj and Hutchison, 2003) and may slow the progression of renal disease (Zarazagaetal. 2001)

The treatment of all the kidney failure patients in Bangladesh is not the answer to tackle the huge number of kidney patients in our country. We must emphasize on the prevention of kidney disease. Many of the kidney patients remain undetected until they reach a stage where nothing much can be done.

Only 10 percent of the people who are suffering from kidney diseases in Bangladesh can afford treatment as treatment is very expensive. After both the kidneys have failed a person needs renal replacement therapy i.e. dialysis or transplantation to survive. Both these treatment modalities are beyond the reach of common people of Bangladesh. In a study we have found that those who start dialysis, 75% of them had to stop dialysis after three months due to lack of money. By this time he has sold all his properties. So when he dies the whole family is at ruins.

Chronic renal failure is a devastating medical, social and economic problem for patients and their families. The availability and quality of dialysis program depends on economic condition, social structure, and health care facilities. The cost of renal replacement therapy (RRT) is expensive. It is better to detect the primary cause of CKD and associated risk factors, nutritional status and dietary intake pattern of CKD patients to improve health and nutritional status and ultimately to prevent the progression and outcome of CKD and to save huge costing of RRT.

1.2 RATIONALE OF THE STUDY

Dietary management, is a vital part of treatment of CKD, is not well established. Importance of diet therapy in the overall management of the patients with chronic kidney disease is unquestioned, as it thought to play a major role in the preservation of renal function and overall well- being in the renal patients. (Moore et al., 2003).

There is limited information about the dietary pattern of CKD patients in Bangladesh. Due to lack of knowledge on proper diet, CKD patients in Bangladesh are going to be worsen. Nutritional knowledge and proper dietary practices along with medication would improve nutritional status; delay the progression of CKD. Recently, there has been increasing number of malnourished CKD patients surviving with misleading information regarding food and nutrition all over the country. Therefore, it is necessary to assess the dietary pattern and nutritional status of CKD patients.

Nutrition is an important non medicinal therapy in CKD patients, it can prevent the progression of CKD, reduce the cost and ensure the well-being of the kidney patients but in the literature the amount of research on that subject is limited especially in Bangladesh.

The study will give some important recommendations such as nutrition education programs for increasing the awareness as well as the improvement of the nutritional status of CKD patients and delay the progression of chronic kidney disease. Save the family from economic burden and ultimately reduce morbidity and mortality in Bangladesh.

1.3 HYPOTHESIS

There is an association between the nutritional knowledge, dietary intake pattern and nutritional status of chronic kidney disease patients with the progression of CKD.

1.4 OBJECTIVES OF THE STUDY

General objectives: To explore risk factors, nutritional status and dietary intake pattern of the chronic kidney disease patients in Bangladesh.

Specific objectives:

- To identify the risk factors of chronic kidney Disease
- To assess the nutritional status of CKD patients.
- To assess the dietary knowledge of CKD patients.
- To assess the dietary intake pattern of CKD patient

1.5 LIST OF ABBREVIETAONS

CKD - Chronic Kidney Disease

ESRD – End Stage Renal Disease

EGFR – Estimated Glomerular Filtration Rate

MDRD – Modification of Diet for Renal Disease

K/**DOQI –** Kidney Disease Outcome Quality Initiative

OPD – Out door patient department

MN – Malnutrition

PEM – Protein energy malnutrition

BMI – Body mass index

RRT – Renal Replacement therapy

NCDs – Non communicable diseases

CGN – Chronic glomerulonephritis

BSMMU – Banggabandhu Sheikh Mujib Medical University Hospital

KFB – Kidney Foundation Hospital, Bangladesh

NIKDU – National Institute of Kidney Disease and Urology

DMC – Dhaka Medical College Hospital

BIRDEM – Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders

1.6 List of the variables:

a. Demographic variables

- Age
- Sex
- Education
- Occupation
- Marital status
- Residence
- Monthly family expenditure

b. Anthropometric variables:

- Height
- Weight

c. Clinical variables:

- Anaemia
- Oedema
- Blood pressure
- Diabetes

d. Biochemical variables:

- Urinary protein
- Serum creatinine
- Hemoglobin
- Serum electrolyte
- Estimated glomerular filtration rate (eGFR)
- Blood sugar level
- Serum lipid profile

e. Dietary variables

- CKD knowledge
- Nutrition Knowledge
- 7 days food consumption

f. Risk factors variables:

- Age
- Gender
- Residence area
- Education
- Diabetes mellitus
- Hypertension
- Smoking
- Anaemia
- Dyslipidemia
- Albuminuria
- Obesity
- Over weight
- Low nutritional knowledge
- Poor dietary intake
- Tobacco using
- Lack of physical exercise

1.7 OPERATIONAL DEFINITIONS

1. **Chronic Kidney Disease (CKD):** Conditions in which an individual has suffered from kidney problems for 3 months or more and is being attended at the renal unit.

2. **Estimated Glomerular Filtration rate (eGFR):** Stages of CKD was calculated based on estimated glomerular filtration rate (eGFR).(NKF, K/DOQI)

3. **Classification of CKD stages:**

CKD Stage	eGFR	Description
1	90+ ml/min/ 1.73m^2	Normal kidney function but urinary findings or structural abnormalities or genetic trait point to kidney disease
2	60-89 ml/min/ 1.73m^2	Mildly reduced kidney function and other findings
3	30-60 ml/min/ 1.73m^2	Moderately reduced kidney function
4	15-29 ml/min/ 1.73m^2	Severely reduced kidney function
5	< 15 ml/min/ 1.73m^2	Very severe, or end stage kidney failure

4. **ESRD** – End stage renal disease (Stage -5): when eGFR is < 15ml/ min/1.73m^2.

5. **Hypertension :**> 140/90 mm of Hg

6. **Serum Haemoglobin** Male: 13 – 17, Female: 12- 15 g/dl

7. **Dislipidemia:** Triglyceride: >150mg/dl, Cholsterol: >200mg/ dl, LDL: > 120mg/dl

8. **Blood glucose** — **Reference Range**
   - Fasting — 3. 89 – 5.83 mmol/L
   - 2 hrs after BF — < 8.0 mmol/L

9. **Serum electrolyte level:** — **Reference range:**
   - Serum Sodium — 135 -146 mmol/L
   - Serum potassium — 3.5- 5.3 mmol/L
   - Chloride — 97 – 106 mmol/L
   - TCO2 — 22- 30 mmol/L

(Ref. Kidney Foundation Hospital and Research Institute, Bangladesh)

Nutritional knowledge: Having concept on nutritional matters**.**

Chapter: 2

Review of literature

2.1 REVIEW OF LITERATURE

Chronic Kidney Disease (CKD) is one of the most common non communicable diseases throughout the world. The prevalence of different stages of CKD and associated risk factors are different in population.

Chronic kidney disease (CKD) is increasingly recognized as a global public health problem and a key determinant of the poor health outcomes (Garcia-Garcia et al., 2015).

One hospital based study demonstrated that in India the overall prevalence of chronic kidney disease was 17% in all outpatient department. The incidence of CKD stagel -40%, stage2-25%, stage3-25%, stage4- 5% and stage5-5% and the risk factors the aggravated the stages of CKD were obesity, hypertension, diabetes mellitus, anaemia, smoking, dyslipidemia and proteinuria (Singh et al.,2013).

Outpatient department of nephrology care in Italy demonstrated the prevalence of CKD stage 3-48%, stage 4-36%, stage 5-15% and their associated risk factors were hypertension, dyslipidemia, anaemia, proteinuria, hyperphosphatemia and smoking (Nicola et al.,201 1).

Diabetes is now the major cause of end-stage kidney failure worldwide in both developed and emerging countries. The prevalence of type 2 diabetes is rising progressively around the world. For example, the diabetes prevalence in Singapore has risen from 2% in 1975 to over 8% in 1998, and this is reflected in many Chinese communities throughout the world (Atkins 2005). Diabetic nephropathy appears in about 30% of patients with type 1 diabetes and 15-60% of patients with type2 diabetes (Weekers et al., 1998). The recent World Health Organization (WHO) report on diabetes prevalence alarmed that diabetes has posed a serious threat to entire population of the world- irrespective of stages of industrialization and development. The prevalence of diabetes for all age groups worldwide was estimated to 2.8 in 2000 and 4.4 in 2030. The number of diabetic population was estimated to rise from 171 million in 2000 to 366 million in 2030 (Wild et al., 2000). Prevalence of diabetes in adults worldwide was estimated to be 4 in 1995 and to 5.4 by the year 2015 (King et al., 1998). In 2000, Bangladesh had 3.2 million people with diabetes and listed at 10th which will occupy the 7th position with 11.1 million in 2003 (Wild et al., 2000).

Nearly 1 billion people worldwide have high blood pressure (defined as >140/90 mm Hg) (Couser et al., 2011). That number is higher if the currently recommended blood pressure goal of 130/80 is used, and it is expected to rise to 1.56 billion people by 2025, increasing by 24 in developed countries and by 80 in developing regions such as Africa and Latin America (Kearney et al., 2005).

CKD is both a cause and a consequence of hypertension. Kidney dysfunction is a major cause of hypertension, and hypertension in turn aggravates CKD and accelerates its progression (Couser et al., 2011). Hypertension is now the major risk factor for development and progression of diabetic and non-diabetic CKD (Ritz and Bakris 2009).

Population-based studies and studies of diabetic patients have reported associations of various lipid abnormalities with the development of renal disease. Dyslipidemia may damage glomerular capillary endothelial and mesangial cells as well as podocytes. Several studies have shown that dyslipidemia may be a risk factor for renal disease. (Muntner et al., 2000).

Many study showed that hypertension, diabetes, and cardiovascular disease, low socioeconomic status is associated with CKD (Couser et al., 2011).

Every individual with kidney disease is unique, and treatment is very individualized based on the cause, stage progression, other coexisting health conditions, and medications. Some individuals in earlier stages of kidney disease can manage their condition with diet, exercise and medications (windy 2010).

Dietary modification is essential in individuals with kidney diseases and the nutritional recommendations vary depending on each patients stage of progression, cause of disease and other treatment methods (Detenois, 2003).

The risk of malnutrition (MN) increases as CKD progresses and often, many patients are malnourished by the time they start dialysis. Many studies have shown that malnutrition (MN) rates are between 28-48 in predialysis patients or those at CKD stage 1-4 (Symes, 2009) and as many as 50% of patients with ESRD may be malnourished MN may be caused in part by inadequate nutritional management of patients during pre-dialysis phase(McKnight,2010).

A kidney diet is one which is intended for individuals who have kidney problems, known as chronic kidney disease (CKD). A kidney friendly planned diet helps to maximize the remaining ability of the kidneys to filter and excrete toxins in the blood. However when the kidneys lose over 85-90% of their function, treatment options become very specific and the renal diet becomes even more tightly controlled (Joshi, 2010).

Protein requirement are based on body weight and degree of renal failure. The requirement of protein is 0.6g/ kg body weight for adults. A higher amounts up to 0.8gm/kg body weight can be prescribed earlier in chronic renal failure when creatinine levels are still below 500mmol/ litre (K/DOQI NKF,2002). A 40 gm protein diet may be used where the weight of an adult is unknown. Maximum protein should be of high biological value such as egg, meat, poultry, milk and fish.

Adequate protein level helps in maintenance of fluid balance, healing and maintenance of skin integrity, finally maintenance of immune function (NKF, 2006). Intake of control of protein rich food is controlled to avoid excessive production of nitrogenous waste products while at the same time maintaining the positive nitrogen balance (K/DOQI NKF, 2002).
The diet should provide adequate calories to maintain optimal nutritional status and a source of energy. It is recommended that for patients aged < 60 years should take 35 Kcal/ kg/day while those aged > 60 or obese should take 30-35 kcal/kg/day (K/DOQI NKF, 2002).

Fluid consumption should be controlled to avoid congestive heart failure, pulmonary oedema, hypertension and swelling of the legs. Fluid allowances are1000– 15000 ml per day based on urine output (K/DOQI NKF, 2002).

Kidney failure causes high level of phosphorus to build up in the blood. Elevated phosphorus level can lead to metastatic calcification (soft tissue calcification), secondary hyper parathyroidism, and renal osteodystrophy. Less than 1200 mg/day phosphorus is recommended for the patients of predialysis phase(K/DOQI NKF, 2003).

Potassium restrictions depend on serum potassium level. To prevent hyperkalemia, potassium should be within 2000-3000 mg/day. Potassium can be reduced by reducing the intake of all fruits and vegetables to one or two servings. Boiling vegetables in large volume of water for

about half an hour and then using them after discarding the water, can achieve further reduction in potassium (Braham et al, 2004).

Sodium intake must be controlled to prevent hypertension, congestive heart failure, and pulmonary oedema. Limiting intake will help avoid help thirst and maintain acceptable fluid balance. The recommended intake of sodium 2000-3000 mg/day for CKD patients (K/DOQI, 2007). Generally sodium is found in many foods but higher amount in table salt and foods that have salt added in them like processed food , and snacks , canned foods , fast foods, cured and smoked foods are also high in sodium (Braham et. Al., 2004).

Patients with CKD frequently have risk factors for atherosclerosis, hypertension, insulin resistance and dyslipidemia, which can be controlled by a fat, sodium and sugar-restricted but high- fiber diet (Merck Manual, 2012). But these patients also commonly present with malnutrition, which calls for a less restricted meal plan (Shoji and Nishizawa, 2005).

Malnutrition is a major issue in patients with chronic kidney disease (CKD), adversely affecting morbidity, mortality, functional activity and patients' quality of life. Malnutrition in patients with CKD, including end- stage renal disease, has been improved by nutritional practice guideline and proper care. Early diagnosis and treatment can improve the prognosis for CKD patients and reduce the monetary costs connected with treatment.

Early nutrition intervention can play a major role in the maintenance of renal function and overall well-being in the renal patient. Such a diet will also help to prevent malnutrition and may slow the progression of chronic kidney disease.

Chapter: 3

3.1 METHODS AND MATERIALS

3. METHODS AND MATERIALS

3.1 Study design

The study was a cross- sectional study.

3.2 Place of study:

The study was carried out in the Out Patient Department of Nephrology Unit of National Institute of Kidney Disease and Urology (NIKDU), Bangladesh Kidney Foundation (KFB) hospital, Banggabandhu Sheikh Mujib Medical University (BSMMU) hospital, Dhaka Medical College Hospital (DMC) and BIRDEM Hospital, Dhaka.

3.3 Study population:

Adult male and female with chronic kidney disease were selected as study population.

3.4 Study period:

The study was conducted for a period of one year.

3.5 Selection criteria of the study subjects

- **Inclusion criteria:**

- Diagnosed cases of CKD (stage 3, 4 and 5 not yet on dialysis)
- Age: 18– 60 years
- Gender: patients with both sexes
- Outdoor patients

- **Exclusion criteria:**

- Seriously ill patients during the period of data collection
- Patients on dialysis

3.6 Sample size:

Total 384 patients presented with chronic kidney disease were enrolled in this study.

3.7 Sample size determination:

The sample size was estimated by using the formula

$$\text{Sample size } n = \frac{z^2 \times pq}{d^2}$$

$n = (1.96)^2 \times 0.19 \times 0.81 / (0.05)^2 = 236$

Here n= the desired sample size

Z= the standard normal deviate, set at 1.96 at 5level of significance which corresponded to 95 confidence level.

p=proportion of CKD patients as 0.19 (As prevalence of CKD in Bangladesh is19).

q = 1- p = (1-0.19) = 0.81

d = the allowable error which is $\pm$.05 from P i.e. +/- .05 from0.19

Considering the Design effect (1.5)

Final sample size = 236x 1.5 =354 $\cong$ 384

3.8 Sampling Design:

The sampling design was stratified random sampling with proportionate allocation. Each hospital was selected as one stratum and from each of hospitals, sample selection depends on the number of CKD patients attending in Out Patient Department of those hospitals. Orderly selection of hospital was done by lottery system. Patients were selected randomly from the outpatient department of each hospitals. The first patient was selected randomly then every 4^{th} patients would be our selected sample for interview. After selecting each patient, his or her detail clinical history and records of medical data were collected and a data collection sheet was filled up. Relevant investigation report was recorded. The stages of CKD was measured and estimated glomerular Filtration Rate (eGFR) was calculated by Modification of Diet for Renal Disease (MDRD) equation method.

3.9 Data collection instruments

Data was collected through a standard pretested questionnaire composed of both open and close ended questions.

The questionnaire was self-administered. The questionnaire was developed by using the selected variables according to the specific objectives. The questionnaire contained questions related to: 1) socio- demographic characteristics, 2) Disease characteristics and other relevant information, and biochemical parameters as well as anthropometric data (Height and weight) of the patients.

3.10 Data collection procedure

Data was collected through face to face interview. Before preceding the data collection, the detail of the study was explained to each eligible patient and written consent from the patient was obtained. Data were collected using a pretested questionnaire by taking socio-demographic data, dietary knowledge, and last 7 days food frequency record of each patients. The clinical and biochemical findings were recorded.

To assess nutritional knowledge level of CKD patients, scoring method was done.

Poor nutritional knowledge: 0-2 answers of total number of nutritional questions
Average nutritional knowledge: 3-5 answers of total number of nutritional questions
Adequate nutritional knowledge: > 5 answers of total number of nutritional questions

To assess the food consumption level of CKD patients, 7 days food frequency consumption scoring method was applied.

To assess the nutritional status of CKD patients, the height was measured with the help of a vertical stand marked in centimeters. The weight was recorded by a portable weighing scale, which was calibrated to the zero marking every time before use. Nutritional status of the CKD patients was assessed by using Body Mass Index (BMI). BMI was calculated using the available weight and height by the following formula: Weight in kg/ (height in meter)2
All the clinical and relevant laboratory examination findings werealso collected.

Stages of CKD was calculated based on estimated glomerular filtration rate (eGFR). CKD stages were classified based on eGFR. (Stage3: 30-60ml/min/1.73m2, stage 4: 15-30 mi/min/1.73m2, stage 5: <15ml/min/ 1.73m2. MDRD equation method was applied to assess eGFR.

3.11Data collection period:

The data collection period was three and half months. (5 samples was interviewed per day from each of the hospitals)

3.12. Data management

All data was compiled and edited meticulously. The data was screened and was also checked for any missing values and discrepancy. All omissions and inconsistencies were corrected and were removed.

3.13 Statistical Analysis

Computer based statistical analysis was carried out with appropriate techniques and systems. All data were recorded systematically in preformed data collection form (questionnaire). Qualitative data was expressed as frequency distribution and percentage. Statistical analysis was performed by using window based computer software devised with statistical packages for social sciences (SPSS) version 22. 95 confidence limit was taken.

The summarized data was then interpreted accordingly and was presented in the form of tables. The statistical analysis employed univariate analysis. To see the association X^0 test was done. Multiple logistic regression was performed to determine the presence of risk factors responsible for advancement of CKD progression.(Transition from earlier stage to advanced stage CKD).

Chapter: 4

RESULTS

4. RESULTS

A. Socio-demographic characteristics of CKD patients:

Table- 4.1 Distribution of CKD patients by different hospitals

Name of Hospitals	Frequency	CKD Patient (%)
NIKDU	120	31.3
KF	120	31.3
BSMMU	40	10.4
DMC	20	5.2
BIRDEM	84	21.9
N (%)	**384**	**100.0**

Table 4.1 table showed the distribution of CKD patients from different hospitals in Dhaka. (Number of patients in each hospital depends on availability of attendance of patients in OPD section.). A total of 384 patients were interviewed. More than one third (31.3%) of them were interviewed from National Institute of Kidney Disease and Urology hospital (NIKDU) and one third (31.3%) from Kidney Foundation Hospital (KF) of Bangladesh followed by BIRDEM hospital (21.9%), Banggabandhu Sheik Mujib Medical University (BSMMU) hospital (0.4%) and Dhaka Medical College hospital (5.2%).

Fig.1: Age distribution of CKD patients

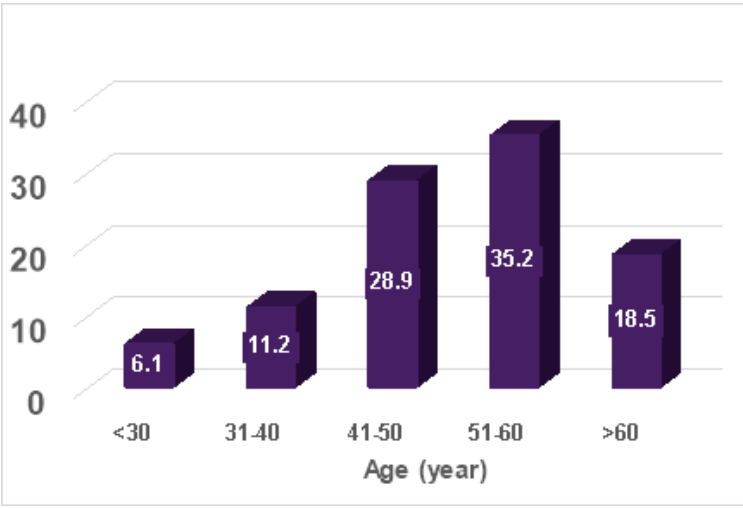

Fig- 1 showed the age distribution of CKD patients. Young age group suffer less from CKD. About 6.3 percent of CKD patients were under 30 years of age. Majority of the patients (35.2%) were age group between 51- 60 years. About 11.2% were between 31-40 years and 28.9 % were between 41-50 years. About 18.5% of patients were above 60 years of age. Majority of patients were between ages 40 to 60 years.

Table-4.2: Distribution of CKD patients by age and gender

Age of patients (years)	CKD patients (%)		
	Male	Female	Both
<30	5.4	7.4	6.3
31-40	11.3	11.0	11.2
41-50	23.5	36.2	28.9
51-60	35.3	35.0	35.2
>60	24.4	10.4	18.5
n	**221**	**163**	**384**

Table 4.2 showed distribution of CKD patients by age and gender. Among both male and female groups, a highest number of CKD patients (35%)were found between the age group 51 to 60 years. Older patients (>60 yrs.) were found more among the male groups (24.4%) compared to female groups (10.4%).

Fig.2 Gender distribution of CKD patients

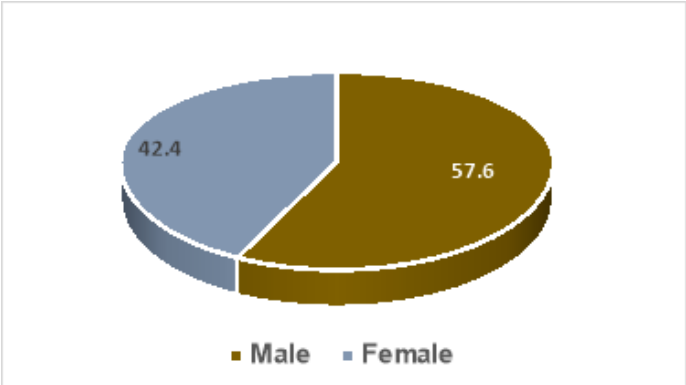

Figure-2: showed gender distribution of CKD patients. More than half (57.6%) of the patients were male and rest 42.4 percent of patients were female group.

Table-4.3: Frequency distribution of CKD patients by home districts

Home district	Frequency	Percent (%)
Dhaka	190	49.5
Other districts	194	50.1
n	**384**	**100.0**

Table-4.3 showed the distribution of CKD patients according to home districts. About half (50) of patients were from Dhaka district.

Table-4.4: Distribution of CKD patients by home district and gender

Home district	CKD patients (%)		
	Male (n=221)	Female (n=163)	Both (N=384)
Dhaka	43.9	57.1	49.5
Other districts	56.1	42.9	50.5
Total (%)	**100**	**100**	**100**

Table-4.4 showed the distribution of CKD patients according to their home districts and gender. Among total female patients (163), majority (57.1%) were from Dhaka district while among the male patients (221), majority (56.1%)were from out of the Dhaka district.

Table-4.5: Distribution of CKD patients by division and gender

Division	CKD patients (%)		
	Male N=221	Female N=163	Both N=384
Dhaka	63.8	69.9	66.4
Chittagong	12.2	8.6	10.7
Rajshahi	10.0	6.7	8.6
Barishal	5.4	6.1	5.7
Sylhet	1.8	0.6	1.3
Khulna	1.4	4.3	2.6
Rangpur	1.8	0.6	1.3
Mymensingh	3.6	3.1	3.4
Total (%)	**100**	**100**	**100**

Table- 4.5 showed the distribution of the CKD patients by division and gender. More than half of the patients (66.4%) were from Dhaka division followed by Chittagong (10.7%), Rajshahi (8.6%), Barishal(5.7%), Mymensingh (3.4%), Khulna (2.6%) and rest were from Sylhet and Rangpur division (1.3%).

Fig.-3: Residence area distribution

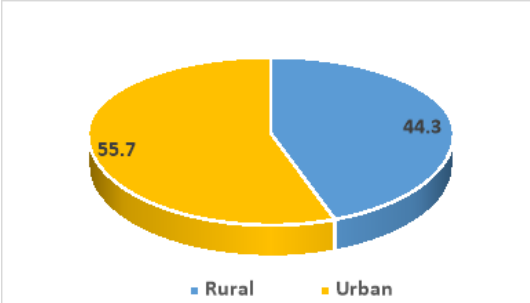

Fig- 3 showed the distribution of the CKD patients by residence area. More than half of the patients (55.7%) were come from urban areas and 44.3 percent were from rural areas.

Table-4.6: Distribution of CKD patients by marital status

Marital status	Frequency	Percent (%)
Married	371	96.9
Unmarried	12	3.1
n	**384**	**100.0**

Table 4.6 showed the marital status of CKD patients. In the study majority of the patients (96.9 %) were married and only 3.1% were unmarried.

Table-4.7: Distribution of CKD patients by education level

Educational level	Frequency	Percent (%)
Illiterate	76	19.8
Less than SSC	132	34.4
SSC to HSC	111	28.9
Higher than HSC	65	16.9
n	**384**	**100.0**

Table 4.7 showed the educational level of CKD patients. Education is one of the most influential determinants of an individual's knowledge, attitudes, and behaviors. In the study about one fifth (19.8%) of the patients had no education. More than one third (34.4%) of patients had completed less than SSC and more than one fifth (28.9%) had completed SSC to HSC level. Comparatively a lower number of patients (16 .9%) completed their education higher than HSC level.

Table-4.8: Distribution of CKD patients by occupational level

Occupational level	Frequency	Percent (%)
Agriculture	20	5.2
Day labour	59	15.4
Service holder	94	24.5
Business	52	13.5
Housewife	144	37.5
Student	15	3.9
n	**384**	**100.0**

Table-4.8 showed the occupational level of CKD patients. More than one third of patients (37.5%) were housewife followed by service holder (24.5%), day labor (15.4%), business (13.5%), agriculture (5.2%) and student (3.9%).

Table-4.9: Distribution of CKD patients by monthly family expenditure

Monthly expenditure	Frequency	Percent
<10,000	19	5.1
10,000-20,000	70	18.7
20000-30000	62	16.5
>30,000	85	22.7
Don't know	139	37.1
n	**384**	**100.0**

Table 4.9 showed the monthly family expenditure of CKD patients. Majority of the patients' (39.2%) monthly family expenditure was more than TK. 20,000 and 18.7% of patients monthly family expenditure was within range of TK. 10,000- 20,000. More than one third of patients(37.1%) did not know about their monthly family expenditure.

B. Disease background:

Fig. 4: Distribution of CKD patients by CKD stage (n=384)

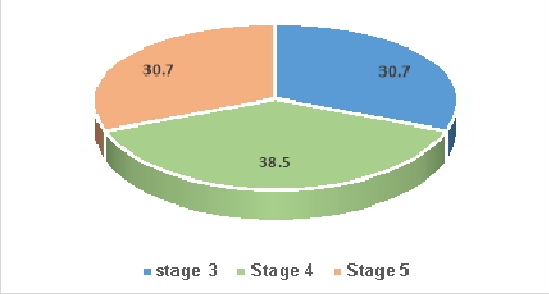

Fig. 4 showed the stage distribution of CKD patients. CKD Stage 4 was found higher (38.5%) compared to other three stages. (Based on eGFR). Stage 3 and stage 5 were found to be similar (30.7%).

Table-4.10: Distribution of CKD patients by stage and gender

CKD stage	CKD patients (%)		
	Male (n=221)	Female (n=163)	Both (N=384)
CKD Stage 3	34.4	25.8	30.7
CKD Stage 4	37.1	40.5	38.5
CKD Stage 5	28.5	33.7	30.7
Total	**100**	**100**	**100**

Table 4.10 showed distribution of CKD patients by stage and gender. Male and female patients were comparatively higher in stage 4 groups (37.4% and 40.5% respectively) compared to stage3 and stage4 groups (34.4% and 25.8% respectively) and (28.5% and 33.7% respectively).

Figure-5: Distribution of CKD patients by primary causes of CKD (diagnosed)

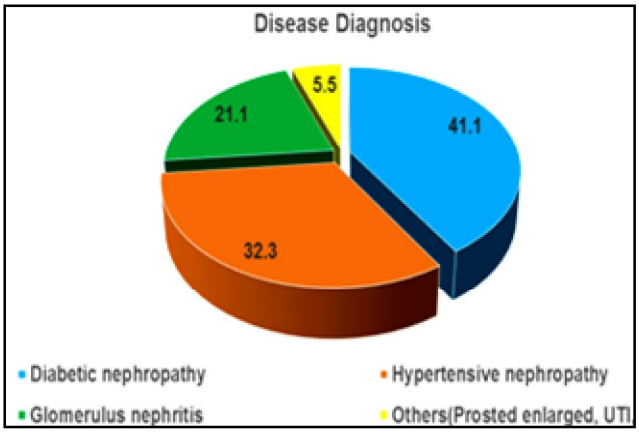

Figure- 5 showed the primary causes of CKD of the patients. About 41.1% were due to diabetic nephropathy followed by hypertensive nephropathy (32.3%), glomerulonephritis (21.1%), and other cause related nephropathy (8.6%).

Table-4.11: Distribution of CKD patients by reported physical problems.

Type of problem	Frequency	Percent (%)
weakness	152	39.6
Back pain	71	18.5
Anorexia	87	22.7
Oedema/Swelling of body	44	11.5
Urinary problems	36	16.2
n	**384**	**100.0**

Table 4.11 showed the physical problems mentioned by the CKD patients. In the study a large number of patients (39.6%) complained about weakness as their physical problem followed by anorexia (22.7%), back pain (18.5%), body swelling (11.5%) and urinary problems (16.2%).

Table-4.12: Distribution of CKD patients by history of hypertension

History of hypertension	Frequency	Percent (%)
Yes	311	81.0
No	73	19.0
n	**384**	**100.0**

Table 4.12 showed the history of hypertension of CKD patients. Out of the total patients majority (81%) had history of hypertension.

Table-4.13: Distribution of CKD patients by current blood pressure status

Blood pressure	Stage (%)			
	Stage 3	Stage 4	Stage 5	All
Normal blood pressure	62.7	54.7	22.9	47.4
High blood pressure	37.3	45.3	77.1	52.6
n	**118**	**148**	**118**	**384**

Chi- squire- 42.73, P-value- 0.00

Table 4.13 showed current blood pressure status of the patients. More than half of the patients had uncontrolled blood pressure during the time of data collection. Among stage 5 (118) majority (77.1%) had comparatively high blood pressure as compared to other stages (37% and 45.3% respectively).

Table-4.14: Distribution of CKD patients by history of diabetes

Indicator		Frequency	Percent (%)
	Diabetes		
Yes		175	45.6
No		209	54.4
n		**384**	**100.0**
	If yes, type of treatment taken		
Insulin Medication		96	54.9
Oral drug		56	32.0
Diet		8	4.6
None		15	8.6
n		**175**	**100.0**

Table 4.14 showed the history of diabetes of the patients. More than 45% of patients had current diabetic and among them, more than half (55%) were taking insulin, 32% oral drug and only 4.6%were maintaining carbohydrate restricted diet whereas only about 9 percent of the patients were taking no treatment for control of diabetes.

Table-4.15: Stage wise distribution of CKD patients by swelling of body (oedema)

Swelling in body (Oedema)	Stage (%)			
	Stage 3(n=118)	Stage 4(n=148)	Stage 5(n=118)	All (N=384)
Absent	16.9	35.1	73.7	41.4
Present	83.1	64.9	26.3	58.6
Total	**100**	**100**	**100**	**100**

Table 4.15 showed the distribution of CKD patients by swelling of body or feet. Out of 384 patients, about 68% patients had oedema, which was found higher among stage 3 group, 118 (83.1%) as compared to stage 4, 148 (64.9%) and stage 5, 118 (26.3%) groups.

Table-4.16: Distribution of CKD patients by serum creatinine level and gender

Serum creatinine (mg/dl)	CKD patients (%)		
	Male (n=221)	Female (n=163)	Both (N=384)
<2.0	24.0	30.1	26.6
2.1-3.0	26.2	28.8	27.3
3.1-4.0	19.5	14.7	17.4
4.1- 5.0	10.9	9.2	10.2
>5	19.5	17.2	18.5
Total	**100**	**100**	**100**

Mean $\pm$ SD = 3.7 $\pm$ 2.57

Table 4-16: showed the serum creatinine level and gender of CKD patients. More than one fourth of the patient's (26.6%) had serum creatinine level less than 2mg/dl, about 27%had within 2.1 to 3 mg/dl and 27.6% had within 3.1 to 5mg/dl. Only above 18% had serum creatinine level >5 mg/dl which was found higher among male patients (221) 19.5%, as compared to female patients (163) (17.2%).

Table-4.17: Distribution of patients according to current blood sugar level and CKD stage

Blood sugar test(Fasting)	CKD patients (%)			
	Stage 3	Stage 4	Stage 5	All
Normal level of blood sugar	57.4	40.4	37.5	45.3
Higher level of blood sugar	42.6	59.6	62.5	54.7
n	**47**	**52**	**40**	**139**

Table 4.17 showed the current diabetic status of the patients. (Those who were prescribed by the doctors). More than half of the patients had current uncontrolled blood sugar level, which was found higher among advanced stage groups.

Table-4.18: Distribution of CKD patients by urinary albumin level and CKD stage

Urinary Albumin	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Negative	47.5	18.2	9.3	24.5
Al+	34.7	34.5	16.9	29.2
Al++	11.0	33.8	39.8	28.6
Al+++	6.8	13.5	33.9	17.7
Total	**100**	**100**	**100**	**384**

X^2- 93.81, P- value- 0.00

Table 4.18 showed the distribution of the patients by urinary albumin level. Among the total patients, only one fourth had presented no albumin excretion in urine and more than 62% had one or two plus albumin excretion in urine while more than 19% had three plus albumin excretion in urine. A higher level of urinary albumin was found higher in advanced stage 5 group (33.9%) as compared to other two groups (6.8% and 13.5% respectively).

C. Food and Nutritional knowledge

Table-4.19: Distribution of CKD patients by stage and kidney knowledge

Indicator	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Function of kidney (multiple answer)				
Purify blood	30.5	22.3	9.3	20.8
Electrolyte balance	13.5	8.8	10.1	10.7
Filtration	31.4	21.6	9.3	20.8
Do not know	27.1	48.6	72.0	49.2
Total	**100**	**100**	**100**	**100**

Table 4.19 showed the distribution of patients by the knowledge on kidney. About half of the patients had no idea about the function of kidney. A huge number of patients (72) from stage 5 group had no knowledge on it as compared to other two groups (27% and 48% respectively).

Table-4.20: Distribution of CKD patients by knowledge about causes and symptoms of kidney disease.

Indicator	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Causes of kidney disease (multiple answer)				
High blood pressure	33.9	21.9	7.0	21.1
Diabetes	17.8	14.6	6.1	13.0
Kidney infection	4.2	5.3	0.9	3.6
Improper food and drinking water	7.5	2.1	2.7	3.5
Drug induced	3.4	0.0	2.6	1.8
Do not know	43.2	59.6	82.6	61.5
Total (%)	**100**	**100**	**100**	**100**
Symptoms of kidney disease (multiple answer)				
Urinary problems	24.6	18.2	11.9	18.2
Back pain	33.9	31.1	11.9	26.3
Oedema	20.3	11.3	16.9	15.9
Anorexia/Weakness/nausea	16.8	8.2	4.9	7.6
Do not know	22.9	37.8	59.3	39.8
Total (%)	**100**	**100**	**100**	**100**

Table-4.20 showed the distribution of CKD patients by their knowledge about causes and symptoms of kidney disease. Among the patients majority (61.5) had no knowledge on causes of kidney disease. The percentage was higher among stage 5 groups (82.6%) as compared to other two groups (43.2% and 59.6% respectively). About 40% of the patients had no knowledge about symptoms of kidney disease which was also higher among the advanced groups.

Table-4.21: Distribution of CKD patients by knowledge about dietary and life style management due to CKD

Indicator	Stage(%)			
	Stage 3 (n=118)	**Stage 4 (n=148)**	**Stage 5 (n=118)**	**All (n=384)**
Knowledge about dietary and life style management due to CKD				
Yes	54.2	42.9	16.1	37.8
No	45.8	58.1	83.9	62.2
Total (%)	**100**	**100**	**100**	**100**
Source of knowledge achieved				
	Stage 3 (n=64)	**Stage 4 (n=64)**	**Stage 5 (n=19)**	**Both (N=145)**
Doctors	62.5	64.5	58.8	63.5
Dieticians	26.6	25.8	10.5	24.8
Relatives	3.1	8.1	10.5	6.2
Print and electronic Media	7.8	1.6	11.8	5.5
Total (%)	**100**	**100**	**100**	**100**

Table 4.21 showed the distribution of CKD patients by their achieved knowledge about CKD treatment. A large number of patients (62.2) had no knowledge about dietary management for kidney disease. The proportion was found higher among stage 5 group (83.9%) as compared to stage 3 and stage 4 group (45.8% and 58.1% respectively).Regarding the sources of CKD management knowledge, Majority (63.5%) told that they would receive it from the doctors followed by the dietitians (24.8%), relatives (6.2%) and from media (5.5%).

Table-4.22: Distribution of CKD patients by knowledge about nutritive value of food

Indicator	Stage (%)			
	Stage 3 (n=118)	**Stage 4 (n=148)**	**Stage 5 (n=118)**	**All (N=384)**
Knowledge about nutritive value of food				
Yes	46.6	30.4	16.1	31.0
No	53.4	69.6	83.9	69.0
n	**100**	**100**	**100**	**100**

Table 4.22 showed the distribution of the patients by their knowledge about nutritive value of food. Patients were asked about nutritive of food. Majority (69%) had no knowledge on it while only 31% had it. A highest number of patients from stage 5 group (83.9%) had no knowledge about nutritive value of food.

Table-4.23: Distribution of CKD patients by stage and knowledge about food restrictions

Indicator	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Food restriction				
Yes	74.6	70.3	50.0	65.4
No	25.4	29.7	50.0	34.6
Total (%)	**100**	**100**	**100**	**100**
Type of restricted food (multiple answer)				
	Stage 3 (n=88)	**Stage 4 (n=104)**	**Stage 5 (n=54)**	**All (N=251)**
Fish/ Meat/egg/milk	36.3	35.7	40.7	37.1
Vegetables	10.2	19.2	18.6	15.9
Fruits	52.3	37.5	33.9	41.8
Pulse/legumes/ seeds	12.5	21.2	16.9	17.1
Total (%)	**100**	**100**	**100**	**100**

Table 4.23 showed the distribution of the patients by their knowledge about any food restrictions due to CKD. More than 65% of the patients told about food restrictions due to CKD. Among them (251), majority (42%) told fruits restriction followed by meat/ fish/ egg/ milk (37%), and pulse/ legumes (17.1%) and vegetables (16%) respectively.

Table-4.24: Distribution of CKD patients by CKD stage and knowledge about protein restriction

Knowledge about protein restriction	Stage			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Yes	64.4	41.9	17.0	41.1
No	35.6	58.1	83.1	58.9
Total (%)	**100**	**100**	**100**	**100**

Table 4.24 showed the distribution of the CKD patients by stage and knowledge about protein restriction

Patients were asked about food restrictions. Only 41.1%patients had knowledge about protein restriction. Knowledge was comparatively higher among stage 3 group (64.4%) as compared to other two groups (41.9% and 17% respectively).

Table-4.25: Stage wise distribution of CKD patients by knowledge on protein rich food

Knowledge about protein rich food (multiple answer)	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Had knowledge about protein rich food	74.5	57.7	28.7	54.1
Had no knowledge	55.9	42.4	76.5	64.1
Total (%)	**100**	**100**	**100**	**100**

Table-4.25 showed stage wise distribution of the CKD patients by their knowledge about protein rich food. Patients were asked about protein rich food. More than half (54.1%) of the patients knew about protein rich food. While majority (64.1%) had no idea on it.

Table-4.26: Distribution of CKD patients by knowledge about potassium rich fruits restriction

Indicator	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Knowledge on fruit Restriction				
Yes	61.9	52.0	34.7	49.7
No	38.1	48. 0	65.3	50.3
Total (%)	**100**	**100**	**100**	**100**
Type of fruits restriction (multiple responses)				
	Stage 3 (n=73)	**Stage 4 (n=77)**	**Stage5 (n=41)**	**All (N=191)**
Banana	58.9	57.1	70.7	60.7
Orange	34.3	26.0	19.5	27.7
Coconut juice	24.7	24.7	17.1	23.0
Mango	5.5	11.7	7.3	8.4
Dried fruits	8.2	5.2	0.0	5.4
Others	5.5	6.5	9.6	6.6
Total (%)	**100**	**100**	**100**	**100**

Table 4.26 showed the distribution of the CKD patients by their knowledge about high potassium containing fruits restriction. About half of the total patients had given their opinion on fruit restrictions due to CKD. Majority of the patients (60.7%) had mentioned about banana followed by orange (27.7%), coconut (23%), mango (8.4%), dried fruits (5.2%) and fruits (6.6%). Patients who opined for fruit restrictions, majority (78.5%) of them had no knowledge about reason for fruit restriction.

Table-4.27: Distribution of CKD patients by knowledge about potassium rich vegetables restriction

Indicator	Stage(%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (n=384)
Knowledge about vegetables restriction (Potassium rich)				
Yes	51.7	44.4	27.0	41.4
No	48.3	55.6	73.0	58.6
Total (%)	**100**	**100**	**100**	**100**
Type of high potassium containing vegetables (multiple responses)				
	n=61	**n=66**	**n=34**	**N=159**
Potato/Sweet potato/Arum	18.1	19.1	18.8	18.9
Spinach	54.1	59.1	40.6	53.5
Green beans	36.1	28.8	28.1	31.4
Others(Tomato/Cauliflower/ Bitter gourd)	13.0	10.6	18.1	15.7
Total (%)	**100**	**100**	**100**	**100**

Table 4.27 showed the distribution of the CKD patients by their knowledge about potassium rich vegetables restriction. About 41.4% of the patients reported for vegetables restrictions. Majority(53.5%) of the patients who had knowledge for vegetables restriction among them, majority told about spinach restriction (53.5%) followed by green beans (31.4%), potatoes/sweet potatoes(18.9%) and others 14.4% respectively. Majority (80.5) of the patients did not know the reason for restriction.

Table-4.28: Distribution of CKD patients by their knowledge about salt restriction

Indicator	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Salt restriction knowledge				
Yes	80.5	75.0	49.2	68.8
No	19.5	25.0	50.8	31.2
Total (%)	**100**	**100**	**100**	**100**
Reason for salt restriction				
	n= 94	**n=110**	**n=57**	**N=261**
Oedema	19.2	20.9	17.5	19.6
Increase blood pressure	50.0	36.6	27.3	39.5
Do not know	31.9	40.9	52.6	41.2
Total (%)	**100**	**100**	**100**	**100**

Table 4.28 showed the distribution of the CKD patients by their knowledge about salt restriction. A large number of patients had knowledge on salt restrictions due to the disease. Patients who had knowledge, among them 41% did not know the reason for restriction while a large number of patients reported, increasing of blood pressure as a reason for salt restriction.

Table-4.29: Distribution of CKD patients by knowledge about processed/ fast food/ soft drink restriction

Knowledge about processed/ fast food/soft drink restriction	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Yes	55.1	31.8	25.4	37.0
No	44.9	67.5	75.7	63.0
Total	**100**	**100**	**100**	**100**

Table 4.29 showed the distribution of the CKD patients by their knowledge about soft drink/ processed/ fast food restriction. Patients were asked regarding the restriction of processed or fast food or soft drink, majority told that they did not heard about the restrictions of those foods. A highest proportion don't no knowledge groups was found among stage 5 groups (75%) compared to other groups (44.9% and 67.5%) respectively.

Table-4.30: Distribution of CKD patients by their nutritional knowledge score

Knowledge about food habit	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Had adequate knowledge	61.9	42.6	16.9	40.6
Had average knowledge	9.3	18.9	16.9	15.4
Had poor knowledge	28.8	38.5	66.1	44.0
Total (%)	**100**	**100**	**100**	**100**

X^2- 6.41, P-value- 0.04

Table 4.30 showed the distribution of CKD patients by their nutritional knowledge score. Knowledge level was categorized based scoring system. The higher score reflects the higher or adequate knowledge level of the patients. Majority of the total patients have poor level of nutrition knowledge which was higher (66.1%) among stage 5 groups as compared to other groups. Majority of the stage 3 group had adequate knowledge (61.9%) as compared to other groups (42.6% and 16.9% respectively)**.**

D. Nutritional Status of CKD patients:

Table-4.31: Distribution of the CKD patients by body mass index (BMI) and gender

Nutritional status (BMI)	CKD patients (%)		
	Male (n=221)	Female (n=163)	Both (n=384)
Under weight (BMI <18.5)	6.8	9.8	8.1
Normal (BMI 18.5—24.9)	32.1	28.8	30.7
Over weight (25.0 – 30.0))	39.8	35.6	38.0
Obese (>30)	21.3	25.8	23.2
Total (%)	**100**	**100**	**100**

Table 4.31 showed CKD patients' nutritional status. It was measured by anthropometric measurement and biochemical parameter. According to BMI, about half of the patients (48.9%) was found to be normal. More than 33% of the patients were found to be overweight, 10.2% were obese and only 8.1% were found to be underweight.

Table-4.32: Distribution of CKD patients by nutritional status and stage

Nutritional status (BMI)	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Under weight (BMI <18.5)	5.1	8.1	11.0	8.1
Normal (BMI18.5-24.9)	28.8	32.5	39.5	30.7
Over weight (BMI 25.0- 30.0)	40.7	37.8	35.6	38.0
Obese(BMI >30)	25.4	21.6	22.9	23.2
Total (%)	**100**	**100**	**100**	**100**

Table 4.32 showed distribution of the CKD patients by nutritional status and CKD stage. According to BMI, underweight patients was found to be higher among stage 5 groups (11.0%) as compared to other groups (5.1% and 8.1% respectively). Obese patients were found to be higher among stage 3 group, (25.4%) compared to stage 4 (21.6%) and stage 5 groups (22.9%).

Table-4.33: Distribution of CKD patients by serum haemoglobin level and gender

Haemoglobin level	CKD patients (%)		
	Male (n=221)	Female (n=163)	Both (n=384)
Anaemic	49.3	68.7	57.6
Non anaemic	50.7	31.3	42.4
Total (%)	**100**	**100**	**100**

Table 4.33 showed sex wise distribution of CKD patients by serum haemoglobin level. In the study majority of the patients were found to be anemic (57.6%) which were found to be higher among female groups (68.7%) 163, compared to their male counterpart (49.3%) 221.

Table-4.34: Stage wise distribution of CKD patients by serum hemoglobin level and CKD stage

Serum haemoglobin level	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Anaemic	31.4	57.4	83.5	57.6
Non anaemic	68.6	42.6	16.1	42.4
Total (%)	**100**	**100**	**100**	**100**

X^2- 66.67, P- value- 0.00

Table-4.34 showed distribution of CKD patients by serum hemoglobin level and stage. Patients suffering from anaemia were found to be higher (83.5%), compared to stage 3 and stage 4 groups, (31.4% and 57.4% respectively).

Table-4.35: Distribution of the CKD patients by serum electrolyte level and CKD stage

Serum electrolyte level	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
Sodium (Na)				
Normal	73.7	75.7	50.8	67.4
Lower level of sodium	4.2	5.4	22.0	10.2
Higher level of sodium	22.0	16.9	27.1	22.4
Total (%)	**100**	**100**	**100**	**100**
Potassium (K)	**n=118**	**n=148**	**n=118**	**N=384**
Normal	71.2	71.2	55.1	66.9
Lower level of potassium	9.3	4.1	4.2	5.7
Higher level of potassium	19.5	23.0	40.7	27.3
N	**100**	**100**	**100**	**100**
Cloride(CL)	**n=118**	**n=148**	**n=118**	**N=384**
Normal	50.0	39.9	52.5	46.9
Lower level of chloride	1.7	3.4	3.4	2.9
Higher level of chloride	48.3	56.8	44.1	50.3
Total (%)	**100**	**100**	**100**	**100**
Carbondioxide (CO2)	**n=118**	**n=148**	**n=118**	**n=384**
Normal	62.7	60.1	58.5	60.4
Lower level of carbondioxide	33.9	38.5	37.3	36.7
Higher level of carbondioxide	3.4	1.4	4.2	2.9
Total (%)	**100**	**100**	**100**	**100**

Table 4.35 showed the serum electrolyte level of the CKD patients. Nearly 68% of the patient's serum sodium and potassium level was found to be normal. Remaining had electrolyte imbalance. In case of chloride (cl), about 47% and in case of co2, about 60% had normal electrolyte level in blood.

Table-4.36: Distribution of CKD patients by serum LDL cholesterol level and stage

Serum cholesterol	Stage (%)			
	Stage 3 (n=27)	Stage 4 (38)	Stage 5 (44)	All (109)
Normal level of LDL Cholesterol	74.1	84.2	93.2	83.2
Higher level of LDL Cholesterol	25.9	15.8	6.8	14.7
Total (%)	**100**	**100**	**100**	**100**

Table 4.36 showed stage wise distribution of CKD patients by their serum LDL cholesterol level. Lipid profile was done only patients who were prescribed by the doctors. High blood LDL cholesterol level was observed among stage 3 groups, (26%) as compared to other groups' stage 4 and stage 5 group (15.8% and 6.8%) respectively.

Table-4.37: Distribution of CKD patients by their serum triglyceride (TG) level and CKD stage

Serum triglyceride (TG)level	Stage (%)			
	Stage 3 (n=26)	Stage 4 (n=38)	Stage 5 (n=42)	All (N=106)
Normal level of TG	57.7	34.2	14.3	32.1
High level of TG	42.3	65.8	85.7	67.9
Total (%)	**100**	**100**	**100**	**100**

Table 4.37 showed stage wise distribution of CKD patients by their serum triglyceride (TG) level. A total of 106 patient's serum TG level was collected according to doctors' advice. Among the patients, majority (67.9%) had high blood TG level, which was comparatively higher among stage 5 group (85.7%) compared to stage 3 and stage 4 groups (42.3% and 65.8% respectively).

E. Dietary Intake pattern:

Table-4.38: Distribution of CKD patients by weekly food intake pattern

Weekly food intake pattern	0 days n=384 (%)	1-3 days n=384 (%)	4-7 days n=384 (%)
Cereals and tubers	0.0	0.0	100.0
Pulses, legumes, nuts and seeds	40.9	41.9	17.2
Vegetables	22.9	30.7	46.4
Fruits	41.1	51.3	7.6
Fish and other sea foods	7.0	61.2	31.8
Meat	41.4	58.3	0.3
Organ meat	94.8	4.9	0.3
Egg	28.6	58.9	12.5
Dairy and dairy products	49.0	35.4	15.6
Fast Food	73.4	25.5	1.0
Sugary Food	52.9	43.0	4.2
Spices and Pickles	76.8	22.9	0.3
Oil	0.0	0.0	100
Pepsi/coca cola/soft drink	71.4	28.6	0.0

Table 4.38 shows the weekly food intake pattern of the CKD patients. Most of the patient's cereal intake was found to be common in 7 days. Around 41% patients did not take pulse/ legumes and fruits in any of the days. Less than half of the patients (46.4%) took vegetables in 4-7 days. Consumption of fish and meat was highest (61% and 58% respectively) in 1-3 days in last week. More than 41% of the patients did not take any meat in any of the day in last week. Around half of the patients (49%) did not take any dairy products in any of the day in last week. Three fourth of the patients did not found to take any fast/ processed food or soft drink in any of the 7 days.

Table 4-39: Weekly intake of animal protein of CKD patients by stage severity

Weekly intake animal protein	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
0 day	0.0	0.7	5.9	2.1
1-3 days	48.3	62.8	75.4	62.2
4-7 days	51.7	36.5	18.6	35.7
Total (%)	**100**	**100**	**100**	**100**

X^2-37.35, P- value 0.00

Table 4-39 showed weekly intake of animal protein of CKD patients according to stage severity. Consumption of animal protein was found by majority of patients (62%) within 1-3 days per week. Animal protein intake was found higher among stage 5 group (75.4%) as compared to other groups (48.3% and 62.8% respectively).

Fig- 6 Weekly intake of animal protein by CKD patients and stage severity

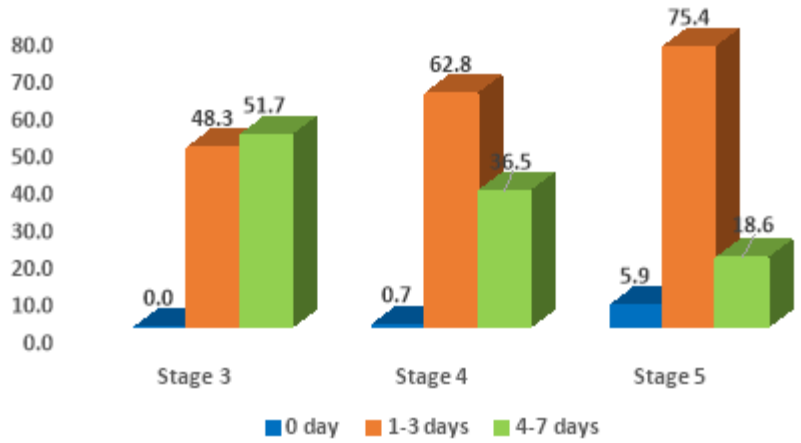

Fig-6 Showed Weekly intake of animal protein by CKD patients and stage severity. Intake of animal protein was found higher among stage 5 group (75.4%) by 1 -3 days. Intake was lower in most of the days.

Table 4.40: Weekly intake of 2nd class protein (pulses/ legumes) of CKD patients according to stage

Weekly intake pulses/legumes protein	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
0 day	35.6	32.4	56.8	40.9
1-3 days	42.4	47.3	34.7	41.9
4-7 days	22.0	20.3	8.5	17.2
Total (%)	**100**	**100**	**100**	**100**

Table 4.40 Showed weekly intake of second class protein (pulse/ legumes) of CKD patients according to stage. A less number of patients (17%) were seen to take second class protein in most of the days (4-7 days).

Fig- 7 Weekly intake of second class protein (pulses/ legumes) by stage

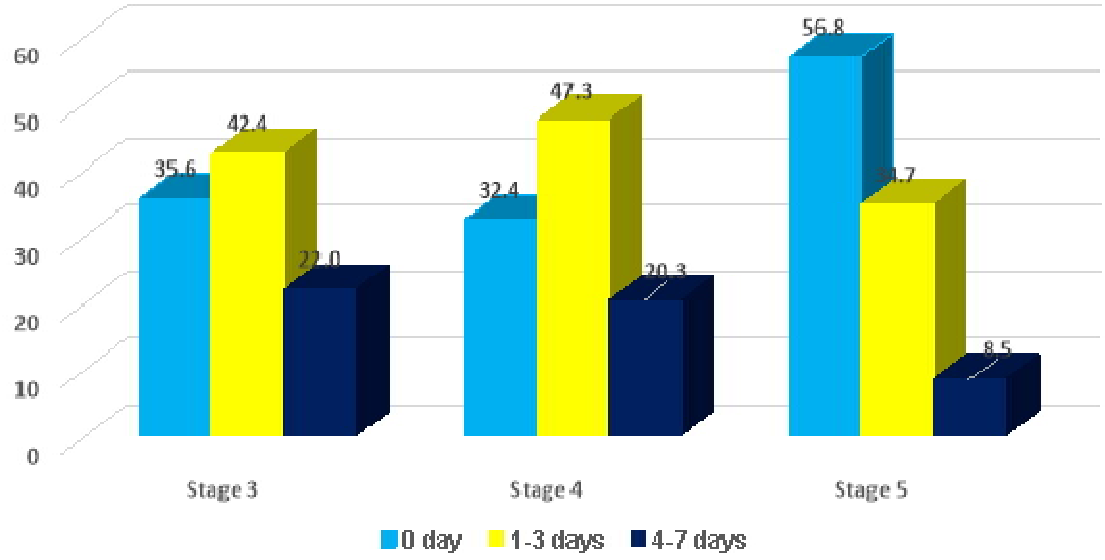

Fig. 7 showed weekly intake of second class protein of CKD patients by stage. A higher number of patients from stage 5 group (56.8%) had not taken pulse or legumes in none of the days.

Table 4. 41: Weekly intake of milk and dairy products of CKD patients by stage

Weekly intake dairy product	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
0 day	51.7	56.8	36.4	49.0
1-3 days	39.0	30.4	38.1	35.4
4-7 days	9.3	12.8	25.4	15.6
Total (%)	**100**	**100**	**100**	**100**

Table 4. 41: Weekly intake of milk and dairy products of CKD patients by stage. About half (49%) of the patients did not take any milk or dairy products in none of the days per week. Only about 15.6 percent of patients had taken it within 4-7 days.

Fig.-7: Weekly intake of milk and dairy products of CKD patients by CKD stage

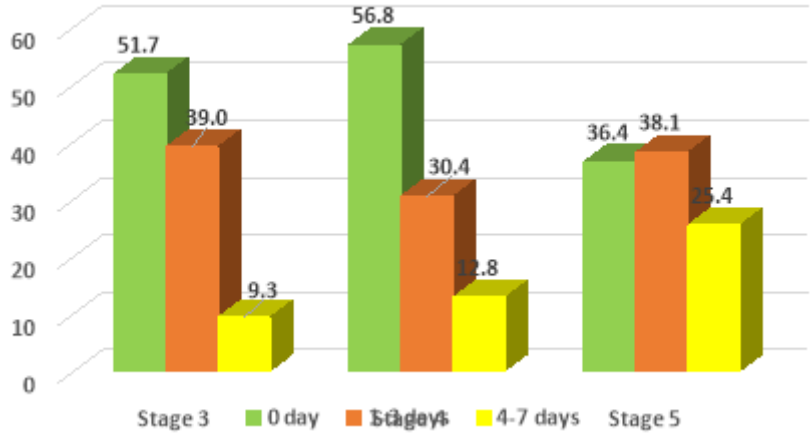

Fig.-7 Showed weekly intake of milk and dairy products of patients by CKD stage. Milk and dairy product intake was comparatively higher among stage 5 group (25.4%) compared to other groups stage 3 and stage 4 (9.3% and 12.8% respectively) in most of the days.

Table 4. 42: Distribution of CKD patients by weekly intake of fruits and CKD stage

Weekly intake fruits	Stage (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
0 day	24.6	37.8	61.9	41.1
1-3 days	61.0	56.1	35.6	51.3
4-7 days	14.4	6.1	2.5	7.6
Total (%)	**100**	**100**	**100**	**100**

X^2- 40.77, P- value- 0.00

Table 4. 42 showed distribution of CKD patients by weekly intake of fruits and CKD stage. About half (51%) of the patients had taken fruits in 1-3 days per week. Only about 7.6% of patients had taken fruits in 4-7 days per week and more than 41% did not take any fruits in none of the days.

Fig.-8: Distribution of CKD patients by weekly intake of fruits and CKD stage

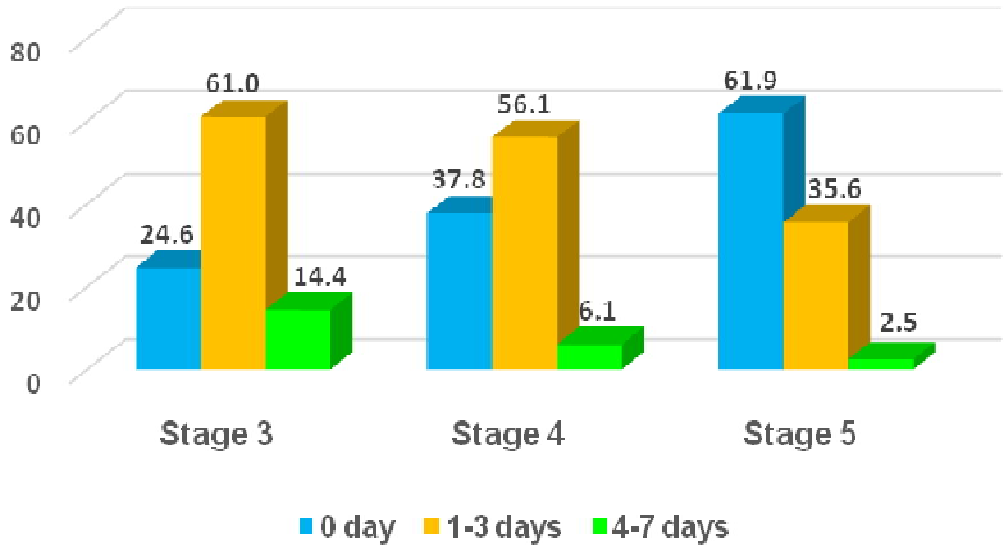

Fig.-8: showed distribution of CKD patients by weekly intake of fruits and CKD stage. Fruits intake was very poor in most of the days of all CKD patients and it was also very lower among stage 5 groups (2.5%) according to stage 3 and stage 4 (14.4% and 6.1% respectively).

Table 4. 43: Weekly intake of vegetables of CKD patients by stage

Weekly intake of vegetables	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (N=384)
0 day	10.2	15.5	44.9	22.9
1-3 days	22.9	34.5	33.9	30.7
4-7 days	66.9	50.0	21.2	46.4
Total (%)	**100**	**100**	**100**	**100**

X^2- 67.56, p-value- 0.00

Table-4. 43 showed weekly intake of vegetables of patients by CKD stage. Less than half of the patients (46.4%) was found to take vegetables 4-7 days.

Fig.-9: Weekly intake of vegetables of CKD patients by stage

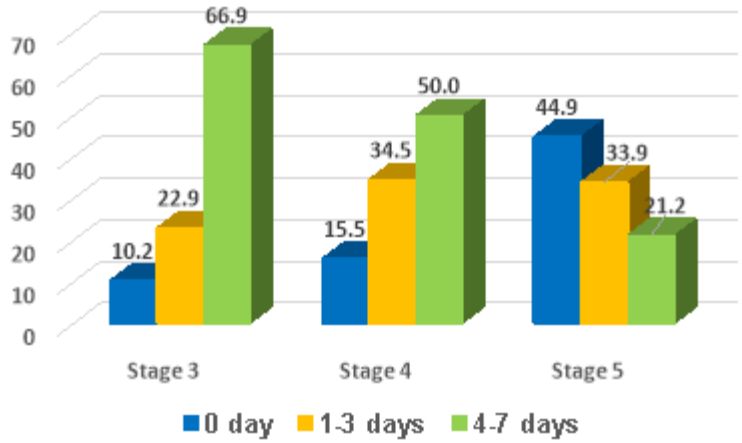

Fig.-9 showed weekly intake of vegetables of patients according to stage. Consumption of vegetables in most of the days was found higher among stage 3 groups (66.9%) as compared to stage 4 and stage 5 groups (50% and 21.2% respectively).

Table 4-44: Weekly intake of processed food / fast food/ soft drink of CKD patients according to stage

Weekly intake processed food/ soft drink	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (n=384)
0 day	78.0	79.1	61.9	73.4
1-3 days	20.3	19.6	38.1	25.5
4-7 days	1.7	1.4	0.0	1.0
Total (%)	**100**	**100**	**100**	**100**

Table 4-44 showed weekly intake of processed food / soft drink of CKD patients according to stage. A huge number of patients (73%) did not take any processed food/ fast food or soft drink in none of the days. Only 25.5% of patients had taken it within 1-3 days per week.

Fig.-10: Weekly intake of processed food /fast food/ soft drink of patients by CKD stage

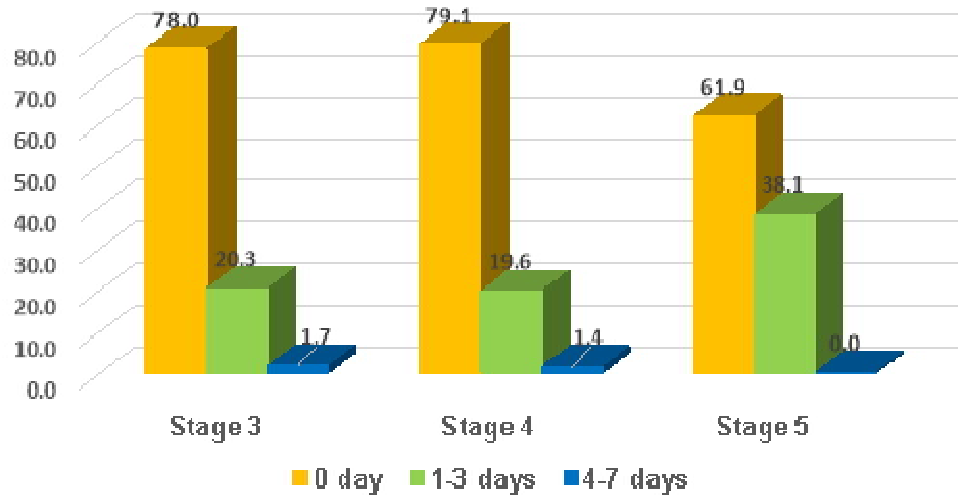

Fig.-10 showed weekly intake processed food / fast food /soft drink of patients by CKD stage. Intake of processed food was found very lower among all the groups in most of the days (4-7 days).

Table-4.45: Distribution of CKD patients by food consumption score

Food consumption score	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (n=384)
Poor consumption	0.0	0.7	3.4	1.3
Borderline consumption	22.0	29.7	44.1	31.8
Acceptable consumption	78.0	69.6	52.5	66.9
Total (%)	**100**	**100**	**100**	**100**

X^2- 45.85, p- value- 0.00

Table 4.45 showed the distribution of CKD patients by food consumption score. Food consumption score of the patients was done based on 7 days food frequency method. A higher number of patients (66.9%) were in a state of acceptable food consumption (adequate consumption). Only 31.8% were in a state of borderline groups (inadequate and average consumption). Acceptable consumption of the patients was found higher among stage 3 groups (78%) as compared to other groups (69.6% and 52.5% respectively).
Borderline consumption was found higher among stage 5 groups as compared to other groups (22% and 29.7% respectively. Poor consumption was found lower among all the groups.

F. Daily life style pattern :

Table-4.46: Distribution of CKD patients by daily physical exercise

Physical exercise	CKD patients (%)			
	Stage 3 (n=118)	Stage 4 (n=148)	Stage 5 (n=118)	All (n=384)
Yes	39.8	18.9	4.2	20.8
No	60.2	81.1	95.8	79.2
Total (%)	**100**	**100**	**100**	**100**

X^2- 45.85, P- value- 0.00

Table-4.46 showed the distribution of CKD patients by their daily physical exercise.
A very few number of patients (21%) were found to be doing moderate exercise during the time of interview. A large number of patients from stage 5 groups (96%) was found to be no physical exercise as compared to other two groups (60% and 81% respectively).

Table-4. 47: Distribution of CKD patients by smoking/tobacco using status

Smoking/ Tobacco using	Stage (%)			
	Stage 3 (n=118)	**Stage 4 (n=148)**	**Stage 5 (n=118)**	**All (n=384)**
Yes	27.1	41.2	61.0	43.0
No	72.9	58.8	39.0	57.0
Total (%)	**100**	**100**	**100**	**100**

X^2- 45.85, P- value- 0.00

Table-4.47 showed the distribution of CKD patients by smoking/tobacco using status. Patients were asked about using of tobacco or smoking status. About 43% of patients were using tobacco or smoking during the time of interview which was found higher among stage 5 groups (61%) compared to other groups stage 3 and stage 4(17.1% and 41.2% respectively).

Table-4.48: Distribution of CKD patients by their daily prescribed fluid intake pattern

Practice of drinking water per day	CKD patients (%)			
	Stage 3 (n=118)	**Stage 4 (n=148)**	**Stage 5 (n=118)**	**All (N=384)**
Maintain fluid intake properly	58.5	54.1	47.5	53.4
Not maintain fluid intake properly	41.5	46.0	52.5	46.6
Total (%)	**100**	**100**	**100**	**100**

Table 4.48 showed the distribution of CKD patients by their prescribed fluid intake.

Less than half (47%) of the patients did not found to be maintained fluid drink properly which was found higher among the advanced (stage 5) groups as compared to other groups (stage 3 and stage 4 (52% vs 41% and 46% respectively).

G. Risk factor analysis:

Odds ratios were calculated to identify various risk factors which influences the progression of chronic kidney disease of patients. (Transition from stage 3 to stage 4 and stage 4 to stage 5.) Multiple logistic regression model showed all significant and insignificant risk factors.

Table 4.49 Risk factors of CKD progression from CKD stage 3 to stage 4.

Dependent variables	Factors	Transition from Stage 3 to stage 4		
		p-value	Odds ratio	CI
Rural residence	Rural vs Urban recidence	.692	1.142	0.59-2.20
Advanced age (> 50 years)	>50yrsvs<50yrs	.219	0.668	0.35-1.27
High blood pressure	High BP vs normal BP	.047	1.900	1.0-3.58
Diabetes	Diabetes vs Non-diabetes	.734	0.898	0.48-1.67
Proteinuria	Albuminuria >2+ vs albuminuria <2 +	.001	3.097	1.66- 5.77
Poor nutritional knowledge	Had no knowledge vs had knowledge	0.456	2.050	0.31- 13.53
Poor CKD knowledge	Had poor knowledge vs had knowledge	.388	0.712	0.32-1.54
Low protein knowledge	Had no knowledge vs had knowledge	.230	1.694	0.71-4.0
Low processed food restrictionknowledge	Had no knowledge vs had knowledge	.023	2.125	1.11-4.06
Poor intake of vegetables	Poor intake vs normal intake	.146	1.633	0.84-3.16
Poor intake of fruits	Poor intake vs normal intake	.242	1.839	0.66-5.10
Inadequate food consumption	Inadequate vs adequate food consumption	0.758	1.127	0.52- 2.41
Anaemia	Anaemic vs non-anaemic	.000	3.165	1.69-5.91
BMI> 25	BMI> 25 vs BMI< 25	.302	1.400	0.73-2.65
Tobacco using	Tobacco user vs Non tobacco user	.473	0.779	0.39-1.54
No physical exercise	Physical exercise vs less physical exercise	.050	1.954	0.94-4.03

Table 4.49 showed the risk factors of progression of CKD from stage 3 to stage 4.

The significant risk factors of CKD progression from stage 3 to stage 4 were high blood pressure, proteinuria, anaemia, less physical exercise, and low knowledge on processed food and the insignificant risk factors were overweight and obesity, poor nutritional knowledge, low protein restriction knowledge, low intake of fruits and vegetables, inadequate food consumption.

Table-4.50 Risk factors of CKD progression from stage 4 to stage 5

Dependent variables	Factors	Transition from CKD Stage 4 to stage5		
		p-value	Odds ratio	CI
Rural residence	Rural vs Urban	0.108	1.714	0.88-3.30
Advanced age (> 50 yrs)	age>50yrs vs<50yrs	0.844	1.068	0.55-2.06
High blood pressure	High BP vs normal BP	0.001	5.605	2.09-15.02
Diabetes	Diabetes vs Non-diabetes	0.016	2.267	1.16-4.42
Proteinuria	Albuminuria >2+ vs Albuminuria <2+	0.194	1.655	0.28- 4.17
Poor nutritional knowledge	Had no knowledge vs had knowledge	0.106	1.739	0.22- 2.44
Poor CKD knowledge	Had no knowledge vs had knowledge	0.158	1.844	0.78-4.31
Low protein knowledge	Had knowledge vs had No knowledge	0.045	2.525	1.0-6.24
Low processed food restriction knowledge	Had no knowledge vs had knowledge	0.191	0.598	0.27-1.29
Poor intake of vegetables	Low intake vs Normal intake	0.001	3.223	1.59-6.49
Poor intake of fruits	Low intake vs Normal intake	0.617	.620	0.96-4.02
Inadequate food consumption	Inadequate vs Adequate consumption	0.283	1.466	0.72- 2.94
Anaemia	Anaemic vs Non-anaemic	0.043	2.113	1.02-4.36
BMI> 25	BMI> 25vs BMI< 25	0.645	.856	0.44-1.66
Tobacco using	Tobacco user vs Non tobacco user	0.471	.785	0.48-1.51
Lack of physical exercise	Lack of exercise vs exercise	0.153	2.455	0.76-8.42

Table 4.50 showed the risk factors of progression of CKD from stage 4 to stage 5 (ESRD).

The significant risk factors of CKD progression from stage 4 to stage 5 were high blood pressure, diabetes, proteinuria, anaemia, low protein restriction knowledge and poor intake of vegetables. The insignificant risk factors of CKD progression were rural residence, proteinuria, poor nutritional knowledge, poor CKD knowledge, inadequate food consumption and lack of physical exercise.

Table 4.51: Common risk factors of CKD progression:

Dependent variables (Risk Factors)	Factors	Stage 3-4 and stage 4-5	
		Odds ratio	Odds ratio
Rural residence	Rural vs Urban	1.142	1.714
High blood pressure	High BP vs Normal BP	1.900	5.605
Diabetes*	Diabetes vs Non-diabetes	0.898	2.267
Protenuria	Albuminuria >2+vs Albuminuria <2+	3.431	1.655
Low protein knowledge	Had no knowledge vs had knowledge	1.694	2.525
poor intake of vegetables	Low intake vs Normal intake	1.633	3.223
Anaemia	Anaemic vs Non-anaemic	3.165	2.113
Lack of physical exercise	No physical exercise vs physical exercise	1.954	2.455

Table 4.51 showed the common significant and insignificant risk factors of CKD progression from stage 3 to stage 4 and stage 4 to stage 5. These included patients of rural residence, high blood pressure, protenuria, anaemia, and low protein knowledge, poor intake of vegetables and lack of physical exercise.

Table 4.52: Significant risk factors of progression of CKD from stage 3 to stage 4

Dependent Variables (Risk factors)	Factors	P value
High Blood pressure	High blood pressure vs Normal blood pressure	0.047
Poor processed food restriction knowledge	Had no knowledge vs had knowledge	0.023
Proteinuria	Albuminuria > 2+ vs Albuminuria < 2+	0.001
Anaemia	Anaemic vs Non anaemic	0.000

Table 4.52 showed the significant risk factors of progression of CKD from stage 3 to stage 4 which were high blood pressure, low knowledge on processed food restriction, proteinuria and anaemia.

Table 4.53: Significant risk factors of CKD progression from stage 4 to stage 5

Dependent Variables	Factors	P value
High Blood pressure	High blood pressure vs normal blood pressure	0.001
Diabetes	Diabetes vs no diabetes	0.016
Low protein knowledge	Had no knowledge vs had knowledge	0.045
Low intake of vegetables	Low intake vs normal intake	0.001
Anaemia	Anaemic vs non anaemic	0.043

Table 4.53 showed the significant risk factors of CKD progression from stage 4 to stage 5 which were high blood pressure, diabetes, low protein knowledge, low intake of vegetables and anaemia.

CHAPTER-5

5.1 Discussion

5.2 Conclusion

5.3 Recommendation

5.4 Limitation of the study

5.1 DISCUSSION

Introduction: The overall aim of this study was to gain a deeper understanding of identification of the risk factors, nutritional status and dietary intake pattern of chronic kidney disease patients in Bangladesh. This section discusses the interpretation of the findings.

Socio-demographic: This descriptive cross- sectional study was conducted in 5 major hospitals in Bangladesh.

Sex distribution of the CKD patients in present study revealed that 58% of the patients were male and 42% were female which was similar with another hospital based study in Bangladesh, 60% were male (Haque MN el al. 2013), in India, 56% were male (Agarwal SK et al. 2005), in Nepal 57% were male (Chhetri PK et al. 2008) It indicates male dominance of seeking treatment in this part of the world.

In present study, age was higher in advanced stages of CKD. Similar data was found in the study of Yamagata et al., (Yamagata et al., 2007). Majority of CKD patients were within 40 to 60 years of age.

Majority of CKD patients with the literacy level showed that 54% had education below SSC level and most of the patients (56%) lived in urban areas. Almost similar data were published by Sing et al (2013) and by Haque MN et el., in their CKD population.

When they were stratified according tomonthly family expenditure level, 23% was below Tk. 20,000 per month which was almost similar with the study in Bangladesh.(Tarik M et al, 2012) and a large number of CKD patients (66%) were from Dhaka division.

In the present study, patients with CKD stage 4 were found higher (38%) based on MDRD method as compared to other stages (stage 3 and stage 5). Similar study was shown in Italy and Spain where CKD stage 3 was the highest. But in India one hospital based study demonstrated that CKD stage 1 was higher than other stages of CKD. (Nicola et al, 2011 and Sing et al., 2013).

A previous study was under taken in Bangladesh Renal Registry Report on ESRD population during 1986-1996 (Rashed, 2002) which was similar to the present study and the pattern was similar after long years but in other countries the pattern was changing. In Bangladesh Renal Registry Report, glomerulonephritis (40%), followed by diabetes mellitus (31%) were the leading causes of ESRD.

Present study showed that primary causes of CKD was diabetes mellitus followed by hypertensive nephropathy and glomerulonephritis. A study was undertaken in western world, showed that glomerulonephritis, and polycystic kidney disease were the leading cause of CKD than diabetes mellitus and hypertension (Nicola et al., 2011). This may be the geographical and life style variation in two parts of the world. According to the 2013 US Renal Data system Annual data Report, the leading causes of CKD in the United States were diabetes mellitus followed by hypertension and glomerulonephritis (Collins et al, 2009).

Nutritional Knowledge:

The results of the present study provided the level of understanding of CKD and nutritional management of CKD patients. Most of the patients (62%) had less knowledge about CKD and among them majority (63%) received knowledge from doctors. The findings of this study were similar to those of another study in United States (Romina A Danguilan et el 2013.) that have indicated that that 34% CKD patients had no knowledge about CKD and majority (97%) had received knowledge from doctors. A study indicated a lack of nutrition knowledge among physians (Kushner et al.,1995). Nutritionist/ dietitians are the experts in the dietary management and assessment of nutritional status of CKD patients as well as patient's motivation and counselling. In the study nutritionist were very few to provide understanding nutritional knowledge of CKD patients.

In the study, majority of CKD patients (60%) had poor and average knowledge on nutrition. Potassium rich fruits and vegetable related knowledge was also very poor among the patients. It correlates with the study findings in Bangladesh. (Ruhul M A et al., 2014).

Our study was also similar with the results by Alipor et al. Study which reported that more than half of the hemodialysis patients had lower than average nutritional knowledge (Aliport et al.,2003).

A study in Iran conducted revealed that 26% of the patients had poor knowledge of nutrition and 58% had moderate knowledge and 16% had good nutritional knowledge (Raheli Sadat Montazeri et al., 2014)

We find significant correlation between nutritional knowledge level and advancement CKD stage. Unlike our study results CKD stage was not significantly associated with patients knowledge in the study by Dangulin. (Dangulin et al., 2013)

A study in India showed that there was an adequate knowledge among the study patients regarding protein rich, potassium rich, sodium rich food but study found that there was no correlation between knowledge, attitude and practice of renal dietary recommendation among the patients who were on haemodialysis. (Bhavana Shailendranath et al.2014)

A study conducted by Polok and Jaffery showed that nutritional knowledge of the haemodialysis patients was significantly lower. (Polok J Jaffery et al.,2007)

A study conducted by Cupisti showed that knowledge of the haemodialysis patients was significantly lower than that of the nurses. (Cupisti et al., 2012)

Educational level may also influence patients' perceived knowledge, as shown by Finkelstein et al. (Finkelstein et al., 2008)
Like our study the nutritional knowledge was found insufficient among the pre dialysis patients by Dariusz et al. They have found significant association between nutritional knowledge and Body Mass Index (BMI) (Dariusz et al., 1912)

Hyperphosphatemia is an important determinant of morbidity and mortality in patients with chronic kidney disease (CKD).Patients with CKD are advised to consume low phosphate diet. Commercially processed food and fast food, soft drink contain phosphate. In our study, 63% of the CKD patients had no knowledge about processed food which should be restricted for CKD patients.
One hospital study conducted in Japan by Yoshiko S. et al found that 78% of the CKD patients undergoing hemodialysis, were aware of the detrimental effects of consumption of high phosphate diet. (Yoshiko S et al.,)

Dietary Intake and life style pattern:
According to the national kidney foundation, USA guideline (NKF, K/DOQI 2006), CKD patients need adequate amount of calories to maintain proper energy balance. Because protein restriction, limitsthe sources of calories from protein rich foods. Maximum calorie should come from carbohydrate rich food especially complex carbohydrate.

In the study daily cereal intake of all patients per week was found to be common, although the amount of carbohydrate taken by the patients were not collected while most of the patient's common problem was anorexia or loss of appetite.

Although excess intake of protein rich food causes deterioration of kidney function but in the study a very few number of patients were found to be taken of first class and second class protein in most of the days per week. According to NKF guideline intake of lean meat or fish is 2-3 ounce/ day for CKD patients before dialysis.
In our study majority of patients did not consume any type of second class protein (pulse/ legumes) due to fear of kidney failure. According to the NKF guideline, Patients may need to consume a moderate level of intake of second class protein depending on their serum creatinine and electrolyte level and CKD stage. (NKF, KDOQI 2006)

Milk and dairy products are rich in phosphorus and calcium, which would be consumed in alimited amount by kidney patients. Although according to the NKF guideline every day a limited amount of dairy products are recommended for CKD patients. But in the study a very less number of CKD patients were found to take milk or dairy products in most of the days per week.

Pattern of food consumption of CKD patients were not adequate. Intake of vegetables and fruits were found to be lower among all the groups in most of the days. According to NKF guideline low potassium containing fruits and vegetable consumption is needed for controlling metabolic acidosis of CKD patients, especially pre dialysis patients. (NKF, K/DOQI, 2006). Similar to the present study, another hospital based study in Australia.
Revealed that adequate amount of fruits and vegetables consumption were found to be lower among the CKD patients (Chan M et al., 2014).

Processed food/ fast food/ carbonated beverages and dairy products are high phosphate and salt containing which are recommended in a limited amount for CKD patients. Because excess intake might cause mineral disorder of CKD patients. In our study Intake of processed food, dairy products and carbonated beverage intake was found to be less among the patients.

In the study a large number of patients were not doing any physical exercise due to disease. Only one fourth (25%) of all patients were found to do physical exercise. Although at least 30 minutes walking is recommended according to guideline.

In the study more than 43% of the patients were found to use tobacco. Several study found that tobacco using and smoking have a detrimental effect of kidney function and it would be a risk factor for the progression of CKD. A study conducted in India revealed that 21% of CKD patients were found to be tobacco user which was almost similar to the present study. (Shing et al. (2013)

Nutritional status:

In the study, nutritional status of the patients revealed that, under weight patients were found to be lower (8%) among all the groups, whereas overweight and obese patients were found to be higher (43%). There were gradual decrease of overweight and obesity from the early stages of CKD to the advanced stages of CKD.

The findings of nutritional status of CKD patients was similar with another study (9%) conducted in tertiary hospitals in Bangladesh. (Tarique M et al., 2015)

Anemia was more common and more severe in the advanced stage due to inappropriate response of the plasma erythropoietin concentration to anaemia (Ritz and Haxen et al., , 2005).

In the study, there were gradual increase of anaemia from the early stages to the advanced stages of CKD. The findings was almost similar with another study conducted in Bangladesh. (Tarik M et al., 2015)

Risk Factors of CKD progression:

In present study, hypertension, diabetes, anaemia, poor nutritional knowledge, lower intake of vegetables and lack of physical activity were the most significant risk factors as identified by multiple logistic regression analysis, influencing the progression of CKD stages.

In hospital based study in Bangladesh, (Tarik et al.,) revealed that older age group, female gender, anaemia and hypertension turn out the most devastating risk factors as identified by multiple analysys, influencing the advancement of CKD stages.

In hospital based study in India the risk factors that aggravated CKD stages were were obesity, hypertension, diabetes mellitus, dyslipidemia, anaemia and smoking (Shing et al,2013).

In Nepal the most common risk factors were over weight, obesity, hypertension and diabetes mellitus (Kumaretal., 2013)

A study of multifocal population of Bangladesh showed that the most common risk factor of CKD was hypertension (Iqbal et al 2010).

Similar study was shown in Japanese population where hypertension poses a greater risk for CKD patients but in Singapore, diabetes mellitus followed by hypertension were most common risk factors of CKD. (Taka hashi et al., 2009).

5.2 CONCLUSION

The study was conducted in 5 major hospitals in Dhaka city. In the study a total of 384 CKD patients were interviewed. The study revealed that majority of the patients were male and maximum number of study subjects were from advanced age group. Patients were mainly from urban areas. Nearly a quarter of patients had no formal education. Nutritional knowledge and dietary intake pattern of chronic kidney disease patients was not adequate. Nutritional knowledge was significantly associated with the advancement of CKD stage. Majority of patients had poor nutritional knowledge. The level of lower nutritional knowledge was significantly greater in patients with earlier stages than those with advanced stages. In the study a huge number of patients did not consume protein rich food in most of the days per week as recommended by National Kidney Foundation (NKF) guide line and was found to be worse among advanced stage groups. Similarly, consumption of fruits and vegetables were not adequate among the patients according to NKF guideline. According to food consumption score, one third of CKD patients were found to be in borderline consumption level which was comparatively lower among advanced stage groups. In the study more than a quarter of patients were tobacco user and a large number of patients were found to do no physical exercise. In the study maximum number of patients were to be found overweight and obese which was going down according to stage of advancement. In the study most of the patients were found to be anaemic and about one third of patient's serum electrolyte level was imbalanced.

In the study there was an association between nutritional knowledge, dietary intake pattern and nutritional status of CKD patients with the progression of disease.

The significant risk factors of CKD progression were high blood pressure, anemia, diabetes, and high albuminuria, and poor nutritional knowledge, poor food restriction knowledge, inadequate fruits and vegetables consumption and lack of physical exercise. The insignificant risk factors of CKD advancement were rural residence, inadequate food consumption as well as overweight and obesity.

Kidney disease related nutritional awareness is needed of the CKD patients. Nutritional education training program is needed both for patients and for health professionals as well as family members. Proper nutritional knowledge, recommended dietary guideline along with proper treatment is needed to delay the advancement of progression of CKD and which can reduce complication of chronic kidney disease, minimize financial cost and thus improve the quality of life and survival rate of the patients. Ultimately reduce morbidity and mortality in Bangladesh.

5.3 RECOMMENDATION

Following recommendations are needed for CKD patients in order to prevent the progression of chronic kidney disease, better nutritional status and to improve the quality of life of CKD patients. These are as follows:

- Improvement of nutritional knowledge of CKD patients is essential.
- Regarding increasing of dietary awareness of patients, educational training program regarding food and nutrition is needed.
- Practicing of kidney friendly diet is needed for the patients.
- Proper dietary guideline should be followed by the patients to halt the progression of the disease and to improve the quality of life of the patients.
- An appropriate protein intake should be maintained by the patients to maintain serum protein level and to reduce protein energy malnutrition.
- Protein intake is not prohibited but restricted. In earlier stage 0.8 gram protein and in advanced stage 0.6 gram minimum protein is recommended.
- According to guideline protein should come from both 1st class and second class protein containing food.
- Due to mainlining serum potassium level, consumption of low potassium containing of fruits and vegetables intake is needed for patients for reducing metabolic acidosis.
- Excess phosphate can cause bone disorder. So high phosphate containing food should be restricted for CKD patients.
- Processed food, fast food and carbonated beverages are high phosphate and salt containing food. So it must be restricted for all patients.
- Extra salt intake should be prohibited by the patients, which would increase thirst, blood pressure and swelling of body.
- Depending on serum sodium level every day 2-3 gram salt is required during for cooking purpose only.
- Fat consumption should be limited by the patients especially saturated and trans fat.
- Controlling of high blood pressure is needed by restriction of salt and fat containing food and taking of proper treatment.
- Controlling of blood sugar level is essential by decreasing sugary food intake, proper treatment and life style modification.

- Weight management must be maintained by proper intake of balanced diet and lifestyle modification.
- Every day at least 30 minutes walking is recommended for CKD patients (Except critical case) for mainlining blood pressure and blood sugar level and management of excess body weight.
- Nutritional training / counseling program is essential for CKD patients and family members as well as health workers.
- Nutritionist / Dietitians are essential in each government and non-government hospitals and health centers for proper counseling and motivation of patients and guardians.
- Nutritionist / Dietitians have better knowledge for assessment of nutritional status and giving dietary service of patients better than other health professionals.
- Further researches on this field should be carried out.
- Awareness program must be conducted all over the country.

5.4 LIMITATIONS OF THE STUDY

- Only carried out in selected hospitals of Dhaka city;
- Study was conducted in different hospitals only;
- Biochemical report was collected from patients but no laboratory test was done;
- Pediatric patients were excluded from the study;
- Patients undergoing dialysis were excluded from the study';
- Follow up was not done to see the after effect of CKD patients

Chapter-6

6.1 REFERRENCES

6.2 Questionnaire

6.1 REFERRENCES

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6.2 Picture of hospitals where the data were collected:

Kidney Foundation Hospital of Bangladesh (KFB)

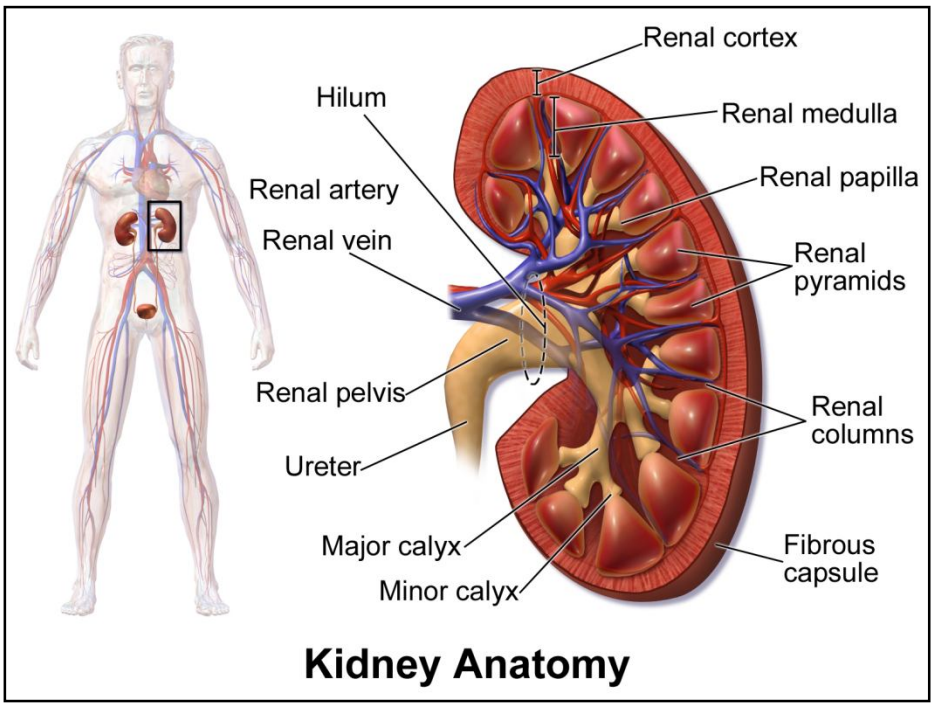
National Institute of Kidney Disease & Urology (NIKDU

BIRDEM Hospital, Dhaka

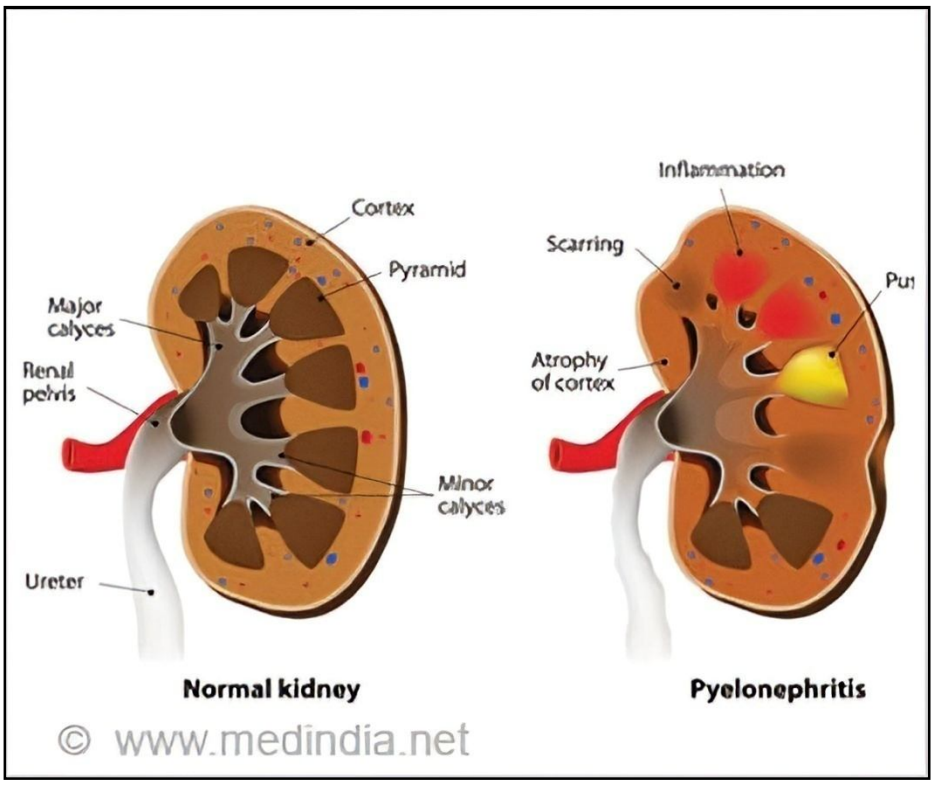
BSMMU Hospital

Dhaka Medical College Hospital (DMCH)

Anatomy of Kidney



Normal & infected Kidney



Division wise Patients of Bangladesh

RISK FACTORS, NUTRITIONAL STATUS AND DIETARY INTAKE PATTERN OF CHRONIC KIDNEY DISEASE PATIENTS IN BANGLADESH.

(Questionnaire for CKD patient) Date:

Name of hospital:_____ 1=NIKDU, 2=KF, 3=BSMMU
4=DMC, 5=BIRDEM

Patient's:_____

SECTION-1

101. Type of patient: 1=Diabetic CKD, 2= Diabetic, hypertensive CKD
3=GN CKD, 4=Hypertensive CKD, 5=Others

102A. Problem: 1. Anorexia, 2=Nausea/Vomiting, 3=weakness, 4=Backache
5=Oliguria or Less urination/Disuria or pain, discomfort and
burning when urinating, 6. Others:_____

103. Patient's age: (Years)

104. Gender: 1= Male, 2= Female

105. Marital status: 1= Married, 2 Unmarried, 3 Divorced/widow

106. Educational status:

1=Less than S.S.C	5 Masters/Kamil
2=S.S.C / Dakhil	6=No education/sign only
3=H.S.C/Alim	7=Technical education
4=Honurs/Fajil	8=Others:_____

107. Patient's occupation:

01. Farmer	02. Labour/Hotel worker/shop keeper
03. Service	04. Teacher/ Advocate/ Doctor/ Engineer
05. Business (small)	06. Business (big)
07. House wife	08. Student
09. Rickshow/ Scooter driver	10.Others

108. Household head's occupation:

01. Farmer	02. Labour/Hotel worker/shop keeper
03. Service	04. Teacher/ Advocate/ Doctor/ Engineer
05. Business (small)	06. Business (big)
07. House wife	08. Student
09. Rickshow/ Scooter driver	10.Others

109. Monthly family expenditure: _____Taka

110. Address: Village/Moholla:_____

110UP/TH Upazila/Thana:_____

110D District:_____

110Mob Mobile:_____

111. Area Type 1. Rural 2. Urban

Patient Identification No:_____

SECTION-2 Anthropometric measurement

201. Height (cm)

202. Weight (Kg)

203. BMI

SECTION-3 Biochemical Investigations and Others

301. Urine RIM/E Done (1-yes, 2= No)
Albumin
0= no, 1=Al+, 2= Al++, 3=Al+++
Sugar (1= yes, 2= No)
WBC (1 yes, 2 No)
RBC (1=yes, 2= No)

302. UACR_____ Not Done= 887

302. AUTP_____ Not Done= 87

303. Hb%_____

304. Blood Sugar (mmol/dl) Fasting_____ Not done 88.7
Random_____ Not Done 887
Two hours after meal_____ Not Done=88.7

305. Serum creatinine (mg/dl)_____

306. Serum Albumin_____ Not Done=87

307. EGFR (ml/min/ 1.73m2)_____ Not Done=887

3.7A. Stage_____

308. Ultra sonography (1=yes, 2= No)_____

Note: US size_____, Shape_____ Ecogenecity_____

309. History of Hypertension: 1=yes, 2= No

309A. History of Medication: 1=yes, 2= No

309B. Blood pressure: Systolic
Diastolic

310. Diabetes: 1= Yes, 2 No

310A. If Yes, 1= Insulin, 2= Oral drug, 3 Diet, 4 None

311. Serum Electrolyte (mg/dl)
Na _____ (Not done= 8887)
K _____ (Not Done=87)

Cl _____ (Not done 887)

Co2 _____ (Not Done= 87)

312. Serum Cholesterol: _____ (Not Done=887)

3.13. TG_____ (Not Done=887)

314. Edema: 1= Yes, 2 No

Section-4. Knowledge about Kidney and Kidney Disease

401. Number of kidneys in human body?

1. One 2. Two 3. Don't Know

402. What are the functions of kidney?

01. Purify the blood 02. Formation of blood

03. Strengthening of bone 04. Electrolyte balance

05. Filtration 06. Don't Know

07. Irrelevant answer 08. Others _____

403. What are the main causes of kidney disease?

01. Blood pressure 02. Diabetes

03. Congenital 04. Infection of Kidney

05. Don't know 06. Irrelevant answer

07. Excess intake of pain killer medicine 08. Others

08. Others_____

404. What are the sign and symptoms 01 kidney disease?

1. Less urination/burning sensation of urine/Oliguria
2. Backache
3. Edema
4. High blood pressure
5. Don't Know
6. Others_____

405. How many months or years have you been suffering from kidney disease?

(1) 3-6 months (2) 7-12 months (3) 13-24 months

(4) 25-36 months (5) >36 months

406. What are the consequence of kidney disease? (Long term)

SECTION-5 Knowledge about food and nutrition

501. Do you know the dietary rules of kidney disease? 1. Yes 2. No

If Yes, whom you know that?

1. Doctor/private practitioner
2. Dietitian
3. Relatives
5. Private hospital's doctors
6. Upazilla / Dist. Health workers
7. Media (TV/ Radio! news paper/book)

4. Govt. Hospital's doctors 8. Others _____

503. Do you know about the nutritive value of food? 1. Yes 2. No

503A. If Yes, what are those?

1. Carbohyd rate 2. Protein 3. Fat 4. Vitamins

5. Minerals 6. Water

504. Which type of food should be restricted mainly due to kidney disease?

1. Protein rich food 2. Carbohydrate rich food

3. Fat rich food 4. Vitamin rich food

5. Minerals rich food 6. Don't know

505. Which foods contain high protein?

1. Vegetables 2. Dall 3. Egg 4. Milk 5. Fish

6. Meat 7. Others 8. Don't know

506. Which type of protein is good for kidney patients? Protein from meat/fish/egg/ milk or protein from seeds/legumes?

1. Protein from seeds/legumes 2. Protein from meat/ fish/egg/milk

3. Don't know

506.A Kidney patient (Without dialysis) can consume how much protein per day?

_____ gms 99. Don't know

507. Number of pieces of meat or fish, can take a kidney patient (without dialysis) per day?

1. One piece 2. Two pieces 3. Three pieces 4. 4 pieces

5. >5 pieces 6. No intake f meat/fish 7. Don't know

508. Is there any food restricted for you? 1. Yes 2. No

508A. If Yes, what are those foods?

1. Meat/ meat 2. Milk 3. Egg 4. Vegetables

5. Fruits 6. Dall 7. Rice/Bread 8. Sugar/sweets

9. Others_____

508B. Why these foods are restricted? _____

509. Is there any fruit restricted for you? 1. Yes 2. No

509A. If Yes what are those fruits?

1. Banaria 2. Orange 3. Malta 4. Mango 5. Dates

6. Green coconut water 7. Coconut 8. Don't know 9. Others

5098. Why these fruits are restricted? _____ 8. Don't know

509C. For which nutrients these fruits are restricted ? _____ 8. Don't know

510. Are there any vegetables restricted for you? 1. Yes 2. No

51 OA. If Yes, what are those vegetables?

1. Sweet potato 2. Jackfruit seed!/any seeds 3. Tomato

4. Shozne 5. Spinach/green leafy vegetables 6. Arum

7. Green Banana 8. Don't Know 9. Others_____

510B. Why these are restricted?_____ 9. Don't know

510C. For which nutrients these vegetables are restricted? _____ 9. Don't know

511. Which amount of salt is recommended for a kidney patient?

1. More than normal 2. Normal

3. Less than normal 4. Salt intake is restricted

511A. Why salt restriction is recommended?

1. Generalized pain in body 2. Edema

3. Blood pressure 4. Irrelevant answer

5. Others _____ 6. Don't know 9.NA

512. Is it right to take canned food/processed food/fast food/coca cola for a kidney patient?

1. Yes 2.No 9.Don't know

512A. Why it is not suitable to take these foods ?_____ 9. Don't know

513. Which type of food is needed to prevent demineralization and keep healthy bones?

1. Milk and milk product 2. Leafy vegetables

3. Legumes 4. Small fish with bones

5. Fatty foods 6. Sugar rich food

7. Others_____ 8. Don't know

513A. Which nutrient is responsible for strong bone and teeth? _____ 9. Don't know

514. Are there any disease where salt intake is restricted?

1. Yes 2. No

514A. If yes, what is the name of the disease? _____

515. Is there any disease where sugar intake is restricted?

1. Yes 2. No

515A. If yes, what is the name of the disease? _____

516. What are the rules a kidney patient should follow.

1. Blood pressure control 2. Keep blood sugar normal

3. Less intake of salt 4. Drinking of proper amount of water

5. No smoking/Tobacco using 6. Walking/exercise

7. Restriction of fast food/ canned food/ carbonated drink

8. Regular intake of proper diet 9. Don't know 10. Others

SECTION-6 Dietary attitude Related Questions

601. Socking or boiling of vegetables in water and discard the water which causes reduction of some salts which is harmful for kidney patients. Do you agree or not?

1. Agree 2. Not agree 3. No response

602. Proper nutrition and dietary management delay the progression of kidney disease.

What is your opinion? 1. Agree 2. Not agree 3. No response

603. Maintaining of the standard body weight according to height is important for a kidney patient. What do you think?

1. Important 2. Not important 3. No response

604. Controlling the blood pressure how much essential for a kidney patient. What is your opinion?

1. Important 2. Not important 3. No response

605. Maintaining a dietary rule is important for a kidney patient? What is your opinion?

1. Agree 2. Not agree 3. No response

SECTION- 7 Dietary Practice related questions

701. Fluid intake per day? _____liter

702. Do you smoke or use tobacco? 1. Yes 2. No

703. How many days did you consume the following foods in last week?

SL	Type of food	Days
a	Carbohydrate rich food Ibread1chaptti, mwi, Chira	
b	Seeds/nuts egurnesentils	
c	Vegetables	
d	Fruits	
e	Fish	
f	Meat (beef! chicken/any other)	
g	Organ meat	
h	Egg	
i	Milk and milk product	
j	Fast food/ canned food/ instant food	
k	Sweet and sweet product	
l	Pickles	
m	Carbonated beverage! Coca colla/Pepsi	