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A STUDY ON CHRONIC RENAL FAILURE ASSOCIATED WITH METABOLIC SYNDROME AND ITS NUTRITIONAL ASSESSMENT IN ALLAHABAD DISTRICT

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ABSTRACT

Metabolic syndrome is a major public health threat for 20 percent of the population which are above 30 years of age and older. Chronic renal failure is associated with many kinds of metabolic Phenomena such as accumulation or deficit of various substances and deregulations of metabolic pathways combine in the pathogenesis of these changes. In the process of accumulation, decreased urinary excretion plays a crucial role and leads to retention of metabolites in the organism (e.g. creatinine, urea, electrolytes, and water). Although it is difficult to discriminate the detrimental renal effects of the metabolic syndrome from those of hypertension and impaired glucose metabolism, its other aspects (particularly obesity) may favor independently the development of renal abnormalities and may be considered new modifiable risk factors for CKD. The research design selected for this study was cross sectional study and hospital based. 60 CRF patients were selected using purposive sampling technique. Study was conducted in Nazareth Hospital of District Allahabad. The instrument used for the study was structured questionnaire. 60 CRF patients were selected for the study. Data was tabulated through percentage and mean was calculated. The study was revealed that the nutritional and biochemical assessment of chronic renal failure patients along with metabolic syndromes. Therefore a research is designed to elucidate the nutritional status of patients as well as to identify of CRF in Metabolic syndrome. The result was found that 75% of male were suffering from chronic renal failure whereas only 25% were female.53.3% of the respondents were suffering from diabetes along with CRF followed by 25% of respondents having hypertension + diabetes + CRF.

Keywords: Chronic renal failure, Metabolic syndrome, Nutritional assessment, Hypertension, Diabetes.

INRODUCTION

The metabolic syndrome is defined as a syndrome of obesity, insulin resistance, elevated BP, hypertriglyceridemia, and hyperuricemia The prevalence of metabolic syndrome has been increasing at an alarming rate throughout the world.According to the National Cholesterol Education Program, Adult Treatment Panel III (NCEP-ATP III) metabolic syndrome is defined as the presence of three or more of the following criteria: Elevated blood pressure (≥130/85 mm of Hg), elevated fasting plasma glucose level (≥110 mg/dl or ≥6.1 mmol/l), high serum triglyceride level (≥150 mg/dl), low serum HDL cholesterol level (<40 mg/dl in men and <50 mg/dl in women), waist circumference is >102 cm in men and >88 cm in women (Nath *et.al*., 2012).

Individuals with MS are at increased risk for development of chronic kidney disease (CKD). It is associated with many kinds of metabolic changes. According to the demographic data Chronic kidney disease (CKD) is an important and noteworthy health issue and has become a global public health challenge because of its high prevalence (Meguid *et.al, 2005*) and the concomitant increase in risk of end-stage renal disease (ESRD), cardiovascular disease (CVD) and premature death (Muntner *et.al.*,2002). Patients with ESRD have a poorer quality of life and a shorter life expectancy compared with individuals of the same age in the general population (GoAS *et.al*, 2004). The prevalence of chronic kidney diseases (CKD) may increase for several reasons. The two major causes of CKD are diabetes mellitus and hypertension, which are aggravated and increased by obesity, dyslipidemia, smoking and other risk factors.

Chronic renal failure is characterized by progressive deterioration of kidney function, which develops eventually into an End stage of chronic renal failure (CKF). CKF has traditionally been categorized as mild, moderate, or severe. Other poorly defined terms like uremia and end-stage renal disease (ESRD) have commonly been applied. During the last few years, an international consensus has emerged categorizing CKF into five stages according to the glomerular filtration rate (GFR) and presence of signs of kidney damage: stage 1: GFR > 90 ml/min and signs of kidney damage, stage 2: GFR = 60-89 ml/min and signs of kidney damage, stage 3: GFR = 30-59 ml/min, stage 4: GFR = 15-29 ml/min, and stage 5: GFR < 15 ml/min (Levey*et et.al.*,2005). Stage 5 represents the total inability of kidneys to maintain homeostasis, and this metabolic state is incompatible with

life. Thus, at this stage, it is necessary to use methods that substitute for kidney function to ensure patient survival; these methods include peritoneal dialysis, hemodialysis, and other extracorporeal purifying procedures, or kidney transplantation.

MATERIALS AND METHODS

The research design selected for this study was cross sectional study and hospital based. The study was conducted in Nazareth Hospital was selected from Allahabad district. 60 CRF patients were selected using purposive sampling technique. This study was conducted to ascertain the general profile, anthropometric measurement, clinical assessment and dietary habits among chronic renal failure patients. Only patients with a confirmed diagnosis of chronic renal failure were recruited and interviewed in order to assess their dietary patterns, nutritional and biochemical assessment.

DATA COLLECTING TOOL

Structured Questionnaire was used as a tool for data collection. The questionnaire used in this study consisted of the following parts. general profile cover the aspects including respondent's name, age, and sex, marital status, income, educational status and occupation. All these are important for knowing the respondents socio-economic status. Nutritional anthropometry is concerned with the measurement of variations of physical dimensions, the gross composition and degree of nutrition. Hence, anthropometric measurements are useful criteria for assessing nutritional status including parameter height, weight measurement and body mass index formula. Patients Clinical data was collected by the admitted patients record files including the diabetes diagnostics test, lipid profile test, urine test, blood test etc. The nutrient intake of the subjects was calculated on the basis of 24 hours dietary recall method. The diet was calculated for calories, protein, fat, carbohydrate, iron, sodium and potassium and nutrient intake was calculated using the food composition table by Gopalan *et. al.* (2004) and compared with the ICMR standard values. Eating habits of the respondents will also be recorded

RESULT AND DISCUSSIONS

The increased prevalence of chronic renal failure association with many types of metabolic syndrome is a major health problem in developing countries including India. This study was conducted using 60 chronic renal failure patients aged 35 to 70 years and above at Nazareth Hospital, Allahabad using a structured questionnaire. The data obtained from the current study are presented and discussed in this chapter. The findings of this study are presented under the following headings; distribution of patients on the basis of their age group, dietary pattern, nutritional assessment Body mass index (BMI) was calculated using the formula "weight (Kg) / height (m2)", biochemical analysis and metabolic diseases.

DISTRIBUTION OF RESPONDENTS ON THE BASIS OF AGE GROUP

From the study was found that 51.66 % respondents were belonging to age group 65-75 years and only 13.33% respondents were of 35-44 years of age group suffering with chronic renal failure. The similar study was done by Ford *et. al,* 6.7% in those aged 20 yr and up to 42% in those aged >70 yr. the study concluded that the age group >60 year were more prominent suffering with CRF.

Table: 1 Distribution of respondent on the basis of their BMI

Categories[1]	BMI (kg/m^2)	No. of patients	Percentage %
Very severely underweight	Less than 15	-	-
Severely underweight	From 15-16	-	-
Underweight	16-18.5		
Normal (healthy weight)	18.6-25	13	21.66%
Overweight	25-30	22	36.66%
Obese Class I (Moderately obese)	30-35	25	41.66%
Obese Class II (Severely obese)	35-40	-	-
Obese Class III (Very severely obese	Above 40	-	-

Sources: [1]Adapted from WHO, 1995, WHO, 2000 and WHO 2004

A study observed that prevalence of the metabolic syndrome in NHANES III was 5% among the subjects of normal weight, 22% among the overweight, and 60% among the obese. A Framingham Heart Study report indicated that a weight increase of ≥2.25 kg over a period of 16 yr was associated with an up to 45% increased risk for developing the metabolic syndrome It is clear from the table 1 that 41.66% of respondents were obese whereas only 36.66% were overweight and 21.66% respondents were normal. Obesity class I is a major risk factor for essential hypertension, diabetes, and other co morbid conditions that contribute to development of chronic kidney disease. Obesity raises blood pressure by increasing renal tubular sodium reabsorption. Defining overweight and obesity as BMI between 25–30 and >40 kg/m2, respectively, Iseki *et al.* suggesting that obesity may be an independent risk factor for CKD. The role of obesity as a potentially important cause of CKD. Current evidence suggests that overweight and obesity account for 65%–75% of the risk for essential hypertension Konen *et.al,* (2010).

Table.2 Distribution of respondent on the basis of other metabolic diseases

Other metabolic diseases	Percentage %
HYPERTENSION + CRF	8.33%
DIABETES + CRF	53.33
HYPERTENSION+ DIABETES + CRF	25%
GOUT + CRF	1.67%
UTI + CRF	5%
CRF	6.67%

The majority of patients 53.33% were suffering with diabetic chronic renal failure, 25% with hypertension and diabetes, 8.33% with hypertension, 6.67% patients were suffering with only chronic renal failure and 5% patients also found with urinary tract infection. Although the results of these studies suggest that there is a close association between the metabolic syndrome and renal dysfunction, it is difficult to draw any definitive conclusion concerning a cause and effect relationship because of the complexity of their interrelationships. First, many patients with the metabolic syndrome are hypertensive and/or have diabetes (*i.e.*, affected by at least one widely known risk factor for the development and progression of CKD). Chen *et al.* who found that the risk for developing chronic renal failure was significantly higher in men with an increased body mass index, even after adjustments for BP and proteinuria, two overweight-related factors that may have accounted for a non independent detrimental effect of obesity on renal function. Moreover, since the first description of an association between massive obesity and nephrotic proteinuria Iseki *et al.*

MEAL PATTERN OF RESPONDENTS

Result shows that 46.6 % respondents were taking four meal patterns, 23.33 % respondents were taking three meal patterns whereas only 30% respondents were taking three meal patterns. Whereas in the present study patients were found overweight and obese due to odema. Renal retention of Na and water may lead to dependent edema.

Table: 3 Comparison between recommended and actual nutrient intake of respondents

Nutrients	Recommended dietary allowances		Nutrients intake/day		Difference	
	Male	Female	Male	Female	Male	Female
Calorie (kcal)	2730	2230	1627	1321	-1103	-909
Protein(g)	60	55	40.2	33.5	-19.8	-21.5
Fat(g)	30	25	42.8	39.8	+12.8	+9.8
Carbohydrate(g)	300	300	269.8	283.2	-30.2	-16.8
Iron(mg)	17	21	9.6	8.4	-7.4	-12.6
Sodium(g)	2-5	2-5	4.08	3.05	+2.08	+1.05
Potassium(g)	4.7	4.7	6.5	5.2	+2.5	+1.2

Table: 3 shows that average intake of respondent were lower as compared to normal RDA of an adult. The consumption of fat is high followed by other nutrients. Iron intake was found very low which the cause of anaemia in CRF patients is. There is depletion of sodium in body and potassium level is increased. These mineral elevate the hypertension. So there is a great need to focus on balancing of these two minerals.

Table: 4 Biochemical observation parameter of respondents suffering with CRF

parameter	Normal range	Male	Female
Fasting Blood Sugar	60-110mg/dl	135.6mg/dl	131.8mg/dl
Blood Urea	M-15-40mg/dl F-10-30mg/dl	M-52.8 mg/dl	F-40.5 mg/dl
Serum Creatinine	M-0.6-1.2mg/dl F-0.4-1.0mg/dl	M-2.2 mg/dl	F-4.2 mg/dl
Calcium	9.0-11mg/dl	7.9 mg/dl	6.8 mg/dl
Haemoglobin	M-13-17g/dl F-12-15g/dl	8.7g/dl	6.2g/dl
Total Proteins	6.0-8.0g/dl	4.8g/dl	3.4g/dl
Sodium	136-145mEq/L	158.9 mEq/L	169.9mEq/L
Potassium	3.8-5.0mEq/L	8.8 mEq/L	9.6 mEq/L
Bicarbonates	20-28mMol/L	35mMol/L	42.5mMol/L
Chloride	99-111mEq/L	119.8mEq/L	122.3 mEq/L

Table: 4 show the biochemical profile of the respondents. It indicates patients has higher level of Blood Urea 52.8mg/dl in male and 40.5mg/dl in female, Serum Creatinine and protein was found higher than normal range (M-2.2mg/dl,F-4.2mg/dl), (M4.8g/dl,F3.4g/dl). Sodium and potassium level was also elevated in urine. Fortunately, even with loss of more than 90 percent of renal function, a remarkable capacity to regulate body fluid volumes and sodium and potassium persists. Serum potassium level is kept within or slightly above normal limits during most of the progressive course of renal failure. Maintenance of potassium equilibrium despite a falling glomerular filtration reflects a progressive adaptation of the mechanisms regulating serum potassium concentration**.** The GFR may be reduced as low as 20-30 mL/min in a small elderly person, while her serum creatinine remains in the upper range of normal. As serum creatinine is so highly dependent on age, sex and body size, a number of corrections and formulae have been developed to estimate the muscle mass and assumed creatinine production creatinine is the ratio between blood urea nitrogen (BUN), a waste product in the blood from protein metabolism, and creatinine. This ratio is used to help determine if kidney function is impaired due to a damaged or diseased kidneys or another factor outside of the kidneys. About one-third of type I diabetics exhibit increased urine albumin, which corelates with glycemia, blood pressure, and duration of illness. Kidney dysfunction patients were more susceptible to diabetes and hypertension. These are the common risk factors and other

characteristics among the subjects diagnosed with CRF were hypertension anemia and diabetes.

CONCLUSION

A close association has been found between the metabolic syndrome and the risk for developing renal damage, clinically expressed in the form of proteinuria, blood urea or CKD. This finding raises a major clinical and public health concern because both the metabolic syndrome and CKD are increasingly common disorders in patients. Despite the close association between the metabolic syndrome and renal damage, it is still unclear whether and to what extent treating patients with the metabolic syndrome will prevent the development and progression of CKD. Present study result reveal that 75% of male were suffering from chronic renal failure whereas only 25% were female.53.3% of the respondents were suffering from diabetes along with CRF followed by 25 % of respondents having hypertension + diabetes + CRF.

RECOMMENDATION

The purpose of the study is to create awareness among population of CRF patients towards nutritional approach of treatment as metabolic syndrome is one of the most leading cause of CRF hence to reduce its severity metabolic syndrome patients should be given proper counseling of nutrition and lifestyle modification along with medication so that progression of disease towards CRF can be checked.

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