m-NUTRIC Score for Assessment of Nutritional Status and Treatment Outcomes in Chronic Kidney Disease Patients

Abstract

Background: Malnutrition entails insufficiency arising of protein, vitamin, and trace elements related to inadequate and unstable diet which may cause poor quality of life and sometimes even lead to death. Undernourishment is the leading reason having a greater impact on outcomes following treatment, which lengthens patient stay and impacts mortality and morbidity. Protein deficiency is commonly reported among chronic kidney disease (CKD) patients. Lack of proper nutrition affects the quality of life of patients with chronic kidney disease. Nutritional problems among CKD subjects needs to be detected earlier. This study aims to assess the nutritional risk of patients with CKD by m-Nutric score and compare the m-Nutric scores among patients with and without haemodialysis.

Material and Method: This will be a cross-sectional study in the Dept. of Medicine, at AVBRH, Wardha. Total 150 patients with CKD reporting to Medicine Department, AVBRH, Wardha will be enrolled in the study. The m-NUTRIC score will be calculated as per the criteria. APACHE II at admittance and Sequential Organ Failure Assessment (SOFA) score will be assessed . NUTRIC points will be calculated without interleukin (IL)-6. Morbidity data, duration of stay of patients and mortality will be recorded.

Expected Results: Subjects having m-NUTRIC scores more than or equal to five will be graded in the high risk category of undernourishment whereas scores less than or equal to four will be categorised as low risk. We expect a significant correlation of m-NUTRIC scores ≥5 to duration of hospitalisation and risk of death.

Conclusion: The m-NUTRIC scores would be directly correlated with mean ICU duration of stay and mortality for patients with hospitalised CKD.

Keywords: Malnutrition, Morbidity, Mortality, Chronic kidney disease, m-NUTRIC score, nutritional status, Haemodialysis,

Introduction:

Numerous apparatus are available to assess nutrition status among CKD subjects[1,2]. Most of these apparatus are having different criteria and commonly designed for high risk patients[3,4]. Due to these reasons, globally no apparatus has been declared as the best system available. The reasons for the lack of best system are their ways to use in numerous research.[5,6]

Malnutrition entails insufficiency arising of protein, vitamin, trace elements related to inadequate & unstable diet which may cause poor quality of life and sometimes even lead to death. Undernourishment is the leading reason having a greater impact on

outcomes following treatment, which lengthens patient stay and impacts mortality and morbidity. In hospitalised patients, the incidence of undernourishment is approximately twenty percent-forty two percent[6]. Therefore by evaluating CKD subject's nutritious status within forty eight hrs of hospitalisation, it becomes important to recognise the subjects who are having chances of suffering from undernourishment. Various rating schemes, standards and methods are used in the hospital setting to determine nutritional risk, including physical evaluation, food consumption, disease severity, functional assessment, and anthropometric data.

Currently limited very defined apparatus are available to diagnose hospitalisation, impact as well as side effects among the patients.[7] Heyland et al.[8] was the Ist one who validated m-NUTRIC score to assess undernourishment in Europe. The main function of this apparatus was to analyse undernourishment among CKD subjects. The advantage of this tool is its ease to understand along with its simplicity for the analysis in undernourished subjects. Recently this system has been modified i.e. modified mNUTRIC score in which Interleukin-6 (IL-6) factor was not included.[9]

Among the comprehensive treatment of Chronic kidney disease subjects, dietary remedy should n't be neglected. Before the initiation of treatment in CKD subjects, dietary factors must be assessed. Incidence of undernourishment among CKD ranges among the studies due to different use of diagnostic tools i.e. incidence ranges from twenty to sixty percent. This undernourishment leads to increase in treatment cost along with the prolonged hospitalisation.[10-11] Protein deficiency and lack of sufficient energy and chances of undernourishment are generally reported among CKD subjects.[12]

An observational research was performed in 2018 by Hafiz Muhammad Ata ur-Rehmanet al.[13] to classify nutritional risk using modified mNUTRIC score in mechanically ventilated subjects. The investigators concluded that 45 percent of mechanically ventilated subjects in ICU are at risk of undernourishment and their mNUTRIC scores are directly proportional to prolonged hospitalisation & death.

Martin Muller et al.[14] in 2019 evaluated Nutrition Risk Screening Score 2002 (NRS) analysis among CKD admitted subjects. According to NRS>3, the authors concluded that malnutrition in among CKD subjects is noteworthy more and therefore directly proportional to prolonged hospitalisation & death.

In their analysis, Kalaiselvan MS et al[15] found that there was dominance of males i.e. sixty seven percent. Average age among the study subjects was fifty five years. There were about 288 (42.5 percent) high nutrient risk patients. Subjects having high mNUTRIC range of > five have a longer mean average ICU period of stay of nine vs seven point eight ($P < 0.01$) & greater death rate of forty one point four percent vs twenty six point one percent versus subjects having lower NUTRIC range. The strong mNUTRIC score (almost 5) expected mortality with a ROC of 0.582. The investigators concluded that approximately forty two point five subjects in ICU were having chances of undernourishment which subsequently cause higher ICU stay as well as death and these findings were directly proportional to higher mNUTRIC score.

However rare literature regarding the validity of mNUTRIC score is validated among Indian population. Sometimes lack of proper nutrition may lead to poor quality of life among CKD subjects due to which it is need of hour to diagnose nutritional problems among

CKD subjects. In our study, we will try to assess the role of by m-NUTRIC Score in CKD subjects.

CKD is a major public health concern in India, with its high prevalence, morbidity and mortality. Suboptimal results have arisen from significant percentages of subjects with poor socioeconomic status etc as well as poor management of health resources. In addition, among the various ongoing problems & rivalry for funding w.r.t. transmissible disorders, CKD has also been overlooked.[1] Consanguinity and genetic inbreeding raise the risk of kidney & genital organ's congenital defects as well as obstructive or reflux nephropathy. Glomerular and interstitial kidney diseases may arise from pollution, inadequate hygiene, contaminants, water pollution, overcrowding, and known and suspected nephrotoxins. The rising burden of hypertension and diabetes mellitus is included in these exposures. By 2030, diabetes subjects in our country will be the most as compared to other countries worldwide. About 50 percent of patients with progressive chronic kidney failure are only seen when the eGFR is <15 ml/min[3] leading to difficulties in access to treatment. Hence it is the utmost requirement to diagnose the subjects at risk for CKD.

Background/Rationale

This study has been designed with a view to illustrate modified NUTRIC score pattern in the population of patients to assess the nutritional status and to characterize nutritional behavior in CKD patients.

Objectives:

a. To assess nutrition among CKD subjects w.r.t stage by m-Nutric score.
b. To define outcome on the basis of m-NUTRIC score in terms of need of dialysis.
c. To compare m-Nutric score in patients on hemodialysis and patients not on hemodialysis.

Methods:

This research will be conducted in the Department of Medicine, at AVBRH, Sawangi (Meghe) Wardha . The study will be undertaken after approval from institute of ethical committee (applied for).

Study design: Cross sectional study

Selection of patients

Patients: We will prospectively enrol all consecutive patients > 18 years of age regardless of gender or ethnicity who was admitted in the medicine ward for Chronic kidney disease treatment at AVBRH, Sawangi. Written informed consent was obtained from all participants.

Inclusion criteria: All Chronic kidney disease patients with age more than 18 years, undergoing treatment in Medicine Department at AVBRH, Sawangi who have given written consent were recruited.

Exclusion criteria: Patients <18 years of age, chronic liver disease, CCF, Malignancy, tuberculosis, patients who will be difficult to cooperate with, and pregnant or breastfeeding patients will be not be considered for our research.

METHODS

Demographic data: Demographic data would be registered for both instances (age, sex, operation). Where available, height will be recorded with the help of stadiometer. The weight can be determined by weighing the weight of the bed. Height and weight can be used for assessing the index of body mass.

Assessment of biochemical parameters: These comprised of CBC, total serum protein, albumin, LFT, blood urea nitrogen (BUN), creatinine, and electrolyte measurements.[16] these parameters will be assessed according to their reference and will be compared.[17]

a) m-NUTRIC score: It will be calculated as per the criteria. APACHE II at admittance[18] and Sequential Organ Failure Assessment (SOFA) score will be assessed too .[19] NUTRIC points will be calculated without interleukin (IL)-6. Subjects having mNUTRIC scores more than equal to five will be graded in high risk category of undernourishment whereas scores less than equal to four will be categorised as low risk. Morbidity data, duration of stay of patients and mortality will be recorded (table 1).

mNUTRIC Score; Table - 1

Variable	Range	Score
Age	Less than fifty	0
	Fifty to Less than seventy five	1
	More than seventy five	2
APACHE II	Less than Fifteen	0
	Fifteen to Less than Twenty	1
	Twenty to Twenty Eight	2
	More than Twenty Eight	3
SOFA	Less than Six	0
	Six to Less than Ten	1
	More than Ten	2
Number of Co-morbidities	Zero to one	0
	More than Two	1
Days from hospital to ICU admission	Zero to Less than One	0
	More than One	1

Sample size and statistical analysis:

In testing terminology, a sample is a group of entities, objects or things for evaluation taken from a wider population. To ensure that we can generalise the results from the test study to the population as a whole the survey should be representative of the population.
Sample size formula with designed error of margin:
n = (Z alpha/2 square X P (1-P))/d square
Where, Z alpha/2 is the level of significance at 5% =1.96
P= Prevalence of CKD=10%
So minimum sample size required will be138patients.
In this study I plan to take a minimum sample size of 150 patients.
The data obtained will be analysed by IBM, SPSSS (IBM Corp., Statistics for Windows, version 24.0, Armonk, NY). Continuous variables would be expressed as a percentage of mean ± standard deviation (SD) and categorical variables. Unpaired sample t-tests will be used to find the statistical difference between the bivariate samples of independent categories, and Chi-square tests will be used to evaluate the meaning of categorical results. P less than equal 0.05 would be called statistically important in all of the mathematical instruments referred to above.

Results:

We expect from our results that malnutrition in CKD patients with m-NUTRIC scores ≥5, will be directly proportional to hospitalisation and death.

Discussion:
CKD is a major public health concern in India, with its high prevalence, morbidity and mortality. Most of the subjects with poor socioeconomic status, weak gross domestic product, and inadequate monetary health care budgets have achieved suboptimal outcomes. Furthermore, CKD has also been neglected in the light of ongoing challenges and competition for support for communicable diseases and increased child and maternal mortality. CKD patients are especially susceptible to malnutrition's deleterious effects, while malnutrition is frequently not known. Previous studies have found that a large percentage of hospitalised patients have been identified as malnourished[20,21]. Similarly, malnutrition was also extremely prevalent (40 percent) in a recent study of hospitalised CKD patients, impacting the duration of hospitalisation, while mortality was not explored[22].

It is important to remember that renal dietary limits often contradict standard nutritional guidelines, and even though complications can be prevented by restricting the consumption of salt, potassium, phosphates, and fluids, concerns emerge where such restrictions are not followed by guidance on alternate dietary options and methods to sustain sufficient nutrition. Very little data exists as to the benefits of dietary treatments in patients with CKD, while current multi-cantered research can offer sufficient evidence to support such treatment strategies. It is well known that there is a high risk of malnutrition in ICU patients. Malnutrition is linked with adverse effects and multiple interventional trials have been undertaken to identify effective nutrition interventions for these patients[23].

Heyland et al[8] started by recognising the need for a more precise nutritional risk assessment method for ICU patients, and found that it was inadequate to ask about weight loss and nutritional situation, especially because of the heterogeneous nature of the intensive care community, and because the m-NUTRIC score is simple to use, they said it was an effective screening tool for this patient. They also found that patients have poorer

health results with a higher score. Increased knowledge of diet risk assessment devices, such as the NUTRIC score, was considered, and risk factors, such as BMI and length of ICU stay, could increase the supply of calories and protein to those patients who most need them. Coltman et al[24] found that conventional screening and evaluation methods did not uniformly classify patients in the ICU as malnourished or at risk of nutrition and could therefore be inadequate for use in patients with ICUs. Inclusion of physical examination, functional status, and disease severity can be helpful in the ICU's prediction of nutrition risk. Studies on nutrition were reviewed [25-28]. Different studies on chronic kidney diseases and patient acre were reported [29-38].

Several reports have indicated that understanding of nutritional status & undernourishment care is frequently lacking and that the problem lies in th,e introduction of effective screening methods to provide accurate nutritional assessment and help.

Conclusion:

To conclude, the mNUTRIC scores would be directly correlated with mean ICU duration of stay and mortality for patients with hospitalised CKD. Since CKD patients constitute a high-risk demographic for adverse effects associated with malnutrition, regular assessment of hospital admission nutritional status should become a systematic procedure.

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