Content available at: https://www.ipinnovative.com/open-access-journals

International Journal of Recent Innovations in Medicine and Clinical Research

Journal homepage: https://www.ijrimcr.com/

Original Research Article

Surveillance of geriatric patients undergoing maintenance hemodialysis

Sowmiya S[1]*, Sathyasagar A[2], C Ananda Vayaravel[1]

[1]*Dept. of Renal Dialysis Technology, Sri Venkateshwaraa College of Paramedical Sciences, Ariyur, Puducherry, India*
[2]*Aarupadai Veedu Medical College & Hospital, Puducherry, India*

ARTICLE INFO

Article history:
Received 20-08-2024
Accepted 18-10-2024
Available online 11-11-2024

Keywords:
Geriatric nutritional risk index
Frequency of dialysis
Adequacy
Elderly hemodialysis patient

ABSTRACT

Background: The Geriatric Nutritional Risk Index (GNRI) is a promising tool for predicting nutrition-related issues in sub-acute care settings. The primary goal of this study was to verify the application of GNRI in elderly hospitalized patients by evaluating its predictive power of patient outcome using a comparison with the nutritional assessment and frequency of dialysis.
Aim and Objective: To study the surveillance in geriatric patients on maintenance of hemodialysis and to collect the demographic and blood sample from the patient, evaluate the blood sample using various technique. To assess the relationship between GNRI, dialysis frequency and adequacy.
Materials and Methods: It is a multi-speciality hospital -based cohort study. We enrolled patients, aged between 60-85 years undergoing maintenance hemodialysis patients were followed thrice a week .Nutritional risk index was assessed by the Geriatric Nutritional Risk Index (GNRI) adequacy of dialysis was calculated using Daugirdas dialyzer clearance of urea (Kt/V) method.
Results: The study population comprised 54 geriatric dialysis patients ranging from 60-85 years of age.57% of the chosen patient population had both diabetes mellitus and hypertension as co-morbid conditions. In contrast, 17% of the patients had only hypertension. 9% had only diabetes mellitus Rest of the patients presented with diabetes mellitus, hypertension, polycystic kidney disease and diabetic kidney disease as co-morbidities. Among these patients, 40% underwent twice-weekly dialysis and the remaining 60% underwent thrice-weekly dialysis.12% of these 54 patients were categorized as high risk on the GNRI, 9% as moderate risk and 22% of the patients were low risk. 57% of the patients were devoid of any risk on the GNRI. 43% of the study population fell in the normal BMI range between 18.5-24.9, whereas 33% were found to be overweight with their BMI ranging between 25-29.9, While 13% of the subjects were classified as being underweight with a BMI below 18.5,11% the patients were found to be obese (category4).
Conclusion: The observations from the current study indicate that more frequent and adequate dialysis likely enhances the standard of living and lowers the GNRI risk in elderly dialysis patients.

1. Introduction

Worldwide, the total number of patients beginning dialysis who are above 65-75 is still rising. According to a recent ERA-EDTA registry report, the growth of dialysis is primarily due to a higher incidence of renal replacement therapy in patients over 75 years of age.[1,2] Dialysis could be a greater burden for elderly patients compared to the younger population. Its impact on life expectancy, practical state and quality of life may be different in the former group. The early mortality rate among all dialysis patients is the highest within 3 months of initiating dialysis, especially with elderly patients who already have a higher early mortality rate than others.[3] Geriatric syndromes

* *Corresponding author*.
E-mail address: sowmisaran510@gmail.com (Sowmiya S).

https://doi.org/10.18231/j.ijrimcr.2024.064

such as aging, frailty, functional impairment and cognitive impairment play a crucial role in the prognosis of elderly hemodialysis patients.[4–6] Therefore, it might be logical to conclude that a greater frequency of adequate dialysis could likely lower the mortality rate of geriatric patients.

2. Materials and Methods

2.1. Sampling method

Probability sampling method is used in this study, the sample size included are 54 geriatric hemodialysis patients.

2.2. Selection of sample

Patient with those receiving maintenance on hemodialysis.

2.3. Inclusion criteria

In this study both male and female patient on hemodialysis are included.

2.4. Exclusion criteria

In this study patient on Peritoneal dialysis, Pediatric dialysis are excluded from the study.

2.5. Assessment technique

The entire procedure was explained to the subjects before assessment.

2.6. Data collection

Demographic data of the subjects, specifically age, sex, diagnosis, frequency and duration of dialysis, were collected from their respective medical record. Anthropometric measurements (height, weight, etc) of the subjects were recorded using appropriate instruments and techniques.

2.7. Blood parameters

Blood samples were collected, processed and assayed and the results were tabulated. all procedures were carried out according to the manufacturers' instructions:

1. Hemoglobin (Oxyhemoglobin method)
2. Albumin (Bromocresol green method)
3. Urea (Urease, UV method)
4. Creatinine(Chromatography method)
5. Cholesterol (Cholesterol oxidase, Esterase, peroxidase method)
6. Total protein (Biuret method)
7. Sodium & potassium (ISE Indirect)
8. Calcium (Arsenazo III)
9. Kt/V (Dialyzer clearance of urea)

Kt/V was calculated using the following formula

Kt/V = - ln (R-0.008 x t) + (4-3.5 x R) x UF/W

ln - natural logarithm
R – post dialysis Serum urea nitrogen
t – session time length (in hours)
UF – volume of fluid removal during dialysis(l)
V – the volume of post- dialysis urea distribution(l)

2.8. Geriatric nutritional risk index determination process

1. Demographic factors (gender and age)
2. Anthropometric characteristics such as height, weight and body mass index (BMI),
3. Complete medical history including previous alcohol and tobacco use and other co-morbidities was obtained. Test results (e.g., albumin, creatinine) were collected from individual medical records upon admission according to pre-specified definitions.
4. Body mass index was computed as body weight divided by height squared (kg/m2).
5. The estimated glomerular filtration rate (eGFR) was calculated by the chronic kidney disease epidemiology collaboration formula and a physical examination was performed to determine the Wagner grade of the foot lesion.
6. Follow-up data were obtained from medical records or through telephone interviews.
7. GNRI was estimated using the following information: serum albumin level, ideal body weight, present body weight in kg and individually measured height in cm.

GNRI = [1489 × albumin (g/L)] + [41.7 × (weight/WLo)]

1. Where WLo indicates ideal weight
2. Wlo is calculated using the following formula, where H indicates height,

Men: WLo = H - 100 - [(H - 150)/4]
Women: H - 100 - [(H - 150)/2.5]

2.9. Statistical analysis

Mean, Basic anthropometric, frequency distribution and percentages were utilized to interpret the subjects' body composition, demographic and anthropometric data.

Correlation Analysis: Statistical significance was evaluated by employing the Pearson correlation coefficient and the chi-square test.

3. Results

3.1. Demographic information and biochemical parameters

Age: The study population comprised of 54 geriatric dialysis patients in the 60-85 age group. The age-wise distribution is shown in (Figure 1).

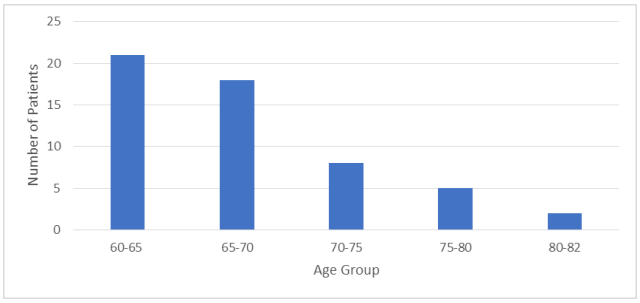

Figure 1: Age

Height: The patients' height (in cm) ranged between 110 – 185cm. (Figure 2)

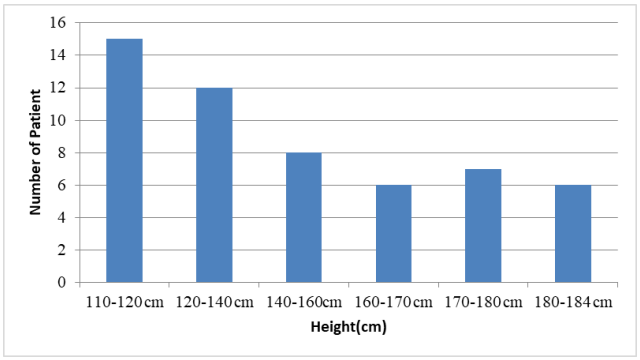

Figure 2: Height

Biochemical parameters: Several clinical/biochemical parameters were assessed and the results are shown in (Table 1). The ean ± SD and the minimum/maximum levels observed for each assay in the study population are tabulated.

Table 1: Biochemical parameters

Parameters	Mean ± Standard deviation	Maximum (mg/dl)	Minimum (mg/dl)
Urea	89 ± 28	183	42
Hemoglobin	10 ± 1.6	14.40	6.60
Creatinine	7 ± 2.7	9.6	3.10
Sodium	133±4.15	140	121
Potassium	5 ± 0.74	6.90	3.50
Calcium	8± 0.68	10.70	7.20
Phosphorous	4 ± 1.37	7.40	1.80
Albumin	3 ± 0.42	2.60	2.60

3.2. Comorbid causes of end-stage kidney disease

Figure 3 chart shows the distribution of co-morbidities amongst the study population. A majority (57%) of the patients had both diabetes mellitus (DM) and hypertension (HT) as co-morbid conditions while 17% had only HT and 9% only DM. Multiple combinations of the co-morbidities were also present in a small but significant percentage of the patient population.

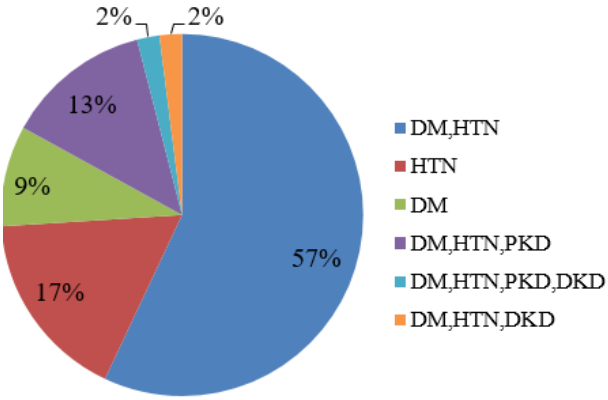

Figure 3: Comorbid causes

3.3. Vascular access for haemodialysis

Of the 54 patients included in this investigation, 24% of patients presented with temporary vascular access in the form of either an internal jugular vein catheter, subclavian catheter or femoral catheter while 76% of the patients had permanent vascular access called Arteriovenous fistula as depicted in (Figure 4).

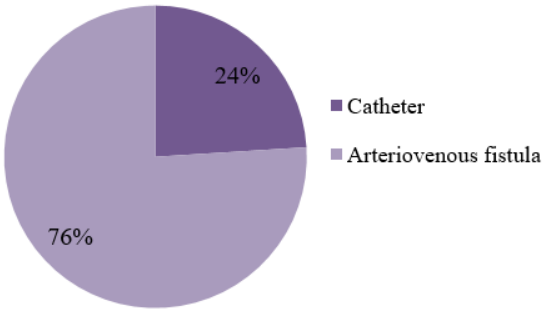

Figure 4: Vascular access

3.4. Frequency of dialysis

Figure 5 shows the dialysis frequency among the patients investigated. 40% of the patients underwent twice-weekly dialysis whereas 60% had access to thrice-weekly dialysis procedures.

3.5. Geriatric nutritional risk index

Among the 54 patients studied, 12% of patients were identified as high risk on the GNRI, 9% as moderate risk

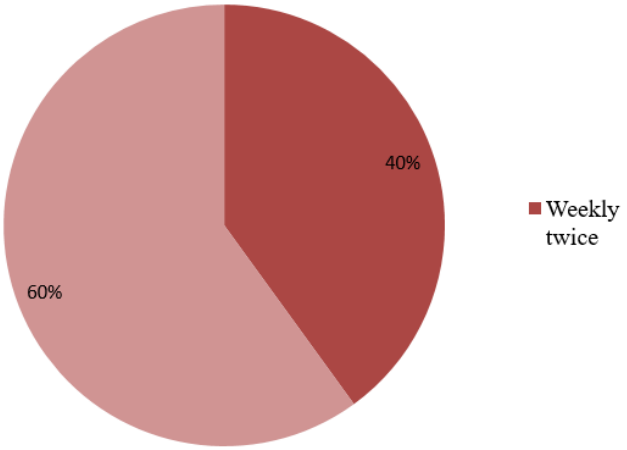

Figure 5: Dialysis frequency

while 22% were low risk on the GNRI. The remaining 57% of patients were deemed to be without any risk (Figure 6).

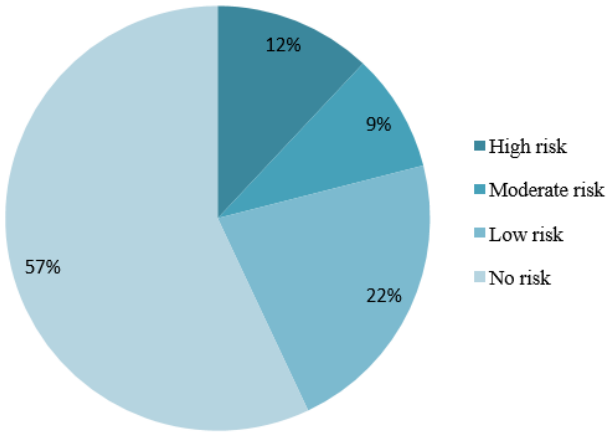

Figure 6: Geriatric nutritional risk index

3.6. *Body mass index*

43% of the total study population was calculated to be within the normal BMI range 18.5-24.9). 33% fell in the overweight range (25-29.9) and 11% were characterized as being obese (>30)13% of the study population was found to be underweight (<18.5). The data is shown in (Figure 7).

3.7. *Classification of the respondents based on levels of risk and frequency*

The participants in the study were classified based on levels of risk and frequency of dialysis. Accordingly, as shown in (Table 2), 6 of them were placed in a high-risk group, 12 of them in a low-risk group whereas 31 patients were identified as without any risk.

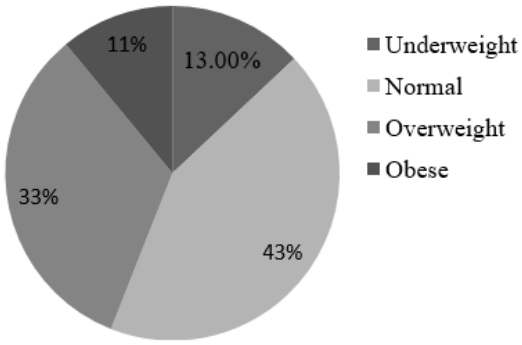

Figure 7: BMI

Table 2: Participants in the study were classified based on levels of risk and frequency of dialysis

Levels	Frequency		Total
	Weekly twice	Weekly thrice	
High risk	4	2	6
Moderate risk	3	2	5
Low risk	4	8	12
No risk	11	20	31
Total	22	32	54

3.8. *Pearson correlation*

Pearson correlation was used and the data revealed that a significant correlation exists between BMI and GNRI with a p-value of 0.001 and an 'r' value of 0.469 indicating moderate correlation.

4. Discussion

The present study focuses on geriatric surveillance of patients undergoing maintenance hemodialysis. Geriatric patients have more risk of mortality and morbidity compared with normal patients because of age, nutritional deficiency, cardiovascular problems, depression, etc., which correlates with Steven R.Gambert et al.[2] This study included 54 geriatric patients undergoing maintenance hemodialysis. The demographic patient data were gathered. Anthropometric assessment among the subjects was measured using appropriate instruments and recorded. Kt/V dialyzer clearance of urea is calculated by using Kt/V formula Daugirdas et al., 2015[7] the evaluation of the suitability of intermittent hemodialysis is conventionally based upon urea kinetic methods for calculation of single pool Kt/V with 1.2 accepted as minimum adequate clearance for weekly thrice hemodialysis.

This study showed that low body weight and hypo-albuminemia could reflect malnutritional and that lower BMI could also be an important index of protein-energy wasting. BMI was related to mortality in patient on hemodialysis.[8] Kobayashi et al., 2015 also proved that there was substantial correlation between the GNRI and mortality in patient on hemodialysis.[9] Berger et al., 2016 article discussed with particular emphasis on the outcome of frailty and functional status, choice of dialysis and frequency of dialysis will improve the standard of living in geriatric patients which was correlated with this study.

An another study Tsai et al.,2016[10] stated that an important predictor of death for senior hemodialysis patients was the low geriatric nutritional risk index and may be adopted to improve assessment of the malnutrition-inflammation status which was completely correlated with our study.

In this investigation, GNRI demonstrated a stronger predictive value for diagnosing and categorizing nutritional status and nutritional-related problems in hospitalized older patients which correlated with Abd-El-Gawad et al.,2014 research.[11] In another study Anand S. M. Kurella Tamura et al.,2010 stated the application of HD to support the elderly has expanded along with improvements in life expectancy that corresponded to this inquiry. Elderly people receiving dialysis had a decreased survival rate[12] Goncalves. J.G et al.,2021 correlates with this investigation.

Panichi et al.,2014[13] stated that low GNRI is a powerful predictor of overall mortality in HD patients and is linked to malnutrition. Locatelli Francesco et al.,2005[14] mentioned The use of Daily HD has great promise for enhancing dialysis results and quality of life, while its effect on patient mortality has not yet been conclusively demonstrated which was distinctive with this study.[15]

Tuğcu M et al.,2018 revealed In the group of elderly hemodialysis patients, comorbidities and poor performance level of dialysis had reduced the survival time that slightly analog with this research.

The proportion of all patients in normal nutritional status was 57.4% and the rate of malnutrition and / or severe risk of nutrition was 11%. From the above crosstabs between BMI, GNRI and Dialysis frequency concluded that the frequency of dialysis and GNRI were significantly correlated.

The patients undergoing weekly thrice dialysis have better adequacy and lower risk of GNRI, compared to twice-weekly dialysis.

5. Conclusion

In our study, based on the geriatric nutrition risk index, the geriatric patients with critical risk of nutrition were 11% and average risk of nutrition was 9.3% and 22.2% of patients with mild risk of nutrition. Patients who received thrice weekly dialysis have higher adequacy and a lower risk of GNRI than twice-weekly dialysis.

Hence, a higher frequency of dialysis improves the quality of life and lowers the GNRI risk in dialysis patients.

6. Source of Funding

None.

7. Conflict of Ineterest

None.

References

1. Marilyn L, Tomlinson G, Naglie G, Cook WL, Jassal SV. Geriatric comorbidities, such as falls, confer an independent mortality risk to elderly dialysis patients. *Nephrol Dial Transplant*. 2008;23(4):1396–400.
2. Gambert SR. Comprehensive Geriatric Assessment: A Multidimensional Process Designed to Assess an Elderly Person's Functional Ability, Physical Health, Cognitive and Mental Health, and Socio-Environmental Situation. *Am Soc Nephrol*. 2009;p. 1–3.
3. Kramer A, Stel V, Zoccali C, Heaf J, Ansell D, Grönhagen-Riska C, et al. An update on renal replacement therapy in Europe: ERA-EDTA Registry data from. *Nephrol Dial Transplant*. 2009;24(12):3557–66.
4. Zhao X, Wang M, Zuo L. Early mortality risk in incident Chinese hemodialysis patients: a retrospective cohort study. *Ren Fail*. 2017;39(1):526–32.
5. Canaud B, Tong L, Tentori F, Akiba T, Karaboyas A, Gillespie B, et al. Clinical practices and outcomes in elderly hemodialysis patients: results from the Dialysis Outcomes and Practice Patterns Study(DOPPS). *Clin J Am Soc Nephrol*. 2011;6(7):1651–62.
6. Jassal SV, Watson D. Dialysis in late life: benefit or burden. *Clin J Am Soc Nephrol*. 2009;4(12):2008–12.
7. Daugirdas JT. Physiologic principles and Urea Kinetic Modeling. In: Blake PG, Ing TS, et al., editors. Handbook of dialysis. United States: Lippincott Williams & Wilkins; 2015. p. 25–58.
8. Ikue K, ishimura E, Kato Y, okuno S, Yamamoto T, Yamakawa T, et al. Geriatric Nutritional Risk Index, a simplified nutritional screening index, is a significant predictor of mortality in chronic dialysis patients. *Nephrol Dial Transplant*. 2010;25(10):3361–5.
9. Joseph RB, Jaikaransingh V, Hedayati SS. End-Stage kidney disease in the elderly: approach to dialysis initiation, choosing modality, and predicting outcomes. *Adv Chronic Kidney Dis*. 2016;23(1):36–43.
10. Tsai M, Liu HC, Huang TP. The impact of malnutritional status on survival in elderly hemodialysis patients. *J Chin Med Assoc*. 2016;79(6):309–13.
11. Abd-El-Gawad WM, Abou-Hashem RM, Maraghy ME, Amin G. The validity of Geriatric Nutrition Risk Index: simple tool for prediction of nutritional-related complication of hospitalized elderly patients. Comparison with Mini Nutritional Assessment. *Clin Nutr*. 2014;33(6):1108–16.
12. Gonçalves JG, Lugon JR, Nascimento MM, Sesso RC. Demographics and clinical features of elderly patients undergoing regular dialysis in Brazil. *Braz J Med Biol Res*. 2021;54(4):e9806.
13. Panichi V, Cupisti A, Rosati A, Giorgio AD, Scatena A, Menconi O, et al. Geriatric nutritional risk index is a strong predictor of mortality in hemodialysis patients: data from the Riscavid cohort. *J Nephrol*. 2014;27(2):193–201.
14. Francesco L, Buoncristiani U, Canaud B, Köhler H, Petitclerc T, Zucchelli P. Dialysis dose and frequency. *Nephrol Dial Transplant*. 2005;20(2):285–96.
15. Tuğcu M, Kasapoğlu U, Şahin G, Apaydın S. The factors affecting survival in geriatric hemodialysis patients. *Int J Nephrol*. 2018;2018:5769762.

Author's biography

Sowmiya S, Assistant Professor

Sathyasagar A, Assistant Professor

C Ananda Vayaravel, Professor & Principal https://orcid.org/0000-0002-2103-8417

Cite this article: Sowmiya S, Sathyasagar A, Vayaravel CA. Surveillance of geriatric patients undergoing maintenance hemodialysis. *Int J Recent Innov Med Clin Res* 2024;6(4):128-133.