NUTRITIONAL PARAMETER TRAJECTORIES BEFORE AND AFTER ORAL NUTRITIONAL SUPPLEMENT PRESCRIPTION AMONG PATIENTS WITH NON-DIALYSIS CHRONIC KIDNEY DISEASE

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Introduction

- Undernutrition and protein-energy wasting are complications of advanced chronic kidney disease (CKD) that are associated with increased risk of frailty, cardiovascular disease, infectious complications, and mortality.[1]
- In the province of British Columbia, Canada, a Nutritional Supplement Policy is stewarded by renal dietitians and guides prescription of oral nutritional supplements (ONS) for CKD patients of all eGFR levels who meet any of the following indications[2]:
  - Unintentional weight loss >10% in past 6 months
  - Current weight of <90% of desirable body weight
  - Inadequate nutrient intake (<80% of recommended intake)
  - Hypercatabolic state
- Previous studies have focused on ONS treatment among dialysis patients. However, the association between ONS prescription and nutritional parameters in non-dialysis CKD (CKD-ND) patients with malnutrition has not been previously assessed.

Objective

- To characterize nutritional status parameter slopes before and after ONS prescription among non-dialysis CKD patients qualifying for ONS.

Methods

- We conducted a cohort study of adult non-dialysis CKD patients who were followed at multidisciplinary CKD clinics in British Columbia during January 2010-December 2019 and who received at least one ONS prescription.
- Using a before-after study design, linear mixed effects models with segmented regression were used to determine the slopes of body mass index (BMI), serum albumin, serum bicarbonate, serum phosphate, and neutrophil-to-lymphocyte ratio (NLR, a marker of inflammation) in the 2 years prior to ("pre-ONS") and 2 years after ("post-ONS") the first ONS prescription. Each model was adjusted for sex, age, eGFR, urine albumin-creatinine ratio, hypertension, cardiovascular disease, diabetes, health region, and calendar year of first ONS prescription.

Results

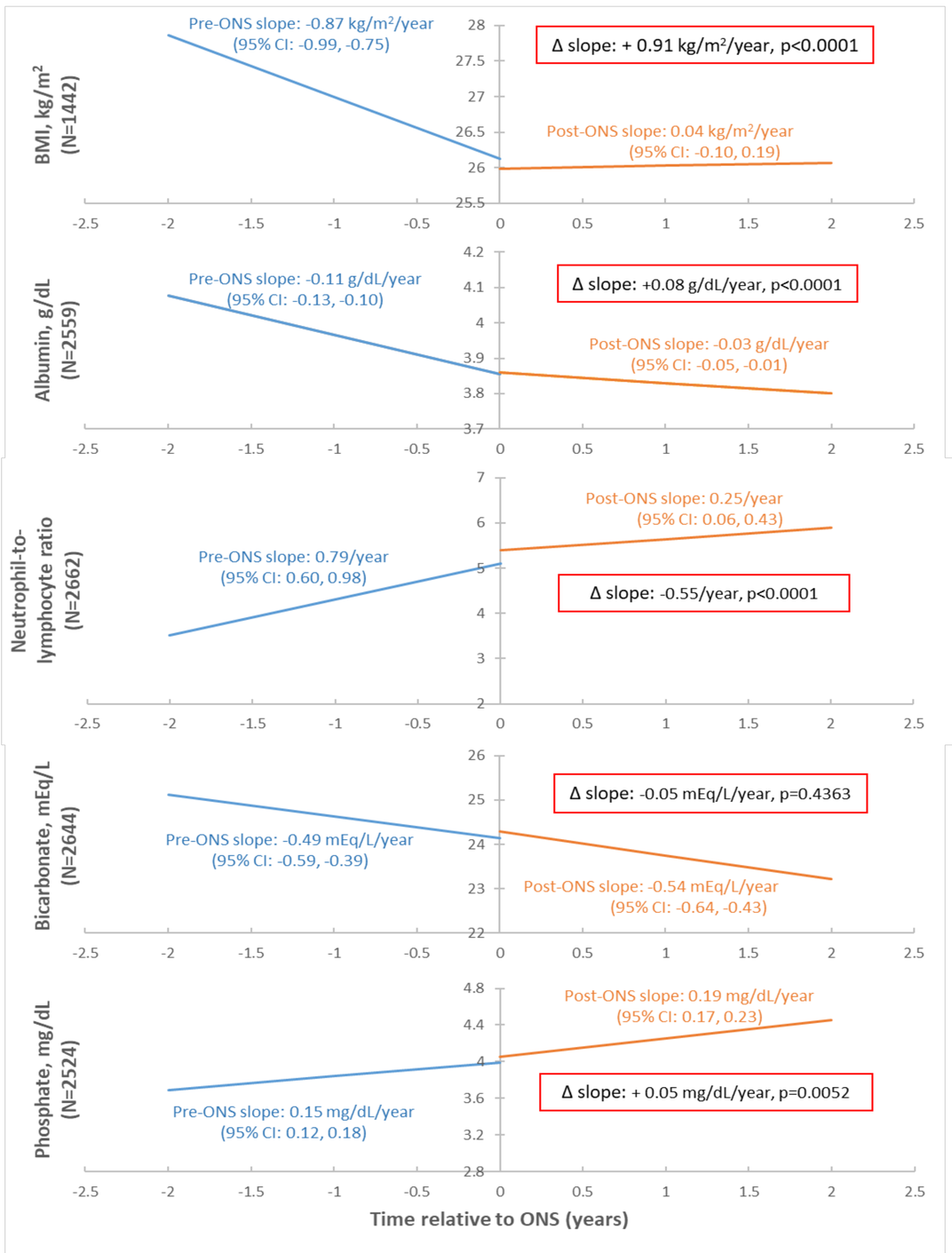

Figure. Nutritional parameter slopes for body mass index serum albumin, neutrophil-to-lymphocyte ratio, serum bicarbonate, and serum phosphate, before and after first ONS prescription among non-dialysis CKD patients.

Graphs are shown for a reference patient: age 60; male sex; no history of cardiovascular disease, diabetes or hypertension; urine ACR 3mg/mmol ; eGFR 60ml/min/1.73m^2; Interior Health Authority; 1st ONS prescription in 2015.

Results

- This analysis included longitudinal data from 3957 patients with a median age of 76.5 years (IQR 66.5, 83.6), 46.5% women, and median eGFR of 23 ml/min/1.73 m2 (IQR 16, 31) at baseline (Table). Median time from clinic entry to first ONS prescription was 8.6 months (IQR: 2.0, 24.4).
- In the "pre-ONS" period, patients demonstrated declines in BMI (-0.87 kg/m^2/year, 95% CI -0.99 to -0.75), serum albumin (-1.11 g/L/year, 95% CI, -1.27 to -0.95), and serum bicarbonate (-0.49 mmol/L/year; 95% CI: -0.59 to -0.39), an increase in NLR (0.79/year; 95% CI: 0.60 to 0.98), and a slight change in serum phosphate (0.05 mmol/L/year; 95% CI 0.04 to 0.06) (Figure).
- Following the 1st ONS prescription, there were statistically significant increases in BMI slope (+0.91 kg/m^2/year, p<0.0001) and albumin slope (+0.82 g/L/year, p<0.0001), as well as a decline in NLR slope of -0.55/year (p<0.0001) (Figure). The change in serum phosphate slope was of small magnitude (+0.02 mmol/L/year, p=0.005), while there was no statistically significant change in bicarbonate slope (Figure).

Table. Baseline characteristics* of non-dialysis CKD patients prescribed ONS.

Age (years)	76.5 (66.5, 83.6)
Female (%)	1838 (46.5%)
Comorbidities (%)	
Diabetes	2074 (52.4%)
Hypertension	3141 (79.4%)
eGFR (ml/min/1.73 m^2)	23 (16, 31)
Urine ACR (mg/mmol)	28.4 (5.1, 141.8)
Body Mass Index (kg/m^2)	24.6 (21.8, 28.3)
Serum albumin (g/L)	39 (35, 42)
Serum total cholesterol (mmol/L)	4.0 (3.2, 4.9)
Serum phosphate (mmol/L)	1.3 (1.1, 1.5)
Serum bicarbonate (mmol/L)	24 (22, 27)
Serum ferritin (µg/L)	157 (77, 325)
Iron saturation (%)	23 (17, 31)
Hemoglobin (g/L)	108 (97, 120)
Parathyroid hormone (pmol/L)	12.2 (7.3, 19.9)
Neutrophil-to-lymphocyte ratio	3.3 (2.3, 5.2)

* Median (IQR) or number (percentage) shown

Conclusions

Among CKD-ND patients prescribed ONS, there were improvements in longitudinal trajectories of nutrition and inflammation parameters following the 1st ONS prescription. Future analyses comparing responses to ONS among different phenotypes of patients with malnutrition, as determined by cluster analysis, may assist with assessing variation in response to ONS and identifying which patients may benefit most from ONS intervention.

Acknowledgements

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References

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