Correlates and predictors of sarcopenia among men with metastatic castrate-resistant prostate cancer

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ABSTRACT

INTRODUCTION: Sarcopenia is a predictor of clinical outcomes in men with metastatic castrate-resistant prostate cancer (mCRPC); however, correlates and predictors of sarcopenia are poorly understood in this population. The aim of this study was to examine correlates and predictors of sarcopenia in men with mCRPC prior to treatment.

METHODS: A secondary analysis of an observational study was performed. Participants were receiving care for mCRPC at the Princess Margaret Cancer Centre. Sarcopenia was assessed prior to treatment and was defined as the combination of low grip strength (<35.5 kg), low gait speed (<0.8 m/s), and computed tomography-derived low muscle mass or density. Participants' sociodemographic and clinical characteristics, comorbidity information, and clinically relevant blood markers were collected prior to treatment and were used to identify correlates and predictors of sarcopenia through Spearman correlations and multivariable logistic regression, respectively.

RESULTS: In total, 110 men had complete data on sarcopenia measures and were included in the analysis. Sarcopenia was identified in 30 (27.3%) participants. Pre-treatment sarcopenia was moderately correlated with dependence in one or more instrumental activities of daily living (IADLs) (r=0.412), Vulnerable Elders Survey-13 (r=0.404), and a lower hemoglobin (r=0.407 per 10 g/L decrease). In adjusted logistic regression, dependence in one or more IADLs (odds ratio [OR] 4.37, 95% confidence interval [CI] 1.37–13.86, p=0.012), and a 10 g/L decrease in hemoglobin (OR 1.70, 95% CI 1.13–2.57, p=0.012) were significantly associated with sarcopenia.

CONCLUSIONS: In settings where assessment of sarcopenia is not feasible, evaluation of IADLs and hemoglobin may be used to identify high-risk patients that can benefit from supportive care strategies aiming to improve muscle mass and function.

INTRODUCTION

Sarcopenia is gaining increasing research attention in oncology,[1] as it appears to negatively impact clinical outcomes[2,3] and patient quality of life.[4] Loss of muscle mass and function, which are the fundamental components of sarcopenia, are common consequences of cancer and its treatments,[5] particularly in patients with advanced disease.

Several groups have examined the impact of sarcopenia on clinically relevant outcomes in men with advanced prostate cancer (PCa).[6-8] Most patients with advanced disease receive androgen deprivation therapy (ADT) or androgen receptor-axis target therapy (ARAT). These treatments have been shown to accelerate loss of muscle mass and function alone[9] or in combination.[10] A meta-analysis of 1656 participants with advanced PCa found that sarcopenia was associated with shorter overall survival and progression-free survival.[11] These findings underscore the need to extend the focus of sarcopenia from the research setting to the day-to-day clinical oncology practice.

The initial step toward the assessment and management of sarcopenia in daily clinical practice was made in 2016 with the recognition of sarcopenia as an independent condition with an International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) code.[12] Nonetheless, several barriers currently impede the systematic assessment and management of sarcopenia following a cancer diagnosis, some of which include time constraints, additional costs, and lack of both

KEY MESSAGES

- A lower hemoglobin level per 10g/L was associated with a 70% higher risk of sarcopenia.
- Low hemoglobin may worsen fatigue during treatment for mCRPC, leading to physical inactivity and adverse effects on muscle mass and function.
- Dependence in one or more IADLs was associated with sarcopenia.
- Evaluation of hemoglobin and IADLs may be used for risk stratification in settings where sarcopenia assessment is not feasible.

equipment and clinical expertise. Despite these barriers, efforts must be made to detect patients with sarcopenia or those at risk in clinical practice to improve patient care and, potentially, disease outcomes.

Correlates and predictors of sarcopenia are poorly understood in men with metastatic castrate-resistant prostate cancer (mCRPC) but their availability could help clinicians recognize high-risk patients for sarcopenia and adverse events that can benefit from targeted supportive care strategies aiming to delay, mitigate, or even reverse the loss of muscle mass and function. Therefore, the objective of this study was to identify correlates and predictors of sarcopenia among men with mCRPC.

METHODS

Study setting and participants

The data for this secondary analysis were retrieved from a prospective, multicenter, observational study that aimed to assess the prevalence and predictors of treatment toxicity in men with mCRPC.[13] The main study was conducted in three tertiary cancer centers (Princess Margaret Cancer Centre, Odette Cancer Centre, and Kingston Regional Cancer Centre) in Ontario, Canada from July 2015 to April 2019. This secondary analysis included data from July 2015 to May 2021.[14]

Participants were included if they were ≥65 years old, had radiologically confirmed metastatic PCa with castrate testosterone levels, and were starting chemotherapy or (ARAT). A detailed description of the inclusion and exclusion criteria can be found elsewhere.[13]

All participants underwent a baseline assessment prior to initiating chemotherapy or ARAT. During the baseline assessment, sociodemographic and clinical characteristics, including comorbidities, were collected, and participants' grip strength and gait speed were measured. Following this, participants were followed per standard of care to evaluate the frequency and severity of potential toxicities.

Study procedures

Participants' information at baseline and prior to treatment were examined in relation to sarcopenia status defined by pre-treatment computed tomography (CT), grip strength, and gait speed. Only participants from the Princess Margaret Cancer Centre were included, as access to CT scans of participants at other study sites was not feasible. Participants provided written informed consent in the original study, whereas the requirement for an additional consent for this secondary analysis was waived. All study procedures were approved by the Ontario Cancer Research Ethics Board (ID: 1162) and the Research Ethics Board at the University Health Network (ID: 15-9075.5). All data were accessed and analyzed from June 2021 to March 2023 following institutional approval.

Evaluation of sarcopenia

A detailed description of the methods used to assess sarcopenia are published elsewhere.[14] In brief, the following criteria identified participants with sarcopenia prior to treatment: 1) low muscle strength defined by a grip strength score of <35.5kg;[15] 2) slowness defined by a walking speed of <0.8m/s;[15] and 3) low muscle quantity or quality, per Martin et al,[16] at the level of the third lumbar vertebra.[17] Grip strength and the 4 m walk were assessed by the research coordinator at baseline using standard procedures. Muscle quantity and quality were assessed through an abdominal CT scan for each participant prior to treatment (median interval between CT scan and start of therapy 46.2 days) using five contiguous slices (0.82 x 0.82 x 2.5 mm voxel size). Specifically, all slices were first processed through a fully automated algorithm (iterative threshold-seeking algorithm),[18] and any algorithm-derived inaccuracies were reviewed and edited manually through the Slice-O-Matic (TomoVision, Montreal, QC, Canada) medical imaging software by two trained members of the research team (EP and LZ).

The Hounsfield unit range for manual correction of muscle was set at -29 to +150.[17] The average of the five slices per participants was used to provide a single value of muscle cross-sectional area (cm^2) at the L3 level, which was normalized by patients' stature in

Table 1. Characteristics of study participants at baseline

Characteristic	Sarcopenia[a] n=30	No sarcopenia n=80	p	All participants n=110	Missing n (%)
Age (years), mean (SD)	75.7 (7.6)	74.1 (6.8)	0.30	74.6 (7.1)	0 (0)
BMI (kg/m^2), mean (SD)	26.5 (4.9)	27.9 (4.6)	0.18	27.5 (4.7)	0 (0)
Race					0 (0)
Black	3 (10.0)	10 (12.5)	0.76	13 (11.8)	
South Asian	3 (10.0)	4 (5.0)		7 (6.4)	
Southeast Asian	3 (10.0)	5 (6.3)		8 (7.3)	
Unknown	0 (0)	1 (1.3)		1 (0.9)	
White	21 (70.0)	60 (75.0)		81 (73.6)	
Education, n (%)					0 (0)
Completed college/university or graduate degree	15 (50.0)	43 (53.8)	0.72	58 (52.7)	
Clinical characteristics					
Gleason score ≥8, n (%)	11 (45.8)	35 (50.0)	0.72	46 (48.9)	16 (14.5)
ADT duration (years), mean (SD)	6.4 (4.6)	6.1 (5.0)	0.73	6.2 (4.9)	0 (0)
Treatment type, n (%)			**0.002**		0 (0)
ARAT	10 (33.3)	53 (66.3)		63 (57.3)	
Chemotherapy	20 (66.7)	27 (33.8)		47 (42.7)	
Bone metastasis, n (%)	20 (66.7)	60 (75.0)	0.38	80 (72.7)	0 (0)
PSA most proximal to baseline, median (IQR), ng/mL	78.0 (76.0)	146.3 (806.9)	0.65	26.0 (8.9–76.1)	2 (1.8)
Comorbidities					
MoCA, mean (SD)	24.9 (3.5)	24.4 (3.7)	0.59	24.6 (3.6)	1 (0.9)
Dependence in one or more IADLs, n (%)	21 (70.0)	20 (25.3)	**<0.001**	41 (37.3)	1 (0.9)
VES-13 ≥3, n (%)	17 (56.7)	13 (16.3)	**<0.001**	30 (27.3)	0 (0)
Comorbidities					
Arthritis, n (%)	15 (50.0)	38 (47.5)	0.81	53 (48.2)	0 (0)
Congestive heart failure, n (%)	1 (1.3)	4 (13.3)	**0.007**	5 (4.5)	0 (0)
Diabetes, n (%)	8 (26.7)	14 (17.5)	0.28	22 (20.0)	0 (0)
Hyperlipidemia, n (%)	14 (46.7)	32 (40.0)	0.53	46 (41.8)	0 (0)
Hypertension, n (%)	21 (70.0)	39 (48.8)	**0.046**	60 (54.5)	0 (0)
Osteoporosis, n (%)	3 (10.0)	4 (5.0)	0.34	7 (6.4)	0 (0)

[a]Sarcopenia was defined as the presence of low muscle strength (grip strength <35.5 kg), low gait speed (walking speed <0.8 m/s), and low muscle quantity or quality. ADT: androgen deprivation therapy; ARAT: androgen receptor-axis targeted therapy; BMI: body mass index; HU: Hounsfield unit; IADLs: instrumental activities of daily living; IQR: interquartile range; MoCA: Montreal cognitive assessment; PSA: prostate-specific antigen; SD: standard deviation; VES-13: Vulnerable Elders Survey-13.

meters squared to obtain the skeletal muscle index (SMI) (cm^2/m^2) that represents muscle quantity/mass. Skeletal muscle density (SMD) was used to assess muscle quality based on fat infiltration within the skeletal muscle at the L3 level averaged across the five slices. Published cutoffs were used to identify participants with low muscle quantity and/or quality.[16]

Table 1 (cont'd). Characteristics of study participants at baseline

Characteristic	Sarcopenia[a] n=30	No sarcopenia n=80	p	All participants n=110	Missing n (%)
Blood markers					
Albumin (g/L), mean (SD) units	37.9 (3.6)	41.0 (3.1)	**<0.001**	40.1 (3.5)	15 (13.6)
Alkaline phosphatase (IU/L), median, (IQR)	194.9 (184.2)	130.0 (150.1)	0.10	96.0 (74.0 – 143.3)	12 (10.9)
Lactate dehydrogenase (IU/L), mean (SD)	308.14 (132.61)	240.5 (73.0)	**0.016**	260.9 (99.2)	17 (15.5)
Hemoglobin (g/L), mean (SD)	112.34 (17.0)	128.0 (12.9)	**<0.001**	123.5 (15.9)	10 (9.1)
Creatinine (IU/L), mean (SD)	111.1 (52.2)	94.9 (48.9)	0.14	99.7 (50.2)	10 (9.1)
Sarcopenia measures	111.1 (52.2)	94.9 (48.9)	0.14	99.7 (50.2)	10 (9.1)
Grip strength (kg), mean (SD)	25.6 (4.7)	34.1 (7.4)	**<0.001**	31.8 (7.8)	0 (0)
Gait speed (m/s), mean (SD)	0.6 (0.1)	1.0 (0.2)	**<0.001**	0.9 (0.2)	0 (0)
Grip strength <35.5 kg, n (%)	30 (100.0)	44 (55.0)	**<0.001**	74 (67.3)	0 (0)
Gait speed <0.8 m/s, n (%)	30 (100.0)	6 (7.5)	**<0.001**	36 (32.7)	
Days from CT scan to treatment initiation, mean (SD)	43.6 (37.8)	47.1 (42.6)	0.69	46.2 (41.2)	0 (0)
Skeletal muscle index, cm^2/m^2, mean (SD)	39.9 (6.5)	44.0 (7.3)	0.008	42.9 (7.4)	0 (0)
Muscle density (HU), mean (SD)	25.2 (9.3)	27.9 (9.9)	0.19	27.2 (9.8)	0 (0)
Low skeletal muscle index, n (%)	28 (93.3)	63 (78.8)	0.072	91 (82.7)	0 (0)
Low skeletal muscle density, n (%)	28 (93.3)	58 (72.5)	0.018	86 (78.2)	0 (0)

[a]Sarcopenia was defined as the presence of low muscle strength (grip strength <35.5 kg), low gait speed (walking speed <0.8 m/s), and low muscle quantity or quality. ADT: androgen deprivation therapy; ARAT: androgen receptor-axis targeted therapy; BMI: body mass index; HU: Hounsfield unit; IADLs: instrumental activities of daily living; IQR: interquartile range; MoCA: Montreal cognitive assessment; PSA: prostate-specific antigen; SD: standard deviation; VES-13: Vulnerable Elders Survey-13.

Statistical analysis

Characteristics of study participants at baseline were summarized using descriptive statistics. Independent sample t-tests and Chi-squared tests were used to compare continuous and categorical variables, respectively, between participants with and without sarcopenia. The strength and direction of the relationship between pre-treatment sarcopenia (as a dichotomous variable) and baseline characteristics were assessed through Spearman correlations. Univariate and multivariable logistic regression analyses were used to identify predictors of sarcopenia prior to treatment.

Given our relatively small sample, covariates in multivariable analysis included only clinically relevant variables that were significantly associated with sarcopenia in univariate analysis, as indicated by a $p<0.05$. Potential covariates in multivariate analysis included sociodemographic characteristics, such as age, race, and education;[19] ADT duration;[20] bone metastasis and prostate-specific antigen (PSA) most proximal to baseline; the Vulnerable Elders Survey-13 (VES-13);[21] dependence in one or more instrumental activities of daily living (IADLs);[22] clinically relevant blood markers, such as albumin,[23] alkaline phosphatase,[24] creatinine,[25] hemoglobin,[26] and lactate dehydrogenase; and comorbidities given their associations with sarcopenia and/or disease outcomes.

Collinearity across predictors was assessed using Spearman correlations and contingency tables. Variables that exhibited moderate-to-strong correlations with one another were excluded from the multivariable model. The natural log transformation was used for non-normally distributed covariates. The Hosmer-Lemeshow test and c-statistic assessed model calibration and discrimination, respectively.

RESULTS

Baseline characteristics

Baseline characteristics and differences between participants with (n=30) and without (n=80) sarcopenia are listed in Table 1. In short, the mean age of all par-

ticipants (n=110) was 74.6 years. No differences were found between groups in sociodemographic or disease characteristics at baseline; however, chemotherapy was more commonly prescribed to patients with sarcopenia (66.7%), whereas most patients without sarcopenia (66.3%) were initiating ARAT. In terms of comorbidities, more patients with sarcopenia had hypertension, congestive heart failure, dependence in one or more IADLs, and were frailer, as per the VES-13, compared with patients without sarcopenia. Additionally, patients with sarcopenia exhibited worse albumin, hemoglobin, and lactate dehydrogenase levels compared to non-sarcopenic participants.[14]

Correlates of sarcopenia

Spearman correlations revealed weak to moderate correlations between pre-treatment sarcopenia and participants' characteristics at baseline (Table 2). Specifically, sarcopenia was moderately correlated with VES-13 (r=0.404), dependence in one or more IADLs (r=0.412), and a decrease in hemoglobin per 10g/L (r=0.407). Weak correlations were observed between sarcopenia and PSA most proximal to treatment initiation (r=0.214), albumin (r=-0.372), lactate dehydrogenase per unit (r=0.267), congestive heart failure (r=0.258), and ADT duration (r=0.052).

Predictors of sarcopenia

Univariate analysis revealed the following predictors of sarcopenia: 1) dependence in one or more IADLs (odds ratio [OR] 6.88, 95% confidence interval [CI] 2.71–17.46, p<0.001); 2) VES-13 (OR 6.74, 95% CI 2.64–17.17, p<0.001); 3) log-transformed alkaline phosphatase (OR 2.00, 95% CI 1.04–3.85, p=0.037); 4) a 10 g/L decrease in hemoglobin (OR 2.00, 95% CI 1.43–2.80, p<0.001); 5) lactate dehydrogenase per unit (OR 1.01, 95% CI 1.00–1.01, p=0.007); and 6) congestive heart failure (OR 12.15, 95% CI 1.30–113.67, p=0.029) (Table 3). Surprisingly, ADT duration was not significantly associated with sarcopenia (OR 1.26, 95% CI 0.54–2.92, p=0.58).

Of these six significant predictors, two were not included in the multivariable analysis due to collinearity (VES-13 with dependence in one or more IADLs) and rarity (congestive heart failure [n=1]). The multivariable analysis demonstrated that dependence in one or more IADLs (OR 4.37, 95% CI 1.37–13.86, p=0.012) and a decrease in hemoglobin per 10g/L (OR 1.70, 95% CI 1.13–2.57, p=0.012) at baseline significantly predicted sarcopenia in this cohort of patients prior to chemotherapy or ARAT initiation (Table 3).

Table 2. Correlations between sarcopenia and baseline characteristics of participants

Variables	Correlation coefficient	Continuous and categorical variables
Age (per year)	0.084	Continuous
Race (White)	-0.037	Categorical
Education (completed college/university or higher degree)	-0.033	Categorical
Gleason score ≥8	-0.036	Categorical
ADT duration >4.6 years	0.052	Categorical
Bone metastasis	-0.083	Categorical
PSA most proximal to treatment (ng/mL)	0.214*	Continuous
VES-13 (≥3)	0.404**	Categorical
Dependence in one or more IADLs	0.412**	Categorical
Albumin (g/L)	-0.372**	Continuous
ALP[a]	0.185	Continuous
Creatinine[a]	0.135	Continuous
Hemoglobin decrease per 10 g/L	0.407**	Continuous
LDH (IU/L)	0.267**	Continuous
Arthritis	0.022	Categorical
Congestive heart failure	0.258**	Categorical
Hyperlipidemia	0.060	Categorical
Hypertension	0.190*	Categorical
Osteoporosis	0.091	Categorical
Type II diabetes	0.102	Categorical

[a]Log-transformed. *Correlation is significant at the 0.05 level. **Correlation is significant at the 0.01 level. ADT: androgen deprivation therapy; ALP: alkaline phosphatase; IADLs: instrumental activities of daily living; LDH: lactate dehydrogenase; PSA: prostate-specific antigen; VES-13: Vulnerable Elders Survey-13.

DISCUSSION

Despite several studies having assessed the impact of body composition on clinical outcomes in patients with advanced PCa,[6-8] correlates and predictors of sarcopenia are poorly understood in this population. The objective of this study was to identify correlates and predictors of sarcopenia in men with mCRPC prior to receiving chemotherapy or ARAT. At baseline, patients with sarcopenia exhibited less favorable levels of albumin, lactate dehydrogenase, and hemoglobin, and a higher prevalence of congestive heart failure and frailty characteristics (e.g., dependence in one or more IADLs and VES-13) compared to participants with no sarcopenia. In multivariable analysis, dependence in one or more IADLs and baseline hemoglobin predicted the presence of sarcopenia.

Table 3. Predictors of sarcopenia in men with mCRPC (univariate and multivariable analysis)

Variable	Univariate OR (95%)	p	Multivariable[a] OR (95%)	p
Age per decade	1.37 (0.75–2.47)	0.30	Not included	
Race			Not included	
White	Reference			
Black	0.85 (0.21–3.41)	0.82		
South/Southeast Asian	1.71 (0.55–5.29)	0.34		
Education (Completed college/ university)	1.16 (0.50–2.69)	0.73	Not included	
ADT duration (years)	1.01 (0.93–1.10)	0.73	Not included	
ADT duration (median)				
>4.6 years	1.26 (0.54–2.92)	0.58		
Bone metastasis (yes)	0.67 (0.29–1.66)	0.38	Not included	
PSA most proximal to baseline (ng/mL)	1.00 (0.99–1.00)	0.68	Not included	
VES-13 (≥3)	6.74 (2.64–17.17)	<0.001	Not included*	
Dependence in one or more IADLs (Yes)	6.88 (2.71–17.46)	<0.001	4.37 (1.37–13.86)	0.012
Albumin per unit (g/L)	0.75 (0.63–0.88)	<0.001	0.90 (0.74–1.09)	0.31
ALP[b]	2.00 (1.04–3.85)	0.037	1.16 (0.43–2.86)	0.74
Creatinine[b]	2.66 (0.82–8.65)	0.10	Not included	
Hemoglobin decrease per 10 g/L	2.00 (1.43–2.80)	<0.001	1.70 (1.13–2.57)	0.012
LDH (IU/L)	1.01 (1.00–1.01)	0.007	1.00 (0.99–1.01)	0.47
Arthritis (Yes)	1.10 (0.47–2.56)	0.81		
Congestive heart failure (Yes)	12.15 (1.30–113.67)	0.029	Not included**	
Hyperlipidemia (Yes)	1.31 (0.56–3.05)	0.53	Not included	
Hypertension (Yes)	2.45 (1.00–6.00)	0.050	Not included	
Type 2 diabetes (Yes)	1.71 (0.63–4.63)	0.29	Not included	
Osteoporosis (Yes)	2.11 (0.44–10.04)	0.34	Not included	

[a]HL=5.39, p=0.71; c-stat: 0.85. [b]Log-transformed. *VES-13 was not included due to collinearity with dependence in one or more IALDs. **Congestive heart failure was not included due to the small number of events (n=1). ADT: androgen deprivation therapy; ALP: alkaline phosphatase; IADLs: instrumental activities of daily living; LDH: lactate dehydrogenase; mCRPC: metastatic castrate-resistant prostate cancer; OR: odds ratio; PSA: prostate-specific antigen; VES-13: Vulnerable Elders Survey-13.

Impairments in IADLs and VES-13 reflect poor physical function and often a physical frailty phenotype. As reviewed by Cesari and colleagues, impairments in physical function assessed through muscle strength, gait speed, and balance are shared characteristics between sarcopenia and frailty;[27] however, dependence in one or more IADLs represents a more advanced stage of frailty[28] than impairments in physical function. After adjusting for covariates, dependence in one or more IADLs prior to treatment remained to be a significant predictor of sarcopenia.

Previous work has shown that dependence in one or more IADLs was a predictor of frailty in community dwelling older women.[28] Therefore, it is likely that some men in our cohort were frail as well as sarcopenic. Indeed, sarcopenia and frailty often coexist as a result of aging and shared pathological conditions.[27] IADL dependence can be easily assessed though brief, validated questionnaires and may help clinicians identifying patients who may benefit the most from supportive care interventions that aim to improve muscle mass and function.

Our analysis also revealed a moderate correlation between hemoglobin and sarcopenia — notably, a reduction in hemoglobin level per 10 g/L in the multivariable analysis was significantly associated with 70% higher odds of a sarcopenia diagnosis. An inverse relationship between hemoglobin and measures of sarcopenia was previously observed in older adults without cancer.[26,29] In older adults with cancer, lower hemoglobin levels were shown to be associated with fatigue, dyspnea, and low muscle strength, but not skeletal muscle mass.[30]

Low hemoglobin levels in men with mCRPC may be caused by various factors, including ADT, bone marrow involvement, chemotherapy, chronic inflammation, and poor nutrition.[31] Anemia is common in men with metastatic PCa and is a predictor of poor survival.[32] Low hemoglobin may worsen fatigue during cancer treatment,[33] which can profoundly undermine patients' abilities to engage in physical activity.[34] In turn, physical inactivity can impair muscle function and mass over time, thereby explaining, in part, the indirect effects of low hemoglobin on sarcopenia.

It has also been demonstrated that hypoxia, combined with physical inactivity, can accelerate muscle wasting.[35] These findings warrant further research to better understand the role of hemoglobin in the development and progression of sarcopenia and identify potential therapeutic strategies.

Interestingly, ADT duration was not significantly associated with sarcopenia, as there is already evidence that the majority of ADT-related sarcopenia occurs early in the treatment course (within 6–12 months).[9,10,36-38] Previous work has demonstrated that the addition of ARATs to ADT does not significantly worsen sarcopenia.[37] Nonetheless, others have found greater loss of muscle volume with enzalutamide or

abiraterone compared to luteinizing hormone-releasing hormone agonists alone.[10]

Strengths and limitations

In our cohort, all participants had metastatic disease. It is therefore possible that metastasis and the associated catabolic processes obscured potential differences in sarcopenia status regardless of ADT duration. It is also possible that our study was underpowered to detect an impact of ADT duration, since confidence intervals do not definitively exclude this possibility.

This study has several strengths. First, sarcopenia was comprehensively examined using a rigorous approach that involved the average skeletal muscle mass and density of five contiguous slices at the L3 level, in addition to grip strength and gait speed. Second, potential correlates of sarcopenia included a wide range of sociodemographic and disease characteristics, as well as comorbidity information and blood markers. The modest sample size is a limitation. Therefore, our findings are hypothesis-generating and warrant further research.

CONCLUSIONS

Dependence in one or more IADLs and a negative difference in hemoglobin per 10 g/L were independent predictors of sarcopenia prior to treatment in this cohort. Assessment of IADLs and hemoglobin may be used by clinicians to identify patients that can benefit from targeted lifestyle interventions aiming to decrease the risk of sarcopenia, which may improve quality of life and treatment outcomes. Future studies should assess the potential of exercise and nutrition optimization to normalize IADLs and hemoglobin before and during cancer treatment, particularly in older patients with advanced disease.

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