Sarcopenia beyond quantitative assessment: the quality of skeletal muscle mass is associated with nutritional status and one-year survival in endometrial cancer patients

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INTRODUCTION

Myosteatosis, the excess deposition of triglycerides within skeletal muscle is associated with poor prognosis, since fat accumulation reduces muscle density and quality. There is increasing evidence linking sarcopenia and cancer prognosis, but limited data has focused on whether and in which extent muscle quality can empire cancer outcomes. The aim of the present study was to describe the relation with sarcopenia and myosteatosis with nutritional status and one-year survival in endometrial cancer (EC) patients.

METHODS

- EC patients who underwent oncological treatment at Brazilian National Cancer Institute between 2008-2014 and had a CT scan available within 30 days before treatment were enrolled (n=212);

- Clinicopathological features and one-year survival were retrospectively collected from medical records;

- Transverse CT images at the third lumbar vertebra (L3) were analyzed using SliceOmatic software v. 5.0 (Tomovision, Canada), which enables specific tissue demarcation using Hounsfield unit (HU) thresholds. Then, the cross-sectional areas (cm^2) were normalized by the square of the height (m^2), as described above:

Skeletal muscle index (SMI): range -29 to +150 HU (cm^2/m^2)

Myosteatosis (reduced muscle attenuation): range -29 to +29 HU (cm^2/m^2)

SMI free of myosteatosis (SMIfree): area SMI – area Myosteatosis (cm^2/m^2)

Total Body Fat Mass Index (FMI): = 0.042 × [total adipose tissue at L3 (cm^2)] + 11.2 (Kg/m^2)

- Sarcopenia was defined when SMI was ≤38,9 cm^2/m^2 (Prado et al., 2008)

- FMI ≥13 Kg/m^2 was used to classify excess of body fat (NHANES, 2013)

- Statistical Analysis: One-year survival were evaluated by Kaplan-Meier method and Cox Regression. Variables were considered statistical significant when p<0.05.

RESULTS

Table 1: Baseline characteristics

	TOTAL (n, %)
Age(years)	
< 60	65 (31,3)
≥ 60	143 (68,8)
Histological type	
Adenocarcinoma	177 (85,1)
Sarcoma	31 (14,9)
Histological subtype	
Endometrioid	96 (53,0)
Non endometrioid[a]	85 (47.0)
Staging	
S I	77 (39,5)
S II	25 (12,8)
S III	52 (26,7)
S IV	41 (21,0)
Treatment	
Surgery	170 (81,7)
chemotherapy	66 (31,7)
Nutritional status	
Body mass index	
Normal weight (18,5 - 24,9 kg/m^2)	53 (26,2)
Overweight (25,0 - 29,9 kg/m^2)	61 (30,2)
Obesity (= 30 kg/m^2)	88 (43,6)
Body composition	
Sarcopenia (SMI ≤ 38,9 cm^2/m^2)	55 (26,4)
Overweight + Sarcopenia	25 (12)
FMI ≥ 13 kg/m^2	68 (32,7)

a. clear-cells carcinoma, serous; SMI: skeletal muscle index; FMI: Fat mass index

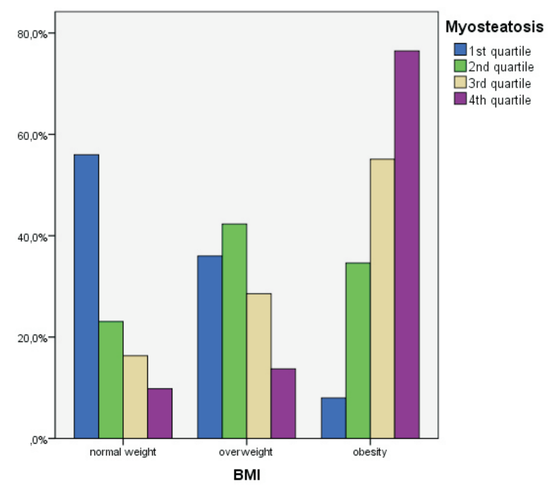

Figure 1: Sarcopenia prevalence according to body mass index classification

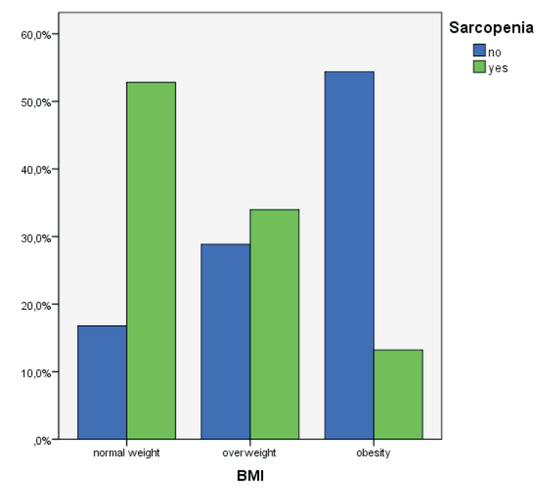

Figure 2: Patterns of distribution of myosteatosis quatiles according to body mass index classification

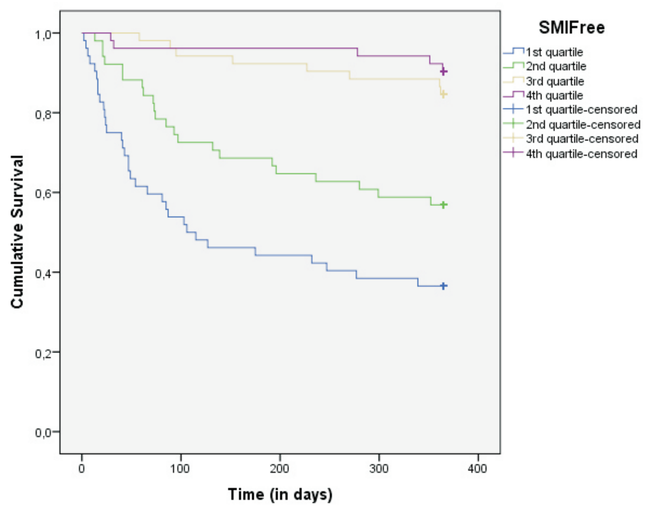

Figure 3: Kaplan Meier survival curves for the Skeletal Muscle Index free of myosteatosis (SMIFree).

Table 2: Uni- and multivariate Cox regression models demonstrating the hazard ratio for one-year survival (n = 212).

	Univariate		Multivariate*	
	HR (95% CI)	**p**	**HR (95% CI)**	**p**
Model 1 - Sarcopenia				
No (constant)	1,00	----	1,00	----
Yes	3,022 (1,878 - 4,865)	<0,001	2,239 (1,191- 4,209)	0,012
FMI = 13 Kg/m^2	0,441 (0,245-0,793)	0,006	0,478 (0,229-0,997)	0,049
Model 2 - SMIFree				
1st quartile	10,955 (4,266-28,130)	<0,001	5,918 (2,165-16,174)	0,001
2nd quartile	5,576 (2,110-14,735)	0,001	3,165 (1,163-8,612)	0,024
3rd quartile	1,622 (0,531-4,958)	0,396	1,039 (0,328-3,292)	0,948
4th quartile (constant)	1,00	----	1,00	----
FMI = 13 Kg/m^2	0,441 (0,245-0,793)	0,006	0,500 (0,252-0,990)	0,47
Model 3 - Myosteatosis				
1st quartile	1,00	----	1,00	----
2nd quartile	1,532 (0,731-3,207)	0,258	1,619 (0,666-3,935)	0,288
3rd quartile	1,697 (0,817-3,523)	0,156	2,068 (0,835-5,119)	0,116
4th quartile	1,972 (0,976-3,987)	0,059	2,571 (1,021-6,475)	0,045
FMI = 13 Kg/m^2	0,441 (0,245-0,793)	0,006	0,349 (0,172-0,709)	0,004

FMI: fat mass index; SMIFree: Skeletal Muscle Index free of myosteatosis; HR: Hazard Ratio; CI: confiance interval.
*Model adjusted for the variables histological type, staging, comorbidities.

CONCLUSIONS

The quality of skeletal muscle mass is a promising predictor of prognosis in cancer patients, although more studies are needed to confirm this association.

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