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Association of Low Fat Mass with Increased Risk of Osteoporosis and Osteosarcopenia in Patients Undergoing Peritoneal Dialysis

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Objectives : Patients with chronic kidney disease (CKD) have a higher risk of osteoporosis than the general population, and the combination of osteopenia and sarcopenia is a particular challenge in the management of CKD patients. The role of fat in osteoporosis and osteosarcopenia is complex and evolving. In patients undergoing peritoneal dialysis (PD), the metabolic complication of obesity is an important issue. We investigated the role of fat mass in osteoporosis and osteosarcopenia in PD patients.

Methods : This prospective cohort study included 359 PD patients from January 2018 to December 2022. ASM per meter squared (ASM/m²) was used to define sarcopenia, with cutoff values of <7.0 kg/m² for men and <5.5 kg/m² for women. Fat mass was quantified by fat tissue index (FTI), and low FTI was defined as FTI less than 1/3. Bone mineral density (BMD) was assessed and a T-score <-2.5 was defined as osteoporosis.

Results : The median duration of PD was 25 (IQR 3-48) months. Patients with osteoporosis were older and had significantly lower BMI, lean tissue index (LTI) (15.3 vs. 12.7 kg/m², p<0.001) and ASM/m² (7.3 vs. 5.8, p<0.001) than patients without osteoporosis. Interestingly, FTI was also lower in the osteoporotic group. Low FTI was strongly associated with both osteoporosis (OR, 3.75; 95% CI, 1.19-11.85; P = 0.024) and osteosarcopenia (OR, 3.55; 95% CI, 1.23-10.24; P = 0.019) in men, even after adjustment for age, BMI, and triglyceride level. Similarly, lower FTI was a significant determinant of osteosarcopenia in women (OR, 3.04; 95% CI, 1.25-7.35; P = 0.014).

Conclusions : Osteoporosis and osteosarcopenia are common in CKD patients with PD. Low fat mass, rather than increased fat mass or obesity, may be significantly associated with increased risk of osteoporosis and osteosarcopenia. This finding highlights the importance of monitoring fat mass in the management of these conditions in this patient population.

PD Osteosarcopenia_11.png

Table 1. Effect of FTI on osteoporosis and osteosarcopenia in PD patients

	Value	Osteoporosis				Osteosarcopenia			
		Univariate		Multivariate*		Univariate		Multivariate*	
		OR	P	OR	P	OR	P	OR	P
Men									
Age	1 yr	1.03 (0.98-1.09)	0.165	0.99 (0.94-1.06)	0.983	1.04 (0.98-1.10)	0.210	1.04 (0.97-1.13)	0.222
BMI	<25 kg/m ²	8.7 (2.50-21.87)	0.001	3.64 (0.90-14.74)	0.071	-	-	-	-
Triglyceride	1 mg/dL	0.99 (0.99-0.99)	0.040	0.99 (0.98-1.00)	0.079	0.99 (0.99-0.99)	0.100	0.99 (0.98-1.00)	0.209
Low LTI	Lower than 1/3	5.97 (2.06-11.60)	<0.001	7.10 (2.26-22.49)	0.001	-	-	-	-
Low FTI	Lower than 1/3	4.08 (1.72-9.67)	0.001	3.75 (1.19-11.85)	0.024	4.04 (1.50-10.97)	0.006	3.55 (1.23-10.24)	0.019
Women									
Age	1 yr	1.07 (1.03-1.11)	<0.001	1.09 (1.04-1.14)	0.001	1.04 (1.01-1.08)	0.035	1.06 (1.02-1.11)	0.006
BMI	<25 kg/m ²	2.15 (1.09-4.27)	0.028	1.59 (0.58-4.70)	0.363	-	-	-	-
Triglyceride	1 mg/dL	0.99 (0.99-0.99)	0.006	0.99 (0.98-0.99)	0.006	0.99 (0.99-1.00)	0.160	-	-
Low LTI	Lower than 1/3	2.65 (1.32-5.31)	0.006	2.79 (1.20-6.70)	0.022	-	-	-	-
Low FTI	Lower than 1/3	1.85 (0.91-3.60)	0.079	2.78 (0.94-8.25)	0.065	1.84 (0.91-3.60)	0.091	3.04 (1.25-7.35)	0.014

* Adjusted for BMI, cholesterol, low LTI

PD Osteosarcopenia_11.png

Figure 1. Prevalence of Osteoporosis, Sarcopenia, and Osteosarcopenia

