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Pulmonary functional and radiological correlations of nutritional status and physical activity in systemic sclerosis

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Purpose

Systemic Sclerosis (Ssc) or scleroderma is a connective tissue disease of unknown origin.

It may affect skin, as well as blood vessels and internal organs including lungs.

In SSc patients physical activity limitation is often observed. It is unclear whether changes in nutritional status contribute to alter physical performance.

The present study was aimed at exploring the physical and nutritional status of patients with SSc.

Methods and Materials

SAMPLE*:*

- 27 subjects with SSc;

- 11 age- and sex-matched healthy volunteers.

MEASUREMENTS: The lung involvement was evaluated by:

- Pulmonary function tests (spirometry and lung diffusion capacity

for CO)

- HRCT (the degree of radiological involvement was evaluated by Warrick score, a semi-quantitative method based on the assessment of severity and extent of different types of lesions).

The nutritional status and the body composition were evaluated by:

- Mini Nutritional Assessment (MNA) questionnaire

- Bio Impedance Assessment (BIA)

To evaluate physical activity subjects wore, for one week, a multisensor device: - Sensewear Armband (see figure 1)

Fig.: Fig.1 The armband device
References: M. Bellia; DIBIMEF sezione di scienze radiologiche, Università degli Studi di Palermo, Palermo (PA), ITALY
The multi-sensor device used five sensors:

- two accelerometers;

- skin temperature;

- near body temperature/heat flux;

- galvanic skin resistance.

The SenseWear Armband allowed to measure:

- Total energy expenditure (TEE);

- Active energy expenditure (AEE);

- Physical activity duration (PAD).

STATISTICAL ANALYSIS: Data are presented as mean±SD. Differences between groups were evaluated by Mann-Whitney test. Correlation between variables were evaluated by Spearman's rho. Probability values of $p<0.05$ were considered to be statistically significant.

Results

In the SSc group, spirometry was normal (FEV1 % pred = 97.5 ± 14%; FVC % pred = 100 ± 12.8%). The diffusing capacity of the lung for CO (DLCO) was significantly lower in SSc group than in controls (61 ± 17% pred. *vs* 88 ± 4.7% pred., respectively; p=0.002). The DLCO correlated with HRCT derived Warrick score of radiologic involvement (r = -0.47; p = 0.029).

The fat-free mass (FFM) was significantly lower in patients compared to controls (FFM= 46.8±7.6 Kg *vs* 53.6 ± 6.3 Kg; p=0.01) (fig. 2)

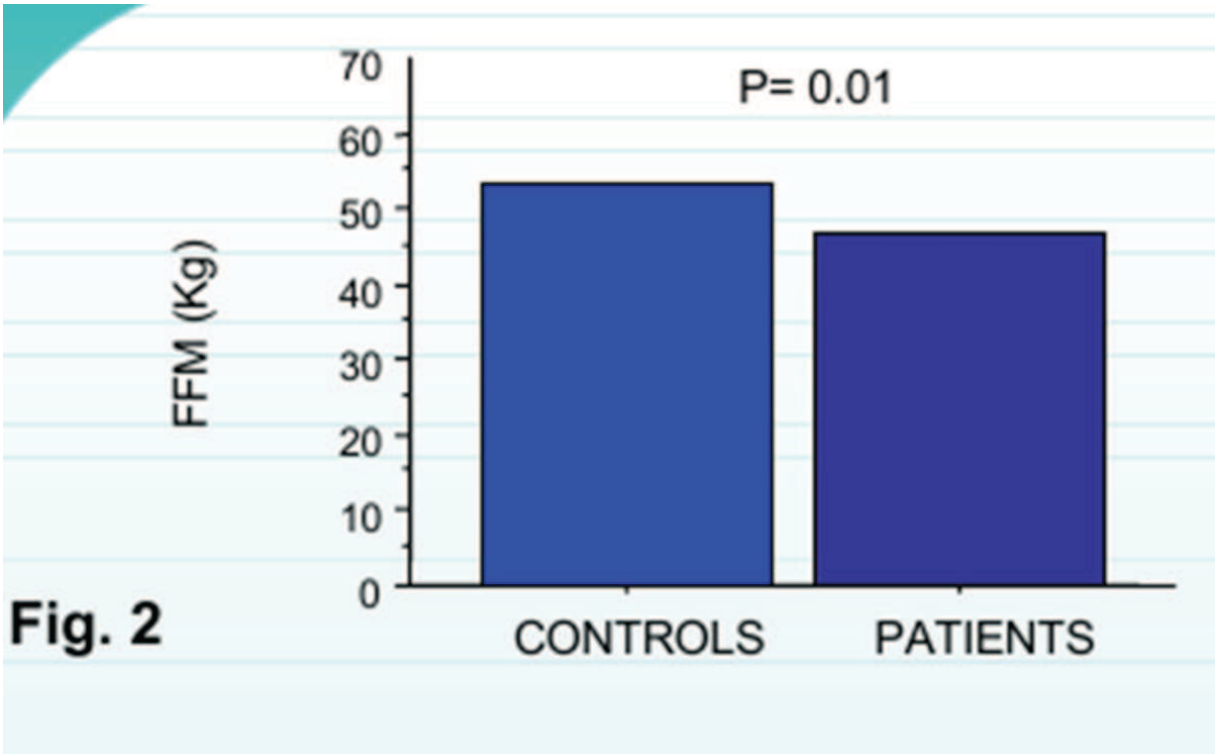

Fig. 2

Fig.: Fig.2 Diagram showing the difference in FFM between cases and controls
References: M. Bellia; DIBIMEF sezione di scienze radiologiche, Università degli Studi di Palermo, Palermo (PA), ITALY
Physical activity duration (PAD) was significantly lower in patients than in controls (PAD= 243 ± 145 min. *vs* 397 ± 142 min.; p=0.004) (fig. 3).

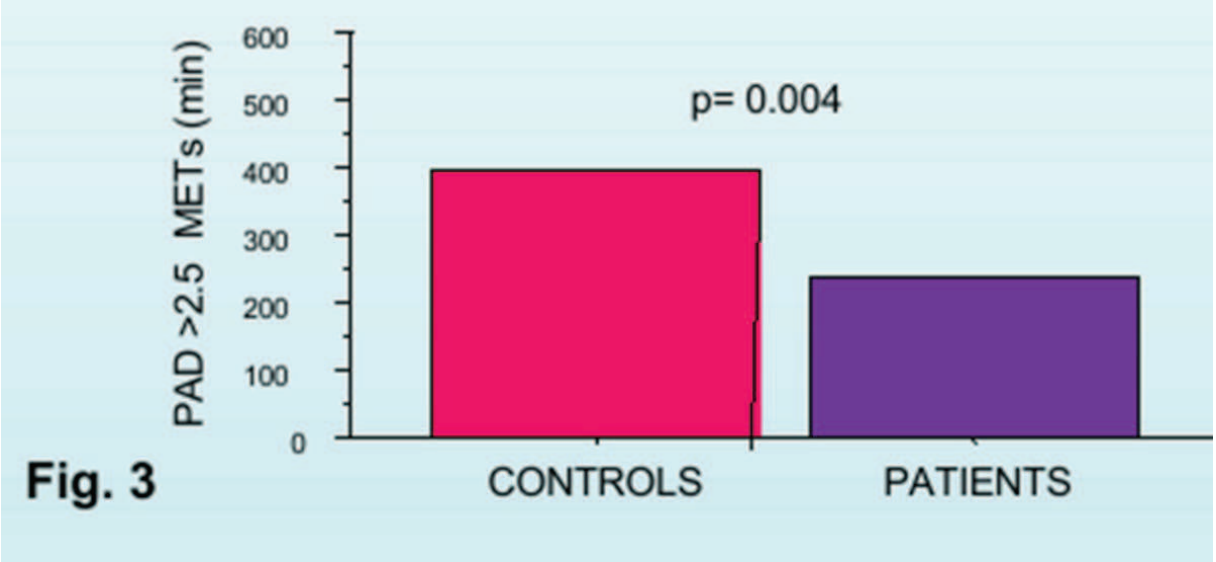

Fig. 3

Fig.: Fig.3 Diagram showing the difference in PAD between cases and controls

References: M. Bellia; DIBIMEF sezione di scienze radiologiche, Università degli Studi di Palermo, Palermo (PA), ITALY

In the whole sample, DLCO was correlated with both PAD (r = 0.39; p = 0.015) and with FFM (r = 0.41; p = 0.011). On the contrary, these correlations were not observed for HRCT derived Warrick score. Moreover, PAD and FFM were correlated (r = 0.48; p = 0.002).

Conclusion

Although SSc patients were in apparently good nutritional and spirometric condition, they showed lower FFM compared to controls. This, together with the correlation between FFM and PAD, could account for physical activity impairment, exercise induced breathlessness and poor quality of life often shown by SSc patients . On this basis further studies are needed to confirm this relationship and to explore the possibility that physical rehabilitation programs become a part of treatment strategy in SSc patients.

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