impact of visceral adiposity on trabecular bone score in obese postmenopausal women:

a cohort study

Antimo Moretti[1], Francesca Gimigliano[2], Dario Calafiore[1], Maria Teresa Giamattei[1], Giovanni Iolascon[1]

[1] Department of Medical and Surgical Specialties and Dentistry, Second University of Naples, Naples, Italy
[2] Department of Physical and Mental Health and Preventive Medicine, Second University of Naples, Naples, Italy

INTRODUCTION

The role of adipose tissue on the microarchitecture of the bone has not been well established yet. Its effects on bone are probably secondary to an increased amount of visceral fat rather than increased BMI. The ''Trabecular Bone Score'' (TBS) is a simple and non-invasive tool able to explore factors influencing bone strength and fracture risk other than bone mineral density (BMD) (figure 1). So far several studies explored the clinical added value of TBS over BMD to assess the risk of fragility fractures. Moreover it is possible to measure through DXA the Visceral Adipose Tissue (VAT) in terms of mass and volume. The objective of our study is to evaluate the effect of VAT on bone microarchitecture in postmenopausal obese women.

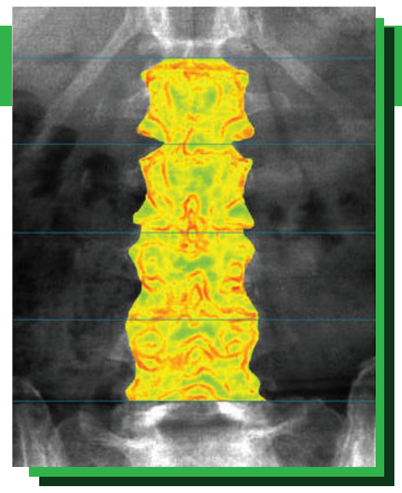

FIGURE 1. TBS ANALYSIS

MATERIALS AND METHODS

In this retrospective study we reported data from medical records of obese postmenopausal women (BMI ≥30 kg/m2) referring to our outpatient rehabilitation service for the prevention and management of osteoporosis over a 3-year period. In these patients we had measured BMD at lumbar spine (LS BMD) and at femoral neck (FN BMD), TBS, VAT volume and VAT mass. The population was divided into quartiles of VAT volume (VAT <1,398 cm^3; VAT between 1,398 and 1,764 cm^3; VAT between 1,765 and 2,371 cm^3; VAT>2,371 cm^3). Differences between groups in terms of TBS, according to cut-off proposed by Silva et al. [1], were assessed using the Kruskal-Wallis test for independent samples. SPSS 21.0 software was used.

RESULTS

We analyzed data of 226 women (mean age 64.56 ± SD 8.42, mean BMI 34.18 ± SD 3.32) (table 1). There were no statistically significant differences for age between groups (p=0.332). In our population, higher VAT volume was associated with a significant worsening of the trabecular bone microarchitecture (p=0.003) (figure 2), but not with a significant lower LS BMD (p=0.984) (figure 3). In particular, in the first quartile, 40.8% of patients had a TBS≤1.200, whereas in the higher quartile 72.2% of women had degraded microarchitecture (figure 4).

Table 1. Study population characteristics

	Total (n=226)	VAT <1397.5 cm^3 (n=56)	VAT 1398<x<1764 cm^3 (n=57)	VAT 1765<x<2370 cm^3 (n=57)	VAT >2371 cm^3 (n=56)	P values
Age (years)	64.56 ± 8.42	63.26 ± 8.87	63.86 ± 7.90	65.25 ± 9.11	65.87 ± 7.57	p=0.332*
BMI (kg/m2)	34.18 ± 3.32	33.00 ± 2.26	33.58 ± 2.80	34.34 ± 2.83	35.83 ± 4.42	p=<0.001*
TBS	1.17 ±0.14	1.23 ± 0.14	1.18 ±0.15	1.17 ± 0.12	1.11 ± 0.13	p=<0.001*
LS BMD (g/cm^2)	1.091 ± 0.18	1.083 ± 0.17	1.101 ± 0.20	1.086 ± 0.17	1.093 ± 0.17	p=0.984*
LS T-score	- 0.715 ± 1.53	- 0.79 ± 1.49	- 0.56 ± 1.73	- 0.78 ± 1.44	- 0.70 ± 1.46	p=0.982*
FN BMD	0.857 ± 0.12	0.863 ± 0.12	0.852 ± 0.13	0.847 ± 0.12	0.867 ± 0.13	p=0.643*
FN T-score	-1.021 ± 1.09	- 0.29 ± 1.11	- 0.45 ± 1.07	- 0.53 ± 1.37	- 0.21 ± 1.01	p=0.888*

Values are expressed as means ± standard deviations. *Kruskal-Wallis test for indipendent samples

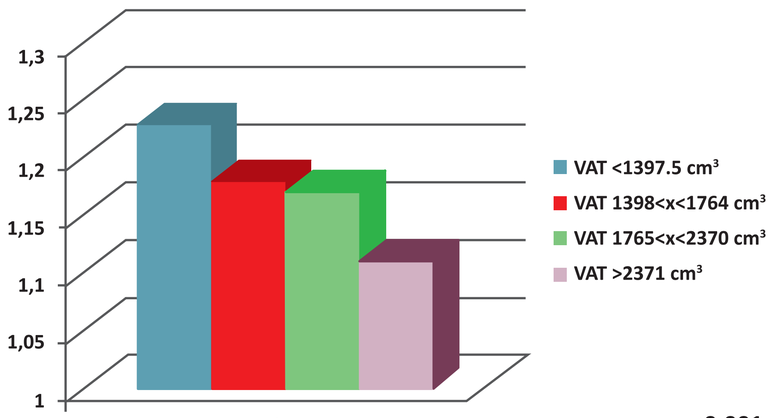

FIGURE 2. TBS CALCULATED IN DIFFERENT CATEGORIES OF VAT.

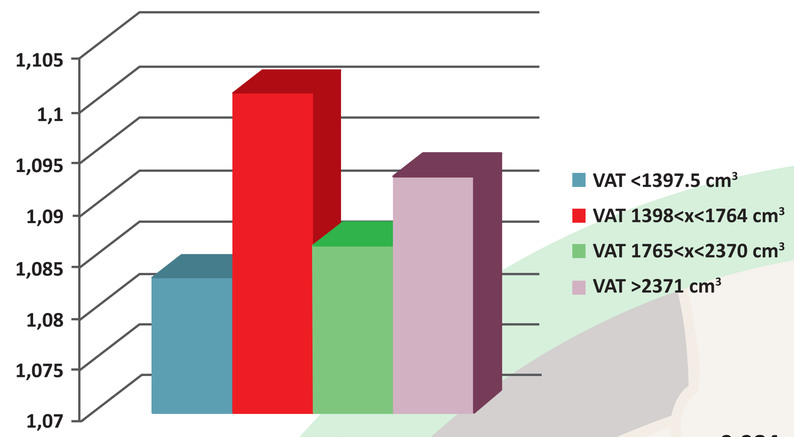

FIGURE 3. LS BMD CALCULATED IN DIFFERENT CATEGORIES OF VAT.

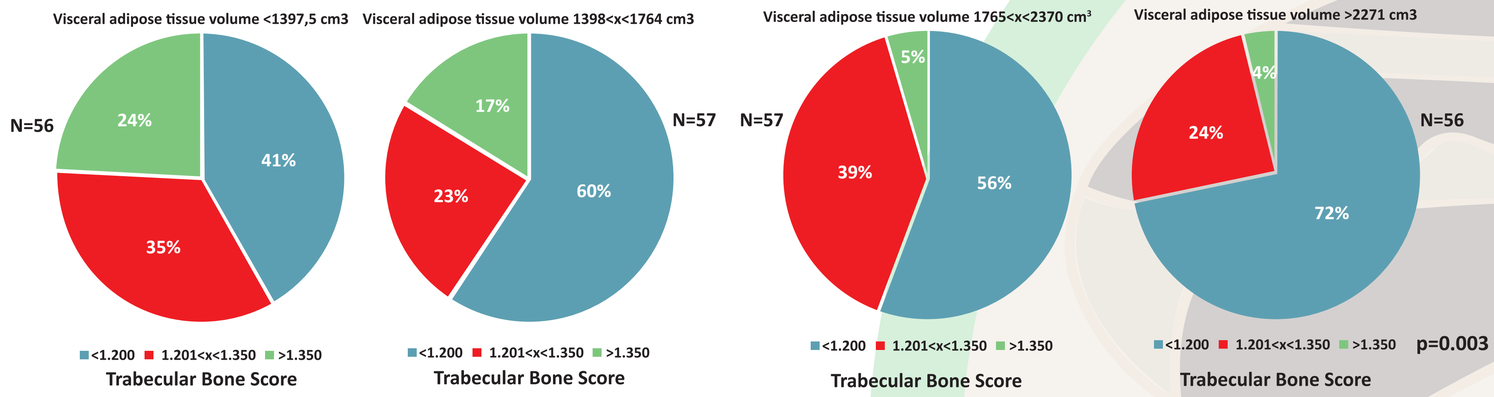

FIGURE 4. PROPORTION OF PATIENTS WITH DIFFERENT TBS ACCORDING TO VAT VOLUME QUARTILES.

CONCLUSIONS

Nowadays, the relationship between adipose tissue and bone is not completely understood. Bone involvement in obese patients is still controversial. The amount of VAT might be one of the pathogenic factors involved in bone microarchitecture deterioration in obese postmenopausal women.

REFERENCES

1. Silva BC, Leslie WD, Resch H, Lamy O, Lesnyak O, Binkley N, McCloskey EV, Kanis JA, Bilezikian JP. Trabecular bone score: a noninvasive analytical method based upon the DXA image. J Bone Miner Res. 2014 Mar;29(3):518-30.