

BONE MINERAL DENSITY IN THYROID CANCER PATIENTS ON SUPRAPHYSIOLOGIC DOSES OF THYROXINE

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INTRODUCTION

Overt hyperthyroidism has long been recognized as a cause of high bone turnover osteoporosis and fracture. Studies have suggested that subclinical hyperthyroidism and long-term suppressive doses of thyroxine may also result in decreased Bone Mineral Density (BMD) and an increased risk of fragility fracture, particularly in postmenopausal women.¹ Dual-energy X-ray absorptiometry (DXA) has been the standard method for diagnosing osteoporosis and provides accurate representation of bone mineral losses. In differentiated thyroid cancer(DTC) patients with lifelong thyroxine suppression, early detection of reduced bone density is of crucial importance to prevent the fragility fractures.

OBJECTIVE

Most DTC patients are given long term supra-physiologic doses of thyroxine to achieve thyroid stimulating hormone (TSH) suppression. We present a cross-sectional review of Bone Mineral Density (BMD), assessed by DXA scan at various stages of treatment and follow up at our center to assess the effect of hyperthyroid state on BMD.

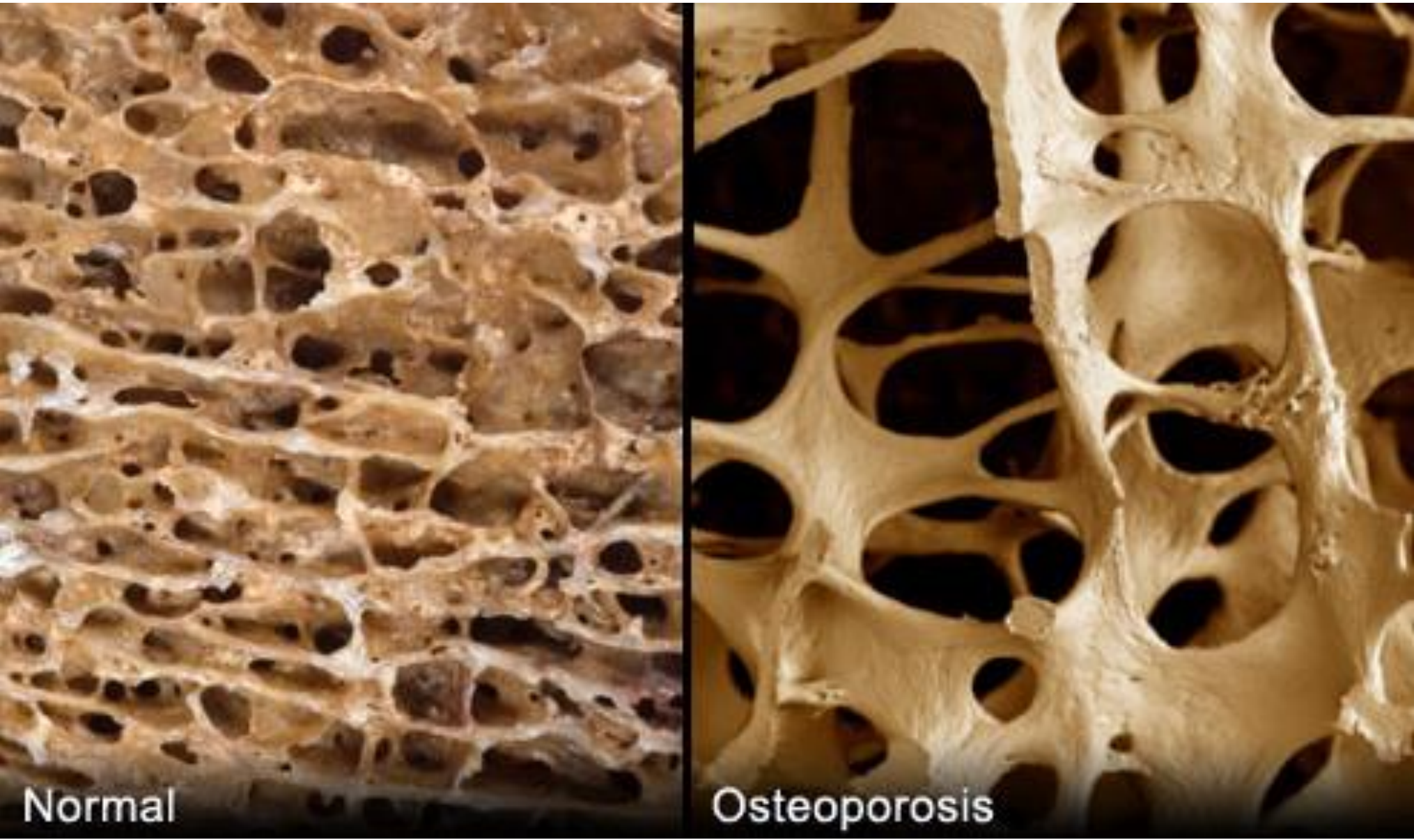
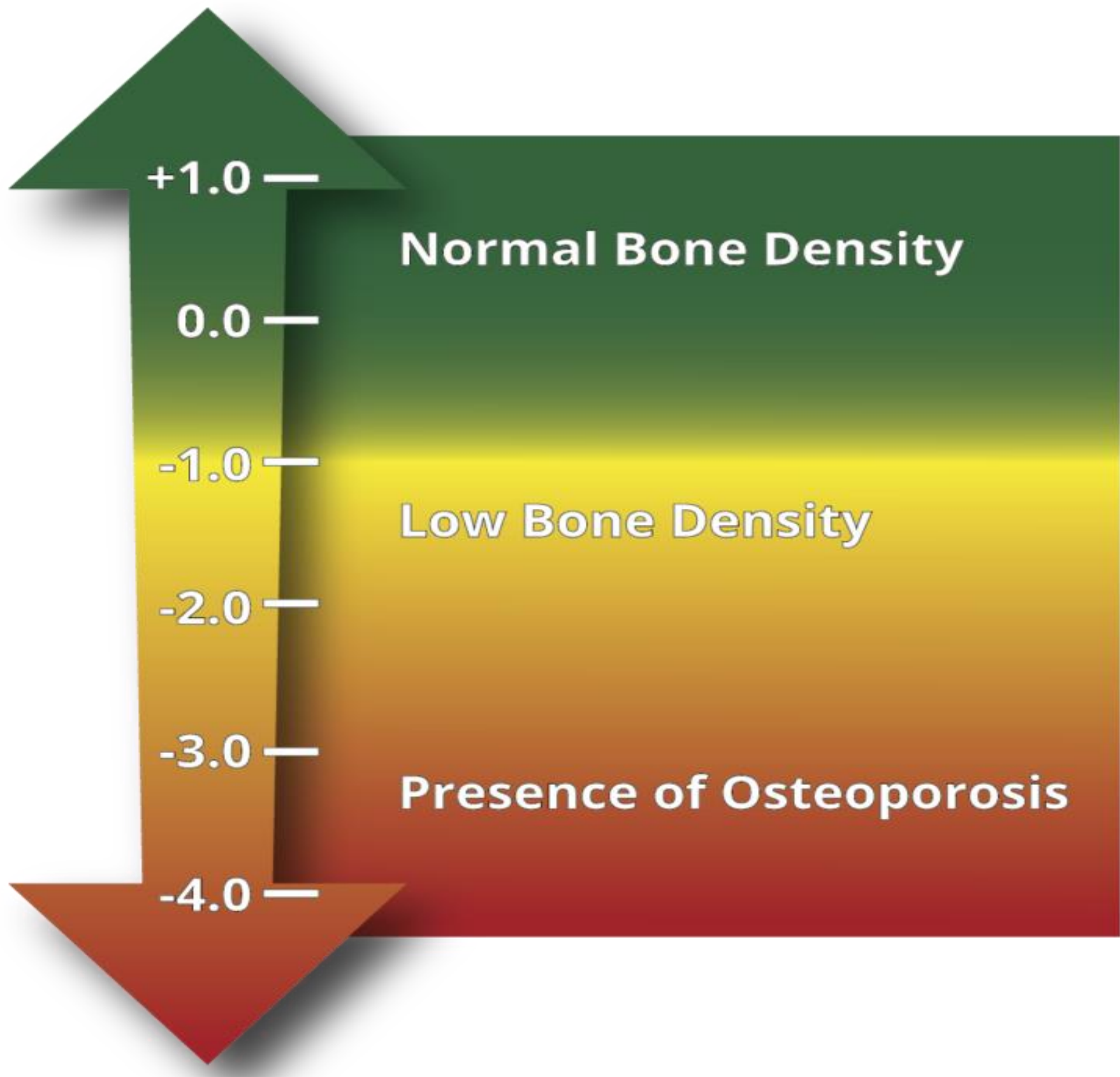


TABLE 1: DEMOGRAPHIC CHARACTERISTICS		
CHARACTERISTIC	CATEGORY	PERCENTAGE / RESULT
Sex	Female	69%
	Male	31%
Age	Range	21–75 years
	<50 years	71%
	≥50 years	29%
Menopausal / Sex Status	Premenopausal	42%
	Postmenopausal	27%

TABLE 2: BONE MINERAL DENSITY (BMD) RESULTS		
GROUP	BMD STATUS	PERCENTAGE
Overall	Reduced BMD	38%
	Osteopenia	41%
	Osteoporosis	41%
Postmenopausal	Normal BMD	18%
	Below expected range for age	9.5%
	Normal BMD	90.5%
Premenopausal	Abnormal BMD	38%
	Osteopenia	26%
	Osteoporosis	6.4%
	Below expected range for age	6.2%

TABLE 3: DXA REASSESSMENT AND DURATION OF THYROXINE SUPPRESSION		
PARAMETER	CATEGORY	RESULT
Reassessment DXA	Patients reassessed	14
	Female	11 (78.6%)
	Postmenopausal among females	82%
	Significant change in BMD	None
Duration of thyroxine suppression	5 years	13%
	6–10 years	33%
	>10 years	54%
Fracture on follow-up	Any documented fracture	None

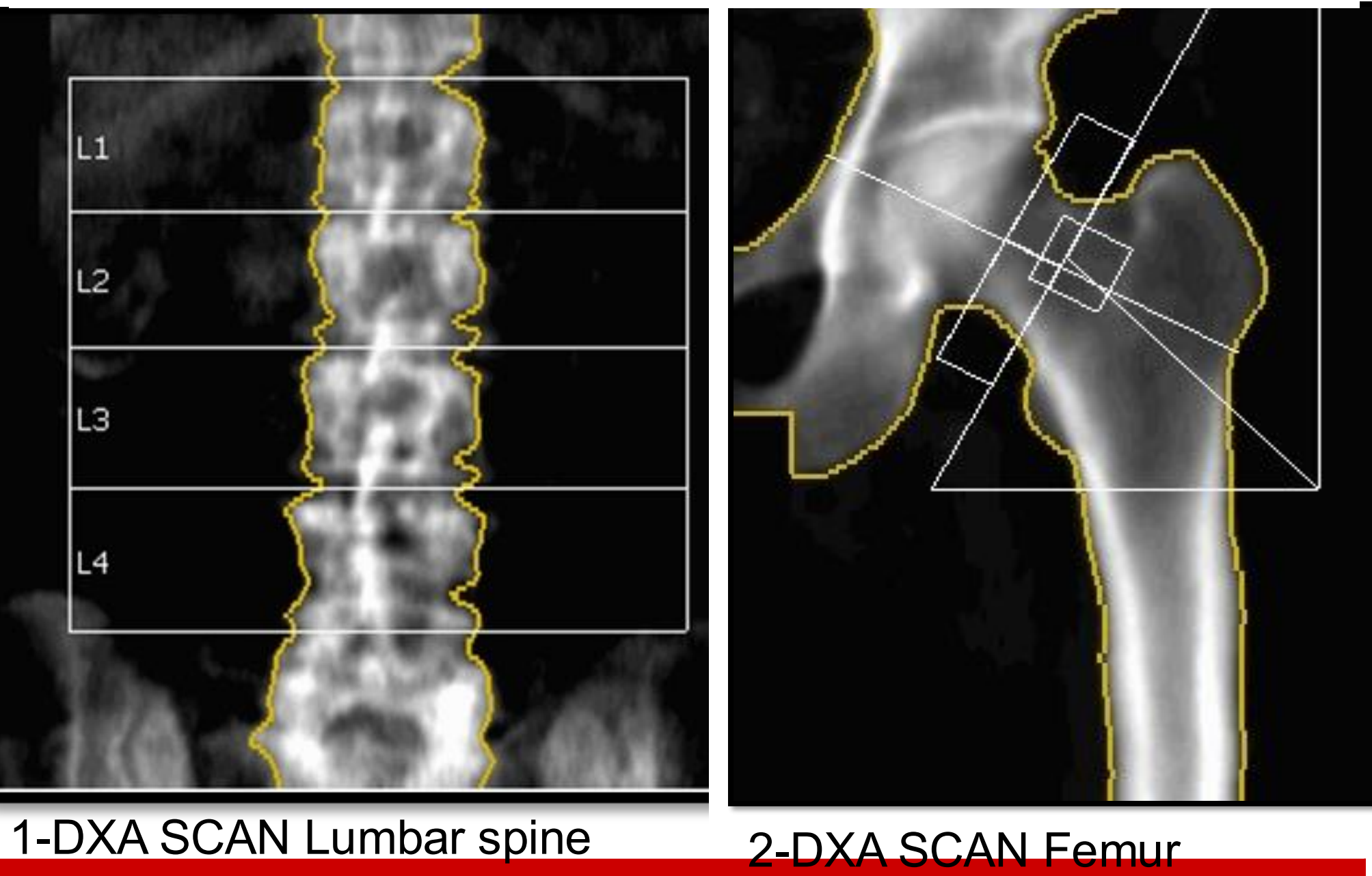
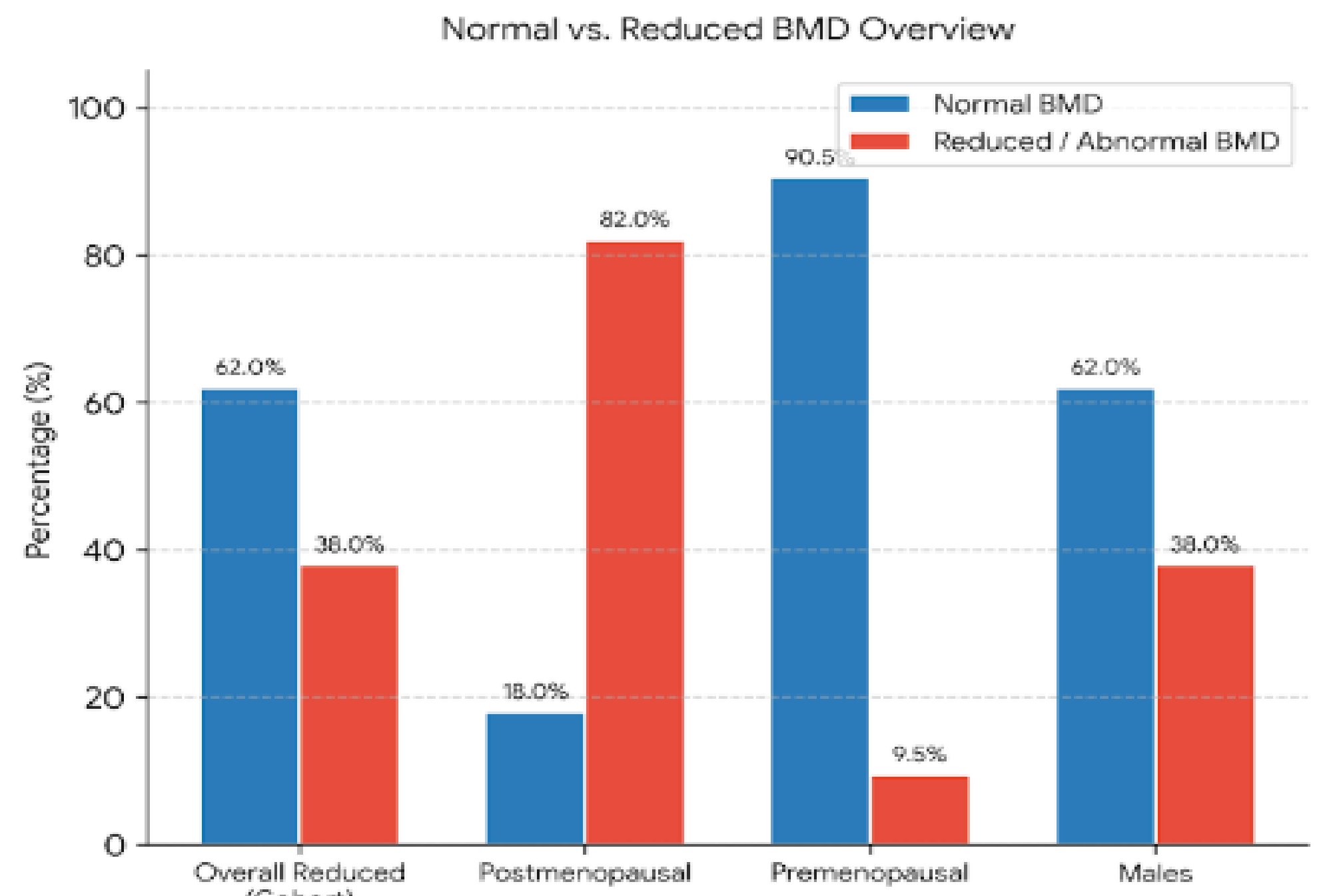


MATERIAL AND METHODS

- Prospective cross-sectional study
- Duration : April 2015 to January 2016
- Mean follow 10.9 ± 4.3 years till July 2026 in 97 patients
- Sample size: n=100
- Bone mineral density measured at the lumbar spine (L1 to L4), left femoral neck and left hip by DXA

RESULTS

- Mean Age: 42.2 ±12.8 years
- Gender: 69 Females and 31 Males
- Reassessment DXA- 14
- 11 Females & 3 Males
- Post-menopausal:82%. None showed significant change in BMD results.
- Thyroxine suppression Stratification: 5 years - 13%, 6 to 10 years - 33% and >10 years 54%.
- No fracture on follow up done till July 2026 in 97 patients.



DISCUSSION

The relationship between osteoporosis and TSH suppressive therapy in DTC patients was first evaluated by Ross et al, reporting potential deleterious effects on bone mass. Most of the previous literature concluded that recommended dose of thyroxine in DTC patients postoperatively does not have negative effects on BMD in premenopausal women and men.² Some of the previous studies demonstrated that low TSH levels cause a decrease in BMD particularly in postmenopausal women. The quantitative and qualitative differences in the pattern of bone loss with aging from the appendicular and the axial skeleton, and the structural differences of trabecular bone between males and females could explain the basis of our results.

CONCLUSION

Thyroxine induced suppression achieving TSH level < 0.1mU/L in differentiated thyroid cancer patients did not cause significant loss in bone mineral density on long term follow up irrespective of duration of medical suppression or menopausal status.

REFERENCES

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3. DeMelo TG et al. *Thyroid Research*. 2015 Jun 2; 8:7.