

A study of prevalence of Osteoporosis in patients with Subclinical hypothyroidism treated with Thyroid hormone at tertiary care center Bikaner, Rajasthan

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Abstract

Background: Due to limited study in our region we conducted a study to estimate the prevalence of osteoporosis in patients with subclinical hypothyroidism treated with thyroid hormone.

Methods: Hospital based case control study conducted at Dept. of General Medicine, S.P. Medical College and P.B.M Hospital, Bikaner.

Results: Mean age of cases was 41.8 ± 2.28 Yrs and mean age of control was 41.85 ± 2.25 Yrs. 122(76.25%) male and 38(23.75%) female patients were present in cases group. 126(78.75%) male and 34(21.25%) female patients were present in control group. Mean TSH level of cases was 6.20 ± 0.81 and mean TSH level of control was 2.59 ± 0.24 . Mean T4 level of cases was 1.39 ± 0.19 and Mean T4 level of control was 1.60 ± 0.22 .

72(45.00%) patients were present with osteoporosis, 36(22.50%) patients were presented with osteopenia in cases group and 25(15.63%) patients were presented with osteoporosis, 17(10.63%) patients were presented with osteopenia in control group.

Conclusion: We conclude that there is a high prevalence of bone loss in patients with subclinical hypothyroidism.

Keywords: Hypothyroidism, osteopenia, osteoporosis.

Introduction

Thyroid disease is one of the most common endocrine problems managed by general physicians in the endocrinology. Hypothyroidism, also called underactive thyroid or low thyroid, is a disorder of the endocrine system in which the thyroid gland does not produce enough thyroid hormone. Hypothyroidism as a clinical syndrome was recognized even later than hyperthyroidism and at first its cause was equally obscure. First defined in London in the 1870s what we call hypothyroidism was named Myxedema because of swollen skin and its excess content of mucin. The common causes of hypothyroidism are Iodine deficiency, Auto immunity, Atrophic Thyroiditis, Hashimoto's thyroiditis and Drug-Induced Hypothyroidism.¹

Subclinical hypothyroidism is defined by as a condition of mild thyroid failure characterized by normal levels of T₃ and T₄ with moderately elevated serum TSH between 5 and 10 mU/L.²

The definition of osteoporosis (OP) by the World Health Organization (WHO) is densitometric and non-clinical and is based on the measurement of bone mass with the DEXA method in the spine or hip. It establishes four categories: normal, osteopenia, osteoporosis and established osteoporosis. The presence of pathological low bone mass, osteopenia or

osteoporosis, is the best indicator of fracture risk for the region where the bone mass is measured, hence its interest, since bone loss is asymptomatic until it produces its natural consequence: the osteoporotic fracture (OF)³

Due to limited study in our region we conducted a study to estimate the prevalence of osteoporosis in patients with subclinical hypothyroidism treated with thyroid hormone.

Material and Methods

Study Design: Hospital based case control study

Study Duration: 12 months (Jan-2019 to dec-2019)

Study Place: Dept. of General Medicine, S.P. Medical College and P.B.M Hospital, Bikaner

Study Population: Case group: Patients diagnosed with subclinical hypothyroidism receiving thyroid hormone replacement therapy.

Control Group: Patients with subclinical hypothyroidism not receiving replacement therapy

Sample Size: Sample size of 163 patients required at 80% study power and alpha error 5%. It is round of 180 patients for present study expecting approx. 10% drops when 14% osteoporosis was observe in case group and 9% in control group.

Sampling Method: Simple random sampling

Inclusion Criteria

Subclinical hypothyroidism receiving thyroid hormone replacement therapy with duration of 5 to 10 years

Age between 20-45 Years

Exclusion Criteria

Patients are not willing to participate in the study.

More than 45 Yrs and less than 20 Yrs

Any other systemic disease to cause secondary osteoporosis like diabetes, hypertension, chronic liver disease, chronic kidney disease, asthma, SLE, family

h/o fracture, chronic alcoholic, on any drugs causing osteoporosis etc.

Data Collection

In all cases the following variables was analyzed: anthropometric, family and personal history, CBC and biochemical analysis, thyroid hormones, being diagnosed with hypothyroidism and receiving thyroid hormone replacement therapy.

Method of diagnosis

Once the sample will be selected its members will be summoned to complete a clinical questionnaire and undergo a bone mineral density scan with DEXA scan of patient’s hand, spine or hip with a validated measuring device.

Data Analysis

All data was analyzed on EPI-info statistical software. Qualitative data was expresse in the form of proportion. Quantitative data was expresse in mean ± SD Qualitative data was compare by Chi square test Unpaired t test was use to infer the difference in means. For significance, following at the level of “p” value was taken-

P > 0.05 = Not significant

P = 0.05 = Just significant

P < 0.05 = Significant

P < 0.001 = highly significant.

Results

Table 1: Age wise distribution

Age (Yrs)	Cases (n=160)	Control (n=160)
Mean	41.8	41.85
SD	2.28	2.25
p-value	0.99	

In present study mean age of cases was 41.8±2.28 Yrs and mean age of control was 41.85±2.25Yrs. The age wise difference in both groups was found stastically Insignificants.

Table 2: Sex wise distribution

Sex	Cases (n=160)		Control (n=160)	
	No	Percentage	No	Percentage
Male	38	23.75	34	21.25
Female	122	76.25	126	78.75
Total	160	100.00	160	100.00
p-value	0.68			

In present study, 122(76.25%) male and 38(23.75%) female patients were present in cases group. 126(78.75%) male and 34(21.25%) female patients were present in control group the sex wise difference in both groups was found stastically Insignificants.

Table 3: BMI wise distribution

BMI (Kg/mt ²)	Cases (n=160)	Control (n=160)
Mean	22.82	22.26
SD	2.04	2.18
p-value	0.67	

In present study mean age of cases was 22.82±2.04 Kg/mt² and mean age of control was 22.26±2.18 Kg/mt². The BMI wise difference in both groups was found stastically Insignificants.

Table 4: TSH & T4 level wise distribution

Thyroid function test	Cases (n=160)		Control (n=160)		p-value
	Mean	SD	Mean	SD	
TSH	6.20	0.81	2.59	0.24	0.001
T4	1.39	0.19	1.60	0.22	0.001

In present study, mean TSH level of cases was 6.20±0.81 and mean TSH level of control was 2.59±0.24. Mean T4 level of cases was 1.39±0.19 and Mean T4 level of control was 1.60±0.22. The TSH level wise difference in both groups was found stastically significant.

Table5: BMD wise distribution

BMD	Cases (n=160)		Control (n=160)	
	No	Percentage	No	Percentage
Osteoporosis	72	45.00	25	15.63
Osteopenia	36	22.50	17	10.63
Normal	52	32.50	118	73.75
Total	160	100.00	160	100.00
p-value	0.001			

In present study, 72(45.00%) patients were present with osteoporosis, 36(22.50%) patients were presented with osteopenia in cases group and 25(15.63%) patients were presented with osteoporosis, 17(10.63%) patients were presented with osteopenia in control group. The BMD wise difference in both groups was found stastically Insignificants.

Discussion

Subclinical hypothyroidism is defined by experts as a condition of mild thyroid failure characterized by normal levels of T₃ and T₄ with moderately elevated serum TSH of between 5 and 10 mU/L. Analyzing the results we can see that the “symptoms” of this condition include weight changes, various gynecological issues (changes in the duration and amount of the cycle, infertility), depressive symptoms, alopecia, musculoskeletal pain and nonspecific fatigue and dizziness. These are the reasons for which patients present themselves and which lead to a request for TSH to be measured.

Although at an appropriate dose thyroxin is a very safe medicine, before treatment begins a number of possible side effects must be considered including restoration of euthyroidism, the exacerbation of ischemic heart disease and the production of acute adrenal insufficiency. Care must be taken to get the dose right, since an excess can lead to decreased bone mineral

density, the onset of atrial arrhythmias and the precipitation of angina pectoris. Although there have been no descriptions of such complications arising, patients with coronary artery disease should initially receive a lower dose of levothyroxine, usually 12.5 to 25 µg per day, with this does being reassessed in 4 to 6 weeks depending on successive determinations of TSH and the clinical assessment. This is not the case with elevated TSH and normal T₄ as the adverse effects of thyroxin outweigh the benefits in patients with subclinical hypothyroidism scheduled for urgent or semi-elective surgery or invasive methods. Such procedures should not be delayed because there is no evidence of increased risk of complications or mortality, even in cases of established hypothyroidism⁴⁻⁶. The relationship between bone mass and thyroid functional status is an issue of utmost importance and currently controversial. Thyroid hormones are essential for growth and development during childhood and for the maintenance of bone in adulthood. In children with hypothyroidism one sees stunted growth with epiphyseal dysgenesis and delayed skeletal maturation while in adults the phases of bone renewal are prolonged with reduced osteoblast activity and increased cortical bone thickness. However, the most pronounced effects of thyroid hormones on bone in adults are seen in hyperthyroidism. Hyperthyroidism is a common pathology, with a prevalence of 2% in women and 0.2% in men. Despite treatment, in the long term, the mortality rate increases in this latter population to 2.9% as a result of the aftermath of femoral neck fractures⁷⁰. In a review of the impact of hyperthyroidism on bone, it was noted that 8% of patients had symptomatic bone disease, all women, mostly postmenopausal, of whom 65% had severe bone

pain or evidence of fractures and up to 75% had been thyrotoxic for less than 1 year⁷⁻⁹.

Conclusion

We conclude that there is a high prevalence of bone loss in patients with subclinical hypothyroidism.

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