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Association of Vitamin D3 and Serum Calcium Levels in Subclinical Hypothyroidism

KEYWORDS: Vit D, Calcium, Subclinical hypothyroidism.

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ABSTRACT *Aim: The aim of our study was to evaluate the levels of Sr. Vit D3 and Sr. Calcium among patients with Subclinical hypothyroidism and to compare it with healthy controls.Study Design: A hospital based cross sectional study was conducted on patients attending the Out Patient Department of Medicine of SGRRIM&HS for a period of 6 months from Sept 2015 to Feb 2016. A total no. of 151 subjects (100 case and 51 control cases) in the age group 30-60 yrs were selected randomly for the study.Exclusion criteria was age less than 30 yrs and more than 60 yrs, previous history of DM, TB, hypertension, CV diseases etc.Methodology: All the 151 subjects both 100 cases (75 F and 25 M) and 51 controls (35 Female and 16 Male) in the age group 30-60 yrs were analysed for Sr T3, Sr T4, Sr TSH, Sr Ca and Sr Vit D.Result: The Serum Calcium and Serum Vit D in subclinical hypothyroid women were found to be lower (9.03 ± 0.49 ± 0.12 mg/dl) and (16.25 ± 5.61 ± 0.78) respectively than the normal females (9.67 ± 0.43 ± 0.12 mg/dl) and (23.41 ± 3.99 ± 1.7 units/l) respectively.Similarly the Serum Calcium and Serum Vit D values in males suffering from SCH were found to be lower (9.14 ± 0.46 ± 0.33 mg/dl) and (17.93 ± 3.98 ± 0.13) respectively than normal males (9.53 ± 0.37 ± 0.09 mg/dl) (26.79 ± 4.49 ± 2.11) respectively.*

INTRODUCTION

Vit D plays an essential role in calcium homeostasis and the development and maintenance of the skeleton(1). It is recognized as the sunshine vitamin. Exposure to ultraviolet B light (290-320 nm) are the main source of Vit D(2). In the classical endocrine pathway, Vit D enters the circulation attached to a D-binding protein, which is first hydroxylated in the liver to 25 hydroxy Vit D and then in the Kidney to form the active metabolite 1, 25 Dihydroxy Vit D or Calcitriol(3).

Although the biological activities of Vit D are mainly manifested in the regulation of calcium & phosphorus metabolism. Studies in the past 30 yrs indicate that Vit D may play an important role in the immune system (4,5). Vit D mediates its effect through binding to Vit D receptor. Importantly, both Vit D and thyroid hormone bind to similar receptors called steroid hormone receptors.

Subclinical hypothyroidism is defined as a serum TSH conc. above the statistically defined upper limit of the reference range when Serum T3 and Serum T4 Conc is within its reference range(6). Subclinical hypothyroidism is associated with progression to overt hypothyroidism.

Mild thyroid failure is often asymptomatic; however nearly 30% of patients with this condition may have symptoms that are suggestive of thyroid hormone deficiency(7).

Women are more likely than men to be afflicted with thyroid problems. The great majority of these women suffer from hypothyroidism, which leads to fatigue, weight gain, depression, high cholesterol and other symptoms. A small fraction suffer from hyperthyroidism which is an overactive thyroid.

It is believed that Subclinical hypothyroidism represents mild thyroid failure and is a clinically important disorder that has adverse clinical consequences, and that should be treated in most if not all cases (9). Mild thyroid failure progresses to overt hypothyroidism. Progression has infact been reported to occur in approx 3-18% of the affected patients per year(10).

Few studies have been conducted to find an association between levels of Vit D and serum calcium and hypothyroidism and also to determine whether Vit D deficiency is involved in pathogenesis of hypothyroidism or is rather consequence of the disease.

Material & Method

A hospital based cross sectional study was conducted on patients attending the OPD of Medicine of SGRR Medical College for a period of 6 months from Sept 2015- Feb 2016. A total no. of 151 subjects (100 cases and 51 controls) in the age group 30-60 yrs were selected randomly for the study. Exclusion criteria was age less than 30 yrs and more than 60 yrs, previous history of DM, TB, hypertension and cardiovascular disease etc.

All the subjects both cases and controls underwent a biochemical analysis of Serum T3, Serum T4, and Serum TSH which was estimated using ELISA competitive enzyme immunoassay method as described by Sterling(11)and Serum Ca(12) and Serum Vit D3 (13), were also assayed on fully automatic analyzer.

Result

The Serum Calcium levels in Subclinical hypothyroidism females and males both were lower (9.03±0.49±0.12 mg/dl) and (9.14±0.46±0.33 mg/dl) respectively than normal females(9.67±0.43±0.12mg/dl) and males (9.53±0.37±0.09mg/dl).Similarly Serum Vit D levels in SCH females (16.25±5.61±0.78 ng/ml) and SCH Males (17.93±3.98±0.13 ng/ml) is much lower as compared to normal females (23.41±3.99±1.77 ng/ml) and normal males (26.79±4.49±2.11 ng/ml).

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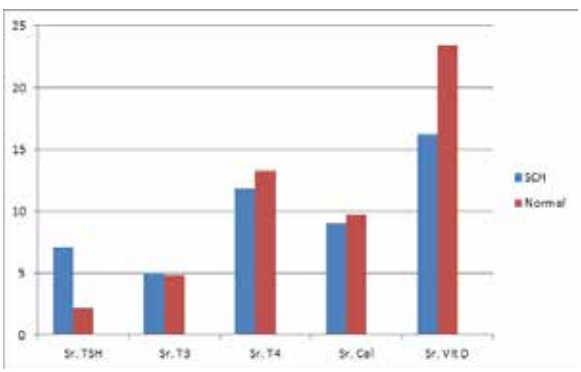
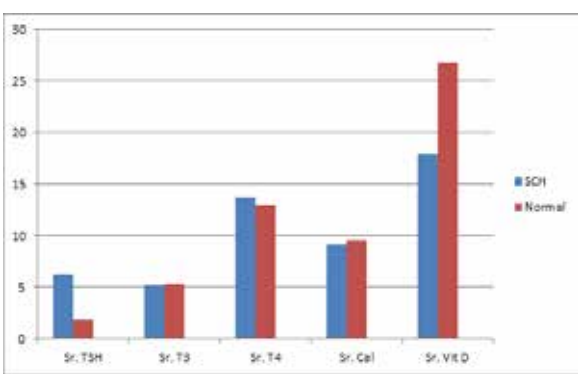
Parameter	Normal Female (35)	SCH Females (75)	Normal Males (16)	SCH Males (25)
Sr. TSH	2.14±0.94±0.15	7.13±3.40±0.39	1.89±1.01±0.25	6.19±2.07±0.41
Sr. T3	4.80±0.51±0.08	4.98±1.46±0.16	5.30±0.85±0.21	5.14±1.0±0.2
Sr. T4	13.24±3.36±0.56	11.77±3.51±0.4	12.96±2.40±0.6	13.69±4.29±0.8
Sr. Cal	9.67±0.43±0.12	9.03±0.49±0.12	9.53±0.37±0.09	9.14±0.46±0.33
Sr. Vit D	23.41±3.99±1.17	16.25±5.61±0.78	26.79±4.49±2.11	17.93±3.98±0.13



FEMALE



MALE

Discussion

Vit D is known for its primary role in bone and mineral homeostasis, and it has been shown recently that its deficiency is associated with various diseases such as cardiovascular disease cancer; infection osteoporosis etc (14).

Our results reveal a slight decrease in both Serum Calcium and Serum Vit D levels in both males and females suffering from subclinical hypothyroidism, as compared to their normal controls. Byron Richards (2008) studied that effect of Vit D deficiency on thyroid gland and reported that low thyroid hormones lead to a lack of Vit D (15).

Calcium is an important essential mineral that is primarily found in bones. It is also needed for healthy muscle, nerve and blood clotting function.

The low levels of Vit D may be due to poor absorption of Vit D from the small intestine or reduced ability to synthesize and activate Vit D effectively. The low levels of Vit D inturn result in reduced production of hormone calcitriol leading to deficiency in Calcium absorption from the intestines and a loss of Calcium from bones. Hence it is important for individuals with SCH to have both Vit D and Calcium levels monitored as well as bone density scans to assess health.

Conclusion

Our results indicate that patients with hypothyroidism also suffer from hypovitaminosis D associated with hypocalcaemia. Deficiency of serum Vit D and Calcium levels were significantly associated with degree and severity of hypothyroidism, which encourage the supplmentation of Vit D. Therefore treatment & follow up of hypothyroidism should include monitoring of Sr. Calcium and Sr. Vit D. Screening for Vit D & calcium levels is recommended for all hypothyroidism cases.

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