A STUDY ON ESTIMATION OF SERUM CALCIUM IN SUBCLINICAL HYPOTHYROID FEMALES OF DIFFERENT AGE GROUPS AND ITS CORRELATION WITH THYROID STIMULATING HORMONE (TSH)

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ABSTRACT

BACKGROUND

Hypothyroidism is a clinical condition arising because of the inadequacy of thyroid hormones or from inability to perform a normal function. Hypothyroidism is a typical metabolic condition in almost all community groups. In India, 42 million individuals are experiencing thyroid disease; hypothyroidism being the commonest thyroid disorder.(1) Serum calcium levels are lower in patients with high TSH than with typical TSH ($p < 0.01$).(2)

METHODOLOGY

There were 50 females with SCH were selected in the study. Patients with 18 to 65 years of age, with TSH levels more than 5.0 mIU/L, free T4 within normal limits, and general well-being patients were incorporated. The study period was from January to April 2016. Owaisi Hospital and Research Centre, it is a 1000 bedded hospital with super specialty services in Hyderabad, giving particularly tertiary level human services to all strata of individuals.

RESULTS

Out of 50 patients, 24 patients with hypothyroidism are in hypocalcaemia, which constitute 48% (n=24) of the people required in the study had estimation of serum calcium under 9 mg/dL. This shows to be the one of the important concern associated with hypothyroidism. In rest 52% (n=26) of patients who were having normal calcium levels, chances of developing hypocalcaemia in future is high.

DISCUSSION

The mean age, serum calcium and thyroid stimulating hormone (TSH) in AlaEldin S. Ashmaik et al was: Age: 32.00±15.76, TSH: 26.02±34.74, and serum calcium: 7.97±.62 while in our study it shows a mean age of 39.9 ±13.82, TSH: 10.47 ±3.46, and serum calcium: 9.04 ±1.47. The mean age in our study was higher than the study by AlaEldin done in Sudan population, the mean TSH was found to be much lower while the serum calcium levels show elevated levels in our study in contrast to study by AlaEldin S. Ashmaik et al.

CONCLUSION

This study presumed that in Telangana state, patients have low levels of serum calcium in hypothyroidism. S.Ca++ in hypothyroid people demonstrates a constructive connection between the S.Ca++ and serum TSH. These fluctuations of serum calcium ought to be considered in treating the patients with hypothyroidism by therapeutic experts.

KEYWORDS

Hypothyroid, Serum Calcium, TSH.

HOW TO CITE THIS ARTICLE: Khan MK, Mohiuddin MN, Owaisi N. A study on estimation of serum calcium in subclinical hypothyroid females of different age groups and its correlation with thyroid stimulating hormone (TSH). J. Evid. Based Med. Healthc. 2016; 3(71), 3836-3839. DOI: 10.18410/jebmh/2016/820

INTRODUCTION: Hypothyroidism is a clinical condition arising because of the inability of the thyroid gland to produce thyroid hormones. Hypothyroidism is a typical metabolic condition in all community groups.

Financial or Other, Competing Interest: None.
Submission 14-07-2016, Peer Review 25-07-2016,
Acceptance 28-07-2016, Published 03-09-2016.
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DOI: 10.18410/jebmh/2016/820

In India, 42 million individuals are experiencing thyroid disease; hypothyroidism being the commonest thyroid disorder. Serum calcium levels were altogether lower in patients with high TSH than with normal TSH ($p<0.01$). The mean yearly occurrence rate of hypothyroidism is up to 4 for every 1000 ladies, 1 for each 1000 men, 1 in 4000 in new conceived. The predominance of hypothyroidism increase with age. Inadequacy of thyroid hormone in early stages of life prompts lead to delay in the bone and mineral metabolism and rigid appearance of epiphyseal surfaces, this outcome is possible in dwarfism. In hypothyroidism, the calcitonin extraction from the gland

can advance the tubular retention of phosphate, furthermore supporting the tubular discharge of calcium from kidneys.[3]

Subclinical hypothyroidism is a disorder instead of a disease and it effects the individual with temperature fluctuation of the body, chills or increase in the temperature of body, and changes in the skin and hair composition.[4] Hypothyroidism is a standout amongst the most well-known types of thyroid dysfunction coming about because of the insufficiency of thyroid hormones or from their debilitated action. Thyroid sicknesses have boundless systemic indications including their consequences for bone and mineral metabolism.[5] Thyroid hormones impacts on osteoblasts by means of atomic receptors to look for osteoplastic bone reabsorption. Thyroid hormones most likely empower bone reabsorption od calcium, in this manner increasing serum calcium and phosphorous levels, furthermore maintains serum parathyroid hormone and 1,25-dihydroxy vitamin D3 concentrations.[5] makes changes in bone and mineral metabolism. Past studies done on serum calcium and phosphorous levels in thyroid issue had conflicting results. Some studies have reported ordinary levels, while others have reported diminished serum calcium and phosphorous levels in hypothyroidism. A study by Mukesh G Gohel et al showed a noteworthy low level of serum calcium in cases than controls.

Lack of vitamin D has been distinguished as a high risk component for various immune system sicknesses including type 1 diabetes and multiple sclerosis. Low levels of vitamin D are identified with the early phases of immune system with thyroid disease.[6] Very few studies in the past have given an account of a putative relationship between thyroid autoimmunity and vitamin D, and these have created uncertain results.[6] Disorders of thyroid organ are among the most substantial endocrine issue in India. Thyroid diseases have far reaching systemic appearances including their consequences for bone and mineral metabolism. Mineral metabolism (Calcium and phosphorous) is, as often as possible, disturbed in hyperthyroidism.[7] The mean serum calcium levels were altogether lower in Hypothyroid patients.[7]

It is essential to check the levels of minerals in all thyroid issues. Treatment for low mineral density should be given by supplementation of minerals if needed to reduce further bone complications. The plasma contains calcium that presents in three physiosynthetic states. Ionised calcium, which is additionally termed as free calcium constitutes around half, which is 40% bound to the plasma proteins, and the rest 10% is attached with little anions. All plasma or serum calcium is ionised, paying low response to its relationship with proteins or little anions; henceforth, the term ionised calcium is not right. Since the free or ionised calcium is organically dynamic and firmly controlled, it is the best marker for calcium status.[8] An impeded assembly of calcium into the bone can bring about a low turnover in hypothyroidism, and this can regularly prompt in lowering the blood calcium levels in the body.[8]

Disorder of thyroid organ supports variable of creating post-thyroidectomy hypocalcaemia. Malignancy, Hashimoto's thyroiditis, and Graves' disease are high risk diseases which may cause post-thyroidectomy hypocalcaemia.[9] A study by MS Islam recommends that serum calcium level diminishes after thyroidectomy. Study done in India in 2011 by B. Suneel et al reported that in hypothyroid patients, the serum levels of calcium were essentially diminished ($p<0.001$). Most basic reason for hypothyroidism is immune system thyroiditis. Estimation of plasma TSH focus is an essential test for biochemical assessment of hypothyroidism. Ordinary level of TSH is 0.3-3.5 mIU/L and >10 mIU/L is seen in hypothyroidism. Both vitamin D and thyroid hormone tie to receptors which are comparable in structure.[10] The mean serum calcium and salivary calcium in hypothyroid patients and in controls were practically same with a mean contrast of 0.3 which was measurably not important ($p=0.4$). Serum levels in hypothyroid patients creating salivation might be utilised as an adjuvant analytic tool.[11]

Hypothyroidism ought to be treated with levothyroxine, which is accessible as 25, 50 and 100 µg tablets. It begins gradually and 50 µg every day ought to be given for 3 weeks, increasing from there on to 100 µg/day for a further 3 weeks, lastly to 150 µg/day. After starting treatment for hypothyroidism, Serum TSH fall gradually as serum T4 fixation rises. The right dose of thyroxin is what re-establishes the serum TSH to normal.[12]

Methodology: 50 ladies with SCH were selected in the study. Patients between 18 to 65 years of age, with TSH levels more than 5.0 mIU/L, free T4 with in normal limits, and general well-being patients were considered. The study was conducted from January to April 2016, in Owaisi Hospital and research centre, it is a 1000-bedded hospital with super specialities services in Hyderabad, giving particularly tertiary level human services to all strata of peoples. Patients going to the outpatient Department of General Medicine in Owaisi Hospital and Research centre were chosen for the present study. The patients chosen had a background marked by hypothyroidism for over a year and were on oral levothyroxine. A sum of 50 members was selected in the study. Blood tests were gathered from 50 chosen hypothyroid patients on the premise of a background marked by a hypothyroidism, and joint agonies; of these patients, all were females. Points of interest of the patients like history of hypothyroidism and other diagnostic parameters were recorded in the predesigned and pretested proforma which comprises (TSH) thyroid stimulating hormone and serum calcium level boxes. Each of these parameters examined, recorded and arranged. At last, a comparison was made between the age of patients with the TSH and serum calcium; later the outcomes were computed and recorded in Mean ±standard deviation.

Inclusion criteria:

1. Patients with conventional thyroid ultrasound examination.
2. Patients with calcium deficiency risk.
3. Patients with normal history for clear blood incident and normal finding in upper gastrointestinal endoscopy and normal pelvic ultrasound for females.

Exclusion Criteria:

1. Patients who have hypothyroidism below 18 years or more than 65 years of age.
2. Patients coming to emergency division with cardiovascular emergencies were rejected.
3. Patients with any history cardiovascular catheter Surgeries.

STATISTICAL ANALYSIS: Using Microsoft word, Microsoft excel and Epi Info 7, statistical analysis was done.

Ethical Approval: Approval from institutional review board was obtained before the study was initiated.

AIMS AND OBJECTIVES: This study is aimed to focus on the level of serum calcium deficiency in hypothyroid patients and to evaluate the etiologic proof of decreased calcium levels in patients with hypothyroidism.

RESULTS: Out of 50 patients, 24 patients with hypothyroidism had hypocalcaemia, which constitute 48% (n=24) of the study had estimation of serum calcium under 9 mg/dL. This shows to be the one the customary concern associated with hypothyroidism. In rest 52% (n=26) patients who were having typical calcium levels, chances of developing hypocalcaemia in future is high. In present study, in 25 cases within age 41-65 years, there were right around 8 patients having low calcium levels that is under 9-10.5 mg/dL, which constitute to 32% cases in this age group. Consequently, patients with older age may have slower effects towards a levothyroxine hormone and thus the low risk of hypocalcaemia. 25 members during a time period 20-40 years old have high TSH i.e. more than 10 U/mL in 10 subjects bringing about 40% which demonstrates that the patients under the age of 40 years have high TSH values in contrast to that of older age group. Among both groups, the 20-40 years age group is more prone to hypocalcaemia with a mean of 8.94±0.75 when compared to the mean of older age group 9.14±0.75.

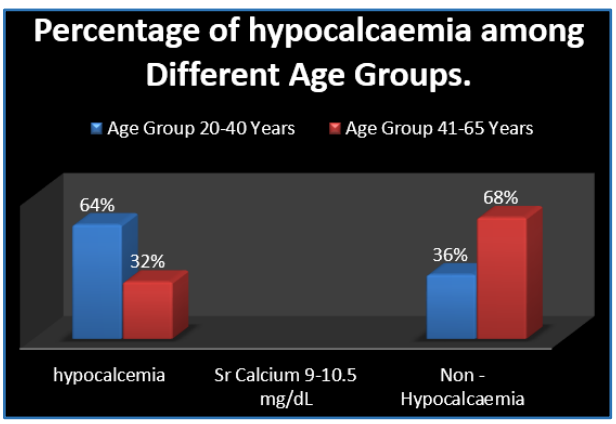
Category	Overall Patients Mean ±Standard Deviation
Age (Years)	39.9±13.82
Normal: S. Calcium 9 -10.5 mg/dL	9.04±1.47
Normal: TSH 0.3 - 5.0 U/mL	10.47±3.46

Table 1: Mean For Overall Patients

The above Table demonstrates that in the present study mean age for hypothyroid patients was 39.9±13.82 years and mean serum calcium levels are 9.04±1.47 which is lower than the ordinary reach (9-10.5 mg/dL). While the thyroid invigorating component has the mean±standard Deviation 10.47±3.46 which is much higher than the normal reach 0.3-5.0 U/mL as noticed in table.

	Age Group 20-40 Years	Age Group 41-65 Years
Hypocalcaemia - S. Calcium 9-10.5 mg/dL	64%	32%
Non-Hypocalcaemia	36%	68%

Table 2: Percentage of Hypocalcaemia among Different Age Groups



32% of the patients of 41 to 65 years age group have hypocalcaemia while the patients with age lower than 41 years had 64% risk of hypocalcaemia as noticed in Table 2.

Category	Age Group 20-40 Years Mean±Standard Deviation	Age Group 41-65 Years Mean±Standard Deviation
Age (Years)	29.32±7.04	50.48±6.93
Normal: S. Calcium 9-10.5 mg/dL	8.94±0.75	9.14±0.75
Normal: TSH 0.3 -5.0 U/mL	10.20±2.36	10.73±3.82

Table 3: Mean TSH and HB Values with Different Age Groups

The mean age of the patients between 20-40 years is 29.32±7.04 while for patients 41-65 years is 50.48±6.93. Among this age group, the hypocalcaemia levels are more in young patients i.e. 8.94±0.75**,** while in the older age group, it is 9.14±0.75 which was higher than the young age patients. The TSH in the age group of 20-40 years was 10.20±2.36 while in the age group of 41-65 years it was 10.73±3.82 as shown in the Table 3.

DISCUSSION: Low calcium level is a progressive finding in hypothyroidism and reveals the clinical picture of hypothyroidism that impacts various organs, yet changes in the bone mineral thickness have been evaluated in numerous studies which includes phosphorus as well. The

present study patients with hypothyroid have an incredible risk of serum calcium insufficiency. The study done in female patients of Telangana state with SCH shows large amounts of TSH in older age group patients with hypothyroidism. A study done by Mukesh G Gohel et al showed a mean age of 46.7±7.3, while the current study revealed the mean age of the patients with hypothyroidism along with low serum calcium levels as 39.9±13.82, which is on the lower side when compared to the study done by Mukesh G Gohel et al. While the serum calcium levels in our study is 9.04±1.47, in Mukesh G Gohel et al study it was found to be 8.21±0.66, which was lower than the present study. The thyroid stimulating hormone in our study was found to be 10.47±3.46, while Mukesh G Gohel et al study revealed the range of 13.87±9.78, which was much higher than our study. A study done by Shivaleela MB et al shows a TSH levels of 7.73±0.09 which was much lower than our study and the serum calcium levels of Shivaleela MB et al study was almost equal to our study, i.e. 9.14±0.5 in Shivaleela MB et al, 9.04±1.47 in our study.Calcium levels in hypothyroidism are generally ordinary, yet calcium might be somewhat on the lower side. Calcium equalisation is likewise variable and any adjustments in the serum calcium levels results in improving mineral density of bone. The change in calcium and its rate of turnover were lowered; any changes that reflect low bone development and reabsorption is considered as high risk for bone developments and patients may develop osteoporosis. In our study, mean estimation of serum calcium was essentially lower. Hypocalcaemia may bring about neuromuscular disorders including aesthesia, chills or tetany. The serum calcium levels are essentially adjusted in thyroid issue, so it is imperative to check the levels of these minerals in all thyroid issues. In our study, there was a critical relationship amongst S. Ca++ and serum TSH in hypothyroid patients. This was further affirmed by the study done by AlaEldin S. Ashmaik et al. The mean age, serum calcium and thyroid stimulating hormone (TSH) in AlaEldin S. Ashmaik et al was Age: 32.00±15.76, TSH: 26.02±34.74, and serum calcium: 7.97±.62 while our study shows a mean age of 39.9±13.82, TSH: 10.47±3.46, and serum calcium: 9.04±1.47. The mean age in our study is higher than the study by AlaEldin done in Sudan population, the mean TSH was found to be much lower while the serum calcium levels show elevated levels in our study in contrast to study by AlaEldin S. Ashmaik et al.

CONCLUSION: This study presumed that in Telangana state, patients have low levels of serum calcium in hypothyroidism. S.Ca++ in hypothyroid people demonstrates a constructive connection between the S.Ca++ and serum TSH. These fluctuations of serum calcium ought to be considered in treating the patients with hypothyroidism by therapeutic experts.

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