

Study of Clinical Profile of Hypothyroidism with Emphasis on Vitamin B12 Levels

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ABSTRACT: Hypothyroidism, also known as underactive thyroid disease, is a condition in which the thyroid gland does not produce sufficient levels of the thyroid hormones, Triiodothyronine (T3) and Thyroxine (T4). The body's metabolism is affected by thyroid hormone. Hypothyroid patients despite being on adequate replacement doses of thyroxine often present with symptoms of weakness, numbness, paresthesia, and poor memory. Vitamin B12 deficiency could be the reason for these symptoms, so patients with hypothyroidism have vitamin B12 deficiency also, hence undertook to evaluate vitamin B12 levels in patients with hypothyroidism.

Hypothyroidism gets worse by the deficiency of vitamin B12. The real problem is that sometime it is difficult to diagnose as both deficiencies can go unnoticed. There are many other causes which may cause vitamin B12 deficiency: - altered intestinal absorption due to sluggish bowel motility, bacterial overgrowth and bowel wall edema.

Keywords: hypothyroidism, subclinical hypothyroidism, vitamin B12

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I. Introduction

Indian population has thyroid disorder in common and there is a high prevalence of subclinical hypothyroidism[1]. Subclinical hypothyroidism is a form of mild disorder which is characterized by elevated serum thyroid stimulating hormone (TSH) and normal free thyroxine level[2,3]. Subclinical hypothyroidism is more common in females and increases with age. Hypothyroidism is an endocrine system disorder in which the thyroid hormone is not produced in enough quantity by thyroid gland. Weight gain, poor ability to tolerate cold, feeling of tiredness, depression and constipation are some of the common symptoms caused by hypothyroidism along with the occasional swelling of the front part of the neck due to goiter. If hypothyroidism remains untreated it may cause many problems like obstetric and gynecological problems, delayed development and growth including intellectual development of the baby and it may also lead to cretinism.[4]

It is relatively easy to diagnose thyroid disease because the symptoms are quite visible most of the time and also because of visible swelling of thyroid that is the reason why thyroid disease is different from other disease, because of this management of thyroid is easily possible is the possibility of early diagnosis and subsequently the management of thyroid disease which is mostly available.[5]

Vitamin B-12 is a water-soluble vitamin, like all other B-vitamins. It occurs naturally in meat products and can only be industrially produced through bacterial fermentation synthesis. There are four forms of vitamin B-12 Cyanocobalamin, Hydroxycobalamin, Methylcobalamin, Adenosylcobalamin. Before the body utilizes the cyanocobalamin which is a synthetic form, the most popular form of vitamin B-12, it has to be converted to the two natural forms, adenosylcobalamin and methylcobalamin. The daily B-12 requirements by the body are fairly low but a very crucial role is played by vitamin B-12 in cellular and metabolic process. Vitamin B-12 deficiency may be caused by a sluggish thyroid, or hypothyroidism and this vitamin B-12 deficiency in turn can further exacerbate the slow thyroid or affect the energy level negatively. Vitamin B12 deficiency could be the reason for these symptoms, so patients with hypothyroidism have vitamin B12 deficiency also, hence we undertook to evaluate vitamin B12 levels in patients with hypothyroidism.[6]

II. Aims And Objectives

- To assess clinical profile of patient with hypothyroidism.
 - To assess vitamin B-12 deficiency prevalence and clinical features in hypothyroid patients.
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- To evaluate the clinical response in symptoms to B12 replacement therapy

STUDY DESIGN – PROSPECTIVE OBSERVATIONAL STUDY

Source of Data- The study was conducted in our hospital. Total 75 patients with hypothyroidism were selected for the study. They were selected by convenient sampling based on the inclusion/exclusion criteria.

All patient’s demographic history, chief complaints, history of comorbidities, treatment history and general examination findings were recorded. The parameters were estimated in the fasting samples of patients in the clinical laboratory for estimation of thyroid profile. Samples were collected for study purpose after informed consent from the patients.

INCLUSION CRITERIA:-

Patients who were diagnosed with Hypothyroidism and Subclinical hypothyroidism were selected as the cases.

EXCLUSION CRITERIA:-

1. Patients on drugs known to interfere with vitamin B12 absorption such as phenytoin, dihydrofolate reductase inhibitors etc.
2. Subjects with history suggestive of malabsorption syndromes, previous gastrectomy were also excluded from the study.
3. Subjects older than 65 years and younger than 18 years were excluded as elderly subjects are known to have B-12 deficiency.
4. Critically ill patients.
5. Those who have already received blood transfusions within last 1 month prior to presentation. Those already on vitamin B12 supplementations.

III. Methodology

Following parameter was evaluated: – Body Mass Index

Following Investigations were performed for the study outcome

- CBC with RBC indices
- VITAMIN B-12
- FBS (Fasting blood sugar)
- T3, T4, TSH
- LIPID PROFILE

IV. Results

SEX WISE DISTRIBUTION:-

Out of total 75 patients 40% were male and 60% were female

Table 1: Shows total count of symptom’s the patients presented with and who were diagnosed with hypothyroidism.

Symptoms	Count	Column N%
GENERALISED WEAKNESS, BODY ACHE, EASY FATIGUABILITY	49	65.33
HEADACHE	28	37.33
WEIGHT GAIN, INCREASED WEIGHT	25	33.33
DECREASE APPETITE, LOSS OF APPETITE	15	20.00
HAIR LOSS	13	17.33
TINGLING NUMBNESS, TREMORS	10	13.33
IRREGULAR MENSES	10	13.33
JOINT PAIN	1	1.33
CONSTIPATION	1	1.33
INCREASE SLEEP DURATION	1	1.33

Table 2: MOST COMMON SYMPTOMS IN HYPOTHYROID PATIENTS WITH VITAMIN B12 DEFICIENCY

	Count
Tingling Numbness	9
Generalized Weakness, Body ache, Easy Fatigability	21
Total	30

OTHER COMORBIDITIES: - Out of total 75 patients 8% had hypertension, 5.3% had diabetes, 2.7% had hypertension with diabetes and 84% had no comorbidities.

BMI: - Out of total 75 patients 4% were underweight, 33.3% were normal and 62.7% were overweight

FBS:- Out of 75 patients 2.7% had blood sugar less than 74, 89.3% had blood sugar between 74 to 100, 8% had blood sugar more than 100

T3:- Out of 75 patients 0% had T3 less than 0.8, 100% had T3 between 0.8 to 2.0 and 0% had T3 more than 2.0

T4:- Out of 75 patients 0% had T4 less than 5.1, 98.7% had T4 between 5.1 to 14.1 and 1.3% had T4 more than 14.1

TSH: - Out of 75 patients 0% had TSH less than 0.27, 0% had TSH between 0.27 to 4.2 and 100% had TSH more than 4.2

LIPID PROFILE: - Out of 75 patients 100% had less than 200 total cholesterol, 0% had total cholesterol 200 and more

- 90.7% had triglycerides less than 150, 9.3% had triglycerides more than 150
- 70.7% had HDL less than 40, 18.7% had HDL between 40 to 60, 10.7% had HDL more than 60
- 100% had LDL less than 100, 0% had LDL 100 and more
- 0% had VLDL less than 7, 100% had VLDL between 7 to 35, 0% had VLDL more than 35

Table 3: TABLE SHOWING LEVEL OF VIT B12

Level of Vitamin B12	Count (n=75)	Percentage (100%)
Less than 211	45	60.0%
211 to 911	30	40.0%
More than 911	0	0.0%

Table 4: CLINICAL SYMPTOMS IMPROVED AFTER GIVING VITAMIN B-12 INJECTION FOR 22 PATIENTS:-

Number of patients Symptoms seen	BEFORE GIVING TREATMENT	AFTER TREATMENT	IMPROVEMENT SEEN IN (%)
TINGLING NUMBNESS	9	2	7(77.77)
GENERALISED WEAKNESS, BODY ACHE, EASY FATIGABILTY	21	6	15(71.14)
TOTAL	30	8	22(73.33)

V. Discussion

Indian population has high level of thyroid disorders which is very common and also subclinical hypothyroidism prevalence is high. An under functioning thyroid gland causes subclinical hypothyroidism and it is presented with varied symptoms. There are many common symptoms but they have limited value when it comes to the diagnosis and there are few symptoms like loss of memory, weakness and insomnia which are usually attributed to old age. Rajge H., Thakkar M. (2018) concluded from their study that there is a positive association of metabolic syndrome in patients with Thyroid disorder more with hypothyroidism as compared to hyperthyroidism.[7]

The present study assessed the prevalence of vitamin B-12 deficiency in hypothyroid patients and found 45 out of total 75 i.e. (60%) patients to have low B-12 levels. Of which 30 were treated with vitamin B12 supplements i.e. Cyanocobalamin (1500 mcg twice a week for five weeks and follow up after six weeks) and the results showed that there was an improvement in the symptoms in 22 patients i.e. 73% patients showed improvement.

Jabeen et. al. (2016) also concluded from the results of their study that there is a high(45%) prevalence of B12 deficiency in hypothyroid patients and if the patients are treated with B12 replacement therapy, it leads to improvement in symptoms.[8]Khubchandani A. (2015) conducted a study to assess the prevalence of vitamin B12 deficiency in hypothyroid patients. The study concluded that in hypothyroid patients there is a high (approx. 64%) prevalence of B12 deficiency. Study further concluded that it is important to screen all the hypothyroid patients for vitamin B12 levels and also the symptoms can improve with vitamin B12 supplements.[9]

Study conducted by Caplan R.H. et. al. showed results against our study which concluded that there was no change found in the levels of serum folate and vitamin B12 because of thyroid function abnormalities.[10]

VI. Conclusions

Thyroid disorders are very common in young and middle aged females. Hypothyroidism is a treatable cause of weight gain, pericardial effusion, infertility, menstrual irregularities, and dyslipidemias. The prevalence of hypothyroidism in India is 11%, compared with only 2% in the UK and 4.6% in the USA. Clinicians should

keep hypothyroidism in mind as a differential diagnosis because the patients quite often present symptoms suggesting hypothyroidism which clinicians sometime miss out in daily practice. Hypothyroidism may cause vitamin B-12 deficiency, and due to this the patient's condition may worsen because it can further exacerbate the slow thyroid or energy levels may be affected negatively. The patients with hypothyroidism possess high prevalence of vitamin B12 deficiency and it is observed that there is an improvement in the symptoms with vitamin B12 supplements.

All the patients whom we suspect subclinical hypothyroidism should be screened for vitamin B12 levels.

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